An evaluation of village funds spending to promote sustainable communities: The case Cihideung Village, West Java

Z S Iskandar and A F Aritenang

1Urban and Regional Planning Department, Bandung Institute of Technology, Jl. B, Lb. Siliwangi, Kecamatan Coblong, Kota Bandung, Jawa Barat, Indonesia

Corresponding author’s email: zaharasittaiskandar@gmail.com

Abstract. The Indonesian government initiated the Village Funds since 2015. This study looks at the Cihideung village classified under ‘Desa Maju’ based on the Indonesian village typology. The Building Villages Index of Cihideung Village is 0.733, which shows that it has high economic, social, and ecological resilience. Thus, the development impact from the government’s Village Funds program the village is expected to be large. This paper provides a frontier study on the evaluation of the Village Fund's effectiveness on rural development. In the first two years of Village Fund implementation, the law directs that Village Funds should be prioritized for village development programs and empowering rural communities with the aim to improve the village economy. In the case of Cihideung Village, most of the funds are deployed for road construction. Considering the recent implementation of the law, this study conducted statistics path analysis to evaluate the immediate impact of Village Funds spending on accelerating the village economy. This paper shows that Village Funds has accelerated the economy through harnessing local economic potential, i.e., providing an increase in income and of employment as well as reduced transportation costs. Study found that Village Funds have a positive impact on rural and community development.

1. Introduction
Law Number 6/2014 on Villages stipulates that the village government have the authority to deal with development aspects [1]. The enactment of this law was followed by the implementation of Government Regulation 60/2014 on Village Funds to realize the three pillars of the desa membangun Indonesia program (village-driven development of Indonesia) [2]. Based on Regulation of the Minister of Villages, Development of Disadvantaged Regions, and Transmigration No. 21 of 2015 concerning Determination of Priorities for the Use of Village Funds in 2016, the use of Village Funds is prioritized based on the principles of justice, priority needs, and village typology [3]. This ministry has also determined the village typology based on the Village Development Index [4]. Cihideung Village is located in Parongpong Sub-district, West Bandung Regency and has an area of 445.41 ha. The village has received Village Funds since the implementation of the Village Funds policy in 2015. It is one of the 5000 Advanced Villages the ministry prioritizes its development. Cihideung Village is directed to convert local resources into economic value. This is one of the three pillars of the Village-Driven Development program, i.e., villages as economic centers. The usage of Village Funds is one way to achieve this goal.
Cihideung Village has a Village Building Index of 0.733 that shows its high economic, social and ecological resilience [4]. The Village Fund policy should have a greater impact on developing villages as economic centers if these dimensions are high. The high-level social dimension reflects the high quality of human resources in the village, including in managing village finances. As an Advanced Village, Cihideung Village also has high environmental quality (ecological dimension), which means that Cihideung Village has the physical means to support most of the activities of its people. Thus, it is important to examine the impact of the Village Funds policy on achieving the goal of villages as economic centers based on these three dimensions. This is in line with one of the objectives of the ministry, i.e., to stimulate the local economic potential of villages whose development is prioritized.

This paper aims to examine the immediate impact of infrastructure expenditure of Village Funds on job opportunities and economic activities in the village. This paper identifies the realization of Village Funds spending and its impact on accelerating the economy by harnessing the village's local economic potential.

The study conducts a pseudo-evaluation using mixed analysis: a qualitative descriptive analysis with coding and a quantitative analysis comprising path analysis and determining correlations. This paper is expected to provide an overview of Village Funds spending on priority programs. This paper also addresses the success of the Village Funds in achieving the program objectives and the direct benefits of the Village Funds that are felt by the community.

2. Literature framework
The government has issued Law No.6/2014 on Villages. The expected impact from the law is the sustainable development of villages and rural areas [5]. To operationalize the Law, the government issued Government Regulation No. 43 of 2014 concerning the Implementation of Law No. 6 concerning Villages. Each program must be based on a plan that states the objectives and direction of village development. The plan-making should involve deliberation with the community and the allocation of Village Funds must be in accordance with the development plan and priorities for the use of Village Funds. Moreover, the entire community must be involved and projects are to be self-managed by the community [6].

Article 7 of Law No. 6/2014 stipulates that Village Funds aim to improve welfare and the equitable distribution of village development by improving public services in the village, accelerating the village economy, overcoming development disparities between villages and reinforcing village communities [1]. The management of Village Funds must meet several principles, e.g., it must be effective, efficient, transparent, empower the community, in line with gotong-royong (mutual cooperation), and accountable.

2.1. The effects of infrastructure & physical development towards regional economies
The construction of roads and infrastructure can create opportunities for economic growth and poverty reduction [7]. It can reduce the costs for transportation, consumption, and production of goods or services, increase labor supply in various sectors, and increase per capita income. Moreover, according to J'afar in [8], the provision of infrastructure can reduce poverty, improve quality of life, support the growth of economic centers, and increase the mobility of goods and services [8]. Meanwhile, according to Fan and Zhang (2004) in [9], investments in rural infrastructure are key to increasing the income of village communities.

According to Anwar and Tito (1996) in [8], infrastructure, especially road infrastructure, can play a role in increasing employment that in turn will increase employment opportunities and employment absorption. This will raise community income, reduce travel time, expand agricultural commodity markets, induce a shift from barter trade systems to market transactions (traditional markets), and change people's behavior.

Infrastructure might have a two-way impact (directly and indirectly) [10]. A direct impact of infrastructure is the increase of the contribution of economic sectors to the GDP and as an additional input in the production processes of other sectors. Whilst, the indirect impact of infrastructure
facilitates the efficiency of economic activities which leads to increased productivity by reducing transactions and other costs. Moreover, the construction of infrastructure, especially of roads, increases efficiency in terms of movement of goods and services, accelerates investment, and strengthens innovations for economies of scale and the agglomeration of economic activities [11].

Strengthening economic activities, increasing employment opportunities, and raising community income, also promote the formation of sustainable communities. These are places where people want to live and work for now and the future. The sustainability of communities can be determined with 8 key components, one of which is the economy [12]. This component implies that sustainable communities must involve community members in the local economy and diversify it [13]. Infrastructure developments can boost the growth of the local economy and promote sustainable development.

3. Data and methodology
The impact of the use of Village Funds on the village economy is identified for priority programs for the use of the Village Funds in 2016-2017, i.e., road infrastructure construction which uses 40 percent of the total Village Funds in 2016-2017 [14,15]. The investment in road construction using Village Funds is used as a variable to determine the impact of program implementation in accelerating the economy, with the following considerations:

- The questionnaire is based on a sample of the community members who are involved in economic activities related to the local economic potential (farmers) in their daily economic activities. Each sample is obtained from one road segment, which was constructed as part of the Village Funds program in 2016-2017. As such, the funds used in the construction of each road can represent the impact of the road on the economic situation of the surrounding community.
- The amount of investment can illustrate the magnitude of the program (the length or class of the road). Specifically, a higher road class or a longer road should provide greater impacts and benefits. Thus, the investment is directly proportional to the benefits obtained from the provision of road infrastructure.

The analysis consists of a mixed-method with a sequential exploratory approach. This method consists of data collection and qualitative analysis as the first stage of data processing; the results from this are then used to develop instruments for quantitative analysis to answer the research questions [16]. The evaluation in this paper is carried out by identifying the realization of the Village Funds. Moreover, the institutional survey collected various data including sources on village income, village budgets, village government work plans, and other planning documents related to village financial management, village financial cycles, and Village Fund management. Furthermore, the impact of the usage of Village Funds was identified using R-Pearson correlation analysis to uncover relationships or effects between two or more variables [17]. In addition, path analysis is assessed to estimate the magnitude and significance of the hypothesized causal relationships between sets of variables that are displayed using a path diagram [18]. The analysis consists of the following four stages:

(i) Determining the location of the programs to be evaluated. This stage took into account the priority programs for the utilization of the Village Funds at the study location. These programs were based on the realization of the Village Funds and data collection through a questionnaire of community members who work in the agriculture sector, which is the village's local sector of economic potential.

(ii) Testing the validity and reliability of the questionnaire results and transforming data format from ordinal into interval-ratio data. This data transformation uses the successive interval method, which calculates the proportion of each option on a scale and finds the proportional value [19].

(iii) Statistical analysis of the variables using R-Pearson analysis and path analysis. In the R-Pearson analysis, a test with sig two-tailed was used because the direction of the hypothesis was unclear and the purpose of the test was to see if there is a relationship between variables. To categorize the strength of the relationship, the paper follows the following table by Leary (2011)
Moreover, standardized coefficients were used to interpret the independent variable coefficients in path analysis. This was done to eliminate the unit size of the independent variable.

(iv) *Path analysis to explore the impact of Village Fund expenditures on labor creation and economic activities.* The analysis is a form of multiple regression to evaluate the sequential relationship between a series of independent variables on the dependent variable [21]. This method allows us to estimate the magnitude and significance of causal relationships between the variables and visualize it using a path diagram. The path diagram is usually constructed by drawing an input diagram and an output diagram. The input diagram represents the scheme of the sequential relationship between the variables and the output diagram is the input diagram added with the results of the statistical analysis. This paper only presents the latter diagram as the former is embedded in the output diagram.

4. **Analysis**

The paper evaluates the use of the Village Funds in accelerating the economy through local economic potential. To do so, this paper identifies the actualization of Village Funds and the impact of the use of Village Funds on the village economy.

4.1. *Village Funds spending*

Government directives and policies instruct that Village Funds in Cihideung Village should be prioritized for village development programs and empowering rural communities. These programs should aim to improve the village economy. Based on the Village Budget, most of the Village Funds are used for the village development program, e.g., the provision of basic infrastructures such as roads, pipelines, retaining walls, culverts, and water sanitation (95% allocation in 2016, and 81.3% allocation in 2017) [14, 15].

The use of Village Funds in Cihideung Village is entirely in accordance with the general directives for the use of the Village Funds, i.e., for village development and empowerment of rural communities. However, only 40 percent of the programs are explicitly in line with the priority directions of the Ministry of Villages, Development of Disadvantaged Regions, and Transmigration (based on village typology). Notably, the majority of programs are not in line with the priority directions because the village uses funds for issues that are considered more urgent and are directly related to the interests of most of the village community. However, these are not explained in the Ministerial Regulations 21/2015 and 22/2016 concerning Priorities for the Use of Village Funds in 2016 and 2017 [3, 22].

Implementation wise, less than 100 percent of the reported programs were found on the locations listed in the village budget. Field observations showed that 73 percent of the program for 2016 was realized, whilst, 70 percent of the program for 2017 was realized. Thus, the average realization of the priority program for use of Village Fund in 2016-2017 was 71.5%.

4.2. *Exploratory analysis of the impact of village funds usage on accelerating the village economy*

The exploratory analysis is conducted by examining the relationship between investments in road construction and the pre-determined variables using statistical analysis. R-Pearson analysis is used for variables that have a direct relationship, while path analysis is used for variables with no direct relationship. R-Pearson analysis is used to identify the relationship between the road infrastructure construction program and directly related variables, i.e., increased income, investment, and innovation (Table 1). The following hypotheses are used in the correlation analysis:

a. $H_0 = r=0$, there is no relationship between investment in road infrastructure development and the variables of an increase in income/investment/innovation.

b. $H_1 = r$ is not equal to 0, there is a relationship between the investment in road infrastructure development and the variables of an increase in income/investment/innovation.
First, the analysis shows that investments in road construction lead to an increase in income. The amount of Village Funds allocated by the village government for the road construction is positively correlated 0.366 (r = 0.366) to increases in income. The coefficient of determination is 36.6 percent that shows that the variance in costs for road construction can be explained by an increase in income. The two variables have a moderate relationship. The significance of the relationship between the two variables is 0.00 (Sig. (2-tailed) <0.1). Thus, there is a significant correlation between the variables of funds for road construction and increased income.

The analysis shows that the construction of road infrastructure has a direct effect on increasing income. This is in accordance with the mandate given by the Ministry of Villages, Development of Disadvantaged Regions, and Transmigration, which directs the use of Village Funds for advanced village typologies for the growth and expansion of the village economy. In addition, economic development is also related to the general purpose of the Village Funds program, i.e., to improve the welfare of village communities.

Second, there is a lack of evidence that investments in road construction are associated with innovation and investment. The analysis showed a relationship of 0.58 for increased innovation, and 0.84 for increased investment. Both significance values of these variables are larger than the statistical threshold (>0.05), thus the correlation between these variables is not significant. Since the correlation is not significant, the variables of the funds for development, increased investment, and increased innovation cannot be determined using correlation analysis. The non-significant results are thought to be caused by an error in the delivery of the questions when distributing the questionnaire, especially related to the meaning of innovation and investment. Therefore, the information does not represent the actual state of innovation and investment.

Furthermore, more than 30 percent of the respondents stated that the construction of road infrastructure led to increased innovations in producing agricultural products, e.g., applying simple graft techniques to produce roses of various colors on one plant. Moreover, 4.5 percent of respondents stated that road construction leads to novelties in the production process of agricultural products. In addition, 2 percent of respondents stated that infrastructure construction influenced novelties in the agricultural management system. Moreover, 4.5 percent of respondents stated that the road construction program led to the use of improved techniques in various agricultural production processes. The questionnaire showed that the impact of road construction on innovation in agriculture is very small. This is because most constructed roads improve access within the village. As such, it has no significant effect on the exchange of information that could trigger innovation or increase investment.

4.3. Explanatory analysis on the impact of Village Funds usage on accelerating the village economy
This section conducts explanatory analysis using path analysis to examine the impact of Village Funds on improving the village economy. The model is used for indirectly related variables, i.e., preference towards increasing the number of employed workers and employment opportunities through job enlargement in the sector, and the amount of transportation costs through access to raw materials, access to markets, and distribution activities.
4.3.1. The effect of the road infrastructure construction program on the job enlargement in the leading sector of the village. Job enlargement is a sign of economic growth via an increase in the number of employed workers and the increase in employment opportunities. The indirect relationship between road infrastructure construction and economic development in the village can be seen from the increase in the number of employed workers. Path analysis is conducted using the linear regression function to examine the relationship between investments in road infrastructure construction and the dependent variables and assessed the direct and indirect effect. The results show that investment in road infrastructure construction has a direct and indirect effect on economic development. This can be seen from the preferences of farmers in increasing the number of workers and employment opportunities through job creation (Figure 1).

**Figure 1.** The relationship between infrastructure investment and the number of workers and job creation

First, the analysis of the direct effect shows that investments in road infrastructure construction and the number of employed workers are positively related by 0.124 (Variable X towards Z1), where higher investments in road infrastructure construction will lead to an increased number of employed workers. On the other hand, the analysis shows that the construction of road infrastructure has a direct negative effect of -0.225 on the availability of employment opportunities (Variable X towards Z2). This means that higher government investment in the construction of road infrastructure causes lower employment opportunities. This negative effect contradicts the theory that underlies this analysis, where higher investments in the construction of road infrastructure should lead to more employment opportunities. One possible explanation is that government investment in road infrastructure construction facilitates the public to reach the various job locations so that not only the people residing in the direct vicinity can have access to the jobs. This leads to higher competition for jobs and causes reduced employment opportunities.

Second, the indirect effect also reveals that investments in road infrastructure construction have an indirect effect of 0.167 on the number of employed workers and 0.0074 on employment opportunities. This shows that investments in road infrastructure directly affect economic development by leading to more employment opportunities and an increased number of employed workers. Third, the total effect of infrastructure investments on economic development has a total effect of 0.291 on economic development through an increase in the number of employed workers and an effect of 0.151 on increased employment opportunities. Joining both variables suggests that investments in road infrastructure construction have an effect of 0.140 on economic development.

Thus, the government’s Village Fund expenditure on the construction of road infrastructure contributes significantly to local economic development by boosting the numbers of employed workers and increased employment opportunities. The investment also corresponds with sustainable
4.3.2. Identifying the effect of the road infrastructure construction program on the amount of transportation costs. Transportation costs affect economic activities in a region, especially production, distribution, and marketing activities. This can influence the amount of income obtained by the community and can affect the general welfare of society. Path analysis is used to test the direct or indirect relationships between the construction of road infrastructure and transportation costs from the new access to the raw materials, to the market, and the overall distribution of goods and services. The path analysis shows that investments in road infrastructure construction affect economic activities by decreasing transportation costs due to improved access to raw materials, markets, and goods/services (see Figure. 2)

Figure 2. The relationship between infrastructure investment and transportation cost

First, the analysis shows that investments in road infrastructure construction have a direct effect of -0.024. The negative value shows that higher government investment in the construction of road infrastructure results in lower transportation costs for the public in undertaking economic activities. Second, the indirect effect also reveals that investments in road infrastructure construction have an indirect effect of -0.0015 from variable X towards Z through Y1, -0.03 from variable X towards Z through Y2, and 0.0085 from variable X towards Z through Y3.

Investments in road infrastructure construction have a total indirect effect of -0.023 on economic activities as seen from the transportation costs by providing access to raw materials, markets, and the distribution of goods/services. This negative value shows that higher government investment in the construction of road infrastructure results in lower transportation costs due to the ease of distribution of goods and improved access to raw materials. First, government investment in the construction of road infrastructure does not lead to alternative access to market locations because Village Funds are not spent on the construction of new road networks in Cihideung Village. Instead, Village Funds are spent on road improvements and upgrading that may provide better access to market locations.

Second, government investments in the construction of road infrastructure reduce transportation costs and improve the distribution of goods. Road improvement and upgrading of road classes facilitate efficient and effective distribution of goods and services and reduce the frequency of activities due to the greater capacity of vehicles used in the distribution process. Notably, four-wheeled vehicles have replaced two-wheeled vehicles. Third, government investments in the construction of road infrastructure reduce transportation costs that allow greater access to raw materials. Specifically, in Cihideung Village, raw materials such as fertilizers and seeds and are...
widely available along the main village road so upgrading the roads that lead from agricultural locations to the main village road facilitates access for farmers to raw materials.

The total effect of investments in infrastructure construction on economic activities is seen from the transportation costs. Investments in the construction of road infrastructure have a total effect of -0.227 on economic activities as seen from the transportation costs by providing access to raw materials, markets, and the distribution of goods and services. This reveals that the amount of government investment in road construction programs can decrease transportation costs which can boost opportunities to increase economic growth and welfare of the community. Besides that, decreasing transportation costs can boost connectivity among people and provide connectivity to health and other services. That impact corresponds to the efforts of promoting sustainable communities.

5. Conclusion
The analysis found that Village Funds have a positive impact on rural development. First, as only 3% of the Village Funds are spent on empowerment related to Village Government-Owned Enterprises or cooperatives expenditure, the study did not find an effect of the use of Village Funds on the community. On the other hand, the expenditure on village development comprises 97% of the total Village Fund expenditure. Although only 40 percent of the programs are carried out explicitly in accordance with the directions for priority use of the Village Funds, it could be inferred that the program may have improved the village economy by increasing per capita income, job enlargement and reducing transportation costs. The impact of Village Funds expenditure corresponds to promoting sustainable communities by boosting economic activity and involving community members in Cihideung Village in the local economy. Furthermore, the Village Funds drive diversification in the local economy.

The evaluation of the use of Village Funds shows the impact of government intervention through the Village Funds offering economic growth. It is expected that this economic growth can realize economically independent villages with high productivity that can establish mutual economic relations with other regions. This study illustrates the immediate impact of village transformation from rural development to local development. This is in line with the development concept of the Indonesian government for rural areas.

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