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## RESEARCH ARTICLE

# Communities' Physical Contributions for Developing Rural Transport Infrastructure in Dong Nai Province, Vietnam

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### Abstract:

#### Background:

Dong Nai province is located in the southwest of Vietnam. A well-developed Rural Transport Infrastructure (RTI) system is one of the key facilities that enable the development of the province. In fact, the RTI's concrete covering rate in the province is as low as 51.8%. While the current state-funded investment is shorted, a physical contribution from the community is indispensable.

#### Objective:

Therefore, this study is carried out to understand the existing situation, and to suggest solutions that promote the participation of the community in contributing physical assets for developing the RTI.

#### Methods:

Questionnaire surveys are conducted with the participation of 438 households located in four districts of the province.

#### Results:

The results shown that physical contribution is popular in the community, in the forms of labour (99.3% of households), money (85.8%), land (78.0%) and material (64.4%). The study also pointed out the success factors to the active physical contribution from the community, including participated organizations, authorities, contribution mechanisms, households' economics and income, rates of return, education and gender of households' heads, social relationships, household benefits from RTI.

#### Conclusion:

Based on the finding, the study concludes with some solutions of a suitable participatory model and mechanism, of training for community and its representatives, of communicating and mobilizing physical contribution, and of supporting the community's economic development.

**Keywords:** Community, Contribution, Development, Infrastructure, Participation, Public, Transport, Rural.

### Article History

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## 1. INTRODUCTION

The Resolution No. 26/NQ-TW on "Agriculture and Rural Agriculture" (Party Central Committee, 2008) [1] and the Decision No. 800/QĐ-TTg on "Targeted National Program for New Rural Construction in the Period 2010-2020" (TTCP, 2010) [2] are the initial efforts of the government to implement on several pilot locations. However, the overall socio-economic aspect of rural areas is still underdeveloped; the poor quality of rural infrastructure is one of the main reasons. Up to

2020, Vietnam needs about 150-160 billion USD for infrastructure investment, including 53 billion USD for land traffic (Ministry of Transport of Vietnam, 2017) [3]. With the current capacity, the State is only able to fund about 50% of the investment. The rest of the amount is expected to be collected from the contribution of communities. Rural Transportation Infrastructure (RTI) is the central part of the rural infrastructure, including roads, waterways, bridges, and ports which supports agricultural productions, cultural and social exchanges of localities.

Dong Nai province locates in the southwest region of Vietnam. It is adjacent to Binh Thuan Province in the East,

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Lam Dong in the Northeast, Binh Duong and Binh Phuoc in the North, Ba Ria-Vung Tau in the South and Ho Chi Minh City in the West. One of the needed factors for rural development in Dong Nai is the RTI that are in poor quality and serviceability conditions (Fig. 1). At the end of 2018, the province had 8,506 km rural roads; the proportion of hard layers covering (concrete or asphalt) for these roads was about 51.8% (Dong Nai Department of Transportation, 2018) [4]. This is a significant achievement of the province with the involvement of the community with their asset contributions in several ways. However, rural infrastructure development still has many limitations. Therefore, this study aimed to (i) Understand the existing situation of community participation in physical contributions for developing RTI in Dong Nai province; (ii) Identify factors affecting the contribution of participants, and (iii) Propose solutions to promote active participation on substantial contributions for developing RTI in Dong Nai province.

## 2. LITERATURE REVIEWS

Many authors in the world have studied community participation in developing rural traffic infrastructure. The research works from authors, such as Arunagrawal and Clack (1999) [5], Clayton and Pratt (1997) [6], Dinh Pham Hien (2007) [7], Mai Thanh Cuc and Quyen Dinh Ha (2005) [8], Thu Huong (2012) [9], *etc.* provide community-related theories such as the concept, the role in level as well as the participating principles of community.

The studies of community participation in infrastructure development and rural transport (Mekong Economics Ltd, (2005) [10]; Dinh Tuan Hai, (2013) [11] show that Infrastructure in general and rural transport, in particular, are mainly carried out by the government, but community participation is also crucial. Communities can participate in the construction processes and contribute resources to the construction, maintenance of rural transport systems, especially roads, such as public and inter-communal roads, village roads, alleys, and hamlets. Communities can even contribute financial resources, human resources and intellectual resources for rural transport development.

The authors named Tran Tuan Anh (2012) [12], Mekong Economics Ltd (2005) [10], Pham Thi My Dung and Vu Thi Thanh Nhu (2017) [13] who studied the ways of the community's contributions showed that different countries, localities and regions have different ways of contribution depending on the available resources of the community, the requirements of rural transport works, socio-economic conditions, habits of each place, *etc.* In the development of rural transport, the community often contribute money, labour, materials, land, vehicles, tools, *etc.* They show specific evidence in some locations in Vietnam such as Vinh Long, Phu Tho, Hanoi and Dien Bien provinces.

Studies in policies to promote community participation in contributing to rural transport development (Pham Thi My Dung and Vu Thi Thanh Nhu, (2017) [13]; Tran Tuan Anh, (2012) [12]) pointed out that resource mobilization policies are considered specific tools, methods, methods and programs to attract the attention of individuals and organizations. The direct

contribution of the community is minimal compared to other sources, but it acts like leverage for the development of rural transport, especially the inter-village road system. The authors cited some evidence of the policy of promoting community contributions in Undong province (Korea) [14] or Vinh Long, Phu Tho, Hanoi and Dien Bien (Vietnam). With Vietnam, in the program of new rural construction, the state has a policy of mobilizing four financial resources: central, local, foreign and community sources. Although the community resources are minimal, some places account for only 0.6%, but it is advantageous because it is directly linked to the community benefits, so they are very interested in managing, using and protecting.

Overall, the research works had provided some general knowledge. However, the shortcomings here are: They are often based on the assumptive statements, the use of secondary information, the lack of survey information from the community, the evaluation method is mainly qualitative. All of which motivate the author to conduct this study.

## 3. RESEARCH METHODOLOGY

### 3.1. Data Collection

This study mainly used a questionnaire survey with the participation of 438 households representing local communities of the four districts in Dong Nai province: Nhon Trach, Trang Bom and Vinh Cuu and Xuan Loc. The location of these regions is illustrated in Fig. (2), while general information of these surveyed districts is shown in Table 1. The questionnaires were designed to collect general information of households, degrees of participation in physical contributions, reasons of contribution, ability and readiness for future contribution in the year of 2018. Collected data was coded *via* Microsoft Excel and analysed in SPSS program. In-depth interviews have also carried out with some key community members for additional information. Information is presented through boxes to illustrate general statements.

**Table 1. General information of 04 surveyed districts of Dong Nai province.**

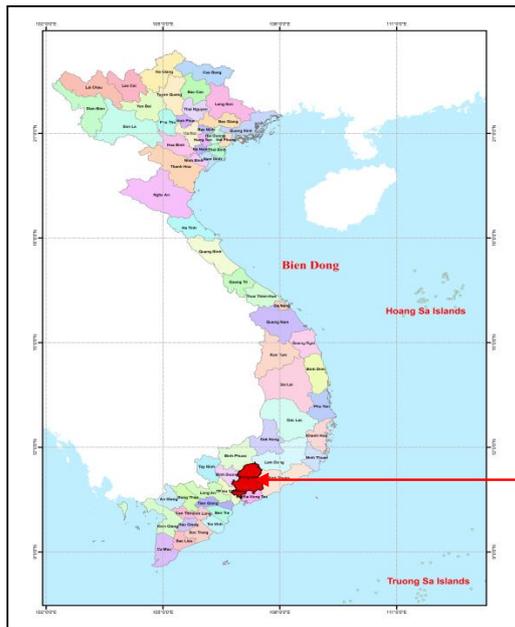
Names of Districts	Area (km <sup>2</sup> )	Population (thousands)	Typical Crops
Nhon Trach	411	401.72	Cassava, sugarcane, paddy, vegetables, flowers and ornamental plants
Trang Bom	328	558.05	
Vinh Cuu	1,096	367.38	
Xuan Loc	726	253.14	

### 3.2. The Evaluation Method

Several methods are used to analyze collected data, such as (1) Descriptive statistical method: analyze and assess communities' participated situations in physical contributions for developing rural infrastructure, (2) Comparative method: use information and data collected to compare critical indicators related to degrees of community participation in physical contributions, and (3) Econometric method: analyze factors affecting community participation on physical contributions. The study uses the Binary Logistic regression model and multivariate nonlinear function (Dinh Phi Ho, 2012) [15] with the following parameters:



Fig. (1). Conditions of transport infrastructure of Dong Nai province.



Dong Nai province locates on southern of Vietnam. Nhon Trach, Trang Bom and Vinh Cuu and Xuan Loc districts are taken on this study due to their agricultural and rural conditions

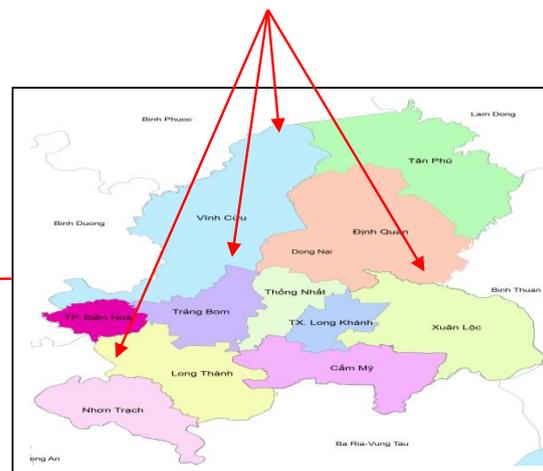


Fig. (2). Maps of Vietnam and Dong Nai province.

$$\ln \left[ \frac{P(Y_j = 1)}{P(Y_j = 0)} \right] = \beta_0 + \sum_{i=1}^n \beta_i X_i$$

In which P(Yj=1) is the probability of community participation, P(Yj=0) is the probability of community not participating, and β (0, i = 1÷n) is the impact level. Meanwhile, Xi is independent variables those X1 is age of household heads, X2 is gender of the household heads, X3 is professional of household heads, X4 is education of household heads, X5 is number of central employees in the household, X6 is household economy, X7 is someone in the household is an officer, X8 is average income per person, X9 is rate of income from agriculture, and X10 is living hood.

4. RESEARCH RESULTS

4.1. Community Participation in Physical Contributions

Community contribution in terms of cash for developing rural infrastructure is increasing. For commune roads only, local communities contributed more than VND 38.7 billion in the period of 2013-2018, VND 97.64 billion for 2016, VND

89.93 billion for 2017 (Dong Nai Department of Transport, 2018) [4]. In terms of labour and material contributions, most of the rural infrastructure development projects at commune levels involve community participation. Contributions are voluntary, exchanging, negotiating or binding, and the contribution of land is common with the expansion of transport infrastructure in general and rural transport in particular. Households can voluntarily exchange (compensate), so there are common complaints, grievances, disputes and negatives that are slow in the whole province. According to survey results, 98.4% of 438 community households in the study have contributed. Especially some localities had 100% contributions. Detailed surveys of community participation in substantial contributions (cash, labour, materials, land, etc.) for developing rural infrastructure are shown in Table 2.

Cash contribution: Trang Bom is the highest with 154 households (97.5%) and contributes 353.5 million VND. The lowest is Vinh Cuu with 38 households (60.3%) and contributes 67.8 million VND. Most communities are actively involved with some localities have the right economic conditions and organizations participating higher.

- Labour contribution: It is the type of contribution for the highest rate with simple thinking “if not abling cash contributions, then contribute by labour instead”. It is important to note that community participation should take into account the conditions of community participation so that the promotion of participation is most appropriate.

- Material contribution: It depends on local conditions, communities contribute differently. Nhon Trach mainly contributes by land, stone pavements, cement, and palm trees; Xuan Loc contributes by sand and stone pavements; Trang Bom contributes stone, soil, and broken bricks; Vinh Cuu contributes mainly by broken bricks and stone pavements. The rate of material contributions is lower than other participation forms because of their living conditions are different and with the opinion as “there is nothing to contribute”.

- Land contribution: 310 households (accounting for 70.8% surveyed households) contributed 2,953.8 m<sup>2</sup> of land. The highest is the Nhon Trach, and the lowest is the Vinh Cuu. The land contribution is quite good and depends on the demand for rural infrastructure development and propaganda. Although there are complaints about land compensation policies, encouraging people to contribute land for constructing and expanding rural roads is very useful.

**Table 2. Participating on community's physical contributions for developing rural transport infrastructure in Dong Nai province**

No.	Physical Contributions	Unit	Amount
1	Households surveyed	No.	438
2	Households contributing cash	No.	376 (about 85,8%)
	Lowest contribution level	Million VND	0,1
	Highest contribution level	Million VND	10,3
	Total cash contributed	Million VND	930,0
3	Households contributing labor	No.	435 (about 99,3%)
	Lowest level	Day	1,0
	Highest level	Day	20,0
	Total employees contribute	Day	3.864,0
4	Households contributing materials	No.	282 (about 64,4%)
	Lowest level	Million VND	0,1
	Highest level	Million VND	13,5
	Total materials contributed	Million VND	673,0
5	Households contributing land	No.	310 (about 78,0%)
	Lowest level	m <sup>2</sup>	1,0
	Highest level	m <sup>2</sup>	33,0
	Total land contributed	m <sup>2</sup>	2.953,8

(Source: 2018 survey data)

## 4.2. Factors Affecting Community Participation

### 4.2.1. Impacts of the Organization Involved in Physical Contributions

Each community has its characteristics and components while demands for developing rural infrastructure are different.

Therefore, the organization has a significant impact on substantial contributions. Participated organizations include propaganda, advocacy, determining levels of participation, types of physical contributions, traffic structures required.

### Box 1. Labour contribution.

“When contributing by labor and cash, the people often want to prioritize the alley and inter-village roads because it is practical to them. Therefore, in this case, there is labor surplus, while for other types of roads there is a shortage of people to work. So the community often encourage, sometimes transfer people between the workplace flexibly.”

As for changing the form of contribution instead of contributing cash, it is quite common because some households have limited economic resources ... so we would sympathise.... For example, Ms. Doan's house, belonging to the poor household of the commune, ...

\* Source: Interview with Mr. Do Xuan Dai Hamlet 2, An Vien Commune, Trang Bom, ĐNai, May 17, 2018

### 4.2.2. Influences of Government Leaders on Community Contributions

The government is not only orienting, creating the environment and policies for community participation but also assures trust for the community. There are cases of community works, but if there is no government support, it cannot be solved.

### Box 2. The government encourages and creates trust for community participation.

“Most people who contribute to rural construction infrastructure are because of their beliefs. When they believe the results they give, they will do it voluntarily.”

Many projects are calling for land contributions to make roads all the time, but it is so complicated that the locality has recommended one district leader to meet the village's seniors and ask for opinions about making the roads for the locals. Then, the seniors suggested that they will ask the households in the area that need land contribution to clear the road and the result is splendid because the contributors were promised a radio broadcast each evening with an announcement to inform households donating land voluntarily, ...”.

\* Source: Interview with Mr. Hau, 42 years old, Head of Ban Tam Nong, Bien Hoa City, ĐNai, September 6, 2018

### 4.2.3. Effects of Mechanism and Management on Physical Contributions

In practical, due to many complicated procedures, many projects require long periods for settling capital (Nguyen Xuan Quyet, 2011) [16] which affects the community participation. There are cases where people register for substantial contributions but have to wait for too long. Some households register for cash contributions but have to wait for a long time due to formal procedures. Many localities opened recorded books to monitor community participation as a basis for paper certification, causing depressive psychology, coping and losing confidence in activities to call for participation.

### 4.2.4. Influences of Internal Factors on Community Contributions

Factors affecting participation in cash contribution are

shown in Table 3 in which  $P(Y_j = 1)$  is the probability of the community contributing money and  $P(Y_j = 0)$  is the probability of community not contributing money. The regression test is based on the significance level (Sig.) of the Wald test shows:

- From X1, to X5 and X7, there are Sig. equally > 0.05, the correlation variables are not significant for variable Y1, 95% reliability.
- The X6 variable has Sig. <0.1, correlation variables are significant for variable Y1, 90% reliability.
- The variables X8 and X9 have Sig <0.01, the correlation variables are significant for the variable Y1, 99% reliability.

**Box 3. What to do with the participation procedure**

<p>“The government’s legal procedures are still heavily leaning towards administrative matters, not only for the organization and management of rural infrastructure development but also for participation as well. For example, the election of a Community Representative for a project under the government's guidelines must be carried out 2-3 times before it is completed, then it takes a month to wait for the approval. The meeting of community organizations also needs government opinion, avoid being regarded as the risk of crowding and insecurity.</p>
<p>The community participation is quite inflexible in my opinion because once registered the form of participation, the person must have it done, is not allowed to change while participation conditions of many households have changed due to the long waiting time. Why not establishing a set of principles for community activities and give proactive communities more recommendations? ...</p>
<p>* Source: Interview with Ms. Tran Thi Ngoc Dung, 43 years old, Officer of the Fatherland Front in Xuan Thanh, Xuan Loc, Dai Nai on June 8, 2018</p>

The factors of average income, the proportion of income from agriculture and the type of household economy have a direct impact on the contribution of community money to rural infrastructure development. In particular, the type of household economy/living standard (poor, near-poor, medium, good) has the highest impact on the decision to contribute, because on one side of the household economy is good, the source of contribution will be good and vice versa. A good household economy also means higher demand for participation. This is taken as a note when mobilizing the community to contribute money.

Factors affecting community participation in labour contributions shown in Table 2 in which  $P(Y_j=1)$  is the probability of the community to contribute public days and  $P(Y_j=0)$  is the probability of the community not contributing to the verification. The results of the function and regression tests are based on the significance level (Sig.) of the Wald test shows:

- From X1, X2, X4-X6 and X8-X10, there are Sig. Equally > 0.05, the correlation variables are not significant for the variable Y2, the reliability is 95%.
- The X7 variable has Sig. = 0.012 <0.02, the correlation variables are significant for the variable Y2, the reliability of 98%.

- The variables X3 have Sig <0.01, the correlation variables are significant for the variable Y2, 99% reliability.

The qualification factor of household heads and households with local officials has a direct impact on labour contributions. In particular, the level of a professional qualification is quite high to decide for participation because qualified people are more confident to participate; Households with people who work as officials often do propaganda through “officers as an example”. However, before calling for contributions of qualified workers, professional surveys and assessments are needed to improve the effectiveness of participation and effective management and employment of the community.

Factors affecting community participation in material contributions are shown in Table 2 in which  $P(Y_j = 1)$  is the probability of the community contributing materials and  $P(Y_j = 0)$  is the probability of community not contributing materials. The results of the function and regression tests are based on the significance level (Sig.) of the Wald test shows:

- From X1, X2, X4-X9 has Sig. > 0.05, the correlation variables are not significant for the variable Y3, the reliability is 95%.
- The X10 variable has Sig. = 0.017 <0.02, the correlation variables are significant for the variable Y3; the reliability is 98%.
- The variables X3 have Sig = 0.002 <0.01, the correlation variables are significant for Y3 variables, 99% reliability.

Factors of professional qualifications and locations of households have direct impacts on communities' material contributions. In particular, professional qualifications have higher impacts on decisions of community participation because people with professional qualifications often participate in different ways. The contribution depends on the conditions of households' ability because there are needs for available materials and the ability to mobilize resources. In the case, if other participation forms limited, this solution is considered very useful because it encourages many community members to participate, many forms of contribution, limiting difficulties of rural people, creating fairness in communities.

Factors affecting community participation in land contributions are shown in Table 2 in which  $P(Y_j = 1)$  is the probability of the community contributing materials and  $P(Y_j = 0)$  is the probability of community not contributing materials. The results of the function and regression tests are based on the significance level (Sig.) of the Wald test shows:

- From X1, X3-X6, X8, X10, there is Sig. > 0.05, the correlation variables are not significant for variable Y4, 95% reliability.
- The variables X2 and X7 have Sig. = 0.086 and 0.030 <0.1, the correlation variables are significant for variable Y4, with 90% confidence.
- X9 variables have Sig = 0.002 <0.01, correlation variables are significant for variable Y4, 99% reliability.

**Table 3. Variables in the equation.**

–	B	S.E.	Wald	df	Sig.	Exp(B)
Step 1a x1	.015	.014	1.180	1	.277	1.015
x2	-.184	.297	.383	1	.536	.832
x3	.075	.206	.131	1	.718	1.077
x4	.125	.297	.177	1	.674	1.133
x5	-.128	.121	1.128	1	.288	.880
x6	.425	.245	3.012	1	.083	1.530
x7	-.061	.405	.023	1	.881	.941
x8	-.037	.014	6.874	1	.009	.964
x9	.023	.008	8.281	1	.004	1.024
x10	-.051	.204	.062	1	.803	.950
Constant	2.975	1.277	5.428	1	.020	19.582

**Table 4. General model of community's physical contributions to develop rural infrastructure.**

Participation Elements	Job Details	Expected Results
Government	Consulting, organizational training and community financial management	- Training materials on organization and management of community finance - Legal framework
Union	Communication, community mobilization	- Report the results of movement and communication
Community representative	Managing and supervising for the community	- Contribution minute - Report the results of contribution and use
Community individual	Contribute; suggestions and feedback	- Material contribution - Idea contribution
Implemented unit	Use contributions according to estimates and plans	- Progress reports - Reply to community comments

The proportion of income from agriculture, gender and households with staff directly affects the land contribution of the community. In particular, households with people who work as cadres and householders have a rather high impact on the decision to contribute land to the community, as these are easily accessible objects. The impact of the proportion of income from agriculture is explained by the fact that rural people have low incomes and land prices are not high. However, participation in land contribution only relates to households close to the road while other households are not eligible.

### 4.3. Solutions for Promoting Communities' Physical Contributions

#### 4.3.1. Develop Models to Promote Participation and Contribution in Accordance with the Characteristics of Each Locality

It is to establish a participated model in accordance with local conditions for physical contribution to overcoming barriers between participated needs and practice. On the basis of general principles, the model of physical contribution is proposed and shown in Table 4. The model clearly defines the role of 5 components: (i) Government supports and creates a democratic, transparent, voluntary environment; (ii) Union can communicate and mobilize; (iii) Community representatives manage, communicate, lead, adjust and evaluate on participation; (iv) Individuals directly contribute physically, and comments; (v) The implementing unit directly performs the work.

#### 4.3.2. Develop Mechanisms to Contribute and Improve Physical Management in Accordance with Community Conditions

In order to help local communities on physical contribution according to communities' regulations and abilities, it is necessary to develop a unified mechanism agreed by local communities. Mechanisms for physical contribution should show the following contents: Forms of physical contributions; Requirement, discussion and voluntary participations; and Requirements of contributed levels for each type of rural infrastructure. Regarding contribution management, it is necessary to plan in advance, discuss and agree timely. If it is not yet in use, it should be stored and stored in a way not to be damaged or lost. The acquisition of artefacts should be clearly and publicly recorded to the community.

#### 4.3.3. Promote Training Activities for the Community

Community training is an indispensable task, function and content in the organization and community management. Because community organization is a collection of community individuals with different awareness, knowledge, conditions, leading to the organization and management is difficult. Moreover, in each locality, each village has its own customs, habits, language, and different project size, so it is necessary to train. Community training includes:

1. Train organization and community management related to organizational knowledge and community management, rural transport infrastructure development, participating in the

community, labour and financial management, propaganda and mobilization of participation. Trainees are representatives of the community, professional departments, representatives of government, mass organizations and related professional units.

2. Train the community on contents, such as participation mechanisms, participation content, participation forms, participation level and participation conditions, participation benefits, methods and participation plans, participation requirements and feedback.

3. The content, method, time and location of the training should be simple and appropriate to the conditions of community officials and members of the community.

#### **4.3.4. Strengthen Propaganda and Calling, Mobilizing to Contribute in Kind Contribution to Rural Infrastructure Development**

Propaganda and calling for physical contributions to develop rural infrastructure should be integrated into propaganda according to local socio-economic development programs, the most effective method for the community to see benefits that participation brings. From there, they will promote the highest self-participation. Using a variety of advocacy forms, such as using local social networks (mass organizations, groups, clubs), using family and relationships among fishes community, use examples in the community. Based on the conditions and circumstances of communities and individuals to propagate and mobilize in accordance with circumstances, interests, and concerns, there will be a higher contribution.

#### **4.3.5. Supporting Economic Development for the Community**

Economic factors have an impact on the form of contribution and the level of contribution. Economic development, the community has a high ability to contribute money and valuable materials. In the underdeveloped economy, the community mainly contributes to labour and simple materials. For the rural community of Dong Nai, supporting economic development for the community should be noted: Exploiting the strengths of different regions to develop agriculture and forestry in the purely agricultural districts; the districts with many industrial zones, such as Trang Bom, the economic development of the non-agricultural community also focuses on trade in services, working in industrial parks; Economic development of poor districts with many ethnicities is the exploitation of support from the poverty reduction program and the sources of poverty alleviation through projects to support sustainable poverty reduction.

### **CONCLUSION**

Participate in physical contributions to develop rural infrastructure is very popular. In which, the highest contribution rate is labour (99.3% of households), followed by cash (85.8%), land (78.0%) and materials (64.4%). There is a significant disparity in the level of contributions among communities because of the need for participation and diverse community conditions [17]. Factors affecting physical contributions are the organization of participation, government leadership, mechanisms and management contributions and internal factors of the community such as household economy,

income sources, the proportion of income from agriculture, the level and gender of the household head, social relations, benefits of rural households from rural infrastructure.

In addition to the general solutions to promote community participation on physical contribution for developing rural infrastructure needs to focus on the following points: Build up appropriate models of participation and contribution; Develop mechanisms to contribute and manage physical contribution within each community; Promote training for communities, community representatives and stakeholders; Enhance propaganda and mobilize physical contributions; Support economic development for the community in appropriate direction. Additional considerations should be paid attention to factual findings that have been mentioned in the above analysis.

### **CONSENT FOR PUBLICATION**

Not applicable.

### **AVAILABILITY OF DATA AND MATERIALS**

Not applicable.

### **FUNDING**

None.

### **CONFLICT OF INTEREST**

The author declares no conflict of interest, financial or otherwise.

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Declared none.

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