Effect of LBT Participation in the Case of Tanzania

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Labour-Based Technoogy (LBT) is a construction technology to maximize the utilization of labour force. This study aims to identify the effect of LBT participation through the field survey in Tanzania. Findings are that LBT participants are lower income/expenditure, younger household head, smaller family size, and more workers in their family and smaller land. Further, regression analysis with income/expenditure as dependent variables and household attributions and LBT participation dummy as independent variables shows negative coefficient of LBT participation dummy.

Key Words: Labour-Based Technology, Road Construction, Tanzania, Regression Analysis.

1. INTRODUCTION

Labour-Based Technology (LBT) is a construction technology to maximize the utilization of labour force for creation of employment, and is applied for small-scale infrastructure such as feeder roads or irrigation in developing countries. International Labour Organization (ILO) defines LBT as "a technology that applies labour/equipment mix that gives priority to labour, supplementing it with appropriate equipment where necessary for reasons of quality or cost" [1]. In addition to employment creation, LBT has various advantages such as low construction cost and use of local resources.

The government of Tanzania decided a policy to promote LBT in road construction at rural areas.

Hanaoka et al. (2010) revealed its effectiveness and issues of LBT in Tanzania based on their natural and social conditions. Few studies, however, analyzed a specific project of LBT using micro data in Tanzania. This study aims to identify the effect of LBT through analyzing the differences on people's life between LBT through one project of Tanzanian village.

2. METHODOLOGY

In order to obtain data of household's life near a LBT project site, we carried out the field survey at a Vwawa village in Mbeya region, Tanzania from 12 to 25 January, 2011. At this village, a one km-long feeder road was rehabilitated by LBT in two months from the beginning of October 2010. Local people

were employed for labour at daily wages of 4000 Tanzanian Shilling (Tsh) for women and 5000 Tsh for men, respectively [1US$=1500Tsh]. For comparison, we distributed the questionnaire sheets to participants as well as nonparticipants. We employed a native surveyor and distributed 50 of questionnaire sheets (25 for each). Although collected 47 sheets, some of them were invalid answers. Thus, only 27 samples (11 participants and 16 nonparticipants) were valid.

In order to clarify the differences of income and expenditure between participants and nonparticipants, we performed multiple regression analysis with income and expenditure as dependent variables, and household attributions such as number of household members, age of household head and LBT participation dummy etc as independent variables (see Table 2).

3. RESULTS

Figure 1 shows how the labour spent their wage obtained from LBT work. More than 90% respondents purchased foods. Other common answers were clothes and farm equipments. Participants spent their wage mainly for basic needs in their daily life. Some respondents replied to spend school fee for their children.

All respondents answered "Yes" to the question "Would you like to participate if another LBT project is initiated?" The reasons are categorized in Figure 2 as motivation for participating in LBT. "Development of the community" and "Improvement of life" are dominant reasons rather than "employment creation" and "income generation".

Household attributions are shown in Figure 3 to 7. According to these results, participants tend to have smaller family size, younger household head, more workers and smaller owned land than nonparticipants. It is notable that more than half of participant households are female-headed, while there is no much difference in their education and occupation.

Table 1 shows monthly income and expenditure per head of respondents. Average income of participants is about 1800 Tsh higher than that of nonparticipants, whereas expenditure is similar. The level of income/expenditure of the respondents seems slightly below the average Tanzanian because average expenditure was 16,418 Tsh/month/head in rural areas, according to National Bureau of Statistics Tanzania (2008).

Prior to the regression analysis, correlation analysis was performed and the result is shown in Table 3. Overall, independent variables are not high correlated to each other. The largest absolute value of correlation coefficient among independent variables is 0.509 (worker and land). The second largest one is 0.419 (family and land). Therefore, we do not need to pay much attention to multicollinearity.

Result of regression analysis is shown in Table 4 and 5. In model I-1 and I-2, dependent variable is monthly income per head, while monthly expenditure per head in model E-1 and E-2. I-1 and E-1 contain eight variables collected by the field survey. Model I-1 is 1% significant in F-test, but significant variables are only age and LBT dummy. On the other hand, model E-1 is 10 % significant and its significant variables are age and farm. LBT dummy is not significant. To improve and simplify the models, some insignificant variables were removed one by one and we obtained model I-2 and E-2. In these models, all variables have negative coefficients and LBT dummy is insignificant. Coefficients of LBT dummy are negative throughout all models, which mean LBT participants are more likely to be at lower income.
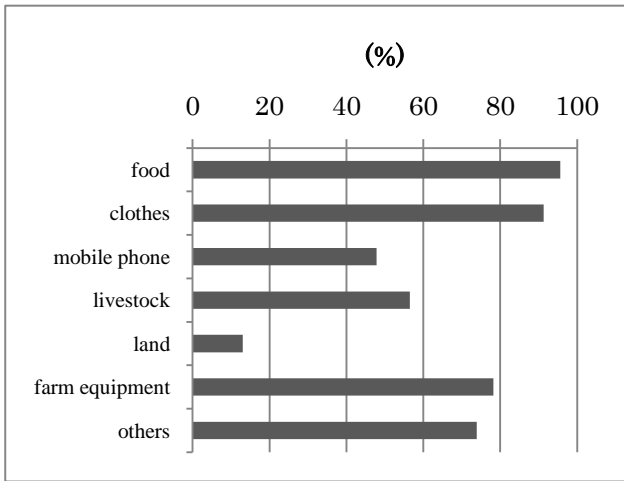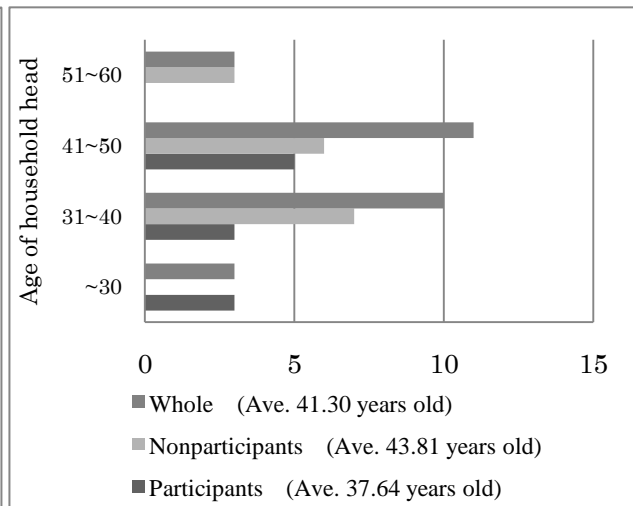
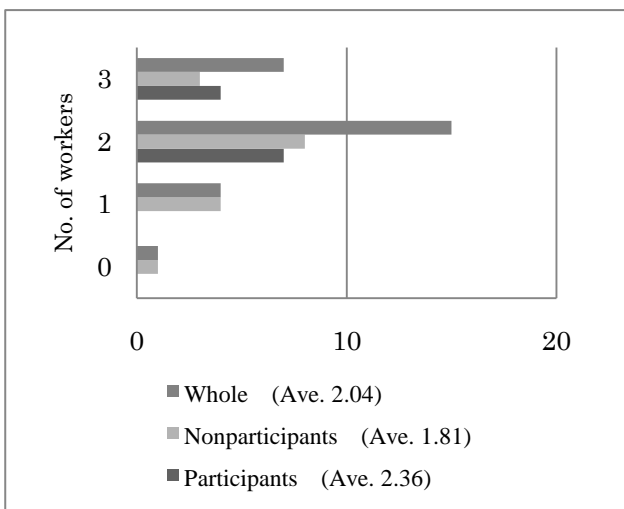**Figure 1: How to use the wage of LBT**
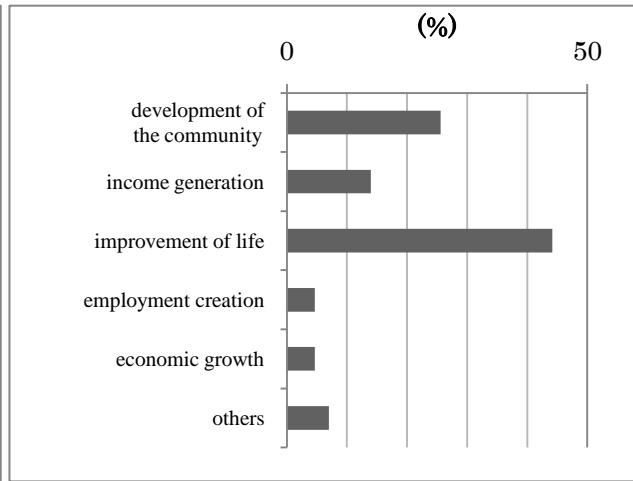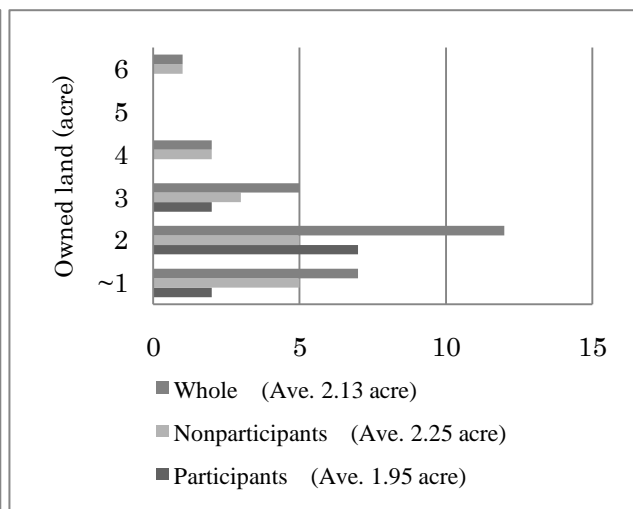

Figure 2: Motivation for LBT
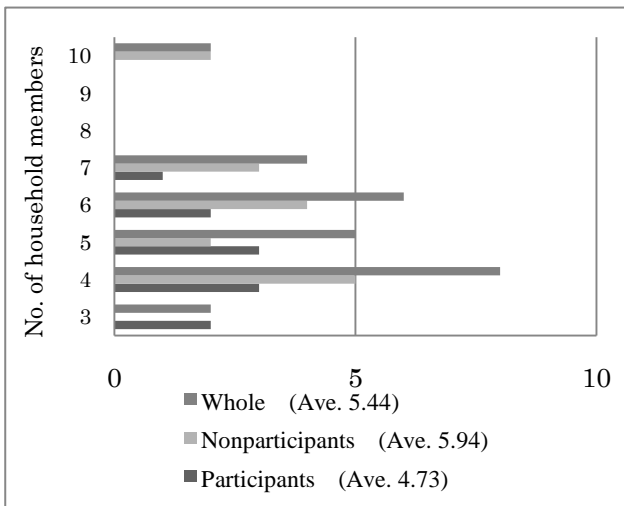
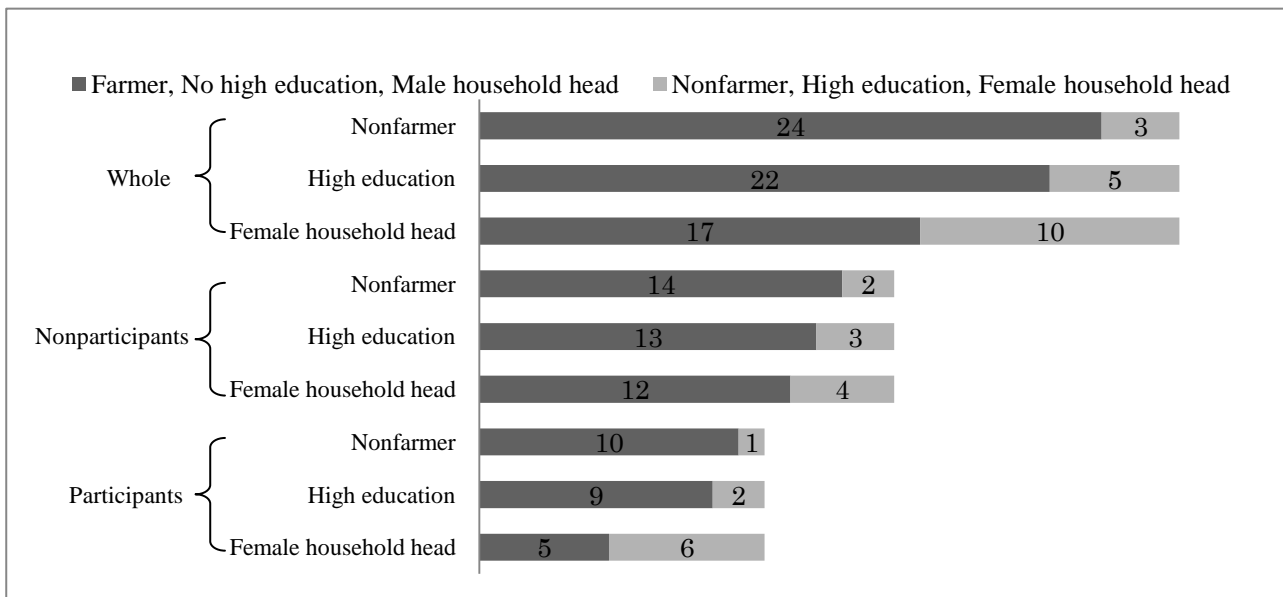**Figure 3: No. of household members**

Figure 4: Age of household head

Figure 5: No. of workers

Figure 6: Area of owned land

Figure 7: Farmer, High education and Female-headed household

Table 1: Monthly expenditure/ income per head

Item		No. of Samples	Max	min	Ave	Standard Deviation
Monthly expenditure per head (Unit:Tsh)	Whole	27	31,356.25	4,529.02	12,367.34	6,575.03
	Participants	11	31,356.25	7,834.88	13,440.03	7,892.01
	Nonparticipants	16	25,000.00	4,529.02	11,629.87	5,655.73
Monthly income per head (Unit:Tsh)	Whole	27	25,000.00	5,243.30	11,748.73	5,409.62
	Participants	11	22,022.92	5,758.33	11,659.73	5,384.72
	Nonparticipants	16	25,000.00	5,243.30	11,809.92	5,602.18

Table 2: Definitions of variables

Variables	Definition(Unit)
Dependent variables	
E	Monthly expenditure per head (Tsh)
I	Monthly per head (Tsh)
Independent variables	
family	No. of household members
worker	No. of workers in the household
head_fem	Female-headed household dummy (1:female)
head_age	Age of the household head
head_edu	high-educated household head dummy (1:high education)
land	Area of owned land (acre)
non-farmer	Non-farmer dummy (1:non-farmer)
LBT	LBT participation dummy (1:participants)

Table 3: Correlation table

	family	fem	age	edu	work	farm	land	LBT	I	E
family	1.000									
fem	-0.282	1.000								
age	0.118	-0.231	1.000							
edu	-0.285	0.029	0.106	1.000						
work	0.016	-0.038	0.102	0.232	1.000					
farm	-0.090	-0.271	-0.106	0.135	-0.176	1.000				
land	0.419	0.073	0.241	0.254	0.509	-0.317	1.000			
LBT	-0.340	0.301	-0.398	-0.007	0.364	-0.053	-0.115	1.000		
I	-0.516	0.283	-0.476	0.361	0.044	0.257	-0.216	0.138	1.000	
E	-0.286	0.072	-0.396	0.327	0.024	0.398	-0.087	-0.014	0.846	1.000

Table 4: Model summary

Model No	No of Independent Variables	R square	Adjusted R square	F-Value
I-1	8	0.642	0.483	4.031***
I-2	3	0.487	0.420	7.283***
E-1	8	0.496	0.273	2.219*
E-2	3	0.293	0.201	3.449**

*** 1% significant, ** 5% significant, * 10% significant

Table 5: Model Results

Model I-1				Model E-1			
Variables	Coefficients	Beta Coefficients	t-Value	Variables	Coefficients	Beta Coefficients	t-Value
family	-1371.64	-0.372	-1.865	family	-835.72	-0.275	-1.165
fem	3183.00	0.238	1.379	fem	957.22	0.087	0.425
age	-451.04	-0.534	-3.243***	age	-359.81	-0.517	-2.652**
edu	4067.94	0.245	1.422	edu	2543.83	0.186	0.912
work	2697.74	0.311	1.526	work	1561.16	0.219	0.905
farm	3745.60	0.182	1.132	farm	5930.03	0.351	1.838*
land	-801.34	-0.156	-0.682	land	226.65	0.54	0.198
LBT	-5148.70	-0.392	-2.005*	LBT	-4243.491	-0.393	-1.694
Model I-2				Model E-2			
Variables	Coefficients	Beta Coefficients	t-Value	Variables	Coefficients	Beta Coefficients	t-Value
family	-1991.10	-0.540	-3.400***	family	-1025.97	-0.338	-1.813*
age	-431.90	-0.511	-3.140***	age	-336.47	-0.484	-2.532***
LBT	-3266.97	-0.249	-1.448	LBT	-3469.93	-0.321	-1.591

4. DISCUSSION

As stated above, average income of participants is higher than that of nonparticipants by about 1800 Tsh. But it doesn't mean that most participants got higher income than nonparticipants. Figure 8 shows that most participants are located at relatively low income/expenditure except two outliers, while nonparticipants run a wide range from low to high. Although average was strongly affected by two outlier samples in this result, it is inferred that LBT participants are basically in poor living standards. This seems highly possible because the labour of this project were those who were interested and selected by community leader.
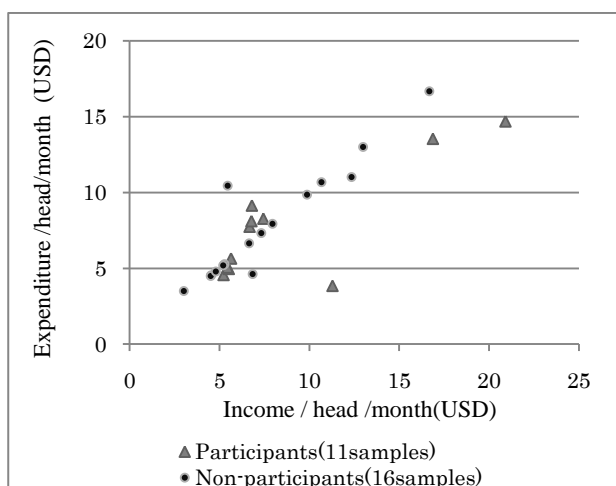

Figure 8: Distribution of Income/Expenditure

Before regression analysis, we assumed that LBT pushed up income/expenditure of participants and this would be reflected in the regression analysis. However, in fact, it is inferred that participants were basically at low income and it was strongly reflected in the result of the regression analysis. This can be regarded as reverse cause-result relationship of expected. In addition, R square of regression models above is not high enough. Thus, this would be not proper models describing their income and expenditure. More elaborated model would be necessary.

One interesting result is that remarkable difference in income/expenditure was not observed regardless of high wage of LBT, with compared to average income level of respondents

Qualitative finding is that local people had positive impression on LBT and recognized various kinds of benefits of LBT. They are motivated by comprehensive benefit of LBT expressed in terms such as "community development" or "improvement of life" rather than just income or employment. One women who manage a local shop near the road of LBT project mentioned increase in sales by approximately 20% since by the project. This is a good example which indicates that LBT can create income opportunity and the labour use their wage near the road and prompt local economy.

5. CONCLUSION

In this research, we revealed some tendencies and differences between LBT participants and nonparticipants in terms of their income and expenditure and other household attributions through the field survey at Vwawa village in Mbeya region, Tanzania. Moreover, their comments on LBT indicated how local people recognize benefit of LBT. As for quantitative analysis, more sophisticated method is required in order to clarify the impact on income and expenditure.

REFERENCES

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