

# IMPACT ANALYSIS OF DRY LAND FARMER LIVELIHOOD AND WELFARE STRENGTHENING PROGRAM IN TIMOR, NUSA TENGGARA TIMUR (NTT)

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## A B S T R A C T

**Y**ayasan Bina Tani Sejahtera (YBTS) introduced strengthening community livelihoods program that resistant to climate risks in West Timor. Thus the evaluation study aims to (1) evaluate the results and impact of the project intervention activities and (2) analyze socio-economics of the project performance. This study sampled in three villages in two districts in NTT. Data and information are collected from documentation, interviews, observation, and focus group discussion. While the analysis of data using qualitative analysis techniques that processed based on categories of data which further described in accordance with the purpose of research. Beside that is used of quantitative analysis techniques to determine the increase of farmers' income targets from before to after program, and financial analysis of water infrastructure investment. Based on the analysis above, it can be stated that empowerment has been successfully performed, as demonstrated by the economic approach as income of the group has increased and they feel their social status increases. Financial analysis showed that water infrastructure investment is profitable and feasible. Based on these results we proposed recommendation to conducted next steps, such as the development programs to other areas with a similar pattern to the location of the existing program.

**K E Y W O R D S :** empowerment program; evaluation; financial analysis; revenue; social and economic impact.

### Background

Timor Barat is part of Nusa Tenggara Timur (NTT) Province in Indonesia, a province with a population of 4.1 million people and an area of 46,138 km<sup>2</sup>. Cultivation of vegetables in Timor technically is still not good, so the farmers cannot get a good harvest. This province is one of the lowest in vegetable production in Indonesia, therefore this province is also low in vegetable consumption. Farmers in Timor also had to face the risk of water shortage in their farming system. They also do not have good market access to sell their agricultural crops.

PT. East West Seed Indonesia (EWSI) through Yayasan Bina Tani Sejahtera (YBTS) has implemented a program to strengthen capacity of farmers in improving the livelihood and welfare through the transfer of knowledge and technology. The activities are implemented in three (3) villages, involving 1,193 farmers or about 319 households, located in Kupang and Soe.

The overall objective of this project is to strengthen and improve community agriculture that is resistant to the risk and can increase capacity of the community to minimize threats/risks of climate in three villages in Timor Barat, which are Tubuhue Village, Amanuban Selatan Subdistrict, Timor Tengah Selatan (TTS) Regency, and Kotabes and Ponain Village, Amarasi Subdistrict, Kupang Regency. The implementation phase of the project began in July 2014 until September 2015. Some activities that has been implemented are the construction of irrigation from water sources to agricultural land, created the demonstration plots and did good farming training, implemented the crop calendar based on market requirements calendar, started market access activities for agricultural products of farmers, maintained preservation of water sources and its catchment area, empowered groups and initiated the establishment of community cooperation.

To ensure that the implementations in the field are in accordance with the program objectives, it is necessary to carry out an implementation evaluation/assessment of the program. In addition, evaluation is also required to take remedial action for the program in the future.

The aims of this study are:

1. Evaluate the results and impact of the interventions project activities, such as irrigation construction investment and farmer training about good agricultural practice.
2. To analyze socio-economics of the project performance.

## Material And Methods

### *Research Location*

The location of the study is in Kupang Regency (2 villages: Ponain Village and Kotabes Village) and Timor Tengah Selatan (TTS) Regency (1 village: Tubuhue Village).

### *Data and Data Sources*

Data used include primary data and secondary data. The primary data were obtained by in-depth interviews to informants using questions guideline and structured interview to 40 households using questionnaires. The secondary data are sourced from activity implementer, village government, and related institutions.

### *Data Collecting Method*

The data collection technique used is the triangulation method to obtain accurate data combination. Data/information collecting techniques include field observations and interviews with the project team and participant farmers in the project.

### *Data Analysis Method*

The data collected is processed in quantitative and analytical descriptive. The results are analyzed and interpreted in accordance with the facts that occurred. The quantitative data is used to support the information to strengthen the qualitative information that has been analyzed.

To find out how much income differences that occurred, mean difference test (paired t-test) is done with this formula:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2} - 2r\left(\frac{S_1}{n_1}\right)\left(\frac{S_2}{n_2}\right)}}$$

Where:

t = t value for the paired group mean or independent samples, or groups of repeated measurements

x1 = average sample 1

x2 = average sample 2

S1 = standard deviation of sample 1

S2 = standard deviation of sample 2

S12 = sample variance 1

S22 = sample variance 2

R = correlation between the two samples

Decision rule: If  $t$  value  $>$   $t$  table, then  $H_0$  is rejected, meaning that there are differences in income before and after the implementation of YBTS Program. If  $t$  value  $<$   $t$  table, then  $H_0$  is accepted, meaning no income difference before and after the implementation of YBTS Program.

To determine the feasibility of the irrigation construction investment, financial analysis is done. The criterias used are the Net Present Value (NPV), Internal Rate of Return (IRR), and Net Benefit Cost Ratio (Net B/C).

The formulas used in the data analysis are:

1) Net Present Value (NPV)

Net Present Value (NPV) is the difference between the present value of benefit (revenue) with the present value of cost (expenses) (Clive Gray, et al., 1997).

Formula:

$$NPV = \sum_{t=1}^n \frac{B_t - C_t}{(1 + i)^t}$$

Information:

$B_t$  : total value of benefit (revenue) in year 1

$C_t$  : Cost (cost) in year  $t$ , consists of fixed costs, variable costs, overhead costs, and more.

$n$  : economic life of the project

$i$  : discount rate

Criteria:

If the  $NPV \geq 0$ , then irrigation development is feasible

If the  $NPV < 0$ , then irrigation development is not feasible

2) Net Benefit Cost Ratio (Net B/C)

Net Benefit Cost Ratio (Net B/C) is ratio between present value net benefit of the relevant years (numerator/positive) with present value of cash flow in year in which  $B_t - C_t$  (denominator/negative).

Formula:

$$Net\ B/C\ Ratio = \frac{\sum_{t=0}^n \frac{B_t - C_t}{(1 + i)^t} \quad \text{for } B_t - C_t > 0}{\sum_{t=0}^n \frac{C_t - B_t}{(1 - i)^t} \quad \text{for } B_t - C_t < 0}$$

Where:

Bt : total value of benefit (revenue) in year t

Ct : cost in year t, consists of fixed costs, variable costs, overhead ] costs, and general and administrative expenses

n : economic life of the project

i : discount rate

Criteria:

If the Net B/C  $\geq$  1, then development of irrigation is feasible

If the Net B/C  $<$  1, then development of irrigation is not feasible

### 3) Internal Rate of Return (IRR)

IRR is the interest rate that reflecting cost between benefit (revenue) which has been converted into present value with cost (expenses) which has been converted into present value equal to zero, so the IRR indicates project's ability to generate return, or profit level that has been achieved.

$$\text{Formula : IRR} = i_1 + \frac{\text{NPV1}}{\text{NPV1} + \text{NPV2}} (i_2 - i_1)$$

Where :

NPV1 = positive NPV (the smallest)

NPV2 = negative NPV (the biggest)

i1 = the interest rate on the NPV is positive

i2 = the interest rate on the NPV is negative

i2 - i1 = no more than 5%

Criteria:

If IRR  $\geq$  1, then development of irrigation is feasible

If IRR  $<$  1, then development of irrigation is not feasible

## RESULT AND DISCUSSION

Based on the data and information obtained, in accordance with the potential of the area, the main commodities that cultivated, and technology developed, the program that conducted in 2013-2015 was Cultivation Agribusiness of horticultural vegetables. This activity was conducted with the aim that farmers would have the skills in vegetables cultivation well.

Participation of farmers in the activities was their involvement and role or contribution, start from the preparation, implementation, and evaluation, which are: socialization of YBTS conception; group and its officials forming; implementation of PRA; group activities planning arrangement; irrigation

development program arrangement; prioritization of activities; proposal making; feasibility assessment; monitoring/assessment of implementation; YBTS impact evaluation toward productivity and incomes increase of program participants.

In preparation phase, farmers followed activities of YBTS concept introduction that facilitated by YBTS staff in farmers meeting (*rembug tani*), which was attended by the board of farmer groups and representatives of each group. Other than that, an election was also conducted to choose the board of new group that consists of a chairman, secretary, and treasury. At the implementation phase, farmers implemented the learning and implementation of Participatory Rural Appraisal (PRA). The results of the PRA contain data or information of current conditions, problems and potential of natural resources, artificial resources, and knowledge or technology. From these data, farmers could produce a seasonal calendar, market calendar, transportation data, and daily activities plans that used for Definitive Plan of Group (DPG)/Definitive Plan of Farmer Groups Needs (DPFGN). Based on DPFGN, farmers identified the needs of training, information and technology, type, quantity, capital, and others. Learning activities agreed for further implementation were arranged in groups together. After that, farmers received priority activities subject to be implemented collectively by prioritizing activities that is urgent. Those activities were held in the village office or villager houses in their respective villages.

Monitoring and evaluation (M & E) phase was held participatory and periodically as needed and in the time that agreed by members of farmer groups. M & E includes planning process, implementation, results, and benefits for farmers. Farmers income in YBTS program is productive farm

Table 1. Business Comparison (before and After) Program

Jenis tanaman	Period	Ponain	Kotabes	Tubuhue	Average
Corn	Before	2,302,500	1,581,250	1,925,000	1,936,250
	After	2,471,429	370,000	240,625	1,027,351
Tomato	Before	6,537,143	3,180,000	874,333	3,530,492
	After	13,735,000	15,970,000	1,920,000	10,541,667
Chili	Before	1,500,000	9,725,000	5,850,000	5,691,667
	After	8,886,667	8,500,000	13,000,000	10,128,889
Others	Before	3,397,000	3,033,333	2,770,000	3,066,778
	After	9,094,000	6,008,333	6,000,000	7,034,111
Total Revenue	Before	13,736,643	17,519,583	9,249,333	13,501,853
	After	34,187,095	30,848,333	21,160,625	28,732,018
Total Cost	Before	1,734,167	1,547,500	1,025,000	1,435,556
	After	8,373,000	3,226,667	1,650,000	4,416,556
Benefit	Before	12,002,476	15,972,083	8,224,333	12,066,298
	After	25,814,095	27,621,667	19,510,625	24,315,462

Source: Data Primer

through vegetables cultivation. After YBTS program running, farmers income increased from vegetable production. The number of farmers involved in this farm business in three villages was 2028 people. The average income of participant farmers of the project was obtained from difference between average revenue with the average production cost. The farmers income was obtained from farming income, which is the income from horticultural productive business. For vegetables business, from the average farmer respondents spent IDR 1,435,556 for production cost in 2014 and increased to IDR 4,416,556 in 2015. After farmers followed learning activities from YBTS, average production increased from 2,077 kg to 3,251 kg.

To search for revenues, we can use formula of production multiplied by the price per unit of product. Farmers' income has increased after the YBTS program, from Rp.13,501,853 in 2014 to Rp.28,732,018 in 2015 (Table 1). The increase was due to addition of agribusiness after YBTS program is also due to increase in the number of production and prices increased. Furthermore, the average income of farmers increases from Rp.12,066,298 in 2014 to Rp.24,315,462 in 2015. For comparison, the Agriculture Census in NTT indicates average income of farm households amount Rp.9.03 million in 2013.

Statistical analysis to differences in total revenues of farmers sample in 2014 and 2015 also showed that total revenues of the farmers did experience an increase in the absolute price,  $t$  value = 8186 in  $df$  41 bigger than  $t$  table = 2,019 on  $df$  41, it means there is a difference revenue in the three villages of research before and after the YBTS.

Based on results of data analysis table can be known that value of correlation between two variables: Results of 0.696 it means a strong and positive relationship as it approaches a value of 1. The value in the Sig. (2-tailed) = 0.000 less than 0.05. This means that  $H_0$  and  $H_1$  accepted. So that there were influence of YBTS program on people's income in all villages of the program.

Table 2. Paired Samples Statistics.

		<i>Mean</i>	<i>N</i>	<i>Std. Deviation</i>	<i>Std. Error Mean</i>
<b>Pair 1</b>	Before	6383809,5238	42	6042238,90518	932337,70434
	After	20611380,9524	42	14602777,24329	2253257,44739

Table 3. Paired Samples Correlations.

		<i>N</i>	<i>Correlation</i>	<i>Sig.</i>
<b>Pair 1</b>	Before & After	42	0,696	0,000

The analysis shows that there are significant differences of income levels of samples before and after participated in the YBTS program. Income is an

important factor in improved welfare of the family. YBTS participant farmers' income is higher than before YBTS program.

Its Seen an increase in revenue when participated in BTS. The difference is significant by  $t = -8.186$ , significant level ( $\alpha$ ) of 5% and df (degrees of freedom) 26, can be obtained  $t$  value  $\geq t$  table ( $8.186 \geq 2.019$ ). The test results showed that significance of 0,000 based on the probability value ( $\text{sig} < 0.05$ ). This means that  $H_0$  is rejected and  $H_a$  accepted with conclusion that population was statistically no significant difference between revenue earned before and after YBTS program. Results similar to organic agriculture, such as research Rahmat (2008) demonstrated that increasing organic farmers' income through increased yields per unit area (Rully, 2013).

Table 4. Paired Samples Test.

		Paired Differences			95% Confidence Interval of the Difference		T	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Deviation Mean	Lower	Upper			
Pair 1	Before & After	-14227571,42	11263433,66	1737985,54	-17737504,44	-10717638,41	-8,186	41	0,000

Table 5. Paired Samples Test Results Revenues.

	Average (Rp)	Quantity	Significance	T-Count
Before (2014)	6.703.000	42	0,000	-8.186
After (2015)	21.114.098	42		

The results of the financial analysis of the irrigation development investments with a fund of Rp. 1,142,781.066 shows Net Present Value (NPV) of the project at an interest rate of 12% is Rp. 16,200,530,407. Decision-making criteria according to NPV analysis requires value  $> 0$  to accept the project. So with the NPV value reached Rp. 16,200,530,407 then the irrigation development project is feasible. Value Benefit Cost Ratio at an interest rate of 12% at 4.36, which means from 100% of of costs incurred will obtain benefits amount 436 % of benefits. In accordance with criteria, of which value of B/C ratio  $> 1$  then construction of the irrigation network is feasible. Furthermore, project IRR amounted to 237.5%. Decision-making criteria according to IRR analysis requires  $r$  value or interest rate is bigger than market rate (12%) to accept the project. So with value of IRR, which reached 237.5% from the irrigation project is feasible.

The farmer training program pack was done by YBTS participated by targeted 409 household to improve their skill and knowledge. The taught subject are: planting calendar (twice in a year), *Good Agricultural Practice/ GAP training*, organic fertilizer, efficient uses of pesticide, efficient uses of water, *Integrated Pest Management*.



Now, most of the farmer has joined the good agriculture practice, selected seed utilization, efficient use of fertilizer and pesticide, and variety kinds of vegetable planting. The planted vegetable is considering the planting calendar, therefore they are able to receive a high selling price.

The farmers are not depend on the large land anymore, instead of planting in a less wide of land and planted much intensively. Except for corn which is planted in larger area during rain season for food supply. Table 6 shows the difference between before and after YBTS program.

Table 6. Difference before and after farmer capability improvement program in 3 villages

No	Indicator	Before	After
1	Farming knowledge	Conventional	Applied <i>Good Agricultural Practices</i> /GAP
2	Commodity selection	Plant Randomly	Considering planting and market cycle calendar
3	Plant Decision	Considering the plant calendar only	Consider both market cycle calendar and plant calendar

Source: Primary Data.

## CONCLUSION

The results showed implementation and impact of YBTS program has been in line with expectations. Farmers have felt an increase in revenue of more than 25% compared to previous. Water facilities has been beneficial for: a) preparing the land with farming vegetables in the dry season, so that b) household labor utilized more productively and c) generate revenue from sales of vegetable production, and d) water demand for domestic and livestock more secure.

In general, capital assets or businesses owned by group has not increased. After join the program has been going on welfare improvements individually, are in the category of low incomes increased by 18 percent, in medium category an increased of 7.5 percent, and the high category increased by 11.5 percent.

After the program there is a change in the fulfillment of basic needs, that are in lower category increased by up to 10 percent, the medium category an increase to 15 percent, and in the high category increased by 19 percent. After the program there is a change in social conditions, that in low category an increase of 8.5 percent, the medium category an increase of 6.5 per cent and in the high category an increase of 2 percent.

Process of public assistance to the society target should be continued until one or two more years, so farmers actually implement a variety of interventions were introduced and more independent. If intensive support is not possible to do, then at least need to be maintained constant communication and monitoring of each semester.

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