THE IMPACT OF ADOPTION GAP STANDARD ON DEVELOPMENT INVESTMENT EFFICIENCY IN AGRICULTURAL PRODUCTION OF HOUSEHOLD, CASE STUDY OF GRAPES AND APPLE IN NINH THUAN PROVINCE, VIETNAM

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Abstract- This research analyzed the impact of applying GAP standard on development investment efficiency of producing Grapes and Apple in NinhThuan province, Vietnam. This study used Data envelopment analysis (DEA) methodology to calculate the total economic efficiency (TE) and Linear regression OLS to estimating the impacting of GAP standard on TE. The result of this study was indicated that adopting GAP standard will have possitive effect to investment outcomes, however, these householde will face a higher risk compared with nonGAP household. Base on this result, authors proposed four main solutions to promote development agriculture producing of household followed GAP standard with connecting four parties Household – Firm- State – Scientist being highlighted solution.

Key words: GAP, Development investment efficien, Agriculture, Household, NinhThuan province, Vietnam

1. INTRODUCTION
Development investment in agricultural production under GAP is an indispensable way to achieve sustainable agricultural development target, contributing to the safety of producers, meeting the increasing demand of consumers and environmental Protection. Agricultural production under the GAP standard of the farmers is limited (according to statistics from vietgap.com, as of January 2018, Vietnam has only 1342 establishments producing certified VietGAP). Thus this study focuses on factors influencing agricultural development investment of the farmer under GAP, as the basis for proposing solutions to promote sustainable agricultural production. Ninh Thuan is one of the most famous provinces in Vietnam for grapes and apples. From 2013 up to now, developing agriculture under GAP has made positive changes such as achieving higher profit than non-GAP production at 15.4 million VND / 1000 m2, farmers also understand more in-depth about GAP standard. In addition to the results achieved, the development of agricultural production of households under the GAP still has limitations such as: The rate of households adopting GAP for production investment is limited (in Ninh Thuan province, with a total of 6360 households producing grapes and apples, only 1272 households have invested in GAP); In the GAP
investment households, the scale and area of investment has increased but not dramatically. This proves that in Ninh Thuan, agricultural investment under GAP is not very attractive to farmers, one of the main reasons is that farmers have not seen the effectiveness of agricultural development investment followed GAP standard.

2. LITERATURE REVIEW

GAP production requires a considerable amount of capital to invest in technical training for production, processing and inputs such as seeds, fertilizers,... periodic certificate for quality accreditation. (Graffham et al 2007; Okello and Swinton 2007). This has a marked impact on efficiency if it does not produce outputs respectively, resulting is difficulties for smallholder farmers and firms to assert themselves in GAP agriculture production, typically in Kenya (Asfaw 2007; Graffham 2006; Graffham et al. 2007; Mungai 2004), và Uganda (Kleih et al. 2007). However, GAP investments have gotten highly effective this also encouraging smallholder farmers to participate in GAP production. In order to be able to protect themselves and compete with businesses, many small farmers joined together to create a standardized agricultural organization and succeed in Zimbabwe (Henson et al. 2005) and in Madagascar (Minton et al 2007), or link farming Small businesses and enterprises like some EurepGAP projects in Zambia (Graffham and MacGregor 2007). According to Henson and Caswell (1999) GAP were being promoted by demand factors so the important challenge was to ensure that the widespread use of GAP will bring benefits to small-scale producers in developing countries in terms of safety, economic and sustainable of domestic production. In the study, Henson and Reardon (2005) also pointed out that, through their suppliers in different regions and countries, retailers have created a system of supply chains. Standardization of product requirements are indispensable to maintain effective linkage of supply chains. In the research of Hobbs (2003) also indicated that benefit of GAP was divided by two main groups, the first is reducing costing for farmers by using labour effectively, choosing proper inputs and applying good management methodology. In case study in Kenya, GAP help dramatic decrease in cost of producing fresh vegetable. This method reformed substantial efficiency in socio-economic and environment aspect. GAP help farmer control cost more effectively. The second is contributing to increase price, quality of GAP product, this make GAP product can attending to high level market. However when supply GAP product is increase, the price of them can be reduced as a indispensable trend of market. Generall, applying GAP standard for Agriculture production will help household increases investment efficiency; reforms the production condition, protecting environment and health of both producer and customer.

3. RESEARCH METHODS

Research site

Ninh Thuan province is a province in the South Central Coast of Vietnam with agricultural products speciality as grapes and apples. Ninh Thuan is the third largest producer in terms of GAP investment, mainly invested in grapes and apples with GAP area of 280 ha and 47.2 ha respectively. However,
Considering the socio-economic conditions as well as the favorable conditions of natural conditions, it can be said that Ninh Thuan is the most difficult region in the process of investing in production development under GAP of the household. This is the place where most of the common characteristics of the factors group affecting the effectiveness of development investment in agricultural production of the household under the GAP. Resolving the bottlenecks in Ninh Thuan will make a great contribution to both theory and practice, making lessons for localities throughout the country and countries with similar conditions for agricultural development under GAP.

3.2. Data collection

Data used in this research was collected from survey household lived in Ninh Thuan province with using standardize questionaires. Primary data was collected by stratified random sampling in Ninh Thuan province with 200 households, of which 100 producers under GAP represented 88 GAP registered groups in the province and 100 non-GAP producers in 5 districts. Base stratification is local aspect and linkages group. Ninh Thuan province has a total of 88 GAP registered groups (Vietgap.com.vn) with a total household size of about 1,272, of which Phan Rang - Thap Cham city has 27 associated groups, Ninh Hai district, Ninh Phuoc district, Ninh Son district, Thuan Nam district have 26, 20, 10 and 5 groups respectively. The research had based on the size of the local linkage group to select the survey group and then surveyed households in the selected groups by random sampling method.

3.3. Data analysis methods

This study used the DEA data envelopment analysis method for the maximum of output in case of changing scale (VRS) to calculate the total economic efficiency (TE). Base on Cobb-Douglas function, output will depend on four factors: Capital, Labour, Natural resources, Technology; This research used four input resources were: Average Cost/1000m²/year, Initial investment/1000m², quantity of labour, area, and three outcome were: Average productivity/1000m²/year, Average profit/1000m²/year and average revenue d/1000m²/year to calculate total economic efficiency. Research used Linear regression OLS to evaluate the impact of applying GAP on development investment efficiency of agriculture production of household with model:

\[ TE = f(GAP, VDT, DT, L, LNBQ, T) \]

+ Identifying the input resources variables, which included: Investment capital, business cost, area, and number of labour base on Cobb-Douglass function. Result in TE indicator shown that factors belonged to input resources factor often have contrary impact on efficiency indicator.

+ Average profit is the output variable which has direct impact on investment effectiveness. Base on estimating TE, it also illustrated that factors belonged to output often have positive impact to efficiency indicator.

+ GAP: According to Hobbs (2003), Adopting GAP had positive impact to investment efficiency by using effectively labour, choosing proper input and applying good manager method.

+ Control variable: The effectiveness of GAP agricultural investment depends very much on natural conditions, especially weather (Pinstrup-Andersen
and Shimokawa, 2006, WB, 2007, Mai Thi Thanh Xuan and Dang Thi Thu Hien, 2013), Qualitative research had the same results with the majority of surveyed households saying that investment efficiency in producing grapes and apples is highly influenced by weather, especially grapes.

4. RESULT AND DISCUSSION

To evaluate the impact of adopting GAP standard on development investment in Agriculture production of household, firstly needing to clearing that how is development investment in agriculture production of GAP household. In the opinion of authors, it is investment of household in all factor of production process to ensure GAP standard to meet the need of market and for sustainable developmentb. Purpose of this action is to reach a modern agriculture, Industrialization - modernization of rural agriculture.

4.1. Evaluating of investment efficiency in agricultural production of grape and apple growers in Ninh Thuan province through analysis of DEA

After analyzing DEA, results are as bellow:

Table 4.1: Total economic efficiency followed results of DEA model

<table>
<thead>
<tr>
<th></th>
<th>NonGAP group</th>
<th>GAP group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>0.8704</td>
<td>0.861</td>
</tr>
<tr>
<td>Max</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Min</td>
<td>0.7205</td>
<td>0.677</td>
</tr>
<tr>
<td>σ</td>
<td>0.644</td>
<td>0.677</td>
</tr>
</tbody>
</table>

Source: Result calculated from data surveyed using DEA software

According to data envelope analysis of two GAP group and nonGAP group base on one data envelopment for both of them, it shown that they are both got efficiency with high level in investment, especially, the latter got average total economic effiency about 0.8704 while the former got lower than that with 0.861. This presented that, due to the relatively large input costs of the GAP while the outputs have not increased proportionally, the total economic efficiency is lower than the remain group. This result supports the view of Schultz (1964) households in developing countries: "poor but effective", that have generated a wave of debate and more experimental research (Sen, 1966; Hopper, 1965). Lipton, 1968; Bliss and Stern, 1984, etc.). Outside that, standardize deviation of the former higher than that of latter, this suggests that the degree of dispersion of efficiency value of GAP group is quite high. There are shown in the following diagram:

Chart 4.1: Diagram total economic efficiency pyramid of two groups of households investing in GAP and non-GAP production

Source: Result calculated from data surveyed with using DEA software

From the barchart aboved, dispersion of household gotten efficiency with the GAP group higher than that of non GAP group, however both of them reach efficiency from 0.8 to nearly 0.9. Though the average effectiveness of the former lower than that of latter, the reason is the former had a lot of householde who
gotten lower level, but the number of higher efficiency level also bigger compared with the remain group. Thus, investment followed GAP standard can create higher effective level and also got severe damage when risk taking in compared with nonGAP group.

Table 4.2: Testing the different about TE between GAP group and nonGAP group

<table>
<thead>
<tr>
<th>Levene's Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>Sig.</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Equal variances assumed</td>
<td>8.232</td>
</tr>
<tr>
<td>Equal variances not assumed</td>
<td>-</td>
</tr>
</tbody>
</table>

Source: Result caculated from data surveyed with using DEA soft ware

However, according to testing result about TE between GAP group and nonGAP group, it cannot be rejected the assume that have a different between two group interm of TE, because of Sig.(2-tailed) =0.395>0.05.

4.2. Verification of conformity of the model

Table 4.3: Testing the level of interpretation of the model

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.778*</td>
<td>.606</td>
<td>.594</td>
<td>.04941</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), TT, L, VDT, DT, LNBQ, GAP

Source: Result caculated from data surveyed with using DEA soft ware

Result from this testing shown that adjusted $R^2$ =0.594. Thus, 59.4% 59.4% of the change in total capital per capita is explained by the independent variable.

Table 4.4: Testing model fit level

ANOVA

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>.724</td>
<td>6</td>
<td>.121</td>
<td>49.450</td>
<td>.000*</td>
</tr>
<tr>
<td>1 Residual</td>
<td>.471</td>
<td>193</td>
<td>.002</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1.196</td>
<td>199</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: TE

b. Predictors: (Constant), TT, L, VDT, DT, LNBQ, GAP

Source: Result caculated from data surveyed with using DEA soft ware

Omnibus Tests of Model Coefficients $\beta$ in table 2 has Sig. =0.000<0.01. So can be reject assume $\beta1 = \beta2 = \ldots = \beta6$. Thus, with significance level 99%, this regression modal is fit.

4.3. The impact of applying GAP standard on development investment efficiency of household’s agricultural producing

Table 4.5: Table regression model Coefficients

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
<th>Collinearity Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Cons</td>
<td>1.082</td>
<td>.044</td>
<td>24.638</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>GAP</td>
<td>.038</td>
<td>.013</td>
<td>.243***</td>
<td>2.950</td>
<td>.004</td>
</tr>
<tr>
<td>VDT</td>
<td>-.003</td>
<td>-.000</td>
<td>-.588***</td>
<td>-8.494</td>
<td>.000</td>
</tr>
<tr>
<td>DT</td>
<td>-.015</td>
<td>-.003</td>
<td>-.282***</td>
<td>-5.842</td>
<td>.000</td>
</tr>
<tr>
<td>L</td>
<td>-.045</td>
<td>-.005</td>
<td>-.441****</td>
<td>-9.213</td>
<td>.000</td>
</tr>
<tr>
<td>LNBQ</td>
<td>.003</td>
<td>.001</td>
<td>.357***</td>
<td>5.021</td>
<td>.000</td>
</tr>
</tbody>
</table>
a. Dependent Variable: TE

Source: Result calculated from data surveyed with using DEA software. The regression outcomes shown that have three variable had converse impact on development investment of agricultural production of household with the significance at 99%, in which, investment capital has strongest impactation, followed by labour force and finally is area. This results shown that increasing input resources have dramatical impact on investment efficiency. Beside that, average profit and weather have positive affection to investment efficiency of agricultural production of household with signicance 99% also. Especially, joining to GAP have positive impact to investment efficiency of household, if another factor unchage the applying GAP will increase investment efficiency of household by 0.243 with significance is 99%.

5. CONCLUSION

Now a day, developing in agriculture followed GAP is an indispensable. This research indicated that: Adopting GAP standard have positive effect to development investment efficiency of agriculture production of household. However, producing under GAP will create opportunities to increase higher effectiveness also risk taking will be lager due to resources input as capital, labour… seem quite a lot.

Base on the results, authors propose some suggestion to promoting to develop agricultural production of GAP household:

(1) Building and implementing the planning on safe production areas suitable with the conditions of each locality. This solution aims to create the environment, conditions and orientations for households to invest in agricultural production under GAP.

(2) Improving the understanding and level of production of the household under GAP. That will helps farmers can see how efficient they are and how to invest in GAP production.

(3) Developing consumption market for GAP products. This is a prerequisite to ensure sustainable development in investing GAP production by farmers.

(4) Making a link between the four parties. In the development of agricultural production under GAP, farmers can not do it alone, but most importantly, it must be closely linked with the business and must involve the participating scientists and the the state organization also. These solutions are consistent with each other. In particular, the most important solution is to implement the link between the four parties, because the implementation of this solution will ensure implementation of other solutions well.

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