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Effect of Barangay Bagsakan to Farmers' Profitability: The Case of Small-scale Vegetable Farmers in Davao City, Philippines

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Effect of Barangay Bagsakan to Farmers' Profitability: The Case of Small-scale Vegetable Farmers in Davao City, Philippines

Meryll Salvaña and Glory Dee Romo*

Abstract

Farmers have depended largely on middlemen in marketing their produce. With the emergence of consolidated centers, however, such as Gulayan sa Barangay, Farmers' Market and Barangay Bagsakan, farmers were given alternatives on where they can sell their produce. Barangay Bagsakan Centers allow farmers to sell their produce without going through different intermediaries. The role played by this system was intended to benefit the small-scale farmers. This study aimed to detemine the effect of Barangay Bagsakan System to vegetable farmers' profitability in Davao City, Philippines using Propensity Score Matching. Moreover, other factors such as Barangay Bagsakan attributes were included to determine what affect farmers' decision to supply to these kinds of outlets. Results showed that farmers were encouraged to sell their produce to Barangay Bagsakan due to convenience of its location. Furthermore, farmers who supply to Barangay Bagsakan tend to get lower income compared to those who supply to other market channels. This is because a Barangay Bagsakan has low capacity to purchase farmers' vegetables. It was recommended that the government provide cash loans to Barangay Bagsakan so the latter would be able to buy larger volume of vegetables. Another option is for a collaboration with institutions like supermarkets and non-government institutions to be established.

Keywords: Propensity Score Matching, Profitability, Small-scale Farmers

I. Introduction

A. Background

The farmers heavily rely on middlemen for their products since direct selling requires substantial capital. In this kind of arrangement, the middlemen could capture a bigger percentage in the profit (Bell, 2010). To minimize the farmers' dependency on middlemen, some forms of organization have emerged. Some of these are wholesale markets outlets where farmers can directly sell their product to the consumers (Alba, 2008).

In the Philippines, there has been a considerable proliferation of consolidation centers and distribution systems where direct selling is done. These are the Gulayan sa Barangay, Farmers' Market, Bagsakan Centers and Barangay Bagsakan Centers. The Barangay Bagsakan Centers (also known as BB), formerly called Barangay Food Terminals, is a food depot and distribution system where several affordable and safe food products are sold such as meat, poultry, and fish. (*Barangay Bagsakan Centers*, 2010).

In Davao Region, there has been an increasing number of Barangay Bagsakan which are launched every year: two in 2007, 25 in 2008, 47 in 2009, and 59 in 2010 (Bagsakan Updates Davao Region). About 65,030 households in Davao Region (14,852 in Davao City, 12,911 in Davao del Norte, 18,352 and 18,915 in Davao del Sur and Oriental) are targeted to be served by the Barangay Bagsakan (Rodriguez, 2010).

The general objective of the study is to evaluate the effect of the Barangay Bagsakan System to the small-scale vegetable farmers in Davao City. Specifically this study aimed to: 1) determine the effect of BBs to farmers' profitability; 2) determine other benefits of the system to small-scale vegetable farmers in Davao City; 3) assess whether some socio-economic characteristics would affect farmers' decision to supply to BBs or not; 4) and, determine which characteristics of the system affect farmers' decision to supply to BBs.

II. Review of Related Literature

There have been several studies about the role of consolidation centers and other infrastructures that allowed farmers to directly sell their products to the consumers and increased their profitability at the same time. The study of Hovhannisyan (2005) identified the benefits of a marketing cooperative in the Republic

of Armenia. The paper analyzed the importance and benefits of marketing cooperative to its member farmer. This study revealed that 93% of milk producers in Armenia encountered difficulties in marketing their produce. However, after forming a cooperative, the farmers that were surveyed have reported that

through marketing cooperative they have ensured a market for their products. In addition, the interview with the cooperative managers have revealed that milk processors are more willing to deal with cooperatives due to these reasons Results of the study also showed that farmers, after joining the cooperative, have increased the number of their cows, thus, milk production have increased as well. This increase in number of cows was attributed to the services rendered by the cooperative to the farmers such as artificial insemination, sanitation programs, and support in acquiring feed, veterinary assistance, and seminars and consultations.

Another study from the Academic Research Repository at the Institute of Developing Economies (ARRIDE) had determined the benefits and limitations of rural cooperatives in Ethiopia. According to their study, cooperatives have helped farmers in terms of providing them price information, capital and transportation. The cooperative has also served as a strong negotiator in the international market which helped farmers to have stronger bargaining power against their buyers. Moreover, the presence of cooperatives in Ethiopia has improved the purchasing price offered by private traders because of competition (Kodama, 2007). However, in the case of the coffee cooperatives in Ethiopia, the biggest problem was the shortage of funds with which to purchase coffee. The cooperative financed their transactions using credits from banks and in cases that they were unable to repay the credit, they were not allowed to get another credit.

The benefits and limitations of the cooperatives might also be existent in Barangay Bagsakan System. This study had looked into the benefits that the system had rendered to the community as well as its limitations so as to further strengthen the BB system.

As mentioned above, consolidation centers have its benefits and limitations. It benefited farmers, especially small-scale farmers to be able to charge retail prices for their products. That is why it is also important to note how these consolidation centers and other distribution channels sustained their activities to continue to serve their purpose. In other countries, consolidation centers and distribution channels like

farmers' market had regained popularity (Bachmann, 2008). According to Bachmann, 2008 the success of Farmers' Market in the U.S was a combination of selling good quality products and strategic pricing of these products. Moreover, the popularity of farmers' market in the U.S is a product of advertising. Farmers invested in advertising their activities in the internet, media or through newsletters, brochures, flyers and postcards. Electronic Benefit Transfer (EBT)[1] was used to expand the production, distribution and consumption of locally grown foods in the City of Minneapolis. Through EBT, people with low income were given access to safe and quality foods. Moreover, the incorporation of EBT system to farmers' market provided farmers with regular consumers. The success of the EBT system was attributed to the following: adequate funding for operating cost, strong community partnership, incentive programs for users and effective promotional campaigns (EBT at Farmers' Market, 2010). Despite the fact that EBT requires substantial amount to implement, the financial support from both private and public sectors have made possible the system of EBT.

Proper implementation of rules, adequate financial support, proper information dissemination and consumers' support are some of the factors needed to put up a successful farmers' market or consolidation centers.

On the other hand, the factors that caused failure to these kinds of outlets include small number of vendors, less administrative revenue to meet operating needs, need for high variety of farm products and low paid or volunteer market managers. These were according to an article by Aimee Brown entitled "Farmers' Market Growing in Popularity but Not All Succeed". Administrative revenue refers to the revenue earned by the farmers' market to sustain its costs for operation (Stephenson, 2008). Another article by Nina Hauptman stated that reasons that caused the failure of Farmers' market in Sierra Madre involved lack of advertising and promotion. The lack of advertisement and promotion had led to unawareness of the general public about the existence of such market. This in turn made farmers' sales enough only to pay for their stall rent.

In contrast to the reasons stated as the key to success of some consolidation centers, lack of financial support, absence of promotion and advertising, and small number of farmers who cooperate are factors that contribute to farmers' market failure.

[1] EBT is a debit card wherein a benefit from a certain program in Minneapolis is administered.

To determine the effect of Barangay Bagsakan to small-scale vegetable farmers, particularly to their income, this study used Propensity Score Matching. Propensity Score Matching (PSM) has been used in different studies to estimate the impact of a program (treatment) to a population who were exposed to it. A study from the University of Hoheinhem shows the benefit of contract farming through the use of PSM. In this particular study, Saigenji and Zeller (2009) used Propensity Score Matching to evaluate the effect of contract farming to the income of smallholder tea producers in North-western Vietnam. The logit model was used to estimate the possibility of contract participation assigned to socio-economic characteristics of households (Saigenji and Zeller, 2009). The independent variables that were considered include the number of household members, proportion of adults, age, education and ethnicity of household head, number of household members who are engaged in associations such as farmers' union and communist party. The number of income sources[2] in 1997 was also included. The results from the logit model were used to estimate the effect of contract farming to the profitability of the tea farmers. Propensity Score Matching was used to reduce the bias when estimating the effect of the treatment. With the use of PSM, the difference in income between two groups (contract farmers and non-contract farmers) can be attributed in contract participation alone. The effect of the factors that might increase or decrease income aside from contract farming are reduced if not eliminated. Results show that participation in contract farming provides slightly higher income compared to those non-participants.

A study of Owusu and Abduali (2009) investigated the impact of non-farm employment on farm household income. The author used Propensity Score Matching to evaluate the impact of both wage and self-employment. In order to examine the impact of non-farm employment on farm household income, the author assumed a linear specification for household income as a function of vector explanatory variables and a participation dummy variable. Moreover, Owusu and Abdulai (2009) have also employed Propensity Score Matching to examine the causal effect of non-farm employment on poverty and household income. Propensity Score Matching was further used in this study to minimized self-selection bias which occurs when assigning participants to either control or treated group is not randomly done. Results showed that

[2] Income source referred to other means of making money

self-employment have much higher impact on the total income earnings of the household in Ghana compared to wage employment.

Another study conducted by Ravallion and Jalan estimated the income gains from an anti-poverty program and how those gains vary prior to the implementation of the program through Propensity Score Matching. According to Ravallion and Jalan, in order to estimate the impact of the program to the income of those who are under it one should include estimating the income of the group before and after the implementation of the program. Since it is difficult to observe the effect of the program to the treated group (those who are engaged in the program) at the same time, it is best to find a group who are not engaged in the program and compare their incomes with that of the treated group. However, doing this may increase the chance of a selection bias. The difference between the characteristics of the treated and untreated group may lead to the variation in their incomes, thus, the result may not be attributed to the involvement in the program (Caliendo and Kopeinig, 2009). In order to reduce selection bias, Ravallion and Jalan used Propensity Score Matching to match the characteristics of the treated with those untreated. Propensity Score Matching also enabled the authors to use a counterfactual group to represent the unobservable characteristic of the treated group. Results showed that those who were under the anti-poverty program gained higher income especially those for younger workers.

These studies have shown the use of Propensity Score Matching in evaluating the impact of a certain program to the income of those who are engaged to it. Propensity Score Matching has been widely used in different study to assess the impact of a certain program to those who have received it. Studying causal inference incurs a lot of selection bias, thus, made PSM an appropriate method to use since it provided the means to minimize biases through its appropriate matching techniques (Love, 2003). In line with these, this study had also used Propensity Score Matching to estimate the effect of Barangay Bagsakan to the profitability of small-scale vegetables farmers in Davao City. The variables that were used in this study include age, gender, farm size, household size, farm experience, educational level, volume of production, income, fare from farm to nearest wet/public market, price offered by Barangay Bagsakan and price offered by other markets. Barangay Bagsakan's attributes such as prices offered, assurance that the produce will be sold, convenience of location and mode of payment were also included in determining the factors that will affect farmers decision to supply

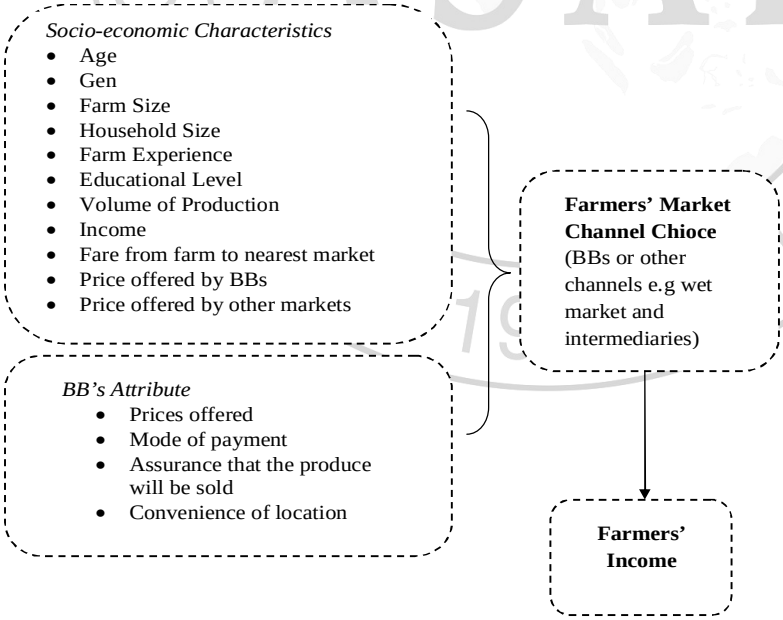
in BBs. Barangay Bagsakan System was only established in 2006. There is a little known about this system. This study may help in understanding the system of Barangay Bagsakan in Davao City.

III. Method

A. Conceptual Framework

The variables that were included in the study are the socio-economic and socio-demographic characteristics of the farmers: age, gender, farm size, household size, educational level, farming experience, income, fare from farm to nearest market, price offered by BBs and price offered by other markets. Barangay Bagsakan attributes such as prices offered, mode of payment and assurance that the produce will be sold, and convenience of the location were also included. In addition, the variables that were used in determining the effect of supplying to BB outlets to farmers' profitability include farmers' income and a dummy variable of participation.[3] These were based on the study conducted by Saigenji and Zeller (2009). The factors and its effect on farmers' decision are shown in the figure below (Figure 2).

Figure 2. Factors affecting Farmers' Decision to Supply in Barangay Bagsakan



1. Propensity Score Matching

[3] 1 if the farmer supply to BB's and 0 if otherwise

This study has also adapted the methodology used by Yoshiko Saegenji and Manfred Zeller in evaluating the effects of Contract farming to the income of Tea farmers in North-western Vietnam. This study made use of the Propensity Score Matching to estimate the impact of Contract farming to the income of small holder farmers in the area.

The concepts that were used in analyzing the effect of contract farming to the income of tea farmers in Vietnam were identified in this section.

2. Evaluation Framework

Inference about the impact of a treatment to an outcome on an individual involves assumption about how this individual would have performed had they not receive the treatment (Caliendo and Kopeinig, 2005). According to Caliendo, et al. (2005), this problem can be formalized through the potential outcome approach or the Roy-Rubin model which main pillars include the individuals, treatments and potential outcomes. The potential outcomes are defined as Y*i*(D*i*) where $D_i = 1$ if individual *i* receives the treatment and 0 if otherwise. Hence, the individual effect of the treatment to an individual can be written as:

$$\tau_i = Y_i(1) - Y_i(0)$$

Where τ_i is the effect of the treatment to an individual, Y*i*(1) is the potential outcome for an individual who receives the treatment and Y*i*(0) is the potential outcome for an individual who does not receive the treatment. However, it is difficult to observed individual treatment effect. One has to concentrate or estimate the average treatment effect at the population or sub-population level (Sianesi, 2001). The average effect of the treatment is defined as:

$$\boldsymbol{ATT = E(Y1 - Y0|D=1) = E(Y1|D=1) - E(Y0|D=1)}$$

Where *E(Y1 – Y0|D=1)* is the Average treatment effect on the treated(ATT), *E(Y1|D=1)* is the average potential outcome for a group of individual who receives the treatment and *E(Y0|D=1)* is the average potential outcome for the same group of individuals had they not receive the treatment.

However, we cannot observed both *E(Y1|D=1)* and *E(Y0|D=1)*[4] for the same group of individuals at the same time. In order to estimate ATT, one must select from the non-treated pool a control group in which the distribution of observed variables is

[4] Outcome of the group had they not receive the treatment

as similar as possible to the distribution in the treated group (Sianesi, 2001). The different characteristics possessed by the non-treated relative to the treated group may cause the variation of the potential outcomes for the two groups even in the absence of the treatment. The true parameter of the ATT is only identified if the difference between the potential outcomes for the treated group had they not received the treatment and the control group who haven't received the treatment is zero.

$$E(Y0|D=1) - E(Y0|D=0) = 0$$

Another parameter of interest is the Average Treatment Effect which is defined as:

$$ATE = E[Y(1) - Y(0)]$$

Where *Y(1)* is the average potential outcome of the treated and *Y(0)* is the average potential outcome of the group who haven't receive the treatment. In ATT, one must construct the counterfactuals for both the treated and untreated groups: $E[Y(1)|D=0]$ [5] and $E[Y(0)|D=1]$ [6].

Given that the observed covariates X[7] is not affected by the treatment assignment and that the treated and controlled groups have overlapping characteristics, the PSM estimator for ATT is written as:

$$\tau_{ATT}^{PSM} = E_{P(X)|D=1}\{E[Y(1)|D=1, P(X)] - E[Y(0)|D=0, P(X)]$$

The PSM estimator is the mean difference in outcomes over the common support appropriately weighted by the propensity score distribution of the participants (Caliendo and Kopeinig, 2005). The common support rules out the phenomenon of perfect predictability of *D* given *X*:

$$0 < P(D=1|X) < 1$$

This implies that persons with *X* values have a positive probability of being both participants and non-participants (Heckman, et.al, 1995).

B. Empirical Framework

The aim of this study will be to determine the effect of Barangay Bagsakan System to the profitability of small-scale vegetable farmers in Davao City. However, it is also important to include in the study other possible benefits of the system.

[5] The potential outcome of the treated had they not receive the treatment
[6] The potential outcome of the non-treated had they receive the treatment
[7] The variables that define the possibility of receiving the treatment or not

1. Determining the factors that would affect farmers' decision to supply to BB's

The following model will estimate the factors that might affect farmers' decision to supply to Barangay Bagsakan Outlets.

$$\ln\left(\frac{\hat{p}}{1-\hat{p}}\right) = B_0 + B_1 X$$

Where $\hat{p}$ is when Y = 1 and 1 - $\hat{p}$ is when Y = 0, $\beta_0 + \beta_1 X$ is the variables included in the logit model (SBB = $\beta_0 - \beta X_{Age} + \beta X_{GEN} - \beta X_{FAS} + \beta X_{HOU} - \beta X_{EXP} - \beta X_{EDU} - \beta X_{VOL} - \beta X_{INC} - \beta X_{FARE} + \beta X_{PRI} - \beta X_{PRI\_other} + e$

$\hat{p}$ can be computed by:

$$\frac{\exp(B_0 + B_1 X)}{1 + \exp(B_0 + B_1 x)} = \frac{e^{B_0 + B_1 x}}{1 + e^{B_0 + B_1 x}}$$

The probability of supplying to Barangay Bagsakan is expected to be inversely related to age, farm size (FAS), educational level (EDU), income (INC), farming experience (EXP), volume of production (VOL), fare from farm to nearest market (FARE), price offered by other markets (PRI_other) whereas the household size (HOU) and price offered by BB (PRI) are expected to be positively related to the dependent variable. The following is a description of the variables in the study.

Variable	Variable Description	Measurement
1. Dependent Variable	The probability of Farmers supplying to BB outlets	**The absence or presence of the treatment** 1 = the *i*th farmer supply to BB's 0 = otherwise
Independent Variables		
1. Age (-)	Age of the respondent	Continuous variable
2. Farm size/ FAS (-)	The number of hectares planted with vegetables	Continuous variable (in hectares)

3. Household Size/HOU (+)	The number of people living in the same house with the farmer. This is only composed of the people who are directly related to the farmer.	Continuous variable
4. Educational Level/EDU (-)	The number of years completed in schooling	Continuous variable
5. Farm Experience/EXP (-)	The number of years associated with vegetable farming	Continuous variable
6. Volume of Production/VOL (-)	The number of kilograms produced of vegetables	Continuous variable
7. Income/INC (-)	Income of the head of the household	Continuous variable
8. Fare from farm to nearest market /FARE (-)	Farmers' expenditure on fare from farm to nearest wet/public market	Continuous variable
9. Price offered by BBs/PRI (+)	BBs pricing on different vegetables (average)	Continuous variable
10. Price offered by other markets/PRI_other (-)	Other markets' pricing on different vegetables (average)	Continuous variable
11. Convenience of the location/CON (+)	Nearness to BB outlets	1-5 (1 as the highest, 5 lowest)
12. Gender/GEN	Male or Female	Male = 0 Female = 1
13. Prices offered by BBs/PRI (+)	The price offered by BBs to farmers' produce	1-5 (1 as the highest, 5 lowest)
14. Assurance/ASSR (+)	Assurance that the produce will be sold	1-5 (1 as the highest, 5 lowest)
15. Mode of payment/MOD (+)	Cash to Cash Basis	1-5 (1 as the highest, 5 lowest)

2. Effect of Barangay Bagsakan to Farmers' Profitability

The results in logit model were used to determine the effect of supplying to Barangay Bagsakan outlets to the profitability of farmers. To determine the effect of supplying to BB's on farmers' profitability, the outcome indicator used in this study is the income of the farmers who are exposed to the treatment and the income of farmers who are not exposed to the treatment. The difference between the incomes of these two groups is the gain due to treatment exposure.

$$E(Y1 - Y0|D=1) = E(Y1|D=1) - E(Y0|D=1)$$

Where: (1)

E(Y1 – Y0|D=1) is the average effect of the treatment to the treated (ATT)

E(Y1|D=1) = the income of the farmers exposed to the treatment

E(Y0|D=1) = the income of the farmers had they not exposed to the treatment

Subject assignment to the treatment can be obtained by matching the non-treated groups to treated groups through their propensity scores. This study uses the predicted values from the logit model to estimate the propensity scores for each participant and the control group. The strategy that was used in choosing the variables to be included in estimating the propensity score is by the level of the variables' statistical significance.

C. Data

The primary goal of this study was to determine the benefits of Barangay Bagsakan to small-scale farmers in Davao City. In order to achieve this goal, primary data were gathered from chosen respondents in the area. The respondents were divided into two groups, those farmers who are supplying to BBs (treated group) and those who do not supply to BB outlets (control group). The treated and control group will be further divided into sub-groups. The treated group will be divided into the treated and counterfactual group. Same goes with the control group; it will be divided into non-treated and counterfactual group. The Propensity Scores of both the treated and control group were used to determine the counterfactual groups.

To avoid selection bias, Propensity Score Matching was applied to determine the appropriate control group to be matched with the treated group. The treated and control group should have almost exactly the same observed characteristics (e.g farm size, number of household, number of income source, etc) so that the difference between the outcome indicator might be attributed to the treatment alone. The respondents that will be included in the interview are those that are directly involved in the production of vegetables.

The Barangay Bagsakan that were included in this study are those that belonged to an Agricultural Cooperative. Agricultural cooperatives are those who are engaged in the production of agricultural products such as fruits, vegetables, rice and corn (Araullo, 2006). Those BBs which do not belong to Agricultural cooperatives were not included in the study since most of their beneficiaries are non-farm workers. BBs

owned by Non-agricultural cooperatives purchased their vegetables from wet markets, not directly from farmers.

The BBs which were considered are located in Barangay Tamugan, Tacunan, Baracatan, Buda and Matina Biao. At least 20% of the farmers in each location were considered as respondents in this study. The total population of the farmers as well as the number of respondents that were included in the interview is shown in Table 1.

Table 1. Farmers' Population from each Barangay that was included in the study

Name of Barangay	Total Number of Farmers	20%	Actual # of farmers included
1. Baracatan	100	20	32
2. Buda	80	16	30
3. Tamugan, Marilog	30	6	16
4. Matina Biao	24	6	12
5. Tacunan	40	8	10
TOTAL	274	56	100

Source: City Agriculturists Office, Davao City

F. Data Analysis

1. Factors that affect farmers' decision to supply to BB's

The study used the Logit regression model to determine what factors affect farmers' decision to supply to BB outlets. Socio-economic factors, farmers' demographics and different BB attributes were included in the model. The significance of each independent variable was determined through their statistical significance obtained from t-ratio. Moreover, the fitness of the model was obtained from the adjusted R^2, provided through the use of software. The results of this analysis were further used to estimate the effect of supplying to BB's to farmers' profitability.

2. Effect of Barangay Bagsakan to Farmers' Profitability

After determining the factors which significantly affect farmers' decision to supply to BBs, PSM can now be applied. The factors that show statistical significance

from the logit model are the variables that were included in estimating propensity scores. Through matching algorithm (which in this case used Nearest Neighbor matching), farmers were divided in two groups.[8] These two groups were further divided into four groups (as shown in figure 3): (1) farmers who will be assigned to the treatment; (2) counterfactuals of farmers who are under the treatment; (3) farmers who will be assigned as the control group and; (4) counterfactuals of farmers who do not receive the treatment.[9] The difference between the income of groups 1 and 2 will be subtracted to the difference in income between groups 3 and 4. The difference between their incomes will be the gain from supplying to BB outlets which is written as:

$$ATE = E[Y(1) - Y(0)]$$

IV. Industry Analysis

A. Vegetable marketing in the Philippines

The vegetable marketing in the Philippines follows a traditional flow where farmers sell their produce to middlemen/intermediaries and wholesalers in the wet markets (Concepcion et.al, 2007). Seventy five to eighty five percent of the farmers sell their produce to middlemen or intermediaries. Middlemen's role in the supply chain is to link the producers and consumers, thereby saving small-scale farmers' produce to be wasted. From middlemen, the farmers produce are sold to wet markets in urban areas. The transfer of products from the farmers to the middlemen and to the wet markets in urban areas had caused the increase in price of vegetables. Value adding activities made by middlemen such as cleaning, sorting and packaging have made them achieve higher value, making them more profitable than the producers (Digal et al., 2006).

The majority of the vegetables were sold in the wet markets in urban areas. Metro Manila is the largest single market of fresh vegetables in the Philippines. However, the increasing income and changing lifestyles of urban consumers have changed the pattern of the supply chain (Conception, et al., 2007). With the continuous emergence of Supermarkets and the increasing demand for convenient shopping, there are other markets for fresh vegetables that were established. Aside from wet markets, traders sell the products to supermarkets which require higher quality standards.

[8] The first group is composed of farmers who are receiving the treatment and the second group is composed of farmers who do not participate in the system.

[9] Groups 1&2 and 3&4 possess the same characteristics except for the assigned dummy variable.

B. Barangay Bagsakan Centers in the Philippines

Barangay Bagsakan Centers were established in 2006 under the Accelerated Hunger Mitigation Program (AHMP) of President Gloria Macapagal-Arroyo. Under this program, the government tries to address hunger and poverty both on producers' and consumers' side by putting up Barangay Bagsakan Centers in different barangays in the Philippines. On the producer side, Barangay Bagsakan System looks at how more food can be produced and how food can be efficiently delivered to consumers, especially to the poorest of the poor consumers. The Department of Agriculture was tasked to implement the Barangay Bagsakan System by providing buildings and facilities for Barangay Bagsakan Centers (Aro, 2010). In addition, the Agribusiness and Marketing Division provides technical assistance through trainings and seminars before and during the operation of Barangay Bagsakan.

The actors of the systems aside from DA includes LGU and the small-scale farmers as well as the consumers in the area. The Local Government Units (LGUs) provides space or for BBs which is accessible to consumers. They are also responsible for installing electrical power source and water facilities and to designate an operator for the BB outlet. On the other hand, the role of farmers and consumers within and in nearby areas is to patronize the products sold in each BBs in their respective area.

Barangay Bagsakan is basically operated by a management team who passed the requirements imposed by DA. This team is composed of Operations Manager, Purchasing Officer, Finance Officer, Cashier and Storekeeper, each has a role to perform in the system (see Appendix A). The functions of each member of the management team and the operations of the BB itself are monitored by a representative from Agribusiness and Marketing Division.

Barangay Bagsakan Centers, as mentioned above, were established to benefit both producers and consumers. It makes basic commodities affordable for its consumers and provides direct selling outlet for farmers' products within and in nearby areas. Compared to public markets, commodities sold in BB centers such as fish, meat, fruits and vegetables are cheaper by P12 (Rodriguez, 2009). The presence of BBs in different barangays in the Philippines also benefits consumers especially those who are situated far from the public market. With BB centers within their barangays, it lessens residents' expense for fare since they can now purchase their basic needs in an outlet

near them (Bordado, 2009). As for the producer side, farmers can now sell their produce without the usual middlemen intervention. Moreover, BBs also generate employment within nearby barangays since idle residents are encourage to do farming (Rodriguez, 2009).

C. Barangay Bagsakan Centers in Davao City

As of April 2010, there were 10 Barangay Bagsakan Centers that have been established in Davao City which are located in Barangay Catalunan Pequeno, Tibungco, Agdao, Baracatan, Panalum, Sibulan, Buda, Tamugan, Colosas, Matina Biao and Tacunan. These Barangay Bagsakan were owned by Multipurpose Cooperatives as well as Agricultural Cooperatives. The Department of Agriculture, Region XI has provided these Barangay Bagsakan Centers with sacks of rice worth P50, 000, chillers, freezers, weighing scale, calculators, crates and other paraphernalia that will be needed in operating BBs[10]. The building and the installation of water and electrical sources were provided by the cooperative who owned the Bagsakan. Barangay Bagsakan in Davao City is basically operated by the manager with the help of other members of the cooperative. Aside from the operations manager, other tasks involved in the operation of BBs such as purchasing officer, finanial officer and storekeeper were given to no particular person as long as that person is a member of the cooperative. The workers of BBs were given monthly honorarium as their salary. The operations of BBs were monitored by DA representative once a month.

Barangay Bagsakan Centers in Davao City involves in selling primary goods such as rice, canned goods, noodles, shampoo, etc. The funds used for purchasing these items were provided by the cooperative (excluding rice). Moreover, BBs, especially those owned by Agricultural cooperatives, also involve selling vegetables to consumers which are provided by farmers in nearby areas. The top five vegetables that were produced include squash, tomato, raddish, bell pepper and lettuce.

Squash has the highest volume followed by tomato, radish, bell pepper and lettuce. Moreover, the top five vegetables sold to Barangay Bagsakan include eggplant, bitter gourd, squash, onion leaf, and pechay.

[10] These were based on the interview done in Barangay Baracatan, Buda, Matina Biao, Tacunan and Tamugan.

D. Issues and Challenges of Barangay Bagsakan Centers in Davao City

Barangay Bagsakan Centers in Davao City face a number of problems that hinder it to provide better service to its benefactors, especially the producers' side. However, this section of the paper includes only the issues that concerns vegetable producers, vegetable purchasing and marketing. The following are the constraints and limitations of Barangay Bagsakan Centers in Davao City. These were based on interview among five Barangay Bagsakan in Davao City which are owned by an agricultural cooperative (Baracatan, Buda, Matina Biao, Tacunan and Tamugan).

1. Lack of Capital

Barangay Bagsakan Centers are characterized by small starting capital to purchase vegetables from farmers. Aside from rice and other paraphernalia needed to operate the Bagsakan, the government didn't provide financial assistance to these BBs. As a result, BB outlets are capable only of purchasing small volume of vegetables making them the last option as an outlet for farmers' produce. One of the main goals of these centers is to serve as farmers' outlet for their produce. However, this is not the case of BBs in Davao City.

An average farmer is capable of producing 491 kg of eggplant per week; however, only 14 kg of these will be bought BBs. Barangay Bagsakan Centers are only capable of purchasing two to ten kilograms of vegetables per day. Thus, despite the presence of BBs, majority of the farmers still opt to sell their produce to middlemen since the latter have no limit in terms of purchasing vegetables.

2. Limited Market for Vegetables

Aside from limited capital for purchasing vegetables, BBs buy small volume of vegetables since they do not have market for these vegetables. They see to it that the vegetables they purchase will be sold within a week (depending on its shelf-life). Majority of the residents in a vegetable producing area doesn't need to buy vegetables since they have allotted certain volume of vegetables for their consumption. Because of this, vegetables in Barangay Bagsakan takes longer time to be sold resulting to maintaining small volume of vegetable purchase from farmers.

3. Lack of Transport Facilities

Trucks and other transport facilities are needed in order to deliver large volume of vegetables in the market. However, none of the Barangay Bagsakan in Davao City owned a truck for transportation purposes. This is a major hindrance in fulfilling the main goal of BBs which is to serve as an outlet for farmers produce. BBs cannot consider their communities as market for vegetables since these people have the capacity to produce vegetables for their own consumption. BBs need other markets for their vegetables and with that they would need a transport vehicle in order for them to tap larger market.

V. Results and Discussion

This section of the paper presents the results of the study as well as the preliminary analysis that were based on the socio-demographic and socio-economic profile of the respondents as well as other factors that affect the decision to supply to Barangay Bagsakan.

A. Profile of the Respondents

The respondents of this study were composed of small-scale vegetable farmers who are directly involved in the activities of their farms such as tilling, planting and harvesting. Moreover, the respondents were divided into two groups, the treated and the non-treated. Treated groups were those who supply their vegetables to Barangay Bagsakan whereas respondents who belonged to non-treated groups were those who sell their vegetables to other buyers such as traders, neighbors and public markets. The respondents were from Baracatan, Buda, Matina Biao, Tacunan and Tamugan, Davao City. These barangays were chosen based on the existence of an agricultural cooperative which owns a Barangay Bagsakan in the area. The following is a preliminary analysis on the socio-demographic and socio-economic profile of the respondents.

The respondents were mostly male with an average age of 46 and had spent an average of 8 years in school (3rd year high school). Moreover, the average household size of the respondents is 5 and each owned an average of 0.6 ha of farm land and harvested an average of 1917.3 kg/mo of different vegetables. Each respondent has an average of 13 years in vegetable farming and an average income of P23,422.85 per month.

1. Characteristics of Farmers in Treated and Non-Treated Group

Table 3 shows the relationship between the groups of respondents and their socio-economic and socio-demographic characteristics. Out of 100 respondents, 49 said that they sold their vegetables to Barangay Bagsakan (Treated group) while 51 respondents sold their vegetables to public markets, traders, neighbors, etc. There is a little difference between the average household size of treated and non-treated group (5.57 and 5.41 respectively). This implies that the decision of supplying to BBs or not is not affected by how large or little is the household size of the farmers. Same is true with variables educational level and farming experience. The respondents in both groups didn't complete any formal education as shown by their average years in school (8years). As for the variable age, older farmers tend to supply to Barangay Bagsakan as shown in the average age per group. The average age for those who supply to BBs is 46.82 compared to 44.37 for those who sell their vegetables to other buyers. Both treated and non-treated group were dominated by male respondents.

On the other hand, there is a significant difference between the average farm size of treated and non-treated group. The farm size of those who do not supply to Barangay Bagsakan is larger by around 400$m^{2.}$ Those who do not sell their vegetables to Barangay Bagsakan are characterized by large farm size. Moreover, in terms of volume, those who belonged to the treated group tend to have lesser volume of produce as compared to those who are in the non-treated group. Non-treated respondents are five times more productive than those who are in the treated group.

As of income, there was a large difference between the income of treated and non-treated group. Income for the non-treated group is higher by around P30, 000. Farmers with smaller income were more likely to supply to Barangay Bagsakan.

2. Characteristics of Market Channels

There are three market channels that were identified in this study: Barangay Bagsakan, Traders/Middlemen and Wet/ Public markets. Table 6 shows the comparison of characteristics between these market channels.

Barangay Bagsakan has an advantage in terms of saving farmers with transportation costs. BBs were scattered around different Barangays all over the country to served farmers and consumers who are far away from the city. However, in

some circumstances, selling vegetables through traders and middlemen is more comfortable than selling to Barangay Bagsakan since these channels picked up farmers' vegetables someplace near their farms.

In terms of payments, BBs and traders/middlemen pay cash upon receiving farmers' produce whereas wet/public markets involves consignment wherein farmers where paid after their produce are sold and the amount of payment is dependent on how much of the vegetables were sold. In terms of purchasing capacity, traders/middlemen and wet/public markets have limited purchasing capacity. These market channels can buy large amount of vegetables as long as it passes their standards. Barangay Bagsakan, on the other hand, purchased limited amount of vegetables per day. They make sure that the amount of vegetables they bought will be sold on or before a week (depending on the shelf life of vegetables). However, BBs' purchased vegetables on a daily basis. This characteristic of BBs is beneficial to farmers who owned very small amount of farm size.

Among these market channels, however, only traders/middlemen offers credit assistance to farmers. They provide farmers with capital and farm inputs. The amount of these credits will be deducted on the payment upon receiving farmers' produce.

3. Frequency Distribution of Farmers' Socio-economic Characteristics

Age

The largest proportion of the respondents belonged to age bracket 54 and above (having 74 as the oldest) which accounted for 29% of the total respondents followed by age bracket 36-41, 19%. Brackets 42-47, 48-53 and 30-35 accounted for 18%, 13% and 12% respectively. Only nine respondents belonged to age bracket 24-29. The average age for the respondents is 46. In the treated group, a large proportion of the respondents (18) belonged to age bracket 54 and above which implies that more elderly farmers are engaged in selling their vegetables to Barangay Bagsakan (see Table 7).

Gender

Majority of the respondents in the interview were male which accounted for 56% of the total sample size of 100 while female respondents accounted for the remaining 44%. The treated group is dominated by males which accounted for 61% or 30 respondents while the females are only 19 or 38%. On the other hand, the non-treated

group is composed of almost equal number of males and females, 26 and 25 respondents respectively (see Table 7).

Educational Level

For the educational level of the respondents, only nine percent had gone to college. The largest proportion of the respondents (48%) had gone to elementary and high school however, not to college while the remaining 43% had spent only six years and below in school. The average number of schooling is only 8 years or second year high school.

In the case of the treated group, the highest distribution of the respondents had only had 6 years and below in schooling (49%), followed by 47% or 23 respondents gone in elementary and high school and only 4% or 2 respondents had taken a course in college. Meanwhile, 49% of the respondents in the non-treated group had gone to elementary and high school while 37% had gone only to elementary. Only 4% or 7 respondents reached college.

Farm Size

The respondents are characterized by small farm size which is, in average, 250 m^2. Large proportion of the respondents (55%) has only 20 to 300 meters land area which is planted with vegetables (see Table 7). Out of 100 respondents, only 11% owned a farm size of 1, 500 meters and above.

Likewise, majority from the treated and non-treated group (67% and 43% respectively) is characterized by very small farm size which is 20 to 300 m^2 only. Out of 49 respondents from the treated group, only 12% owned a farm size of 1, 500 m^2 and above while 10% from the non-treated. This implies that the more a farmer own a large farm size, the lesser the incident of farmers supplying to BBs.

Household Size

Household size is the number of family members directly supported by the household head. The largest proportion of the respondents (21%) has a household size of five. Meanwhile, both the treated and non-treated group has an average household size of five. This implies that supplying to Barangay Bagsakan is not affected by how large the household is.

Farming Experience

Out of 100 respondents, 43% has a length of experience in farming below 10 years while only 11% has above 30 years of experience in farming. The average farming experience for the respondents is 13 years.

Meanwhile, a large proportion of both treated and non-treated group has a farming experience below nine years. However, compared to treated group, the number of non-treated respondents was higher in range 20-24years and 25-29 years. This implies that farming experience affects the decision of farmers whether to sell their vegetables to BBs or not. Farmers who have longer experience in farming tend to supply to other market channels. These farmers may have built contracts or connections with traders and middlemen in terms of marketing their produce.

Volume of Production

A large proportion of the respondents are characterized by low volume of production as shown in Table 7. Fifty-seven percent of the respondents yield less than 500kg of vegetables while only seven percent yields over 10,000kg per month. However, compared to treated group, those who do not supply to Barangay Bagsakan tend to have higher volume of production. There were four respondents from non-treated group who yields 3001-6000kg of vegetables per month and seven respondents from the same group who yields more than 10,000kg. Farmers' decision to supply to BBs is affected by how much they produce. This can be explained since 4 out of 5 BBs buy only little amount of vegetable, enough to be sold within one week only. This restrained farmers with larger volume of vegetables to supply to BBs since BBs can only bought small amount of their produce. This implies that those farmers who have high volume of production rarely sell their produce to Barangay Bagsakan.

Income

As for income, majority of the respondents (54%) earn less than P5, 000 per month from vegetable production. Only 4% of them earns as much as P160, 000. In treated group, 33% of the respondents earns below P5, 000 a month. No respondent from this group has an income of P160, 000 from selling vegetables. On the other hand, 4 respondents from non-treated group earns P80, 000-160, 000 and 4 respondents from the same group has an income of more than P160, 000 from vegetable production per month. Farmers who sold their produce to other market channels are better off (in terms of income) than those who supply to Barangay Bagsakan.

4. Relationship among Dependent and Independent Variables

Aside from socio-economic characteristics of the farmers, their decision as to where they sell their produce is also affected by marketing factors such as transportation cost[11] and prices offered by different markets. In this study, farmers' decision is greatly affected by the prices offered by a particular market. Respondents in Baracatan preferred to sell their vegetables to Barangay Bagsakan since prices are similar to the prices offered in the nearest public market (Toril). In contrast, respondents in Buda, despite high transportation cost prefer to sell their produce to other markets since Barangay Bagsakan offers cheaper prices as compared to other markets. Moreover, transportation cost also affects farmers' decision whether to supply to BBs or not. Majority of the respondents from Tacunan chose to sell their vegetables to other markets despite BB's relatively higher price since transportation cost is cheap (P25).

As for the dependent variable income, there is a significant difference on the average farm size and volume of production between low and high income farmers **(see Table 9)**. Apparently, farm size and volume of production has a significant effect on farmers' income. Farmers have had higher income when they have large farm size and high yield. Moreover, educational level and farm experience also have a considerable effect in income. High income respondents have spent more years in school (9 years) compared to low income farmers (8 years) and they have an average of 15 years farm experience, higher than those of the low income group (13 years).

The dummy variable Barangay Bagsakan (BB) shows no significant effect on the income of farmers based on the table above. Majority of the respondents has low income whether they belonged to treated or not. Only 15% of the respondents belonged to high income group, 2 from the treated and 13 from non-treated group.

B. Econometric Analyses

This section presents the result from Logit and OLS Regression Analysis to determine the effect of independent variables to dependent variables.

[11] Transportation cost, in this case, includes only the fare from farm to the nearest public market.

1. **What particular socio-economic characteristics would affect farmers' decision to supply to Barangay Bagsakan?**

Presented below is an output for determining the probability of selling to Barangay Bagsakan given the farmers' socio-economic characteristics. The dependent variable in this case is 1 if a farmer sells his/her vegetables to BBs and 0 if otherwise. Using Gretl[12], the model is significant at 0.05 alpha with seven significant variables: age, farm size, farm experience, volume of production and price offered by Barangay Bagsakan. The model has 82% prediction rate (see Table 10). As age and farm size increase by one unit, the log-odds in favor of selling to BBs will increase by 0.0462287 and 0.0018617 respectively. On the other hand, if farm experience and volume of production increase by one unit the log-odds will decrease by -0.0636837 and -0.000424851. Among all the variables, the price offered by Barangay Bagsakan has the greatest effect on farmers' decision whether to supply to BBs or not. Price offered by BBs is significant at 0.01 alpha which implies that as the pricing of BBs to vegetables increases by one unit, the log-odds in favor of selling to these outlets will also increase by 0.169891.

Table 10. Logit Analysis for Determining the Effect of Independent Variables to the Probability of Selling to BBs

Model 3: Logit, using observations 1-100
Dependent variable: Y

	Coefficient	std. error	Z	p-value	
const	-4.53001	2.71166	-1.671	0.0948	*
AGE	0.0462287	0.0269665	1.714	0.0865	*
FAS	0.00186175	0.000888480	2.095	0.0361	**
HOU	0.203816	0.136604	1.492	0.1357	
EXP	-0.0636837	0.0319101	-1.996	0.0460	**
EDU	-0.116657	0.122655	-0.9511	0.3416	
VOL	-0.000424851	0.000208841	-2.034	0.0419	**
INC	-2.69132e-05	1.83863e-05	-1.464	0.1433	
FARE	-0.0272465	0.0197305	-1.381	0.1673	

[12] Gretl is an open-source statistical package, mainly for econometrics. The name is an acronym for Gnu Regression, Econometrics and Time-series Library (wikipedia.org)

PRI	0.169891	0.0510237	3.330	0.0009 ***
Number of cases 'correctly predicted' = 82 (82%)				
Likelihood ratio test: Chi-square(9) = 54.8525 [0.0000]				

The original model includes the variables Gender (GEN) and Price offered by other market (PRI_others) however these variables were later omitted. The variable Gender was omitted in the model since the respondents were chosen based on their involvement in farm activities such as tilling, planting and harvesting. It turned out that both male and female (man and wife) has direct involvement in these activities so they were both qualified as respondents. Though the inclusion of Gender as a variable will increase the prediction rate to 83% and would yield 8, it was not considered since it is not consistent with the theory. Moreover, the inclusion of PRI_others would result to multicollinearity problem. PRI_others and Prices offered by BBs are correlated, thus, PRI_others was omitted.

Given these coefficients (refer to column 2, Table 10), farmers' probabilities of supplying to BBs given their average socio-economic characteristic is shown in Table 11. The probabilities for each independent variable were computed using the following formula:

$$\mathbf{P_i = 1/\ 1 + e^z}$$

(1)[13]

Where: $Z = \beta_0 - \beta X_{Age} + \beta X_{GEN} - \beta X_{FAS} + \beta X_{HOU} - \beta X_{EXP} - \beta X_{EDU} - \beta X_{VOL} - \beta X_{INC} - \beta X_{FARE} + \beta X_{PRI} - \beta X_{PRI\_other}$

Among the independent variables, the price offered by BBs has the most significant contribution in the probability that farmers will sell their produce to Barangay Bagsakan. If the pricing of BBs on vegetables is P23, the probability will increase by 0.35. Farm size has also a significant contribution. If farm size will increase to 603 m^2, the probability of supplying to BBs will increase by 0.032. On the other hand, educational level has the least contribution since a farmer who had spent eight years in school has 0.004 probability of supplying to BBs. In addition, if volume of production increases to 1917kg, the probability of supplying to BBs will only increase

[13] This formula was introduced by Damodar Gujarati in his book "Basic Econometrics 4th Edition"(Gujarati, 2004).

to 0.005. Farmers would opt to sell their produce to traders and public markets since these entities have no limitations in terms of the amount to purchase.

Table 11. Probability of Supplying to Barangay Bagsakan

Socio-economic Characteristics	Probabilities
1. Age	0.083
2. Farm Size	0.032
3. Household Size	0.029
4. Farm Experience	0.024
5. Educational Level	0.004
6. Volume of Production	0.005
7. Income	0.006
8. Fare (farm to market)	0.003
9. Price offered by BBs	0.35

Supplying to Barangay Bagsakan is directly proportional to age, farm size, household size, farm experience and price offered by BBs. If these variables increase, the probability of farmers selling to BBs will also increase (see Appendix B). Meanwhile, volume of production, income and fare from farm to nearest market are inversely proportional the dependent variable. The probability of farmers supplying to BBs will decrease if these variables will increase.

2. What is the effect of supplying to Barangay Bagsakan to Farmers' Income?

To estimate the effect of supplying to BBs to farmers' income, a logit regression analysis was conducted. The variables were also tested for multicollinearity and heteroskedasticity problems and proved it free from any of these regression problems.

The model has 0.18 pseudo R^2 which means that the respondents do not have much distinct characteristics, thus, make a good match between treated and control group. Table 12 shows the results before and after matching the two groups. The difference between the income of those who supply to Barangay Bagsakan and to those who supply for other markets is 9075.60. This implies that selling to Barangay Bagsakan would make farmers' income lower by P9, 75.60.5 than if they sell to other markets such as wet markets and traders.

Table 12. Average Treatment Effect on Treated and Control Group

Variable	Sample	Mean		Difference	S.E	
Inc		Treated	Control			T-stat
	Unmatched	6819.2	39375	-32556.13	10317.36	-3.16
	Matched	**7519.21**	**16594.6**	-9075.60	12003.45	-0.76
Pseudo R2 = 0.1843						

Aside from the fact that BBs buy only minimal amount of vegetables from farmers to make sure that it will be all sold out for a week, they have also low capacity to buy vegetables by bulk due to lack of capital. Most of the managers of BBs (those that were included in the study) said that it would be best if they will serve as a consolidation centers for farmers' produce where in farmers can sell all their vegetables to BBs instead of selling it to middlemen or traders. After consolidation, the BB itself will be the one to find a market for those produce that were sold to them. In this case, the node where traders and middlemen come in will be deleted in the picture, thus, bringing most of the profit to farmers. However, due to lack of capital, BBs were also limited to buy large volume of produce from the farmers, bringing farmers back to the mercy of traders and middlemen.

3. What would be the effect of farmers' socio-economic characteristics to income?

With p-value 1.29e-14, less than alpha, the model is significant with 2 significant variables at 0.05 and 0.01 alpha: farm size and volume of production. As farm size and volume of production increase by one unit, income increases by 15.3657 and 8.17975 respectively. Fifty-three percent of the changes or variability in the dependent variable is explained by independent variables. Moreover, the model is homoskedastic and none of the independent variables is correlated with each other. Notice that coefficient for variable BB is negative. This implies that selling vegetables to BBs will decrease income by 9718.32. This can be explained since BBs buy only small amounts of vegetables from the farmers, roughly 2 to 10 kilos daily at the maximum. If farmers (with more than 10 kg of vegetable produce) will only rely on BBs as selling outlets for

their produce, then producing vegetables more than 10 kg will be a waste, thus reducing their incomes as well.

Table 13. OLS Regression for Determining the Effect of the Independent Variables to Income

Model 12: OLS, using observations 1-100

Dependent variable: INC

	Coefficient	std. error	t-ratio	p-value
const	-11137.1	19711.5	-0.5650	0.5734
FAS	15.3657	7.05423	2.178	0.0319 **
HOU	1373.53	1702.91	0.8066	0.4220
EXP	272.284	371.625	0.7327	0.4656
EDU	408.389	1544.56	0.2644	0.7921
VOL	8.17975	1.26337	6.475	4.43e-09 ***
BB	-9718.32	7979.63	-1.218	0.2263

R-squared 0.557338 Adjusted R-squared 0.528779

P-value(F) 1.29e-14

4. What particular BB characteristic affects farmers' decision to sell their vegetables to BB outlets?

One of the objectives of this study is to determine what attribute of Barangay Bagsakan (mode of payment, prices offered, assurance and convenience of location) affects farmers' decision to sell their vegetables to BB outlets. The respondents were asked to rank BB attributes that attracted them to supply to Barangay Bagsakan, 1 as the highest and 5, lowest. Among the four BB attributes, the convenience of location is the strongest driver why farmers would opt to sell their vegetables to BBs. Since most of the respondents produce small volume of vegetable, they would choose to sell it to Barangay Bagsakan rather than spending money for transportation cost if they sell it to wet/public markets. Assurance that the produce will be sold got the second lowest average which implies that farmers chose it as one of the most important BB attribute that attracts them to supply to BBs. Farmers need daily income to support the daily needs of their families. Compared to traders and middlemen, BBs allow farmers to sell their vegetables in a daily basis thus, giving daily income for farmers no matter how

small it might be (the buying capacity of BBs is a different issue). The next BB attribute that greatly affect farmers' decision is the mode of payment. BBs pay farmers in a cash-to-cash basis.

Moreover, the prices offered by BBs are mostly the same with the prices in wet markets and traders. The fact that Barangay Bagsakan Centers were located in small barangays to cater the needs of the community as well as its neighboring communities, farmers need not to go to wet markets in town to sell their vegetables, thus saving them from transportation costs.

VI. Summary, Conclusion, and Recommendation

Due to high marketing costs, farmers weren't able to directly sell their produce to wet markets and super markets making them dependent to traders and middlemen. With these practices, farmers get low profit since they were only price takers. Traders and middlemen left them with a "Take It or Leave It" option. However, the emergence of consolidation centers had opened a new option for farmers. Consolidation centers like Farmers Market, Gulayan sa Barangay and Barangay Bagsakan allow farmers to have direct contact to consumers making them less dependent on traders and middlemen. The fact that these consolidation centers may be beneficial to farmers leads this study about the benefit of Barangay Bagsakan to small-scale vegetable farmers in Davao City. This study was conducted to determine the benefits of BBs to vegetable farmers particularly on their income. Moreover, the study was also conducted to determine what characteristics of farmers and BBs would affect farmers' decision to sell their vegetables to BBs.

Results showed that farm size, volume of production and price offered by Barangay Bagsakan have the most significant contribution to farmers' decision whether to supply to BBs or not. Farmers with smaller farm size have larger probability to supply to BBs since they do not have other options to sell their vegetables. Price offered by Barangay Bagsakan is the most significant among the independent variables. Farmers prefer to sell their produce to BBs if the prices are similar to the prices offered by other markets. By supplying to BBs, farmers were able to minimized transportation cost and at the same time, they get the same price for their vegetables, the same price if they sold it to wet markets in Bangkerohan, Toril or Mintal. On the other hand, farmers who produce large volume of vegetables have smaller probability of supplying to BBs.

With large amount of vegetables, farmers can sell their produce to wet markets or traders and middlemen. BBs also have limitations in terms of purchasing large amount of vegetables. They only buy a maximum of two to ten kilos of vegetables per day, enough to be sold within a week. This explains why farmers with large volume of produce opt to sell their vegetables to other markets rather than selling it to BBs.

Farmers' decision is also affected by BB attributes such as mode of payment, prices offered, assurance that the produce will be sold and convenience of location. However, among these attributes, the convenience of the location has the greatest effect on farmers' decision whether to supply to BBs or not. Majority of farmers who produced very small volume of vegetable would choose to sell to BBs than spending money for transportation costs if they supply to wet/public markets. Moreover, the assurance that the produce will be sold ranked second among the four attributes. Since farmers need daily income to sustain their families, they also need an outlet that would buy their produce in a daily basis. Traders and middlemen buy farmers produce thrice per week or sometimes, once a week only. Thus, it is of great help that BBs buy vegetables from farmers daily. It helped farmers have daily income no matter how little it might be.

As of income, BBs do not have a significant effect on making farmers more profitable when they supply to BB outlets. Results showed that in fact, supplying to BBs will decrease farmers' income to as much as P9, 718.32. However, this can only be applied to farmers with large volume of production. If these farmers will have BBs as their only option to sell their vegetable, then they would definitely lowered their income by P9, 718.32 since only a small amount of their produce will be bought by BBs, the rest will not be purchased by BBs. This fact was supported with results from Propensity Score Matching. Results from PSM showed that those respondents who supplied their vegetables to BBs have lower income than if had sell it to other markets. The treated respondents have an income of P9208.3; however, they would have an income of P16, 594.8 if they had sell it to other markets. The difference between their income if they supply to BBs or to other markets is P9, 075.60. Thus, selling to other market channels other than Barangay Bagsakan still make farmers profitable.

The existence of BBs didn't alter the traditional chain of vegetables since farmers still sell their vegetables to traders and middlemen. Though BBs offer higher price relative to prices offered by traders and middlemen, the fact that BBs purchased

limited amount of vegetables hinder farmers to sell their produce to these kinds of outlets. The problem lies with the fact that BBs have little capital to spend on farmers vegetables. Barangay Bagsakan could be a viable structure for consolidating farmers' produce since it is located in barangays in which vegetable farmers were concentrated. BBs may serve as buyers and consolidation centers for farmers' produce and sell it to wet markets in Bankerohan, Toril, Mintal and Calinan. However, due to lack of capital, they were only able to purchasing two to ten kilos of vegetables only. It would be a lot useful for Barangay Bagsakan if the government will provide them with cash loans aside from providing them with rice[14] and paraphernalia such as chillers, freezers, calculators, weighing scale, etc. Moreover, the operators of Barangay Bagsakan can also pool resources from its member farmers and use these as starting capital to buy large amount of vegetables. BB operators may also contact buyers from wet markets. They should tap buyers and wholesalers in wet markets so as to have other outlets aside from their community. BBs may serve as the "trader/middlemen" and be the one to sell the vegetables to wet markets in their respective cities. One of the problems cited by the manager of BB in Baracatan regarding this arrangement is that they do not have means of transport to deliver large amount of vegetables in the nearest wet market. It would cost them large amount of capital if they will hire a jeepney to sell their vegetables to Toril. However, this study also found out that BBs get their supply from the nearest public market from their barangay. Thus, to save them from high cost of transportation in selling large volume of vegetables to wet markets, they can schedule delivering produce to wet market during the time they buy their supplies. The problems faced by Barangay Bagsakan Centers should first be addressed so as to make these outlets a viable structure in helping both consumers and producers, especially small-scale vegetable farmers.

[14] Rice were only provided to Barangay Bagsakan during its first operation.

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APPENDIX B

Probability of Supplying to Barangay Bagsakan (per variable)

Barangay	Socio-economic Characteristics	Probabilities	Trend
	AGE		
1. Baracatan	46	0.082906835	Directly Proportional
2. Buda	43	0.072953752	
3. Matina Biao	52	0.106583977	
4. Tacunan	48	0.090213326	
5. Tamugan	44	0.076142657	
	FARM SIZE		
1. Baracatan	603	0.032065702	Directly Proportional
2. Buda	1035	0.068939134	
3. Matina Biao	276	0.01770282	
4. Tacunan	239	0.016543913	
5. Tamugan	333	0.019645805	
	HOUSEHOLD SIZE		
1. Baracatan	5	0.029002762	Directly Proportional
2. Buda	6	0.03532786	
3. Matina Biao	5	0.02900276	
4. Tacunan	6	0.03532786	
5. Tamugan	6	0.03532786	
	FARM EXPERIENCE		
1. Baracatan	13	0.024077048	Directly Proportional
2. Buda	11	0.005322187	
3. Matina Biao	11	0.005322187	
4. Tacunan	13	0.024077048	
5. Tamugan	11	0.005322187	
	VOLUME OF PRODUCTION		
1. Baracatan	1917	0.004751873	Inversely Proportional
2. Buda	5049	1.26E-03	
3. Matina Biao	278	0.009488678	
4. Tacunan	186	0.009863169	
5. Tamugan	383	0.009078455	
	INCOME		
1. Baracatan	23423	0.005706641	Inversely Proportional
2. Buda	61357	0.002063414	
3. Matina Biao	4961	0.009344955	
4. Tacunan	2470	0.009986455	
5. Tamugan	7941	0.008630959	
	FARE		
1. Baracatan	42	0.003421097	Inversely Proportional
2. Buda	77	0.001321065	
3. Matina Biao	33	0.00436767	
4. Tacunan	25	0.005425655	
5. Tamugan	36	0.00402624	
	PRICE OFFERED BY BBS		
6. Baracatan	23	0.349209113	Directly Proportional
7. Buda	77	0.001321065	
8. Matina Biao	13	0.089363727	
9. Tacunan	23	0.349209113	
10. Tamugan	18	0.186642902	