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Factors Influencing the Sustainability of Backyard Pig Farming in Borongan City, Eastern Samar

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ABSTRACT

This descriptive explanatory design underscored the perceived sustainability influence of thirteen determinant factors on the sustainability of small-scale backyard pig farming in Borongan City involving 30 pig growers and producers. Results of the regression analysis indicated that the sustainability factor that contribute significantly to the small-scale backyard pig farmers' decision to continuously engage in backyard pig farming are *family income, organizational affiliation, access to credit sources other than bank, being contract or independent farmer, and extension exposure*. On the other hand, *age of respondent, educational attainment of respondent, number of dependents in the family, available family labor, gender, access to bank credit, market of the product, and tolerance/complaint from neighbors influences farmers decision to discontinue their pig farming activities.* The most significant determinant factors for farmers to continuously engaged in small-scale pig farming business venture in Borongan City is the availability of *financial resources* (such as family income, credit that is easy to access, and contract growing scheme) for supporting backyard pig production, and *enhanced social capital* (organizational affiliation and extension exposure). Two-tailed test and chi square results showed that the differences were all *positive* which means that the measures for the group with sustainable backyard farming were significantly higher than those for group whose backyard pig production systems were not sustainable. The provision of credit facilities and microfinancing program to support the sustainability of small-scale pig farming business in the city of Borongan; The clustering of municipal hog raisers and traders into cooperative, increasing production volume, adopting a community-based approach in herd-health improvement, encouraging joint production of commercial and backyard swine farms, and increasing efforts to promote social awareness regarding environmental impact of swine production and enhancing the pig farming extension activities are also recommended.

Keywords: Backyard Pig Farming, Sustainability Factors, Pig Farming Extension Exposures

Introduction

Pig farming remains one of the important industries in the country and is one of the most popular farming activities and enterprise in region 8 and in Eastern Samar. Its popularity can be attributed to its profitability, good market for finished hogs and pork and its small scale or backyard viability. The average rural Filipino household usually raises a small number of pigs to augment their needs for cash and/or food

and for planned and emergency expenses. Aside from being a source of income, pig raising provides job opportunities, economic role for certain members of the household particularly women, children and the young adults and out of school youth, and utilization of kitchen leftovers, vegetable trimmings and household by-products.

In the Philippines, backyard pig farming operations are found all over the country, while commercial pig farming operations are centered around the major urban areas such as Tacloban City and Catbalogan Samar in the case of Samar Leyte Areas. There is proliferation of backyard pig producers which dominate the country's swine industry. About 68.15% of the total fattener stocks were raised in backyard farms and the rest were in commercial farms. However, in 2015 to 2016, a decrease was observed in the number of fatteners raised in the backyard. As of July 1, 2016, the total inventory of fatteners raised in backyard farms was at 2.49 million heads. This was 3.23% lower than 2015's level of 2.57 million heads (Philippine Statistics Authority, 2016). The participation of backyard farms is important in the regions and province's pig industry; hence, backyard pig farming should be sustainable.

The concept of sustainability usually refers to the long term, and sustainable swine production as discussed by Perey (2017) as involving minimization of the environmental degradation, local water resources pollution and GHG emission while generating income for farmers. In this study, sustainability of backyard pig production is described as the continuous raising of fattening pigs for at least six production cycles within 3 years. The logic in this description is that a farmer cannot continue with his/her backyard pig farming if he/she is constrained by unfavorable factors within oneself, his/her household, and the immediate environment. Pig farming is more capital intensive than raising other livestock. Grown in confinement, pigs depend on care and management by the owner. It takes 3-5 months before growing-finishing pigs reach market weight. Income is collected only after this period but the farmer has to spend every day, largely on feed, and farm maintenance to support growth. Feed cost is 70-80% of the total cost of producing growing-finishing pigs. Without other source of income, it is difficult for a low-income farmer to sustain pig production.

Philippine Statistics Authority (2016) defined backyard farm as any farm or household whether farming or non-farming raising 1-20 heads of adult animals. As adopted from this definition, backyard pig farming, in this study, refers to raising of 1-20 heads of growing-finishing pigs. Stanton et al. (2010) as mentioned by Perey (2017) identified two broad subsectors in the Philippine pig farming industry and these are the backyard subsector and the commercial subsector. Backyard subsector comprises two types of farmers-the subsistence producers and the small-holder pig producers. Backyard pig farmers in this study are similar to what was termed by Stanton et al. (2010) as "small-holder pig producers" who are either independent producers or contract farmers. They are also characterized as operating as family enterprise tending up to 20 heads of mainly hybrid pigs or crosses of exotic standard breeds that are procured from nearby commercial pig farms or government breeding stations; having source of income other than pig farming; investing in facilities and capital equipment, for example, pig housing and pens and production equipment; and generally feeding pigs with commercially formulated feed with nutrient supplements that are sourced from local agricultural and veterinary products distributors.

Backyard small scale pig production systems in the municipality of Borongan City are characterized by confining the animals in pens usually with concrete floor, feeding with commercially formulated feed, and usually without the services of veterinarian. Nevertheless, they have access to services of extensionists of the City Agriculture Office of the Department of Agriculture (DA) and the Eastern Samar state University (ESSU) which College of Agriculture and Natural Sciences located in Maypangdan Borongan City.

Preliminary survey in the city revealed that many backyard pig farmers stop engaging in production after one or two production cycles but there are also those who re-enter into the venture when their situation becomes favorable. The backyard pig farming business then is typified by alternating exit-entry/re-entry of farmers into the system.

There are factors at the farmer's and/or household level and environmental limitations that influence the decision and capacity of the pig farmers to engage continuously in backyard pig production. As this sector produces more than two-thirds of the City's pork supply, it is important that the factors affecting its sustainability be studied. This study investigated the factors that influenced the sustainability of backyard small scale pig farming in the City of Borongan, Eastern Samar.

Statement of the Problem

This study investigated the determinant factors influencing the sustainability of small-scale backyard pig farming in the City of Borongan. Specifically, this research aims to answer the following questions:

1. What is the perceived sustainability influence on backyard pig farming in Borongan City in terms of the following factors:

a. Age
b. Educational attainment
c. Number of dependent
d. Family labor size
e. Household income
f. Gender
g. Organizational affiliations
h. Access to credit facilities
i. Contract or independent grower
j. Extension exposure
k. Access to market

2. What are the most significant influencing factors for farmers to engage continuously in backyard pig farming in the City of Borongan.

3. Is there a significant difference to the sustainability or non-sustainability of pig farmers in the City of Borongan based on the influencing factors?

Methods

This study employed descriptive research design using survey method, ocular observation, and use of secondary sources. The respondents were backyard pig farmers of Borongan City; 13 of them had sustainable and 17 had non-sustainable backyard pig farming. They were interviewed with the use of structured questionnaire adopted from the questions posted in the 2016 survey on agriculture of the Philippine Statistics Authority (PSA). The city of Borongan in the province of Eastern Samar was the study area. Borongan City was chosen as the project site since the characteristics of backyard pig farming in this municipality are believed to be an approximation of all peri urban backyard pig production systems in the region if not in the entire country.

A total of thirty (30) backyard pig farmers were randomly selected as respondent/participant to this study using an adopted inclusion criterion used by Perey (2017) as follows: (1) The pig farmer is listed in the City Agriculture Office as of December 2020, (2) Must have engaged in the backyard pig farming business

for at least the last five years, and (3) must be willing to disclosed details of his backyard farming business freely and voluntarily by way of answering the survey questionnaire and the interview process. Thirty (30) pig farmers were selected from the barangays of Bugas, Lalawigan, Locsoon, San Gabriel, San Jose, San Mateo, San Saturnino, Sta. Fe, and Siha.

The study utilized an adapted researcher-modified survey questionnaire to capture the relevant information and context to answer the specific research objectives. The questionnaire is a fill-blank type survey with statements and indicators benchmarked from the Philippine Statistics Authority (2016). These indicators are indicative of sustainability determinants of backyard pig farming as used in the study of Perey in 2017. The instrument has been subjected to content validity and reliability control by a research expert and copy of the quality assurance and validity certification is hereto attached and appended.

Descriptive statistical tools and techniques such as mean and standard deviation were used in comparing the group of farmers with sustainable backyard pig farming and the group whose pig farming was not sustainable. To determine the degree of difference, inferential statistics was employed. Two-sample t-statistic was used to test for significant differences between the two groups' characteristics. *Jamovi* app was used in the descriptive and inferential statistical treatment (Jamovi.com). Binary logistic regression analysis was used to identify the significant factors that, in combination, determine the sustainability of backyard pig farming. Binary logistic regression examines the relationship between one or more predictor variables and a binary response (Science.direct.com, 2024). The binary response variable in this study is whether backyard pig farming is sustainable or not sustainable.

Results and Discussions

Statistical treatments of the responses on the predictor variables relative to sustainability or non-sustainability as well as the degree of difference of the binary responses through logit regression were set at degree of difference level of 0.05 level of significance. Table 1 and 2 presents the mean, standard error, difference, t- values and p-values for each benchmark statement correspondingly.

Influencing factors of pig farming sustainability

Table 1 presents the mean, standard error and results of t-tests comparing the two groups of respondents. Results revealed significant differences between the sustainable and not-sustainable groups of respondents in terms of their household income, organizational affiliation, access to credit sources other than banks, being contract or independent grower, extension exposure and tolerance by neighbors with p-values of 0.001, 0.001, 0.000, 0.000, 0.000, 0.024 respectively. The differences were all positive which means that the measures for the group with sustainable backyard farming were significantly higher than those for group whose backyard pig production systems were not sustainable. On the other hand, differences between the two groups in terms of age, educational attainment, number of dependent members, family labor size, access to bank credit, and access to market were not significant with p-values of 0.149, 0.757, 0.847, 0.973, 0.778, and 0.573 respectively.

Table 1: Comparison of the mean values for sustainable and not-sustainable backyard pig farming groups based on explanatory variables.

Explanatory variable	**Mean and Standard Error**		**Difference**	**T-value**	**P-value**
	Sustainable n=13	**Not Sustainable n=17**			

Age of respondent	48.3 ±2.4	42.9 ±1.7	4.25	1.46	0.149^{ns}
Educational attainment of respondent	10.15 ±0.54	9.94 ±0.43	0.213	0.31	0.757 ^{ns}
Number of dependents in the family	1.62 ±0.22	1.56 ±0.19	0.057	0.19	0.847 ^{ns}
Available family labor	4.69 ±0.40	4.68 ±0.28	0.016	0.03	0.973 ^{ns}
Family income	15375 ±1653	8724 ±940	6520	3.48	0.001**
Gender	0.346 ±0.095	0.382 ±0.085	-0.036	-0.28	0.778 ^{ns}
Organizational affiliation	0.731 ±0.089	0.294 ±0.079	0.437	3.66	0.001**
Access to bank credit	0.269 ±0.089	0.206 ±0.070	0.063	0.57	0.573 ^{ns}
Access to credit sources other than bank	0.731 ±0.089	0.206 ±0.070	0.525	4.70	0.000**
Contract or independent farmer	0.654 ±0.095	0.265 ±0.077	0.389	3.22	0.002**
Extension exposure	0.692 ±0.092	0.294 ±0.079	0.398	3.28	0.002**
Market of the product	0.538 ±0.10	0.353 ±0.083	0.186	1.44	0.156 ^{ns}
Tolerance/Complaint from neighbors	0.615 ±0.097	0.324 ±0.081	0.292	2.31	0.024*

**Significant at α=0.05 (P>0.01, P≤0.05) **significant at α=0.01 (P≤0.01) ^{ns} Not significant (P>0.05)*

Table 2 below shows the results of logistic regression showing that respondent's age is not a factor of continuity of backyard pig production (p-value of 0.543). This result is corroborated by the findings of Rahman (2007) that among the pig farmers of Aizawl district of Mizoram, India, age did not influence the adoption of pig farming technologies. Also, Petrus et al. (2011) explained that pig farming in the rural areas of Etayi Constituency of Namibia is participated by the adult and young members of the family.

This result on the other hand contradicts the findings of Asiabaka and Owens (2002) saying that age is one of the farmers' socioeconomic characteristics that influenced the adoption behavior of rural farmers in Nigeria. Age was also shown to be negatively correlated with technology adoption among pig farmers in Ashanti region of Ghana and among the smallholder pigs production in Tanzania as reported by Kimbi et al. in 2015.

As to Educational Attainment, education is often expected to influence farmers' decision in adopting new technologies in farming. This is because education level of a farmer increases his ability to access, understand and utilize information relevant to his decision to adopt technology (Mignouna, 2011). Similarly, Asiabaka and Owens (2002) found that in rural Nigeria, education is one of the socioeconomic characteristics that influenced the farmers' adoptive behavior.

In this study, however, educational attainment was found to have no significant influence (p-value of 0.247) on the decision of backyard pig farmers in Borongan City area, on whether to continue or not their backyard pig operation. This result is similar to the findings of Rahman (2007) that along with 14 other independent variables, education level had no significant contribution to the adoption of improved technologies by the pig farmers of Aizawl district of Mizoram, India. Likewise, in Ashanti region of Ghana, education is not a factor of technology adoption among pig farmers (Zanu et al., 2012).

Socio-demographics as predictors of pig farming sustainability

Family size exerts pressure on the farmers' production decisions according to Zanu et al. (2012). The number of dependent family members puts more pressure to the farming household head. For the purpose of earning additional income, he/she may wish to continue the backyard pig farming but the same pressure may compel him/her to stop the venture. In case of limited income, the farmer has to prioritize supporting the need of humans over that of the animals (Perey, 2017). In this study, and based on the table above, the number of dependent members was found not a significant factor (p-value of 0.464) that influenced the pig farmers' decision to continue or stop backyard pig operation.

While the number of family members that can provide labor is not a significant factor (p-value of 0.671) of sustainability of backyard pig farming. This is because labor is generally not a scarce resource in small farm operation. In a study conducted at Etayi Constituency of Namibia, Petrus et. al. (2011) revealed that unpaid family labor is usually available and that the whole family is involved in the rearing of pigs in the rural areas. The adult and young members, especially women and girls, participate in feeding. It was also reported that 57% and 39% of the caretakers of pigs were wives and young girls. The adoption of pig farming technology by the pig farmers of Aizawl district of Mizoram, India was also not influenced by family size (Rahman, 2007).

In the case of household income as a predictor variable, this study shows that it significantly affects the decision of farmers to sustain backyard pig farming. The lack of income to support the backyard pig production sometimes forced the respondents to stop their operation. This can be compared to adoption of technologies that require large amount of investment. Lapar et al. (2006) explained that many smallholder pig producers in Vietnam practice conventional and low-level production technologies because they are constrained by limited financial resources.

Household income in this study, as can be gleaned from the table above, is shown to be positively related (p-value of 0.009) to sustainability of backyard pig farming. Pig farmers with higher income were more able to sustain their farming operation. The income in excess of the amount required by the household for its members' needs can be used to support the expenses in the farm especially on feed. Such income can be used as substitute for borrowed capital in rural economies especially for households with credit constraints (Diiro, 2013). Pig farming is a capital-intensive practice and smaller-sized producers encounter financial constraints when it comes to access to feeds and quality breeding stocks, and access to veterinary and other services (Costales et al. 2006). Pig farmers with higher household incomes have greater chance of continuing the backyard pig farming, The importance of household income is also emphasized by the report of Aquino and Malazo in 2004, the output of the Philippine swine industry declined minimally after several years of continued growth which was partly due to the closure of some backyard pig operations. The low-income backyard operators were constrained by great increases in cost of feeds and drugs.

Furthermore, and as can be gleaned from the table, gender as a predictor variable is found not significant (p-value of 0.113) to the sustainability of pig farming in the City of Borongan, similar to the findings of Petrus et al., 2011 where women and wives are participants and caretakers in pig farming in the rural areas of Namibia, reporting that 57% and 39% of the caretakers of pigs were wives and young girls (Petrus et al., 2011). However, Zanu et al. (2012) reported that in Ashanti region of Ghana the high percentage of men involved in pig production than women was because the venture is both labor- and capital-intensive. The great physical exertion and labor input required by pig farming discourage women participation. A significant correlation +0.26 between sex and adoption was obtained. The inconsistent findings on the relationship between gender and adoption decision imply that more studies on this topic are needed and

that the role of women in livestock development such as in rearing, on-farm processing and marketing of livestock products must be given priority.

External support system: Its influence to backyard pig farming sustainability

In addition, organizational affiliation (with a p-value of 0.035) significantly contributed to the farmers' decision to continue backyard pig production. With membership in organizations, farmers have better access to veterinary services, production and marketing information, and supply of feed and feed ingredients. This support the study of Katungi and Akankwasa, (2010) which suggested that local organizations could be considered an alternative to the traditional agricultural extension model for dissemination of agricultural technologies in many sub-Saharan countries. Similarly, Godquin and Quisumbing (2006), opined that local organizations are generally perceived as a more efficient channel for disseminating technologies to many farmers aside from being a source of social capital that facilitates resources and information sharing among actors (Ojiako, 2013).

In a social group or network, the members gain confidence, trust and belongingness and it where they usually have exchange or sharing of ideas and information; they learn from one another. The effect of organizational affiliation is important for individual decisions. Awotide (2013) indicated that formation of associations among the rural farmers should be encouraged. It is then believed that it will be possible for agricultural development agencies to achieve great success when they work in collaboration with farmers' organizations (Verteeg and Koudokpon, 1993). There are a lot of small farmers in the province of Eastern Samar with less than one hectare of cultivated land (PSA, 2016). One of the main difficulties for small farmers is how to gain power in a value chain that the more powerful actors such as traders, agro-enterprises and exporters usually have. One way to overcome such difficulty and to have a mechanism to improve access to information, capital and relevant contacts is through joining farmer organizations including farmer groups, cooperatives and farmer association (Lapar et al., 2006).

Access to Credit is another external influencing factor that influences backyard pig farming sustainability. The lack of income to support the backyard pig production sometimes forced the respondents to stop their operation. Based on the results, farmer's access to bank credit did not influence significantly the decision of the respondents to sustain backyard pig farming operation while access to credit facilities other than banks had significant influence (p-value of 0.152).

It is believed that access to credit promotes the adoption of risky technologies through relaxation of the liquidity constraint as well as through the boosting of household's-risk bearing ability. This is because with an option of borrowing, a household can do away with risk reducing but inefficient income diversification strategies and concentrate on more risky but efficient investments (Simtowe and Zeller, 2006). Farmers of Namibia were not able to expand their herd sizes due to lack of access to micro-finance or credit to (Petrus et. al., 2011).

In the case of Borongan City pig farmers several types of microfinancing and types of credit source were available including informal sources such as friends, relatives and feed and veterinary supply stores. This finding supports the opinion of Nimoh et al. (2013) who found out that most farmers in Ghana preferred to borrow from informal financial institutions. They rather would prefer borrowing from other private commercial lenders. And further revealed that most farmers had multiple accounts and mostly supplemented formal institutional funding with credit from either friends or relatives or other convenient sources. In the Philippines, one of the recommendations to improve the swine industry was for the government to provide the small pig producers low interest loans (Aspile et al., 2015).

On the factor of being Contract or independent grower, the table shows that being a contract grower is a favorable factor (p-value of 0.029) to the continuity of backyard pig farming among small scale backyard pig farmers of Borongan City. This result posits that contract growing is practiced by most of the small backyard pig raisers who were able to sustain production. The contractors are feed suppliers who also operates several backyard pig farms. The weanlings, veterinary and other technical services, feed, veterinary supplies and market of finished hogs are the responsibility of the contractor while the housing, labor and herd management are shouldered by the farmer grower.

Moreover, some small-scale backyard pig farmers in Borongan City are also exposed to agricultural extension services which are policy instruments used to support agricultural development. Extension workers play a vital role in educating farmers to produce better crops and more productive animals at lower cost. This study opined that exposure to extension services significantly influence in the sustainability of pig farmers (p-value of 0.013) in the city of Borongan. This result agrees with the findings of Petrus et. Al., (2011) stating that farmers in Namibia also indicated that they struggled to get extension services and customers. They also had no access to micro-finance or credit to enable them to expand their herd sizes (Petrus et. al., 2011). Farmers in the developing world such as the Philippines have limited expertise resulting in poor management and planning of pig enterprises. This lack of technical know-how is a common problem and is coupled with a general lack of supporting services (Steinfeld and Mac 1997). Godquin and Quisumbing (2006) explained the significant influence of extension variables such as visits by agricultural extension workers or consultation with them, credibility of the extension agents, availability of reading materials and continuity of receiving information about the technology. According to them farmers can obtain knowledge and information from extension agents, demonstration farms, farm tours and/or contact with other farmers, as well as from mass media and published materials. The education that farmers get enhances their ability to acquire and synthesize the information and consequently help them in making decisions (Perey, 2017).

In the case of Access to market as a factor, results of this study indicated as not significant (p-value of 0.122). This underscores that although procuring inputs and disposing finished hogs is important in the pig farming business, it viewed however that alleviating constraints to marketing and upgrading marketing infrastructures will potentially increase the welfare of small-scale backyard farmers as in the case of consumers in Ethiopia (Ayele et al., 2003). Poor smallholders in Uganda, Ouma (2013) reported that one of the constraints of the smallholder pig systems were poorly organized markets. Such literatures negate the findings of this study which showed that access to market has no significant contribution to the sustainability of backyard pig production among farmers in Borongan City.

Finally on the issue of environmental concerns as measures by the factor complaint by neighbors: The p-value of 0.340 indicates that complaints by neighbors is not a significant factor of the sustainability of the backyard pig farming operation in Borongan City. At the time the study was being conducted it is noted that there were no formal complaints reported by the respondents as to the nuisance from their backyard pig farming operations. Several literatures, reported some major constraints to pig production in Ethiopia according to their order of importance (Mekuriaw and Asmare, 2014 as cited by Perey, 2017) as feed availability and cost, shortage of water, cost of medicine, and lack of skilled veterinarians on pig diseases and poor preventive health care. Similar constraints were also reported by Tekle et al. (2013) among the smallholder pig producers of Tigray Region, North Ethiopia. Nothing was mentioned about the complaints by neighbors of pig farmers in the City of Borongan. However, complaints are usually encountered by

commercial piggery operators. As swine manure emits methane, nitrous oxide, and other gases, the usual complaints of residents concerning piggeries is the emission of foul odors (Nowlin, 2013).

Table 2: Results of logistic regression analysis

Source	DF	Adj Dev	Adj Mean	Chi-Square	P-Value
Regression	13	32.0539	4.0041	32.05	0.000**
Age of respondent	1	0.3695	0.3695	0.37	0.543^{ns}
Educational attainment of respondent	1	1.3399	1.3399	1.34	0.247^{ns}
Number of dependents in the family	1	0.5362	0.5362	0.54	0.464^{ns}
Available family labor	1	0.1805	0.1805	0.18	0.671^{ns}
Family income	1	6.7459	6.7459	6.75	0.009**
Gender	1	2.5130	2.5130	2.51	0.113^{ns}
Organizational affiliation	1	4.4624	4.4624	4.46	0.035*
Access to bank credit	1	2.0492	2.0492	2.05	0.152^{ns}
Access to credit sources other than bank	1	8.2635	8.2635	8.26	0.004**
Contract or independent farmer	1	4.7874	4.7874	4.79	0.029*
Extension exposure	1	6.1559	6.1559	6.16	0.013*
Market of the product	1	2.3886	2.3886	2.39	0.122^{ns}
Tolerance/Complaint from neighbors	1	0.9097	0.9097	0.91	0.340^{ns}
Error	4	7.539	0.6533		
Total	30	23.1078			

* Significant at α=0.05 (P>0.01, P≤0.05) ** significant at α=0.01 (P≤0.01) ^{ns} not significant (P>0.05)

Conclusions

1. The perceived sustainability influence factors that contribute significantly to the small-scale backyard pig farmers' decision to continuously engage in backyard pig farming are *family income, organizational affiliation, access to credit sources other than bank, being contract or independent farmer, and extension exposure*. On the other hand, *age of respondent, educational attainment of respondent, number of dependents in the family, available family labor, gender, access to bank credit, market of the product, and tolerance/complaint from neighbors influences farmers decision to discontinue their pig farming activities.*
2. The most significant determinant factors for farmers to continuously engaged in small-scale pig farming business venture in Borongan City is the availability of financial resources (such as family income, credit that is easy to access, and contract growing scheme) for supporting backyard pig production, and enhanced social capital (organizational affiliation and extension exposure).
3. The differences were all ***positive*** which means that the measures for the group with sustainable backyard farming were significantly higher than those for group whose backyard pig production systems were not sustainable.

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