

Factors that affect adoption and sustainability of ornamental production: The case of ornamental growers in Baybay City, Leyte

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Abstract: Ornamental plant production is becoming increasingly popular as an enterprise especially when the COVID-19 pandemic has started. Many people now venture into this kind of business because of its importance to the local and global market. The study was carried out to understand the conditions surrounding the adoption and sustainability of ornamental plant production with the use of a qualitative approach specifically the grounded theory developed by Glaser and Strauss in 1967. Snowball sampling technique was adopted in selecting the informants. A total of 30 ornamental growers served as the informants who come from the four barangays of Baybay. It was found out that the conditions surrounding adoption and sustainability of ornamental plant production technology are categorized into: 1) contextual, 2) human, 3) economic, 4) institutional and technological factors. Results also revealed that despite the lack of support from the government and other problems met by the respondents, they still venture into ornamental production mainly because of its economic benefits. With positive reinforcement of all the factors that surround the adoption and sustainability of ornamental production, discontinuance of the adopted technology can be mitigated. Hence, a need for technical assistance from concerned institutions, change agents and other factors is also important to sustain the technology.

Keywords: Adoption, sustainability, ornamental plant production, reinforcement.

1. INTRODUCTION

Adoption of technologies plays a vital role in the progress of every country. According to Udimal et al (2017) adoption of agricultural technologies can increase farm productivity and may help reduce poverty among farm households. However, a person's decision in adopting a new technology depends on the characteristics of the technology and the array of conditions and circumstances (Loevisohn et al 2012).

In Eastern Visayas, ornamental production is seen as a potential alternative livelihood for the farmers given the favorable climatic condition of the area. It has become an intervention in addressing low farm productivity and improving the income of marginalized farmers who mainly rely on subsistence farming and who have no or little access to business opportunities (PSA 2004).

In Baybay City, Leyte, where the study was conducted, adoption of different ornamental production technology is visible especially in barangay Patag, Guadalupe, Marcos and San Agustin. Miraflor (2020) stated that understanding these conditions is very important because nowadays, the industry is not a priority program of the government and there are still many farmers who are not aware of the economic value of growing ornamentals. Although there are many studies related to the importance and factors that contribute to the adoption and sustainability of ornamental plant production in the country, nothing or little has been done yet in Baybay City, Leyte, hence this study was conducted.

This study sought to understand the conditions surrounding the sustainability of technology adoption among ornamental growers in the selected barangays of Baybay City, Leyte. This study is important because results can help people to have a deeper understanding on the benefits of venturing into ornamental production. Theories that will be generated from this study will be used in providing guidance for future research and may contribute in organizing relevant empirical facts that

can help better understand the phenomenon of ornamental plant production (Johnson 2018), particularly in technology adoption process. Further, results of this study can be used as bases in improving extension strategies used by extension agents in convincing more people to grow and venture into ornamental plant production. The theoretical model formulated in this study can also be useful reference in other technology adoption and sustainability process.

2. METHODOLOGY

The study was conducted in four selected barangays of Baybay City, Leyte namely: Patag, Guadalupe, Marcos and San Agustin (Figure 1). These barangays were selected because after the preliminary survey of the researcher, these barangays were found to be the top growers of ornamental plant in the city where quite a number of households are growing ornamental plants. In addition, due to the COVID-19 pandemic these nearby barangays were selected to lessen to lessen travel and exposure to crowds. The researcher resides near these barangays.

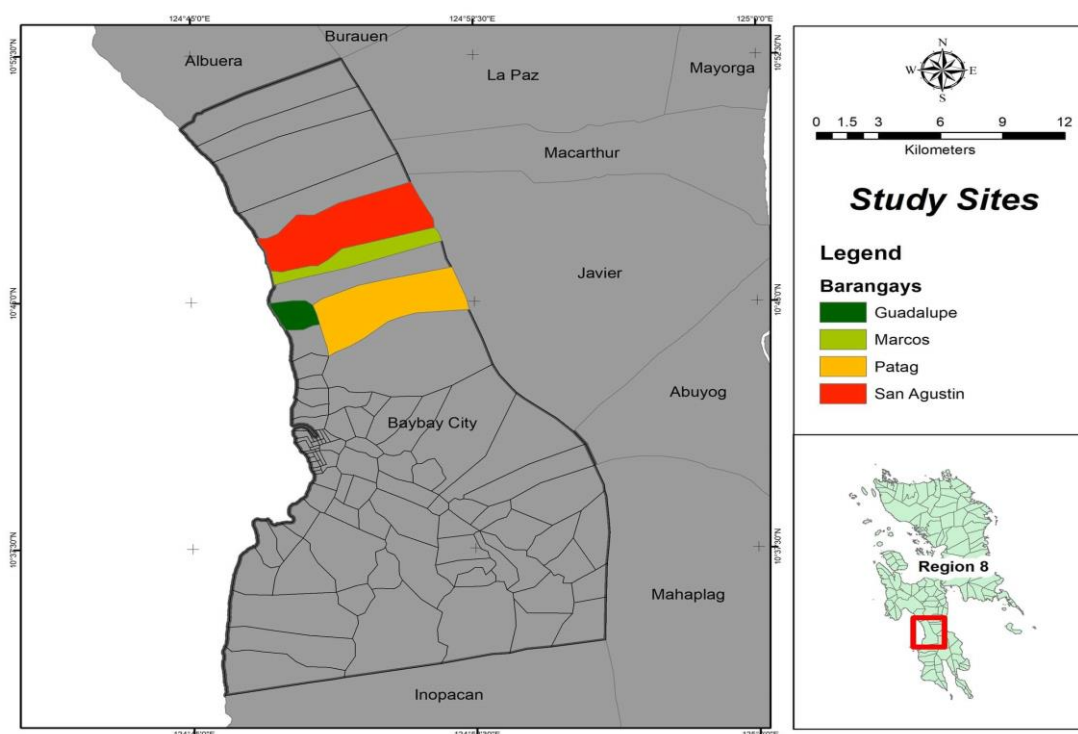


Figure 1: Map of barangay Guadalupe, Marcos, Patag and San Agustin, Baybay City, Leyte

Respondents of the Study

The respondents of the study were ornamental growers who were into ornamental production for five or more years. According to Adoukonou (2019), more than 50% of businesses have failed within five years of start-up due to some factors like lack of financial assistance, visibility, information to make strategic decisions, etc. This study was conducted from April to May 2021.

Research Design

This research followed the qualitative approach. Bhandari (2020) stated that qualitative research involves collecting and analyzing non-numerical data to understand concepts, opinions, or experiences which can be used to gather in-depth insights into a problem or generate new ideas for research. It seeks to tell the story of an individual or group's experiences in their own words about a particular phenomenon. In qualitative research, researchers often conducted in-depth interviews to guide individuals in sharing their perspectives on the phenomena of interest (Statistics Solutions 2020). It begins with assumptions that inform the study of research problems addressing the meaning individuals or groups ascribe to a social or human problem (Creswell 1998).

Specifically, this study followed the grounded theory approach developed by American sociologists Glaser and Strauss in 1967. The purpose of grounded theory is to generate or develop a theory, which is in the form of an abstract analytical

diagram of a phenomenon related to particular situation (Corwin 2013). Grounded theory is often adopted to formulate hypotheses or theories based on existing phenomena, or to discover the participants' main concern and how they continually try to resolve it (Ke & Wenglensky 2010). In grounded theory, the substantive theory to be generated by the researcher is grounded on the data gathered from the field, especially in the actions, interactions, processes and views of the participants in the study area in response to the phenomenon (Creswell 1998).

Sampling Procedure

The informants were identified using the snowball sampling technique in which primary respondent were identified with the help of the barangay officials. The next informant was identified through a referral by the primary informant (Ogalesco et al 2020). The next informants were identified using the same referral procedure.

The number of informants for this study was determined with the use of theoretical sampling, which enabled the researcher to select subjects that maximize the potential to discover as many dimensions and conditions related to the phenomenon as possible (Ke & Wenglensky 2010). In theoretical sampling, the number of respondents was not pre-identified. Data gathering continued until such time the data obtained reached theoretical saturation. Theoretical saturation is defined by Vollstedt & Rezat (2019) as the stage where new data do not contribute any longer to a substantial development of the theory and where further observations and interviews add nothing to the data identified by the researcher. Hence, failure to reach data saturation has an impact on the quality of the research conducted and hampers content validity (Fusch & Ness 2015).

Data Gathering Procedure

Four barangays of Baybay City, Leyte namely, Patag, Guadalupe, Marcos and San Agustin were selected since the said barangays have the highest number of ornamental growers and where COVID-19 cases are minimal or none at all. A formal request letter to conduct the study was sent to the barangay chairman in each barangay (Appendix A). Upon approval, the study was immediately commenced by following the minimum health standards of DOH and IATF such as wearing of face mask/shield, social distancing, hand washing etc.

The data were gathered through an unstructured in-depth interviews and the information that was obtained included the socio-demographic characteristics of the informants: age, sex, educational attainment, marital status, number of household members etc. (Appendix C). The informants were also asked to answer questions regarding their perception towards ornamental production, number of years into ornamental production and the factors that influence them to adopt and sustain ornamental growing.

The in-depth interview guides for the informants were constructed in English, and then translated into Cebuano dialect (Appendix C). Questions were mostly open-ended to allow respondents to elaborate their answers and draw out their views and opinions about a particular phenomenon; it also included probe questions ("how" and "why") so that the researcher was able to get the kind of answers needed to conceptualize a theory (Dossetto 2020).

The informants' answers were recorded using a digital recorder with their permission. These were transcribed verbatim and were encoded as a written document. Field note-taking was also done during the time of the interview.

3. DATA ANALYSIS

Descriptive statistics was used to analyze the informants' socio-demographic characteristics. Recorded interviews were transcribed verbatim and encoded in written documents every after the interview to facilitate data analysis.

Data gathering and analysis went thru hand-in-hand. Every after the interview, transcripts from the recorded interview were analyzed immediately. This procedure is referred to as constant comparative method. According to Kolb (2012), constant comparative method was used by the researcher to develop concepts from the data by coding and analyzing at the same time where the new information should be constantly compared with the previously identified information. The second interview was an opportunity to affirm, modify, add, clarify, and elaborate on what has been said during the first interview.

Constant comparative methodology incorporates four stages: “(1) comparing incidents applicable to each category, (2) integrating categories and their properties, (3) delimiting the theory, and (4) writing the theory”. Throughout the four stages of the constant comparative method, the researcher continually sorted through the data collected, analyzed and coded the information, and reinforced theory generation through the process of theoretical sampling (Kolb 2012).

In analyzing the data, the procedure in the grounded theory approach outlined by Corbin and Strauss in 1990 was used. Charmaz (2003) recommended that in grounded theory, the researcher should follow the systematic and standardized format to develop a theory which is described below (Corbin & Strauss 1990):

1. Open coding - Open coding is the part of data analysis that focused on the conceptualization and categorization of phenomena through an intensive analysis of the data (Vollstedt & Rezat 2019). Open coding is the interpretive process by which data were broken down analytically. Its purpose is to give the analyst new insights by breaking through standard ways of thinking about or interpreting phenomena reflected in the data. In open coding, events/actions/interactions were compared with others for similarities and differences. They were also given conceptual labels. In this way, conceptually similar events/actions/interactions are grouped together to form categories and subcategories.

2. Axial coding - According to Allen (2017), axial coding involves relating data together in order to reveal codes, categories, and subcategories ground within participants’ voices within one’s collected data. According to Vollstedt & Rezat (2019), axial coding is needed to investigate the relationships between concepts and categories that have been developed in the open coding process.

3. Selective Coding - Selective coding is the process by which all categories are unified around a “core” category, and categories that need further explication are filled-in with descriptive detail. This involved the process of choosing one core category then connecting all the other categories to that category. A storyline was developed wherein everything else was arranged.

At the end of the coding process, a theoretical model on the technology adoption was developed. It presented the conditions surrounding technology adoption among ornamental growers in the four selected barangays.

4. RESULTS AND DISCUSSION

Description of the Study Site

The city of Baybay, province of Leyte is situated on the western coast of Leyte, immediately fronting the Camotes Islands bounded by the Camotes Sea of Cebu, where it lays beyond the Queen City of the South, Cebu City. The city has a total land area of 46,050 hectares and is known to be one of the largest in terms of land area in the Eastern Visayas region. It is divided into ninety-two (92) barangays, composed of 24 urban barangays and 68 rural barangays (LGU Baybay 2013).

According to the 2015 census, barangay Patag has a total population of 1,535 in 2015. This represented 1.40% of total population of Baybay City. As of 2020, its population was 1,695 which denotes an increase of 160 people from 2015. Barangay Guadalupe shares common border with this barangay. According to the 2019 census, the total population of barangay Guadalupe was 2,607 people which corresponded to 2.42% of Baybay’s total population. Farming and fishing have been the source of livelihood of the people in the community. Some of them are engaged on business like production and selling of ornamental plants (PhilAtlas 2021).

Based on the barangay profile of San Agustin, it is just 11.5 kilometers from Baybay City and it just lies at the foot of the two great mountains of Leyte namely Mount Lunas, the second highest peak of the island and Mount Pangasugan which is the third highest of Leyte. This barangay has a total population of 1,765 as of 2020. The agricultural sector in San Agustin is known for low productivity, as it employs about 36 percent of the labor force but accounts for only 14.8 percent of Gross Domestic Product (GDP). Farming and fishing are the means of livelihood of the barangay but because of low production, some of them were into ornamental growing. This barangay also shares a common border with barangay Marcos, which was formerly a sitio of barangay San Agustin. Now, barangay Marcos proudly exists as an independent village of San Agustin which has a total land area of 1,832.647 square meters and a total population of 1,373 as of 2020. Residents of this barangay are into farming and some of them grow ornamental plants not just for home beautification but also for business purposes.

Socio-demographic profile of the informants

A total of 30 informants were interviewed in the research study. Results revealed that majority (73.3%) of the respondents were middle-aged, almost one-fourth (20%) were older adults and there were only 2 (6.7%) who were young adults. Majority (80%) of them were females and only six (20%) were males.

Almost all of the informants were married (86.7%) and the rest were single and widowed (6.7%). More than one-fourth (26.7%) of them were high school level. There were seven (23.3%) respondents who were high school graduate and college level, only 4 (13.3%) were college graduate, and the rest were elementary graduate (10%) and elementary level (3.3%).

Most of the informants in this study were not members of an organization (73.3%). There were three (10%) of them who were members of barangay Patag Farmer's Association, two (6.7%) were members of Patag Rainforest Association and the remaining were members of Patag Nature Conservation Association (3.3%), Green the Home Project of DAEEEx, VSU (3.3%) and Guadalupe Consumer Cooperative (3.3%).

Socio-economic profile of the respondents

More than half (63.3) of the informants were tenants and the rest (36.7%) were land owners. Almost half (46.7%) of the households had a household size ranging from 4-5, more than one-fourth (26.7%) had 6-7 members, and only 5 (16.7%) and 3 (10%) households had a household size ranging from 2-3 and 8-9 respectively. Almost all (96.7%) of the respondents had a farm size below one hectare and there was only one (3.3%) had a farm size of one hectare and above.

Results also revealed that majority (70%) of the respondents had an annual income below 65,000 and the rest had an annual income of 65,000 and above with mean annual income of 79,607. More than half (60%) of the respondents have been growing ornamental plants for 5-10 years. The rest were growing ornamentals for more than 10 years.

Perception of respondents before towards ornamental plants

Just for house display. Based on the narratives of the ornamental growers, majority of them thought that ornamental plants are just for house display and for aesthetic purposes only. Informant no. 1 stated that,

"At first, I never knew its importance and uses because all I knew was that it's just a plant that was used only for house display."

No economic value. Some of the informants said that they thought that ornamental plants have no economic benefits. They perceived it as plants that are just grown for aesthetics only without economic contribution. Informants 5 said,

"Before I really never thought that there's money in planting ornamentals. I just planted it in our house because I just love watching my plants blooming, without even knowing the fact that there are so much more it can offer."

Stages Leading to Adoption and Sustainability of Technology

Exposure to trainings and garden shows/agro-fairs. As what informant no. 5 narrated, she started to learn the economic benefits of ornamental plants during the VSU Flower and Garden Show. She said,

"During VSU anniversary, we visited the university, then we entered in the Garden Show...there I found out that there's money in flowers".

Interest and evaluation. In addition to what informant no. 5 narrated, she uttered that she is always interested in joining the VSU Flower and Garden Show because she realized the importance of the plants. She said,

"...so if there is Garden Show at Visca, I always join because I see how important the plants are."

Informant no. 17 mentioned that she was encouraged to plant ornamentals because of the training and garden shows that she had participated. She said,

"As I participated in training and garden shows, I am more attracted and encouraged to plant ornamentals."

Trial and adoption. Informant no. 5 also said that,

“From the moment I realized that ornamental plants can be sold, I started to plant...I even continued to plant more and more in our house. Before, I only have few number of plants but now, there are so many already.”

Reinforcement. As what informant no. 2 said,

“There is also help from VSU, since when ma’am Milan became the president, who was the one who helped us in constructing this building, until doctor Bacusmo who also come to visit here to monitor and observe our plants then, now president Tulin who also helped us here.”

Factors that surround the adoption and sustainability of ornamental plant production

Table 1: Factors that surround the adoption and sustainability of ornamental plant production

THEMES	DESCRIPTION
Contextual Factor	Some of the informants said they are growing of ornamental plants because of the influence of their parents, neighbors, and other ornamental growers.
Economic Factors	
<ul style="list-style-type: none"> • Source of income 	Most of the ornamental growers said that ornamental plants have been their source of income.
<ul style="list-style-type: none"> • Employment generation 	A few of the informants said that ornamental production is a means of livelihood, provides employment and generates income.
<ul style="list-style-type: none"> • Generate other enterprise 	An informant narrated that her ornamental production became an avenue to put up her convenience store.
<ul style="list-style-type: none"> • Able to send children to school 	Some of the informants mentioned that they were able to finish their children in college because of ornamental production.
<ul style="list-style-type: none"> • Comparative advantage over other crops 	An informants narrated that he converted his rice fields into ornamental production because it produces more income compared to rice.
<ul style="list-style-type: none"> • Provided personal and family needs 	Almost all of the informants said that ornamental production provides their basic needs.
Human/Social Factors	
<ul style="list-style-type: none"> • Socio-demographic 	Some of the informants said that age, educational attainment, and their organization affiliation were also some of the factors that affect the adoption of growing ornamentals. Others also believed that these are not, but all of them said that civil status is not really a factor.
<ul style="list-style-type: none"> • Socio-economic 	There was an informant who mentioned that tenurial status and annual income can contribute in the adoption of technology because if a person owns a

	land which he/she can utilized for planting as well as income for the capital then it would not be difficult for her to venture into ornamental production.
<ul style="list-style-type: none"> • Other related Factors 	A few of the informants said that their knowledge and skills in marketing to strategize and persuade costumers really helped them to have more loyal buyers and gain more income.
Knowledge and skills in marketing	Some of them said that a good relations with customers, proper maintenance for the plants, ability to take risk, and being motivated to grow more plants are very important because these will help us to sustain our business.
Attitude and behavior	Most of them said that the reason why they adopted ornamental growing is because it is their hobby. Some of them also said that they feel happy and relieved every time they look at their plants growing.
Personal attributes	
Institutional Factors	A few of the informants said that institutions like VSU, DENR and LGU have been their great supporter because these institutions have provided them some training, financial support and planting materials. Others also said that access to credit agencies and support from barangay official and family helped them in the sustainability of growing ornamentals.
Technological Factors	Most of the respondents said that growing ornamental plants is manageable and does not require bigger space. It relieves stresses and way to comfort for from the problems encountered.

Contextual Factors. Some of the informants in this study said that their parents have been a great influencer to them. Just like their parents, they also love growing ornamental plants because that is how they observed their parents as they grow older, that is why growing of ornamental plants has been their culture and their way of life. Informant no. 3 said,

“There were so many flowers displayed in our house, that’s why I was convinced ‘coz my parents also wanted me to help them and this influenced me to make it as my hobby.”

Informant no. 1 expressed that she was influenced by other ornamental growers. She said,

“During the year 1994, we were active in Couples for Christ (CFC), in which one of our leaders convinced me because she also loves planting. She encouraged me to plant ornamentals ‘coz it really has earnings.”

Informant no. 2 also narrated that she started to learn the importance of ornamentals during the VSU Flowers and Garden Show as one of the highlights during VSU anniversary. She said,

“Before I started this, my only know-how about ornamental was that it’s just a flower. I started to learn that there’s earnings in plants in the year 1994...during the VSU anniversary. I learned it during the Garden Show.”

An informant also added that because of the COVID-19 pandemic, it pushed her to plant more in order to gain more. She said,

“In this current pandemic also sir, a lot of people buy plants because they can do nothing else, that’s why I also plant more.”

Economic Factors. Based on the transcribed data, results revealed that economic importance of growing ornamental plants is a strong indicator in the adoption and sustainability of technology. Narratives of the informants were subcategorized into six which include: 1) source of income, 2) able to send children to school, 3) comparative advantage over other crops, 4) provide personal and family needs, 5) employment generation, and 6) generate other enterprise.

Source of income. Informant no. 1 said,

"It is very nice. In all the businesses I have been in, I used to buy and sell rice, I used to run a convenience store, and I used to sell fish, but planting of ornamentals really have lasted and sustained because it became a real source of our income."

Able to send children to school. Informant no. 2 narrated that growing of ornamental plants really helped her family especially for her children's education. She said,

"Planting of ornamentals is really a big help for our family, it really helped all my children to graduate in college. That's why I am not ashamed in selling these plants because it really helped us and my neighbors 'coz I also display their plants."

Comparative advantage over other crops. According to informant no. 3, he said that ornamental plants have income compared to rice that is why he shifted from rice to ornamental production. He said,

"The income of ornamental plants is really high compared to his rice production that's why I converted my rice paddy into ornamentals."

Provided personal and family needs. Informant no. 15 added that ornamental plants are not for eyes only but also a means to provide our own needs. She said,

"To those who say that ornamentals are for eyes only, the fact is it is both for eyes and stomach because it can also help you buy foods."

Employment generation. Informant no. 12 expressed his thought that aside from it adds income, it can also generate employment. He said,

"Aside from it adds income and beauty, I have also been able to bring in people who are unemployed. So it also generates employment."

Generate other enterprise. According to informant no. 18, her ornamental plants have helped her to put up and sustain her convenience store. She said,

"It also helped in constructing my convenience store. If I have sales, I also used it to buy more goods for my store then roll it out so I can buy more high demand plants."

Human Factors. A few of the informants expressed their ideas that one should have the determination and courage to take risk in putting up a business. An informant also said that we should love, care and treat our plants like a human because they also have life in which their benefits give us good life.

Socio-demographic Factors. Some of the informants believed that the age, educational attainment, household size and organizational affiliation are also the factors that lead them to adopt ornamental growing. There were also some of them who disagree with age, civil status and sex as factors in the adoption of ornamental growing because they believed that as long as it is your hobby and you have the determination, willingness and commitment to grow plants, then it is something that you will always do.

As what informant no. 1 said, she believed that age is a factor that influenced her to adopt ornamental production. She said,

"Because of course as we get older, we become more mature and determined. If we work, we must be determined and committed because without it, we will not survive."

Another informant also said and believed that educational attainment is a factor that influenced her to adopt ornamental production. She said,

“Most often people judge a person and would say that “ah, since that person is into planting, he/she is not educated but there are actually a lot of educated or professional growers who make ornamentals as a business because they know that it generates income.”

According to informant no. 2, sex and civil status were not the factors why she adopted growing of ornamentals. She said,

“...because there are also men who love to grow ornamentals. For me, it cannot affect because it will matter on your hard work, even if you are single and if you want to plant, then you will do it because it is your hobby.”

Socio-economic factors. An informant uttered the importance of land and need for capital in a business. He said,

“If you have your own land, you won’t have to bother finding where to display the plants...capital also because how can you put up a business if you don’t have capital?”

Other related factors

Knowledge and skills in marketing

According to informant no. 1, she has been using her own marketing strategy and technique in her ornamental production enterprise because it is really an effective way for her to have more earnings. She said,

“My own strategy for me to have more earnings, I buy rare ones. I really stock rare plants in my garden because that’s the number 1 factor that the customer is looking for. I also have technique; number 1 technique is you organize and arrange your plants and put the rare plants in front to attract more customers.”

a. Propagation of rare planting materials. Informant no. 4 also stated,

“We have mother plants that we can use to propagate again so that before it is bought, we have already a new replacement.”

b. Online selling strategy. As what informant no. 12 shared, he said that he makes used of online selling as a platform to gain more customers and he keeps himself updated on the new trend or popular ornamental plants. He said,

“I have online selling so that I can attract more customers. In order to earn more, you should be updated on the new trend of plants.”

Attitude and behaviour

a. Good personal relations with customer. For informant no. 16, she said that she has to plant more plants because there are also customer who will ask for additional plants that’s free. She said,

“I plant more because there are customers who will ask for free and just entertain them well because it will help you get their loyalty and become your loyal buyers.”

b. Proper maintenance of plants. A few of the informants said that the reason why their ornamentals have been sustained is because they also take good care of their plants by doing fertilizer application and other plant maintenance to make them healthy and look beautiful. Informant no. 8 said,

“They have to be taken cared of properly. Plants are also like a human being so, we should treat it like a human ‘coz it’s pity if it is not taken care of especially that it really has a big help for our needs.”

c. Taking risk in putting a business. An informant also expressed her feelings that in putting up a business, you really have to take risk and be determined along the process. She said,

“In putting up a business, you need to take risks. Sometimes, there is no sales or just a little sales but it is important that you are determined. It is okay if you do not have sales in that day as long you have something to look forward to.”

d. Motivation to grow more. According to informant no. 15,

“I just have a motivating factor because every day I plant 10 and if you have to times it in 1 week or 1 month, you can really produce more.”

Personal attributes

a. Fond of ornamentals. Most of the respondents said that they really loved planting. Some of them also said that it's their way to escape and feel comfortable if they encounter some problems. Informant no. 6 said,

"I've been doing gardening for how many years now. It has been my hobby to plant. I really love plants."

Informant no. 8 added that she just loves planting. She said,

"Before I really loved planting. I enjoy looking around especially in the morning because it gives me fresh air."

b. Strengthen family relationship. Informant 2 mentioned that ornamental plants changed the perceptions and lifestyle of her husband. She said,

Every time I came back home before, my husband was always drunk, but when he found out that there's money in planting that's why he joined me, and we both worked here together."

Institutional Factors. Some of the informants narrated that there were also financial support from different institutions or agency like the DENR and LGU, which helped them construct a nursery or form an association for ornamental plants. The institutions also provide seedlings and other technical support such as training. Family cooperation also has been a factor why their enterprise has sustained.

Technical support from VSU, DENR and LGU. Informant no. 2 said,

"There's also technical support from VSU like training, provision of seedlings and construction of this association booth. There is also help from DENR and LGU."

Barangay officials and family members help in promoting the product. Informant no. 15 also stressed that their barangay and her family also supported her and their ornamental production enterprise. She said,

"The barangay also helps in promoting the products and there is also support from family members in order to lessen the expenses such as labor."

Access to loan. According to informant no. 16, she used to loan money so that she can buy some rare plants that she can display and sell. She said,

"I also borrow money...I used to loan so I could buy some rare plants that I can display because most buyers buy those famous or expensive plants."

Technological Factors. There was an informants who expressed her thoughts and ideas about ornamental production. She said that growing ornamental plants is manageable and easy to propagate.

Easy to manage and light work. As what informant no. 8 said,

"It is also manageable because it is not a heavy or difficult job, it adds income and can relieve stress."

Propagation techniques are easy to do. Informant no. 17 added that technology on propagating ornamental plants is easy to learn. She said,

"I propagate to produce more. It's just easy to propagate. Sometimes I do marcotting or cutting."

Stress reliever. Most of the respondents said that growing ornamental plants has been a way to relieve them from stress, which can also motivate others. Informant no. 15 said,

"It can also relieve stress and can motivate others."

Provided happiness and enjoyment. As what informant no. 3 said, if a person really loves what he/she is doing, then he/she will do it regardless of how stressful it is. He said,

"Though it is also tough but if you are happy with what you are doing, then it will not be a problem 'coz you will find joy and happiness from it."

Limiting and facilitating factors in technology adoption and sustainability

The responses of the ornamental growers revealed eight limiting factors met by ornamental growers which include: (1) insect, pests and diseases, (2) natural calamities, (3) thief, (4) lack of government support, (5) unorganized members of an association, (6) limited area for plant's display, (7) high production cost, and 8) lack of stock or capital to invest on rare plants (Table 2).

Table 2: Limiting and facilitating factors in the adoption and sustainability of ornamental production

LIMITING FACTORS	DESCRIPTION	FACILITATING FACTORS
Insects, pests and diseases	Almost all of the respondents said that insects, pests and diseases have been a challenge for them in growing ornamental plants.	Mechanical and chemical control methods.
Natural Calamities	Some of the informants mentioned that natural calamities like typhoon and flash flood were some of the big problems that they met.	Being vigilant on weather updates to keep the plants safe from any calamities.
Stealing	There were two informants who expressed their bad experience in growing ornamentals. They said that it hurts them when their rare and expensive plants were stolen by an unknown people. According to them, there is still lack of barangay supervision in their barangay.	Security of plants and constant monitoring and supervision.
Lack of government support	Some of the informants said that there's still no support from the government in their ornamental production enterprise because this business is not a priority of the government.	Determination and perseverance of oneself.
Unorganized members of an association	A few of the informants mentioned that unorganized members of an association will lead to lack of communication and competition.	
Lack of communication	An informant also considered lack of communication as a barrier in joining with some of the training set by VSU because of unorganized members of a group.	Competent leader and good relationship among members of an association.
Competition	An informant said that competition is also a problem because there is no price control within growers.	Human innovativeness and access to media for plant's exposure.
Limited area for plant's display	An informant said that widening of the national road is a big challenge for her because this lessens her income and production, since it hindered her opportunity to display the plants.	Always provide good service with customers.

High production cost	A few of the informants said that other inputs needed in growing ornamentals like soil, fertilizer and agricultural chemicals are costly.	Government support to regulate the price of agricultural inputs.
Lack of stock or capital to invest on rare plants	Some of the informants mentioned that they need loan just to buy rare plants to propagate and display it in their garden.	Access to loan or credit agencies.

General proposition

The theoretical model generated by this study illustrates the conditions that surround the adoption and sustainability of technology among ornamental growers (Figure 2). Based on this model, the informants' perceptions before adopting ornamental production are categorized into: 1) just for house display, and 2) no economic value.

The model presents five general factors that influence in the adoption and sustainability of technology, the surrounding conditions include: contextual, human, technological, economic and institutional factors.

In the adoption of ornamental production technology, the illustration shows the contextual factors wherein within a context, people would be able to undergo the stages in the adoption of technology. Results of this study revealed that the informants were aware on the use of ornamental plants mainly because of the norms of the social system. Their observations in the environment, influence of other ornamental growers and their exposure to some ornamental related activities like the VSU Flower and Garden Show gave them the drive to seek more information and adopt ornamental plant production technology. But according to Lamorte (2019), adoption may not always be the end. The technology also needs to be reinforced to ensure its sustainability. Thus, reinforcement happens when there's a need for development to strengthen the use of technology. It is also a means to address the challenges that might hinder the process of technology adoption and sustainability.

In this study, the informants mentioned some of the limiting factors in the adoption and sustainability of ornamental production which include the following: a) insects, pests and diseases, b) natural calamities, c) thief, d) lack of government support, e) unorganized members of an association, f) limited area for plant's display, g) high production cost, and i) lack of stock or capital to invest on rare plants. According to them, they don't take these limiting factors as hindrance in the adoption process because these will just flow naturally along the way. In addition, the informants revealed some of the facilitating factors that can address those limiting factors that they faced and these include a) mechanical and chemical control methods, b) being vigilant on the weather updates to keep the plants safe from any calamities, c) constant monitoring and supervision, d) determination and perseverance, e) competent leader and good relationship among members of an association, f) human innovativeness, g) access to social media site for plant's exposure, h) provide good service with customers, and i) government support.

Human factors such as the informant's socio-demographic and socio-economic characteristics, knowledge, skills, attitude or behavior and other personal attributes towards the technology are also presented in the illustration as one of the factors that can affect technology adoption and sustainability.

Some socio-demographic characteristics of the informants that affect the adoption of technology include a) age, b) educational attainment, c) household size, and d) organizational affiliation. They believed that as we get older, we become more mature and knowledgeable, and this result can be supported by the ideas of Mwangi & Kariuki (2015). There were a few of them who expressed that a person's educational attainment is also considered to be a factor since there were also professionals who venture into ornamental production because they believed that it also generates income, and this can be supported by the study of Melesse (2018). A few of the informants also narrated that with the help of other members of the family as well as members of an organization, then the rate of adoption will be high and this can be supported by the study of Polinar (2002).

Aside from the socio-demographic characteristics, the socio-economic factors also contribute to the adoption of ornamental production which include the tenurial status and annual income, because other informants of this study said

that having land that can be utilized for planting as well as annual income, a person is more likely to adopt the technology same with the study of Bhuiyan (1987) and Ntshangase et al (2018).

Other human-related factors that can influence the adoption and sustainability of ornamental production include a) knowledge and skills in marketing, b) attitude and behavior, and c) personal attributes. The informant's knowledge and skills in marketing include their ability to propagate rare plants and use of online selling strategy to get more buyers. According to them, it is very important to be determined and motivated to take risks in a business and to have good personal relations with customers as well as love for plants. Their knowledge, skills and attitude will also determine the progress of the business.

Results from the transcribed data of this study also revealed the economic factors which strongly influenced the sustainability of ornamental production technology, because the growing of ornamental plants has been an effective way to generate income which later became the main source of income of the respondents. Some of the respondents said that growing ornamental plants generates more income compared to rice, which is why they had converted their paddy rice into ornamental plant production. Because of high productivity, aside from the reason that it provides them their basic needs, it also became an avenue to send their children to college and being able to graduate in their chosen degree program. With the presence of regular buyers (gardeners, landscapers, other *plantita* and *plantito*), it affects and motivates the respondents to produce more ornamentals.

Supports given by some institutions like regular monitoring, opportunities to expose and sell their plants to many people just like the VSU Flower and Garden Show event, access to training and credit agencies, and the support and cooperation of DENR, LGU and family members also helped the respondents to reinforce and sustain their products and these are categorized under institutional factors.

Moreover, the technological factors of ornamental plants are also shown in the illustration since the narrative of the informants revealed that this enterprise has a high relative advantage, compatibility, trialability and observability rate because according to them, growing ornamentals is easy to manage and the techniques of propagation are just easy to perform. Almost all of them narrated that growing ornamental plants is their hobby, which relieves them from stress and provides them happiness and enjoyment. Thus, this enterprise also coincides with the Covid-19 pandemic which is timely and relevant to the current situation.

With positive reinforcement of all the factors that surround the adoption and sustainability of ornamental production, discontinuance of the technology will be mitigated, because it is also possible to happen after the technology has been adopted. Hence, a need for technical assistance from change agents and other factors is also important to reduce the level of uncertainty regarding the outcome

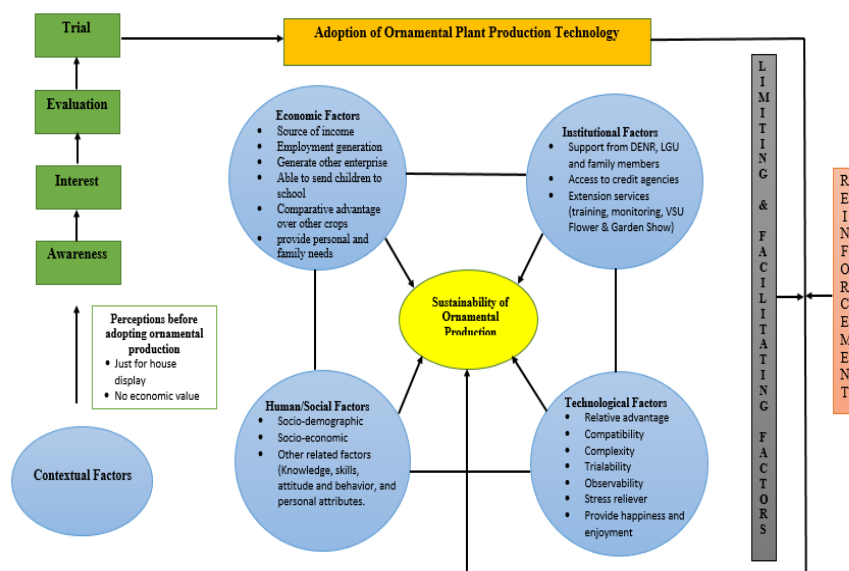


Figure 2. Theoretical Model on the Conditions Surrounding Technology Adoption and Sustainability

5. CONCLUSIONS

Based on the results of the study, the following conclusions were drawn:

1. Majority of the respondents were middle-aged adults and females. Almost all were married, not members of an organization, and there were only four who finished college while majority of them were non-degree holders. Almost half of the households had a household size ranging from 4-5 and in terms of farm size, almost all of the respondents in this study had a farm size below 1 hectare and majority had an annual income below 65,000.
2. The adoption of ornamental production technology of the informants started based on their observation of the environment, influenced of other ornamental growers as well as their exposure to training and other ornamental-related activities just like the VSU Flower and Garden Show. From these factors, they became more interested in it which eventually led them to adopt and sustain the technology because of its economic benefits.
3. The model generated in this study revealed five general factors that influence in the adoption and sustainability of technology, the surrounding factors are categorized into: contextual, human, economic, institutional and technological factors. The contextual factors involves the norms of the social system and the environmental forces that triggered the respondents to adopt the technology. Human factors include the socio-demographic and socio-economic characteristics of the informants as well as their knowledge, skills, attitudes and personal attributes towards ornamental production. For the economic factors, these are subcategorized into six and these include a) source of income, b) able to send their children to school, c) comparative advantage over other crops, d) provided personal and family needs, e) employment generation, and f) generate other enterprise. Institutional factors include a) technical support from VSU, DENR and LGU, b) support from barangay officials and family members, and c) access to loan; while the relative advantage of the technology, compatibility, complexity, trialability and observability as well as it's characteristics to relieve stress and provide happiness and enjoyment fall under the technological factors. Further, positive reinforcement of all these factors is essential to mitigate the discontinuance of the adopted technology and address the challenges that might hinder the process of sustainability.

6. RECOMMENDATIONS

Based on the findings of this study, the following are recommended:

1. Government agencies should have regular supervision and full support to ornamental growers to improve the quality, variety, quantity, consistency of supply, price and service reliability of ornamental production, and to solve some barriers that hinder the improvement of the enterprise such as high production cost, shortage of quality planting materials, competition and unorganized members of an association.
2. Information drive and campaigns about the importance of ornamental plants must also be intensified to spread awareness and to encourage others to grow and venture in ornamental plant production.
3. It is also suggested that for further studies, informants' buyers or costumers should also be included as informants to gather a more comprehensive data on the sustainability of ornamental plant technology.
4. A similar comprehensive study using mixed research design with more variables covering a wider scope in other parts of the region may be conducted to have an evidence-based and a reliable result.

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