

## **Drafting a Plan of Sustainable Urban Vertical Garden to Augment Household Food Security and Livelihood in a Philippine Urban Community**

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— *Review of* —  
**Integrative  
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### **ABSTRACT**

This study attempted to draft a plan of sustainable urban vertical garden for adult women to enhance household food security, and as an alternative source of livelihood during the pandemic. A mixed method approach was used where the qualitative part included an FGD consisting of about 10 women from the Barangay 7, located in Batangas City, in the Philippines. The quantitative portion solicited answers from women members of 120 households with a survey instrument that used themes from the FGD. Results of the T-test showed that household food security is significantly related to budgeting and financial standing, technical position, and marketing ability of the respondents. It may be concluded that vertical gardens could provide women residents the opportunities to grow plants in limited spaces for a sustained supply of vegetables in their tables and for sale to augment their family income.

Keywords: Urban Vertical Garden; Household Food Security; Urban Community Garden Plan.

### **1. INTRODUCTION**

“With the large-scale expansion of the built environment, the amount of vegetation present in those regions encroached upon by development has correspondingly decreased” (Petty, 2008, 1). This is accompanied by buildings being built upward instead of outward to save on land area, which has become a scarce resource. Until now, this phenomenon still exists as can be gleaned from the following studies. Thakor, Pandya, and Mankad (2020) termed it as vegetation loss which is an issue with depleting rural space and rapid urbanization. Green area reduction was the problem identified by Lotfi et al. (2020) as a consequence of dense urban development. Bobby, Dash, and Shetty (2019) contend that urbanization called for the construction of concrete buildings which reduced open spaces for vegetation or green areas in the city. “Shrinking land spaces and multiplying high-rises with scanty space available for gardening” is the phrase used by Rameshkumar (2018, 1) to characterize this situation. Similarly, Jain and Janakiram (2016) maintained that with modernization and urbanization, a great number of buildings were constructed thereby replacing vegetated surfaces. Lastly, Widiastuti, Prianto and Budi (2016) stated that with rapid modernization, the ecosystem was changed through rising temperature brought about by constructing with hard materials such as asphalt, paving and concrete. Thus, there is a need to bring back the vanishing urban green space through the vertical garden system.

Vertical gardens, according to Rameshkumar (2018), are living walls that are wrapped with vegetation. They are also referred to as green walls, living walls or bio walls (Jain and Janakiram (2016). Whatever terms are used, still they refer to all forms of

vegetated wall surfaces (Timur and Karaca, 2013; Widiastuti et al., 2016). They are man-made vertical landscaping which used plants to cover the façade of a building or upright structures, either partially or fully (Lotfi, et al., 2020). Perhaps, Bobby et al. (2019, 1) provides a comprehensive explanation of what vertical gardens are by stating the following:

“Vertical gardens grow vertically upward using a support system like trellis and can be grown both in the interior or exterior walls covered with the various plant species in two different ways; pre-vegetated in other words; ‘prefabricated modular panel’ or in situ applied panels. Vertical gardens are classified according to the types of materials used in the system, namely 1) direct green façade where self-climber plants are planted at the base of the building, 2) double skin vertical/indirect green façade where plants are grown on another layer apart from the wall, and 3) living wall systems (green walls) that are constructed through the use of modular panels.”

The practices of vertical gardening can be traced to ancient Mesopotamian cultures (Petty, 2008) which include the Babylonian civilization. Shaikh, Gunjal, and Chaple (2015) claimed that the hanging gardens of Babylon are the most mentioned ancient green wall concept. However, in the modern era, Patrick Blanc comes to mind when it comes to vertical green (Pui Hoong, 2011). He was born in France in 1953 and he has been building vertical gardens in different public and commercial buildings, hotels, restaurants, lounges, museums, art exhibitions and private places since 1988 (Pui Hoong, 2011).

Since land is scarce in urban areas, gardens should be grown for their functional motivation and must be sustained to provide for the needs of the residents. According to Lofti et al. (2020), vertical gardens could affect the restorative state of the users thereby enhancing the general wellbeing in the urban environment to further improve the urban quality of life. This requires planning the urban environment in order to achieve sustainable development. Urrestarazu and Bures (2012) alleged that a sustainable green wall could be built by using independent modular units, renewable energy, a closed system, environmentally friendly substrates, and a single type of Mediterranean native vegetation. In the Philippines, neighborhood-initiated vertical gardening was undertaken by communities to alleviate the negative effects on urban health (Estrada and Roxas, 2019). The authors claimed that the Makati City urban greening program promotes tree planting and organic urban farming in schools.

The urban quality of life is most challenged during the pandemic. The working populace of urban areas, specifically the National Capital Region and nearby provinces like Batangas was negatively affected. Many lost their jobs and adult women or senior citizens are no exception. This demographic reality demands a call to action to assist the aforementioned vulnerable population (Estrada and Roxas, 2019). In addition, since food is a problem during the pandemic, Melo (2021) stated that food security involves consistent availability of appropriate and safe food from domestic production. The proposed urban greening initiative could provide alternative work to adult women while staying at home. As a form of women empowerment, sustainable vertical gardens in their residences could supply them salable crops for income generation on top of their families’ daily vegetable consumption.

With the general objective stated as “To frame a plan that will guide the establishment of a sustainable vertical garden project for adult women in Barangay 7 located in Batangas City”, the following sub-objectives are presented:

1. To ascertain the financial standing, technical position, and marketing ability of the women participants in the focus group discussion (FGD),

2. To determine if there is any relationship between household food security and the following: budgeting and financial standing, technical position, and marketing ability of the women survey respondents.

## 2. THEORETICAL BACKGROUND

Some ideas contribute to the theoretical underpinnings of this research. These are the following: green economy concepts, sustainable livelihood theory, and empowerment frameworks. These ideas were taken collectively in conceptualizing the entire greening project.

The term ‘green economy’ is a highly complex construct because it tries to fuse different economic, environmental, and social ideas (Bailey and Caprotti, 2014). Further, it tries to merge these ideas with a large selection of actors. UNEP (2011, 16) describes green economy as one that leads to “improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. In its simplest expression, “a green economy is low carbon, resource efficient, and socially inclusive”. Vukovic et al. (2019) added that the policy of governments in terms of the green economy is aimed at protecting the environment while protecting the interests of the society. Further, Badoc-Gonzales et al. (2021, 257) “claimed that in addressing the interplay between ecological and social urban systems, building environmental resilience considers green infrastructure as an important factor”.

Loiseau et al. (2016) associate green economy with sustainability and sustainable development because it could lead to a decline on the use of resources, on climate change and on emissions while simultaneously addressing economic growth and employments. Onyusheva<sup>1</sup>, Ushakov, and Tran Van (2018) elaborated the concept by stating that it is focused at reducing environmental threats and ecological insufficiencies for the country’s sustainable development. Jacobs (2013) call it a sister term to green growth and relates it also to sustainable development.

Another term that comes to mind when discussing sustainable development is sustainable livelihood. Morse, McNamara, and Acholo (2009, 3) define it as “the ability of a social unit to enhance its assets and capabilities in the face of shocks and stresses over time”. The focus of sustainable livelihood and project planning, according to Mandigma et al. (2016) are self-reliance and long-term individual autonomy. Bennett (2010) adapted the same definition in different practical applications like in food security. Said author also suggested a framework for analyzing sustainable livelihoods which includes livelihood outcomes such as the following: 1) more income, 2) increased wellbeing, 3) reduced vulnerability, 4) improved food security, and 5) more sustainable use of natural resource base. However, Badoc-Gonzales, et al. (2021) suggested that policies and sustainable livelihood projects should incorporate sustainability of the natural and cultural environment, in addition to the other aspects.

Thus, there is a need to increase the wellbeing of the people through sustainable livelihood that would counter poverty specifically in the urban areas. Socially sustainable businesses may help promote equality and a good quality of life, particularly in impoverished communities (Mandigma 2017). However, even before, there is poverty which resulted from economic inequity (Majale, 2002). Said author also emphasized two trends in poverty which are still prevalent nowadays, namely: the feminization of poverty, and the urbanization of poverty. As long as the concepts of ‘feminization of poverty’ and ‘urbanization of poverty’ are observed in our system, challenges to these urban women will always exist. It becomes imperative therefore, to empower these urban women in order to mitigate, if not totally eradicate, poverty within their realm of possibility. This

may be aligned to another study by Badoc-Gonzales, et al. (2020), where the goal is to promote sustainable activities and contribute towards resilience. Perkins and Zimmerman (1995) reviewed the meaning and significance of empowerment concept and problems in their article by evaluating several submitted papers. A notable work is that of Maton and Salem (1995) who view empowerment generally as a process which enables individuals to attain their fundamental personal goals with the participation of other people. This interpretation appropriately combines individual reasons with cooperative action and permits process assessment across different community groups and settings. The aforementioned definition provides a suitable foundation for this current research.

### 3. CONCEPTUAL FRAMEWORK

Several studies on vertical gardens were reviewed that justified the relevance of putting up a vertical garden in the chosen locality for the study. Table 1 summarized the findings or results from the reviewed literature.

Table 1 Review of Literature - Summary of Findings/Results

Authors, Date	Locale	Research Method	Findings/Results
Thakor, Pandya, and Mankad, 2020	International	Literature review	Versus the cost input in green walls, the benefits are high & long-lasting, thus, green walls are sustainable urban design.
Lofty et al., 2020	New Cairo, Egypt	Quasi-experiment	Those exposed to vertical gardens have higher restorative effect & lower stress levels. Thus, vertical gardens could enhance quality of life.
Estrada and Roxas, 2019	Philippines	Ethnographic-exploratory research	Vertical gardening could be an avenue for which the elderly could be empowered in a community.
Boby, Dash, and Shetty, 2019	India	Case study	Careful implementation and maintenance of the garden can make the vertical garden feasible in warm and humid climate in the Indian context.
Rameshkumar, 2018	India	Experiment	Among 3 ornamental plants used, <i>Polyscias fruticosa</i> and <i>Philodendron erubescens</i> performed better in vertical garden system.
Llewellyn, 2018	New Jersey, USA	Case Study	Students' self-evaluation shows that vertical garden education program was successful in increasing the students' knowledge at schools.
Jain,Janakiram 2016	India	Book Chapter	The vertical garden can be implemented on any wall, without any size or height.
Widiastuti, et al., 2016	Indonesia	Experiment	The performance of vertical garden is influenced by the weather around the building.
Shaikh, et al., Chaple, 2015	International	Literature Review	Green walls have a great potential for positive environmental change in dense urban areas.
Timur, and Karaca, 2013	Turkey	Book Chapter	Vertical garden applications have been started as a new trend in a lot of cities in Turkey.
Urrestarazu, & Bures. 2012	Spain	Experiment	The benefits of green roofs may be realized in the cities of Spain.
Pui Hoong, 2011	Singapore and Florida, USA	Case Study (Unpublished Thesis)	Rainwater harvesting can be used to irrigate vertical gardens as a sustainable way to maintain greenery in a city.
Petty, 2008	Georgia, USA	Case Study (Unpublished Thesis)	The integration of vegetation and architecture – epitomizes a Time - honored tradition that dates back to the earliest civilizations on record.

Source: Author, 2022

Some of the literatures reviewed in Table 1 showed the requirements for successful vertical garden projects. It was also noted that though the idea of vertical garden dates back to the earliest civilization, some places like some cities in Turkey found this type of gardening as a new trend. Besides, the findings highlighted the benefits provided by vertical gardens, like having restorative effects, increasing vertical garden knowledge of participants, and serving as avenues by which the elderly were empowered in communities. Indeed, green walls or vertical gardens provide opportunities for urban residents living in limited spaces to grow plants that could otherwise flourish only in traditional sprawling gardens. This idea could mean a steady supply of vegetables, specifically herbs that may contribute to the nutritional demands of the urban residents year-round. Any excess harvest may be sold, thus augmenting the income of the planters.

Additionally, “Vertical Gardens provide economic and ecologic benefits as well as aesthetic value” (Timur and Karaca, 2013, 597). These benefits were confirmed by Jain and Janakiram (2016) in their chapter in the book entitled ‘Commercial Horticulture’, and are expected to accrue to the target stakeholders of an urban community. However, such gains could come only if an urban community vertical garden project is carefully planned before implementation. This is exactly the function of this present study. It will serve as the guide providing directions on the courses of actions to be taken during the implementation phase of the entire greening project.

Figure 1 shows the conceptual framework that assisted in the framing of this study. It is patterned after the models discussed in the studies by the Philippines Humanitarian Country Team (2020), Ochoa, et al. (2019) and Gartman (2017). The needs of the target community were first determined against the capabilities of the project participants. Consequently, a plan for an urban community vertical garden is proposed before implementation.

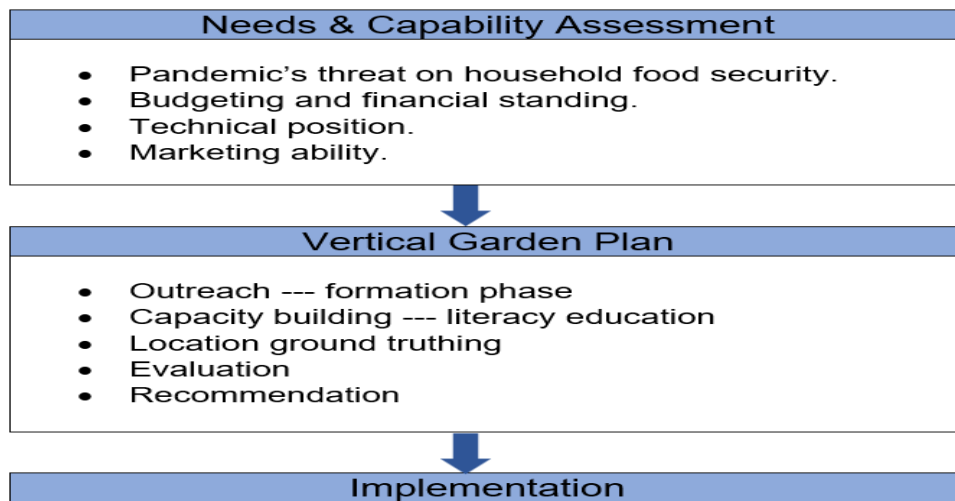


Figure 1 Conceptual Framework

#### 4. METHODS

The study used a mixed method research approach that employed both the qualitative case study design and the quantitative descriptive, correlational design. For the case study, a focus group discussion (FGD) was conducted among 10 women from the study site, who were either out of job or have experienced diminution of family income because of the pandemic. The FGD uncovered several themes that correspond to the women's perceived household food security, financial standing, technical position, and marketing

ability towards the setting up of a vertical garden in their place. These led to the quantitative part of the study which employed a survey questionnaire disseminated to 120 households, each with a woman member as respondent.

The study site is in Barangay 7 in Batangas City (Figure 2). Initially, the greening project shall be launched in four (4) streets where there is less vegetation, namely: Noble, P. Canlapan, D. Silang, and C. Tirona. According to PhilAtlas (2022), Barangay 7, formerly Poblacion, is a barangay in Batangas City, in the province of Batangas. The household population of Barangay 7 in the 2015 Census was 712 broken down into 207 households or an average of 3.44 members per household. However, based on the latest records of the Office of Barangay 7 in 2022, there are only 186 households in the area.

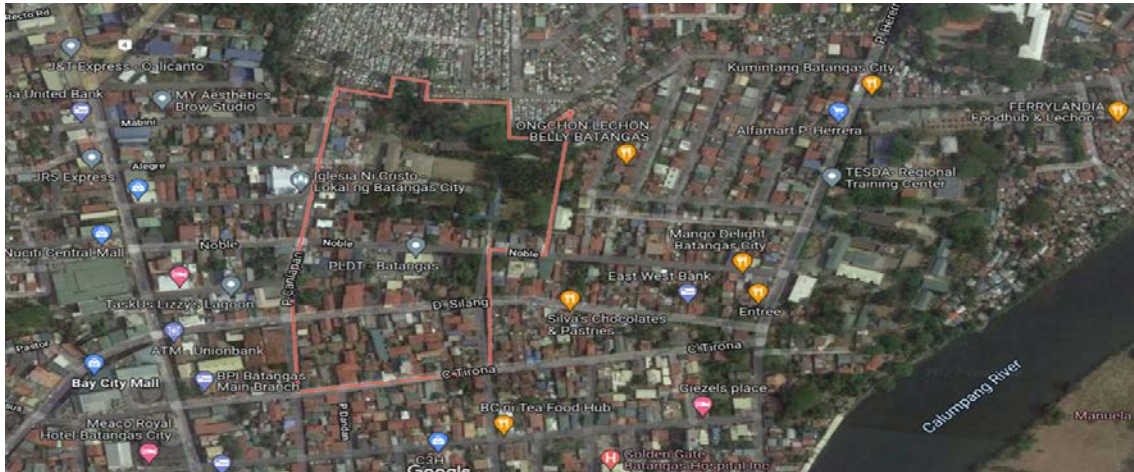


Figure 2. Geographical location of Barangay 7, Batangas City (Source: Created from Google Map)

A purposive sampling method was used in determining FGD participants for the case study. Selection criteria for choosing the FGD members were as follows:

1. Must be a woman resident of Barangay 7, Batangas City for at least 5 years.
2. Must be 25 – 55 years old.
3. Must be married, widow, or single mother with at least a minor child in the family.
4. Must have no personal source of regular income and the husband (if applicable) lost his job or suffered considerable diminution of income during the pandemic.

Ten adult women from Barangay 7, who were either out of job or have experienced diminution of family income because of the pandemic, participated in the vertical garden FGD. Thus, a set of questions, which were written in the vernacular, was prepared and included in the FGD Guide for the focus group to answer. However, prior to the FGD, an ethics clearance was obtained from the Philippine Social Science Council (PSSC). The 10 women were requested to read and sign the informed consent for FGD participation in the cover letter of the FGD guide and in the information and consent form which are requirements for the ethics clearance. Each of the 10 participants were given P500 as bother fee or connectivity allowance per recommendation of PSSC. With the help of the Barangay 7 secretary and a few barangay officers, the FGD proceeded on March 8, 2022. The answers of the FGD participants were manually transcribed. The Filipino responses of the participants were translated into English by the author. Some of the participants' statements were reported in this articles' section for findings and discussions.

From the themes that emerged in the FGD, a survey questionnaire was prepared and distributed among 120 households. A woman family member of each household was requested to fill-up the questionnaire. The 10 women who previously participated in the FGD were not included in the survey. The survey instrument included questions on household food security (1 item), budgeting and financial standing (5 items), technical position (4 items), and marketing ability (3 items). The respondents' choices are in Likert scale of 1 to 3, with 3 as the highest score. Table 2 shows the response categories and mean score interpretation for the responses.

Table 2 Categories and Interpretation of Score/Mean Score for the Responses.

Response Categories	Mean Score for Responses	Interpretation
3	2.34 – 3.0	Sufficient, Stable, Adequate, Proficient
2	1.67 - 2.33	Less Sufficient, Less Stable, Less Adequate, Less Proficient
1	1.0 - 1.66	Insufficient, Unstable, Inadequate, Not Proficient

Source: Author, 2022

In order to test if household food security ( $V_1$ ) is associated with budgeting and financial standing ( $V_2$ ), technical position ( $V_3$ ), and marketing ability ( $V_4$ ), chi-square was initially used. However, during the processing of data, some cells have expected count less than 5 thus, another statistical tool, T-test, was employed. There were 3 paired samples, namely:  $V_1$  with  $V_2$ ;  $V_1$  with  $V_3$ ; and  $V_1$  with  $V_4$ .

## 5. FINDINGS AND DISCUSSIONS

### 5.1 Qualitative Study

Analysis of the FGD transcript yields four (4) themes, namely, (1) household food security is threatened by the Covid-19 pandemic; (2) poor budgeting and financial standing; (3) inadequate technical position; and (4) deficient marketing ability.

#### *Theme 1: household food security is threatened by the Covid-19 pandemic*

As Table 3 shows, the women participants view the Covid-19 pandemic as a source of a lot of problems. All the 10 women complained that their family incomes were lessened or their husband's jobs were lost. Consequently, their family budget for nourishment was affected leaving less food on the table. A few women took this as a signal for them to economize. The foregoing worries took a toll on the mental health of some participants. This is in accordance with the findings of De Guzman et al. (2020) where the respondents added they need psychosocial support and guidance on how to be emotionally and mentally fit during the pandemic.

Table 3 How pandemic threatened your household food security

Views	Reference Count	Selected Statement
Loss jobs/less income	10	"Employee earnings are lost because a lot of establishments closed their businesses." Participant 2
Lack food	6	"My husband driver lost a lot of income which affected my budget for food." Participant 6
Need to economize	3	"The first thing I did was to economize." Participant 4
Mental anguish	2	"Emotional problems for everybody in addition to physical and financial problems." Participant 1

Source: Author, 2022

The participants' needs analysis was followed by an assessment of the women's competencies. These are in terms of financial capability, technical potential for vertical gardening, and marketing knowledge. The responses of women are summarized into three themes and are presented in Tables 4 to 6.

*Theme 2: poor budgeting and financial standing*

According to the World Bank (2013), financial capability is the capacity of a person to act according to a specified socio-economic and environmental situation, in his/her best financial interest. It includes financial knowledge or literacy, attitudes and behavior. Table 4 summarizes the responses of the women participants to some financial questions during the FGD.

**Table 4 Budgeting and Financial Standing**

Views	Ref Count	Selected Statement
Source of income: pandemic		
• Husband's earnings	3	"Husband is a construction foreman" Participant 7
• Women online selling	3	"Online selling: food & goods" Participant 8
• Woman salary in a skeletal workforce	1	"My salary is very small while in skeletal workforce" Participant 1
• Woman did home tutorial	1	"Income came from home tutorial." Participant 9
• Woman accepted laundry	1	"I washed clothes to buy food specially for my child." Participant 4
• Pay-out from the government's 4Ps	1	"Dole-outs from government as a registrant in its 4Ps program." – Participant 5 -
Income flows sufficient?		
• No	9	"No, it is very hard to budget." Participant 1
• Yes	1	"With God's help." Participant 7
Allot funds for nutritious foods including vegetables?		
• Not enough	8	"Working everyday but earnings not enough to buy nutritious foods." Participant 9
• Yes	2	"There is money for food but mostly without vegetables." Participant 7
Willing to continuously grow vegetables at home?		
• Yes	10	"I can surely serve my family with fresh vegetables for their health." Participant 2
Planting financial assistance?		
• 1 <sup>st</sup> stage	7	"At the 1 <sup>st</sup> stage to buy seedlings and fertilizer." – participant 7-
• Propagation	3	"In my opinion, at the time when plant propagation is desired." – Participant 10 -

*Source: Author, 2022*

It can be noted that aside from the husband's reduced earnings during the pandemic, women augmented the family income by engaging in some lower, but still helpful, revenue-producing activities. This is corollary to the findings of the National Anti-Poverty Commission (2012, 18) that "While a number of women engage in economically gainful occupations, their earnings have been found to be generally lower than that of their husbands." Despite the aforementioned, nine out of ten women participants complained that the total income was not sufficient to cover family expenses. Further, eight women lamented that they cannot allot enough funds for nutritious foods that include vegetables. Thus, all of them are willing to continuously grow vegetables at



home with some financial support to buy seedlings and fertilizer or when plant propagation is desired. The foregoing findings may be construed to mean that the financial standing of the women participants is not good.

### *Theme 3: inadequate technical position*

Several studies provided exhaustive discussions on the technical requirements of a sustainable vertical garden (e.g., Jain and Janakiram, 2016; Timur and Karaca, 2013; Pui Hoong, 2011). With these studies as guides, the technical position of the women participants was determined and presented in Table 5.

**Table 5 Technical Position**

<b>Views</b>	<b>Ref Count</b>	<b>Selected Statement</b>
Willingness to attend gardening training sessions	10	"I will attend." Participants 1-10
Openness to vertical gardening	10	"I am open to the idea of vertical gardens." Participants 1-10
Adequate ventilation/lighting around residence?		
• Yes	6	"There is." Participants 4, 5, 7, 8, 9, 10
• None	4	"None." Participants 1, 2, 3, 6
Water supply problem?		
• No	8	"It is not a problem." Participants 3 – 10
• Yes	2	"Water supply inadequate." Participants 1, 2

*Source: Author, 2022*

All the women are willing to be trained in gardening by attending coaching sessions. They are also open to the idea of putting up vertical garden structures in their area. However, six of the ten women have ventilation and lighting problems in their house perimeter. Further, eight women admitted their water supply is not adequate. These revelations may mean that the women participants have inadequate technical position.

### *Theme 4: deficient marketing ability*

Kabagani (2020, 2) reported that "technical capability enhancement training is needed to sustain product-marketing requirements". Thus, the marketing activity of the women participants is dependent on their technical knowledge. The sales of their vegetables would be successful if they can produce quality goods at the right time.

**Table 6 Marketing Ability**

<b>Views</b>	<b>Ref Count</b>	<b>Selected Statement</b>
Prospective buyers		
• Neighbors	9	- Participants 1 – 10 except 3 -
• Friends	4	-Participants 3, 7, 9, 10 -
• Co-workers	1	-Participant 1 -
• Relatives	1	-Participant 3 -
How to convince people to buy your vegetables?		
• Fresh vegetables	9	"I will tell them to examine how fresh my vegetables are because they are newly picked." - Participant 5 -
• Low price	1	"I will sell the vegetables at a low price." – Participant 4 -
• Benefits of eating vegetables	1	"I will tell them the benefits of eating vegetables." – Participant 3 -

Planting and harvesting schedule		
• Depending on the suggestions of the garden trainers	10	-Participants 1 – 10 -

*Source: Author, 2022*

It can be gleaned from Table 6 that the women have some know-how in selling. However, training sessions in marketing are still needed to boost their current knowledge. With regards the matching of planting and harvesting schedules, all the women admitted that they are dependent on the suggestions of the trainers. This is a very important aspect of marketing because buyers must be assured of available supply whenever they need vegetables. Customers cannot be made to wait for the right time to harvest the vegetables if they need them already. Not having a steady supply of vegetables will drive customers away to other sources. The foregoing realization attests to the deficiency in the marketing ability of the women participants.

## 5.2 Quantitative Study

One hundred twenty urban households were surveyed to determine if the other women who did not participate in the FGD have the same needs and competencies as the 10 chosen women FGD sharers. The respondents were asked how sufficient was the food for the family during the pandemic. They were also asked how stable were their financial standing; how adequate were their technical position to do vertical gardening at home; and how adequate were their ability to market their garden produce. Results of the survey are presented in Table 7.

Table 7 Interpretation of the Mean Score per Variable

Questions	N	Mean	Interpretation
V1 Household Food Security	120	2.52	Sufficient
V2 Budgeting and Financial Standing:	120	2.37	Stable
Source of income during the pandemic	120	2.44	Stable
Flow of income during the pandemic	120	2.43	Stable
Allotment of funds for nutritious foods, like vegetables	120	2.52	Stable
Can grow vegetables at home regularly	120	2.25	Less Stable
Source of financing for growing vegetable	120	2.21	Less Stable
V3 Technical Position	120	2.22	Less Adequate
Willingness to attend gardening training sessions	120	2.07	Less Adequate
Openness to vertical gardening	120	2.13	Less Adequate
Adequate ventilation/lighting around residence?	120	2.25	Less Adequate
Adequate water supply	120	2.44	Adequate
V4 Marketing Ability	120	2.07	Less Proficient
Ability to look for buyers of excess grown vegetables	120	2.02	Less Proficient
Ability to convince people to buy your vegetables	120	2.03	Less Proficient
Ability to schedule planting and harvesting of vegetables	120	2.15	Less Proficient

*Legend: 2.34 – 3.0 Sufficient, Stable, Adequate, Proficient*

*1.67 - 2.33 Less Sufficient, Less Stable, Less Adequate, Less Proficient*

*1.0 - 1.66 Insufficient, Unstable, Inadequate, Not Proficient*

*Source: Author, 2022*

Most of the 120 women respondents believed that the food for the family is sufficient during the pandemic. However, there were a few residents who accepted that their food is less sufficient. When asked about their financial standing, a majority of the women thought that they have stable financial position, except when they were asked about regularly growing vegetables at home with the needed financing. The rest accepted that

money matters in their family is less stable. Should the women respondents be willing to participate in a vertical garden project, most of them have less adequate technical knowhow and less proficient marketing ability. With these basic needs and competencies assessment, an association test was done to uncover possible relationship between household food security ( $V_1$ ) and the following variables: budgeting and financial standing ( $V_2$ ), technical position ( $V_3$ ), and Marketing ability ( $V_4$ ). Results of the tests are shown in Tables 8 to 10.

Table 8 Paired Samples Statistics

	Pairing	Mean	N	Std. Deviation	Std. Error Mean
Pair 1	$V_1$	2.52	120	.534	.049
	$V_2$	2.3700	120	.50387	.04600
Pair 2	$V_1$	2.52	120	.534	.049
	$V_3$	2.2188	120	.65910	.06017
Pair 3	$V_1$	2.52	120	.534	.049
	$V_4$	2.0667	120	.73793	.06736

Source: Author, 2022

Table 9 Paired Samples Correlations

	Pairing	N	Correlation	Sig.
Pair 1	$V_1 - V_2$	120	.826	.000*
Pair 2	$V_1 - V_3$	120	.362	.000*
Pair 3	$V_1 - V_4$	120	.246	.007*

\*Pair is significantly correlated

Source: Author, 2022

Table 10 Paired Samples Test

	Pairing	Paired Differences				t	df	Sig (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	Interval of the				
					Lower	Upper			
Pair 1	$V_1 - V_2$	.14667	.30759	.02808	.09107	.20227	5.223	119	.000*
Pair 2	$V_1 - V_3$	.29792	.68161	.06222	.17471	.42112	4.788	119	.000*
Pair 3	$V_1 - V_4$	.45000	.79758	.07281	.30583	.59417	6.181	119	.000*

\*Pair is significantly related

Source: Author, 2022

Results of the T-test shows that household food security is significantly related to budgeting and financial standing, technical position, and marketing ability of the respondents. This means that if the family is financially stable, then household food is sufficient; otherwise, if the family is financially unstable, food in the table is insufficient. Also, if the technical position of the family and its woman member respondent is adequate, then household food which includes vegetables, is sufficient; otherwise, if the technical position is inadequate, the family supply of vegetables will be scanty. Further, if the marketing ability of the female member who will join the vertical garden project is proficient, then household food is sufficient; otherwise, if her marketing ability is not proficient, food for the family may be scarce.

### 5.3 Plan for Urban Community Vertical Garden Project

The covid 19 pandemic has brought many problems to Filipino families including food insecurity. Since most families in the Philippines attempt to manage the economic effects of the pandemic, financial education becomes more crucial than ever (Castillo, 2020). Education, not only in finance, is needed but also in other aspects like enhancing access to market, boosting productivity, and developing growth-stage support mechanism (OECD/Economic Research Institute for ASEAN and East Asia, 2018). For community gardens, education in these areas is best delivered through training or coaching. Appropriate training modules that are localized and community-based must be prepared (Kabagani, 2020). Further, these modules must be adapted to women trainees because according to the World Bank Group (2015), Filipino women are considerably more likely to be financially included than men. It can be assumed that Filipino women may also excel in all phases of community gardening.

Merlinda et al. (2021) opined that since the Covid-19 pandemic has an impact on all sectors, they made a study that formulate a model that effectively strengthens the environment in meeting basic needs. Their study found that the most effective model for strengthening the environment is the one that meets basic needs through food barns. For the present study, the findings of the FGD for the qualitative part, point to the necessity of drafting a plan for a sustainable urban vertical garden to augment household food security and livelihood in a Philippine urban community. These were reinforced by the results of the survey, where some of the respondents believed that food on the family table was insufficient, especially the nutritious ones like vegetables.

Gartman (2017) wrote that community gardens are land where members of the community can grow plants that are edible or for ornaments. He also wrote that these community gardens could increase food security of the community as well as its wellness. Table 11 shows the plan for an urban community vertical garden project for barangay 7, Batangas City, that is envisioned to address the issue of food security for some households.

**Table 11 Plan for Urban Community Vertical Garden Project**

<b>Project Lead</b>	<b>UST RCSSED researchers</b>
Project Counterpart	Officials of Barangay 7, Batangas City
Support Objectives	The pilot gardening project is expected to address the following objectives:
	1. To contribute to the participating women's ability to provide a steady supply of vegetables in the table
	2. To assist in the capacity building of the participating women in augmenting their income from selling homegrown vegetables
<b>Line of action</b>	<b>Details</b>
Priority Actions	Understanding women dimension of work
	Mainstreaming women in vertical gardening
	Facilitating women development trainings
	Ensuring vertical garden project continuity
<b>Activities</b>	
• Formation Phase	Recruitment of Participants
	Dialogue with Barangay Officials
	Consultation with Prospective Trainers
• Literacy Education	Garden Literacy Education
	- Preparing garden spaces
	- Design and construction of vertical gardens
	- Accessible water sources
	- Sufficient ventilation and lighting
	- Growing media
	- Selection of appropriate and good species of plants

	<ul style="list-style-type: none"> <li>- Different types of plant reproduction</li> <li>- Storage of seeds for propagation</li> <li>- Planting seedlings and direct seeding</li> <li>- Composting (green recycling) or organic fertilizer</li> <li>- Pesticides</li> </ul>
	<p>Financial Education</p> <ul style="list-style-type: none"> <li>- Basic budgeting skills</li> <li>- Basic financial literacy</li> <li>- Project funding</li> <li>- Garden expenses requisition</li> <li>- Garden expenses liquidation</li> </ul>
	<p>Marketing Education</p> <ul style="list-style-type: none"> <li>- Identifying prospective buyers</li> <li>- Sales techniques</li> <li>- Matching planting and harvesting schedules with expected selling timetable</li> </ul>
<ul style="list-style-type: none"> <li>• Location Ground Truthing</li> </ul>	<p>Management and Preservation of Community Gardens</p> <ul style="list-style-type: none"> <li>- Create working groups among participants</li> <li>- Engaging women gardeners</li> <li>- Resolve conflict that may ensue</li> <li>- Ensure workplace health and safety</li> <li>- Hone women participants' skill over time</li> </ul>
	<p>Keeping Records and Notes</p> <ul style="list-style-type: none"> <li>- Attending women training to take notes</li> <li>- Track women attendance in the training meetings</li> <li>- Wrap-up conversations with the women after each training course</li> <li>- Regularly visit the gardens and take photographs of substantial developments.</li> </ul>
	<p>Observations</p> <ul style="list-style-type: none"> <li>- Observing women during training</li> <li>- Regularly visit the gardens to observe both the gardens' physical development and the behavior and attitudes of the women gardeners</li> </ul>
<ul style="list-style-type: none"> <li>• Evaluation of the Project</li> </ul>	<p>Regular Feedback</p> <ul style="list-style-type: none"> <li>- Solve problems collected during field observations</li> <li>- Attend to the women gardeners when they ask for assistance as they meet challenges in the different phases of the project</li> </ul>
	<p>Post-project Evaluation after one (1) Cycle</p> <ul style="list-style-type: none"> <li>- Review of documents used in women training</li> <li>- Review of text, e-mails, chats, of participants</li> <li>- Observation of foods produced in the garden</li> <li>- Identify best practices</li> <li>- Dialogue with the barangay officials</li> </ul>
<ul style="list-style-type: none"> <li>• Recommendations for the Next Cycle</li> </ul>	<ul style="list-style-type: none"> <li>- Integration of the identified best practices</li> <li>- Communication with trainers and participants</li> <li>- Re-training if needed</li> </ul>

*Source: Author, 2022*

The contents of the plan are simple. The different activity features are (1) Formation Phase; (2) Literacy Education; (3) Location Ground Truthing; (4) Evaluation of the Project; and (5) Recommendations for the Next Cycle. The evaluation of the project is very important before recommendations for the next cycle are made. Feedbacks from the participants, trainers, and barangay officials will considerably direct the flow of activities in the next cycle of urban community gardening in Barangay 7, Batangas City.

## 6. CONCLUSION AND RECOMMENDATIONS

This study was able to frame a plan that will guide the establishment of a sustainable community vertical garden project for adult women in Barangay 7 located in Batangas City. The framing of the plan was initially facilitated by the insights of the 10 women FGD participants from the locale. The FGD yielded findings on the needs and capability status of women in the study area, which consequently provided the foundation for conducting a wider survey of women from 120 households. It was found that for the FGD participants and some survey respondents, household food security was indeed threatened by the Covid-19 pandemic. With regards the capabilities of some of the women participants and respondents, analysis on their budgeting and financial standing, technical position, and marketing ability, pointed to their lack of sufficient understanding or competence. Thus, they needed a way by which to check these problems, because a test of these variables showed that they exhibited significant relationship with household food security. Educating these women, therefore, is the center of the suggested plan. Different training and mentoring sessions must be offered and received by the participating women in Barangay 7 before the actual implementation of the community vertical garden project to support its success.

Recommendations on the aspects of research, practice, and policies are proposed. Research on other urban areas must be conducted to ascertain the feasibility of putting up community vertical gardens that could address household food insecurity. The suggestion for practice includes the training of the trainers themselves, so as to make adjustments in their modules and teaching techniques that will be more adopted to the needs of the participating women in different urban areas of concern. Lastly, it is recommended that Barangay 7, Batangas City, Philippines adopt a policy of involving women constituents in some other revenue-producing ventures to incapacitate them. In all of the above, it is worth looking into the possibility of network collaboration in the aspects of performance and continuity of the projects during and after the Covid-19 pandemic (Badoc-Gonzales, et al., 2022).

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