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IMPLEMENTATION OF AN AQUAPONICS AT KELURAHAN KEMBANGAN SELATAN

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Abstract – History proves that food security is closely related to social security, economic stability, political stability and national security or security. Therefore, one of Goal the National Medium Term Development Plans (RPJMN) for 2015-2019 is to realize economic independence by moving the strategic sectors of the domestic economy through increasing sovereignty / food security. Food security is closely related to improve the quality of Indonesian human resources. We hold community service in the area of South Kembangan, which has 9 Rukun Warga, but only 7 Rukun Warga are active in each activity. The total population in Kembangan Selatan Village are 30,169 people, consisting of 3,219 toddlers aged 0-4 years, 3,774 children aged between 5-9 years, 2,849 children aged between 10-15 years, 3,457 teenagers aged between 15- 19 years, 13,640 people aged 20-44 years, 3,230 people aged over 50 years. We chose urban area as our community service, where the people live in a house where the land area is not wide enough to grow crops in contrast to rural areas where the land is still large enough to grow crops. Not surprisingly, urban food needs are mostly produced from rural areas. Then how can each household use the limited land effectively, especially those who live in urban areas? In recent years Aquaponics technology has been introduced primarily so that people can use their yards effectively. Aquaponics combines aquaculture and hydroponics systems "that is, by utilizing organic waste fish farming as a source of nutrition in crop cultivation. Aquaponics continuously uses water sourced from ponds where water is raised for plants and then returned to fish ponds so that this forms a circulation. For this activity we conducted several trainings for the PKK activator groups in the Kembangan Selatan Village. We hope that these PKK drivers can apply Aquaponics technology in their respective regions. Training and aquaponics tools were made at the Child Friendly Integrated Public Space (RPTRA) park in South Kembangan. Our training on a number of topics: 1. Healthy, Independent and Prosperous Families, 2. Family Financial Management, 3. Family Food Security, 4. Aquaponics Training. The training conducted was an aquaponics technology pilot project for Kembangan Selatan Village. The purpose of this activity is establishing Food and Economy for each Household in the Kembangan Selatan Village.

Keywords: Aquaponics, family, food and economic stability, kembangan selatan

INTRODUCTION

Situation Analysis

Entering the era of globalization which is full of competition and the struggle of life, admittedly or not, our attention to the importance of the population as a development resource is increasingly prominent. Today's population is not just seen as a mere production factor that produces goods and services, but is increasingly seen as producers, consumers, sources of thought and sources of development motivation. In line with our commitment to the importance of the population in development as mentioned above, the role of the family as the smallest community institution, we also feel becomes increasingly important. Because as the first and foremost small community institution in which humans begin to recognize world civilization, families have a very large role in determining the values that exist in society. The family is also a vehicle for social control and adjustment for its members. To be able to play a role as a vehicle for preparing development human resources, families must have certain qualities so that they can carry out their functions properly. In order to carry out its

functions properly - which also serves to ensure its survival - efforts to build a prosperous family are needed. One effort to build family welfare is through family food security.

Efforts to build solid food security have always been the main focus of national agricultural development from the colonial era, the old order, the new order and the reform era to date. History proves that food security is closely related to social security, economic stability, political stability and national security or resilience (Ritonga, 2008; Irianto, 2008). In addition, food security in terms of food affordability is also closely related to efforts to improve the quality of Indonesia's human resources. Without the support of sufficient and quality food, qualified human resources cannot be produced, therefore building a robust food security system is an absolute requirement for national development.

Based on the research of Suparlan et al in Hidayah (2011) the comparison of rural and urban communities is as follows:

Rural: Physical environmental aspects, dominated by trees, fresh air, incomplete facilities. Settlements are not crowded, Aspects of the social environment, low population density, employment is dominated by the agricultural sector. Lower education level. The economic level and lifestyle are relatively homogeneous. Strong social relations,The tendency to diversify staple foods, is often diversified, but the motivation to diversify is extrinsic (an emergency when the price of rice is not affordable).

Urban: Physical aspects, dominated by artificial buildings, polluted air. Physical facilities are more complete. Solid and crowded settlements, aspects of the social environment, high population density, employment is dominated by the industrial sector. Higher education level. The economic level and heterogeneous lifestyle. Weak social relations, the tendency to diversify staple foods, is still not ready. Food diversification is only as a snack or at breakfast. If it is ready, the motivation is only because it is intrinsic. The existence of differences based on physical environmental aspects, social environment, life values, the tendency of diversification of staple foods between rural and urban areas will certainly give a difference in the amount of income and household consumption. The amount of income that households make will affect household and non-food consumption by households. This will certainly have an impact on the level of household food security.

The causes of food insecurity are caused by various problems starting with:There is no economic access for individuals / households to obtain sufficient food, there is no physical access for individuals households to obtain sufficient food, insufficient food for the productive life of individuals / households, and insufficient food fulfillment in quantity, quality, variety, security and affordability of prices (Food Security Council and World Food Program, 2009).

In addition, the impact of global climate change also has a major influence on food supply strategies that rely on producers / food producers in this case farmers who are mostly in rural areas, therefore a food supply strategy needs to be changed. Rosyadi & Purnomo (2012) in their study stated that the proportion (share) of household expenditure for food needs was much higher than household expenditure for non-food ingredients, which was an average of 78% for food needs, while 22% for non-food needs. food. From the components of food affordability, the community (household) in the study area is included in the category of vulnerable to food.

According to Law Number 18 of 2012 concerning Food, the state is obliged to realize the availability, affordability and fulfillment of adequate, safe, quality and balanced nutrition consumption, both at the national and regional levels to individuals equally throughout the Unitary State of the Republic of Indonesia all the time by utilizing local resources, institutions and culture. One of the 2015-2019 National Medium Term Development Plans (RPJMN) was made to realize economic independence by moving the strategic sectors of the domestic economy through increasing sovereignty / food security.

The general policy direction of food sovereignty in the 2015-2019 RPJMN is strengthening food security towards food independence by increasing staple food production, stabilization of food prices, guaranteed safe and quality food ingredients with increased nutritional value and increasing the welfare of food entrepreneurs.

Below are the conditions faced by food development so far: more prioritizing rice staple food than other food commodities, more attention to rice fields than other land resources, attention to the Western Region of Indonesia, especially Java, compared to Eastern Indonesia, more oriented towards national food security than regional and household food security, prioritize import-based commodities rather than locally-based commodities, and more open market orientation than the strengthening of domestic

agricultural resilience. As a result of these conditions, the results of food development have not been maximized which is characterized by a large dependence of food on rice or unsuccessful diversification of food from rice to non-rice, while local food sources are less developed as their potential.

The food policy which has been more focused and siding with rice has been considered to have a negative impact on the development of food diversification. Non-rice carbohydrate food sources and protein sources such as meat, eggs, milk, and sources of micronutrients such as vegetables and fruit tend to be inhibited to develop. This condition is related to food culture and the increasing number of people experiencing food insecurity (Ariani, 2010; Ariani and Pitono, 2013; Hermanto, 2013b).

One of the strategies to support these changes is through the utilization of the public yard, especially those who live in cities. However, agricultural cultivation in the yard, especially in urban areas, has distinctive characteristics. These characteristics include having a narrow area to very narrow. Therefore, optimizing the use of yards in the cultivation of crops and food sources in urban areas.

In this community service activity we also involved 4 students from Mercu Buana University. Students are involved in this activity with the aim of: helping students to improve the ability of community service, in the application of knowledge learned and the process of implementation in the community, students implement their ability to invite people to participate in this activity, improve the ability and competency of students according to the study fields studied, promote commitment, care and cooperation between students and the community around the University.

Partner Problems

We, from the team of Mercu Buana University lecturers, wish to assist the government program to provide solutions in our tertiary institutions in terms of implementing the program "Food Security and Food Diversification" in this case by applying Aquaponics technology. We have held discussions with the Head of the Kembangan Selatan Village and the Chair of Family Welfare Development (PKK). Our plan was welcomed by the Head of the Village Head, Matrullah and Chairperson of the PKK, Ibu Firda because it was in line with the objectives of the South Kembangan Village program in advancing the economy and providing welfare for its citizens in the Kembangan Selatan Village.

Based on the data we received from the Head of the Implementation Unit for Population and Civil Registration Services in the South Kembangan Village that in the Kembangan Selatan Village has 9 Pillars of Citizens. The total population in Kembangan Selatan Village is 30,169 people, consisting of 3,219 toddlers aged 0-4 years, 3,774 children aged between 5-9 years, 2,849 children aged between 10-15 years, 3,457 teenagers aged between 15- 19 years, 13,640 people aged 20-44 years, 3,230 people aged over 50 years.

Population growth rates have a direct impact on increasing food consumption and increasing housing needs which will indirectly change agricultural land to be used as residential land. No doubt, if the population increases requires boards and food, while food productivity is also very dependent on land that has narrowed due to the transfer of functions for settlements.

The food crisis that has always been a great conversation in the last few decades is not a future opinion, by looking at current demographic conditions it should be balanced with rising food productivity. Below is a summary of the problems faced in the Kembangan Selatan Village: inequality in the level of the economy of the community around Kembangan Selatan Village, there are still many families that are still economically disadvantaged, the high cost of living in urban areas, so that the income of economically disadvantaged people is only used for daily food consumption, there are still households experiencing "food insecurity", due to the economic problems they face.

At the household level, the development of food consumption levels also reflects the level of income or purchasing power of households. Increased income will cause individuals to tend to improve the quality of their food consumption at more expensive prices. If income increases, the pattern of food consumption will be more diverse so that food consumption that is more valuable in high nutrition will also increase (Yudaningrum, 2011).

Activity Objectives

Here is the activity objectivies: assisting the Government program in realizing food security within the family, helping students to improve community service skills, in the application of knowledge learned and the process of implementation in the community, increasing knowledge,

attitudes and behavior of the community, promote commitment, care and cooperation of various parties to anticipate various population problems.

Benefits of Activities

Reducing the burden on family expenses in fulfilling their food : this skill development can produce products that can be used in families as well as having a selling value and increasing the family's economy, from this activity can motivate women in helping the family economy.

METHOD

Place and time

Community Service Activities have been carried out in the Child Friendly Integrated Public Space (RPTRA) of Kembangan Selatan village, Kembangan District, West Jakarta. Distance from Mercu Buana University to the Location is around 4.8 Km. Access to reach the location can be reached by using a two-wheeled or four-wheeled vehicle. The South Kembangan Village was chosen as the place of activity with consideration that the location of the Integrated Child Friendly Public Space Hall (RPTRA) could be used for productive activities for the PKK group. RPTRA Kembangan Selatan was built on an area of 2,304 square meters located on Kembangan Abadi 2 RT. 01/08 Kelurahan Kembangan Selatan, West Jakarta. RPTRA is equipped with various facilities among its multipurpose rooms, libraries, toilets, futsal courts, children's playgrounds, nutrition pools, planting spots, lactation rooms, PKK MART, as well as family medicinal plants.

Figure 1. RPTRA Garden Kembangan Selatan

The following below is a location map of PKM activities.

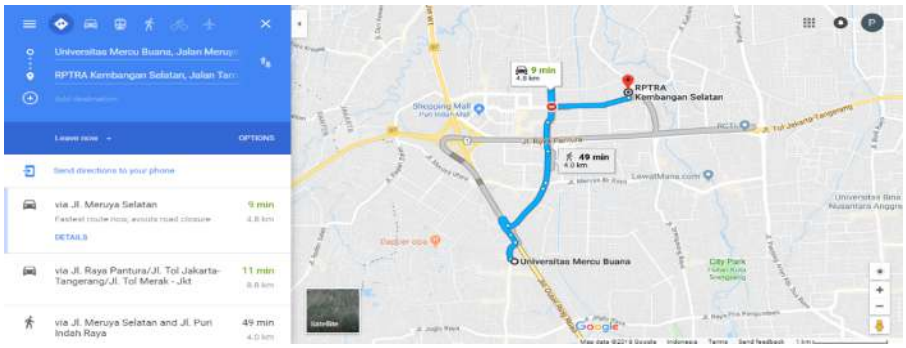

Figure 2. Location Map of RPTRA Kembangan Selatan

Target

The target of community service is the PKK mobilization team in Kembangan Selatan Village and South Meruya Village. The reason for choosing the PKK motivating team is because those who later interact more with mothers in their respective regions.

Tipe of Activity

Community service activities related to the empowerment of PKK mothers in improving the family economy are carried out in the form of training provided to mothers of the PKK driving team in making aquaponics in a home environment to realize food security in the family. We conducted several trainings with the aim to provide mothers with the PKK driving knowledge about healthy, independent and prosperous families, family financial management, family food security.

IMPLEMENTATION OF ACTIVITIES

Organization Structure

The following below is the composition of the implementation team of Real Work Lecture Activities:

Tabel 1. Organization Structure

No.	Name/NIDN/NIM	University	Field	Position
1.	Rona Tumiur Mauli Caroline Simorangkir SE, MM. CMA. NIDN 0307017604	Mercu Buana University	Accounting	Chairman
2.	Siti Atikah NIM 43215010011	Mercu Buana University	Accounting	Member
3.	Helen Kusniati NIM 43215110492	Mercu Buana University	Accounting	Member
4.	Susi Yanti Romauli Panjaitan NIM 43214120271	Mercu Buana University	Accounting	Member
5.	Nova Dwi Ayu Angraeni NIM 43215110245	Mercu Buana University	Accounting	Member

Schedule of Activities

On July 24, 2018 the Mercu Buana University Lecturer Team went to the Secretary of the Kembangan District to coordinate the activities of the Mercu Buana University Lecturer Team in the kelurahan area under the Kembangan Sub-district. On 30 July a coordination meeting will be held with the village heads. Kembangan Subdistrict supervises 6 villages consisting of: Kembangan Selatan Village led by Head of Village Drs. Matrullah, North Meruya Village led by Pangestu Urban Village Chief Aji Swandhanu, S.STP M.AP, South Meruya Village led by Lurah Sarwono, SH, Srengseng Village led by Lurah Joko, Joglo Village led by Lurah Walman Debataraja, S.Km, Msi, Kembangan Utara Village led by Lurah Edy Sukarya, S.Sos

Figure 3. Coordination with the Camat Secretary Sefri Dwipayuda

Figure 4. Coordination with the Camat Secretary Sefri Dwipayuda

On 30 July 2018 the Mercu Buana University Lecturer Team attended a joint meeting with the village heads in the Kembangan Subdistrict area led by the Head of District Agus Ramdani to coordinate the Real Work Lecture activities organized by the Provincial Child Protection and Population Control (DPPAPP) Office DKI Jakarta.

Figure 5. Coordination meeting with the village heads under the Kembangan sub-district

On July 31, 2018, the coordination meeting with the PKK Kelurahan Selatan Development Counselor Ibu Firda (Wives of the Lurah Kembangan Selatan), discussed the location and time of the Real Work Lecture and also asked permission to be able to coordinate the PKK activists in Kembangan Selatan Village to participate in Aquaponics Training activities on August 8, 2018.

Figure 6. Coordination meeting with Ibu Firda, PKK Chairperson of Kembangan Selatan Village

On 1 August 2018 Site survey for the Real Work Lecture activities to be conducted in the Kembangan Selatan Child-Friendly Integrated Public Space (RPTRA) and coordination meeting with PPAPP management and Firda Village Head.

Figure 7. Pengukuran Kolam yang berada di RPTRA Kembangan Selatan

Figure 8. Survey to the location of RPTRA Kembangan Selatan

On August 8, 2018 the Real Work Lecture Activity was filled with Training held by Students and Lecturers from Mercu Buana University. The training was filled with 4 training sessions namely: Training on healthy, independent and prosperous families, Training on family financial management., Training on family food security,Training on how to plant and maintain fish with an aquaponic system.

Figure 9. Training Activities on 8 August 2018

Figure 10. Aquaponics Training August 8, 2018

The following below is the Training Material presented during the implementation of the Real Work Lecture activity: Presentation Material on Healthy, Independent and Prosperous Families "What is Family? And how important is the family in your eyes ?? ". Family is two or more than two individuals who are joined because of blood relations, marital relationships or appointments and they live in a household, interact with each other. The reciprocal relationship between husband and wife is because they are the main actors. In addition to husband and wife, the family component that is no less important is the presence of children, a family has at least the following characteristics: consists of people who have blood ties or adoption. members of a family usually live together in one house and they form one household, having one unit of people who interact and communicate with each other, who play the role of husband and wife, father and mother, child and brother, maintaining a shared culture that mostly comes from a broader general culture.

A family consists of father, mother and child. Each has a role in the family. Each family member has an important position. Father as head of the family. Mother as a housewife. Therefore family is very important in our lives. A healthy family can be defined as a condition or a state of well-being both physically, mentally and socially which then allows a whole family (consisting of individuals led by a family head who lives in one environment) in order to live a normal life social and economic. Some characteristics of healthy families include: physical aspects (Families who are physically fit if they meet the following criteria: The family owns and uses clean water in their neighborhood, owns and uses clean toilets, all members do not smoke, and ensure that all family members are adequately nourished), mental and Social Aspects (A healthy family generally must also be able to maintain and develop the mental health of each family member, and keep the socialization process well implemented).

Healthy family criteria: healthy body and healthy soul (a family member is said to be healthy, not in physical condition if the body is fit, not sick/disabled due to illness, accident or due to a collision

with a hard object), nutritious Food (A family member who is healthy in body and soul is one who consumes nutritious food in a sufficient size (normal). Nutritious food is four perfectly healthy five foods (rice, bread, vegetables, side dishes, fruit and milk). But the level of income and number of family members that influence it, regarding an independent and prosperous family, independent and prosperous families are families who are able to meet the health needs of their families. There are factors affecting welfare: number of family members, residence, family socioeconomic circumstances, family welfare needs to be maintained and continued to develop shock and mental tension among family members need to be avoided, because this can undermine peace and comfort of life and family welfare. Factors that can cause a mental shock and inner peace of family members who come from outside the family environment include: human factors: jealousy, and slander, physical threats, violation of norms, natural factors: natural hazards, riots and various kinds of disease viruses, economic factors of the country: income of each population.

In line with our commitment to the importance of the population in development as mentioned above, the role of the family as the smallest community institution, we also feel becomes increasingly important. Because as the first and foremost small community institution in which humans begin to recognize world civilization, families have a very large role in determining the values that exist in society. The family is also a vehicle for social control and adjustment for its members. In addition, the family is also a refuge for its members from various physical and non-physical threats. Thus, considering the number and role that are so strategic, if the family can be prepared properly, it will be a vital development institution. Especially in participating in preparing the human resources of development supporters who have the qualities as mentioned above. To be able to play a role as a vehicle for preparing development human resources, families must have certain qualities so that they can carry out their functions properly. In order to carry out its functions properly - which also serves to ensure its survival - efforts to build a prosperous family are needed.

It should be noted that before reaching a prosperous condition, families often get threats, challenges, obstacles and disturbances that can always destabilize the family's existence. Various forms of threats, challenges, obstacles and disturbances can come from outside and within the family itself. All of that if it cannot be overcome immediately, will be a serious barrier in an effort to improve the quality of the family. In such conditions, it is certainly less likely to be able to create the expected individuals. Therefore, in order to overcome all these problems, the family must mobilize all its power and effort and utilize all its potential to be able to meet all the needs of its members. In addition, the family must also endeavor to always create a safe, peaceful and comfortable atmosphere at home which is a guarantee for all family members to be able to "stay at home". Building a prosperous family, thus, in essence not only means eradicating the family from poverty alone and physical needs, but also various other dimensions of needs that include psychological social and self-development for a longer period of time. One of the things that underlie it is that the need for a prosperous life is not enough only from the fulfillment of external needs, but also from the inside.

Figure 11. Presentation of Healthy, Independent and Prosperous Families brought by Mercu Buana Students

Family Financial Management

Do you have a family and often have difficulties in planning and managing family finances? If you answer yes, the problem must be immediately found a solution because if it is left unchecked, it is likely that you will experience financial problems that lead to your trapping in debt. Be aware that this problem will make you and your family unable to live life calmly because it is always haunted by bills or debt installments every month. Do you want to continue to live like that? For that, plan your family finances as well as possible from now on so that your life does not continue to be trapped in financial problems. How to regulate mandatory finance to achieve family financial goals : zakat, Infaq and alms 5%, 10% emergency fund, cost of living 50%, 10% short-term savings, 5% investment

How to realize good financial management so that families become prosperous; do not be lazy to make monthly and non-routine budgets, distribution of the financial post budget into envelopes, discipline against plans that have been made, conduct evaluation.

Figure 12. Family Finance Management Presentation was delivered by Mercu Buana University Students

Family Food Security

Law No.7 of 1996 concerning Food, defines food security as: conditions for the fulfillment of food for each household, which is reflected in the availability of sufficient food, both quantity and quality, safe, equitable, and affordable. Understanding of food security includes macro aspects, namely the availability of adequate food; and at the same time micro aspects, namely the fulfillment of the food needs of each household to live a healthy and active life. At the national level, food security is defined as the ability of a nation to guarantee that all its inhabitants obtain adequate food, adequate quality, safe; and is based on optimizing utilization and based on the diversity of local resources.

Figure 13. Presentation of Family Food Security was delivered by Mercu Buana Lecturer

Food security is a system consisting of the availability, distribution and consumption subsystems. The food availability subsystem serves to guarantee the supply of food to meet the needs of the entire population, both in terms of quantity, quality, diversity and security. Distribution subsystems function to realize an effective and efficient distribution system to ensure that all households can obtain sufficient quantities and quality of food at all times at affordable prices. While the consumption subsystem serves to direct the national pattern of food utilization to meet the rules of quality, diversity, nutrient content, security and halalness. The food security situation in our country is still weak. This is shown, among others, by:

Data on the development of energy and protein availability as well as the availability of Food Expectation Pattern (PPH) in 2013-2017. The average energy availability during the 2013-2016 period is 3.797 kcal / capita / day. The availability of energy has an average increase of 1.4 percent per year . The trend of increasing energy availability is due to an increase in production of several food commodities.

Tabel 2 .Development of Energy and Protein Availability

Perkembangan Ketersediaan Energi dan Protein serta Skor PPH Ketersediaan Tahun 2013–2017

Tahun	Energi (Kalori/Hari)			Protein (Gram/Hari)			Skor PPH
	Total	Nabati	Hewani	Total	Nabati	Hewani	Ketersediaan
2013	3,770	3,586	184	89.59	71.82	17.76	84.46
2014	3,731	3,559	172	91.87	74.09	17.78	82.80
2015	3,515	3,337	178	90.86	72.33	18.53	81.59
2016	3,964	3,772	191	94.76	75.13	19.63	81.52
2017*	4,006	3,807	199	92.75	70.33	21.42	83.04
Total Pertumbhn	0.070	0.070	0.085	0.036	-0.017	0.194	-0.016
Rata-rata Pertumbhn (%)	1.402	1.395	1.692	0.723	-0.347	3.877	-0.330
Rata-rata	**3,797**	**3,612**	**184.8**	**91.97**	**72.74**	**19.02**	**82.68**

*Keterangan : *) Angka Sangat Sementara (2016 masih angka sementara)*
Sumber : Badan Ketahanan Pangan (BKP). Kementerian Pertanian

The percentage of food insecurity based on the nutritional adequacy rate (RDA) of an area, is calculated by adding up the population with a calorie consumption of less than 1400 kcal per capita divided by the number of population in certain expenditure categories. Food insecurity figures in 2013 - 2017 can be seen in the table shown in table 3.3.

Table 3. Food Prone Numbers

Angka Rawan Pangan Tahun 2013-2017

Tahun	Presentase Penduduk Rawan Pangan (< 70% AKG)%
2013	18,68
2014	16,94
2015	12,96
2016	12,69
2017	12,69*)

Sumber: Data Susenas BPS berdasarkan pangsa pengeluaran dan konsumsi pangan dengan jumlah kecukupan gizi 2000 kkal/hari sesuai dengan WNPG VIII tahun 2004.
**) angka masih sangat sementara dan masih menggunakan angka 2016, menunggu perhitungan dengan metode baru/PoU*

Graphically, the percentage of the development of population food insecurity in Indonesia in 2013-2017 can be seen in Graph 4. Based on the development of the number of food insecurity in the table and graph above shows that since 2013 - 2016 there was a decrease in the number of food insecure population by 5.99 percent or achieving the target of reducing the number of food insecure population by 1 percent per year, while in 2017 the numbers used are in the process of being calculated with the new method / PoU.

Figure 14. Graph of Prone Figures

Based on the definition of food security from FAO (1996) and RI Law No. 7 of 1996, which adopted the definition of FAO, there were 4 components that had to be fulfilled to achieve the conditions of food security namely: adequacy of food availability, stability of food availability without fluctuations from season to season or from Year to year, accessibility / affordability of food and food quality / safety. According to Bustanul Arifin (2005) food security is a challenge that gets priority to achieve national prosperity in the millennium. When looking at the Explanation of PP 68/2002, efforts to realize national food security must rely on local food resources that contain diversity between regions. Since 1798 when Thomas Malthus warned that the number of people increased exponentially, while the business of increasing food supply could only increase arithmetically. In the course of history, various local famines have been recorded, which have sometimes spread to severe national famines in various countries. The above problems are the characteristics of a country that is not yet independent in terms of food security (Nasoetion, 2008). Food security is a pillar for the development of other sectors. This is considered strategic because there is no country that is able to develop the economy without first solving its food problems. In Indonesia, the food sector is a determinant of the level of welfare because most of the population working on-farm for those in rural areas and for urban areas, there are still many people who spend their income for consumption. Paying attention to this, food independence is an absolute requirement for national security. One of the strategic steps to maintain national security is through efforts to realize food independence. Conceptually, independence is a condition that there is no dependence on anyone and no party can dictate or govern in matters relating to food.

Food independence cannot be realized without the role of government and society. Farmers who are the spearhead of local food supply must receive attention and support from the government. The heart of food independence lies in the quality and productivity of agriculture so the government must take sides and support farmers in full. In addition, price policies can also support the strengthening and realization of food independence.

Aquaponic Presentation

Maybe you've heard the term aquaponics used in agriculture or how to plant crops. The aquapionic system that you often hear is a combination that combines fish farming or aquaculture systems with hydroponic planting systems that use water and are able to recycle nutrients so that in this system you can cultivate fish and plants at once. This system is also known as the intercropping system which has been widely used by farmers in Indonesia, especially farmers in Java since the 1990s. Even some farmers grow rice while cultivating fish in their fields. However, the plants planted in this aquaponics system do not grow above or on the soil but on other planting media such as hydroponic planting media in general which can be in the form of growing beds filled with gravel and so on.

Figure 14. Aquaponic equipment installed at RPTRA Kembangan Selatan

The basic principle in an aquaponics cropping system is a system of recirculation or reuse of water flow that was previously used in the maintenance of fish and plants cultivated at the top act as filters or water filters. The plant will use waste material produced by fish as nutrients or nutrients needed so that the use of nutrients in this medium is very minimal and the plant does not need chemical fertilizer anymore.

Figure 15. Plants in pots that use special stones flowing by water pipes.

The water that is dirty and mixed with fish feces is not good for the growth of fish so that the dirt is flowed to the plants. Actually, even though it contains poisons for fish, it turns out to be very beneficial for plants and can be used to support its growth. Benefits of the Aquaponics system Aquaponic fish farming and cultivation systems have several benefits for farmers, the community and the surrounding environment. The benefits of this aquaponics planting system include: able to produce vegetables, fruits or fish as well as to meet household needs and for commercial purposes that generate profits. The aquaponics system is considered efficient to produce a source of protein derived from fish and a source of vitamins and minerals contained in vegetables, vegetables and fish produced have better quality and are free from chemicals or residues of inorganic fertilizers and chemical pesticides. So that the planting media or aquaponic cultivation can be referred to as organic planting media, it is suitable to be applied in areas that lack land or areas with narrow land such as urban areas. This system can save land efficiently and does not require a lot of space because vegetables and fish that are cultivated can be put together in one place or location., The aquaponics system is also useful in introducing organic planting systems to communities that are certainly more environmentally friendly. This system circulates fish feces and does not use chemicals that can pollute the soil or the surrounding environment, can save water used in growing vegetables and cultivating fish. Aquaponics systems are claimed to be more water efficient and environmentally friendly than other cropping systems because this system uses only 1/10 of water used in conventional planting methods.

Before starting to assemble and use this system you should first know the tools and materials commonly used in the aquaponics system. The tools and materials needed in making the system include: fish seed is one of the ingredients needed because later this fish is cultivated as a source of animal protein, where the waste or the rest will be used by plants. The selected fish seeds must be of good quality and adapted to the water conditions and environment of the place of cultivation. Look carefully and learn how to choose fish seeds with superior quality. plant seeds in the aquaponic system do not differ much from plant seeds used in hydroponic systems. This system uses seedlings which are first sown in a container and transferred to an aquaponics device or system after the seeds have grown and have true roots and leaves. Choose good quality plant seeds and pay attention to seeding,ilter media Fixed filter media is still used in this technique as a complement or complement that is located outside of hydroponic devices. The arrangement from the bottom up is ziolite stone, shell charcoal, and filter cloth, planting media and Planting containers, In an aquaponic system, a well arranged device is needed. Usually plants will be planted on ponds or water storage containers. Plant containers commonly used in an aquaponic system are netpot or can also be replaced with bottles or glass of used mineral water that has been perforated. The container of the plant will be placed on a PVC pipe that has previously been designed above the fish pond and perforated. While the planting medium that can be used can vary the use of charcoal, zeolite, red sand, gauze, bioball, tissue, sand and husk charcoal. For sand and rice husk, it is no longer recommended because it has obstacles to the aquaponics work technique. The media can be used for aquaponic tidal systems. For aquaponics models such as floating rafts do not require planting media, but Styrofoam foam as a plant support.

A fish pond, ingredients that are not toxic to fish and plants should be chosen. Can use concrete ponds, barrel or drum used by industrial waste, fiberglass pools, tarpaulin pools or aquariums. For those who already have a pool at home, can use it by heating the aquaponics installation. Fish and pond supplements Although plants grown in aquaponics planting methods or systems do not require fertilizers or nutrients such as hydroponic planting systems or methods, fish supplements can be given to increase their nutrition and also to improve the quality of fish that are cultivated. and pool supplements to improve the quality of water in the pond to maximize fish growth. Water pump, to drain water and nutrients dissolved in fish ponds, a water pump is needed. The water pumped into the pipe at the top of the pond will drain the pipe and touch the roots of the plant so that the plant can obtain nutrients and simultaneously filter dirt on the water so that the water can be returned to the pond clean. The pump chosen must be able to drain the total water in 1 hour. If the volume of a 1000 liter pool is the minimum pump selected, the pump has a discharge of 1000 liters / hour.

Electricity

Electricity serves as an energy source to provide a thrust of water pumps. If the electricity is cut off or extinguished, the plant cannot water and can cause dehydration.

The following below should be considered in the aquaponics process: Type of Plant**,** Almost all plants, both leaf vegetables and fruit vegetables can be planted with an Aquaponics Technique. Even ornamental plants and herbs that have not too large structures can be applied with an aquaponics system.

Nursery

There is no need to bother looking for seedlings. If the location is limited, the nursery can be combined with an aquaponic installation. But there are also those who plant seeds first in separate containers (pots, trays or trays). After 12-14 days and growing 3-5 leaves, new seeds are transferred to the aquaponics unit. For plants that can be planted directly without having to be sown first, examples are spinach and kale, Planting, Seeds that are old enough are characterized by the growth of 3-5 leaves. This seed is relatively strong when transferred to an aquaponics installation. Before the seeds are removed, the planting medium is doused with water. In addition to easily revoked seedlings to reduce stress. In order not to be too stressful, the time of transfer of seedlings is as good as in the morning or evening. Here are the steps for transferring plants to pots in drip irrigation systems. Prepare planting media (gravel), add the bioball or broken pieces to the bottom of the pot, then add the planting medium to the pot. After that, flush the water until it becomes saturated, make the planting hole in the media the size of the seedlings (tomatoes, chili), plant the seeds in a pot by inserting all the media that wraps the

root of the seedlings into the planting hole. One pot contains 1-2 seeds, flatten the planting media on the surface until the base of the seedling roots is closed properly.

The seeds in the pot are ready to be drained by water. Here are some things to consider when harvesting vegetables: harvest time. It should be done in the morning because cell turgor is still high so that the vegetables will feel fresher, harvesting tools. To harvest leaf vegetables and fruit vegetables can use scissors or sharp knives, how to harvest. Harvesting chili or tomato is done by including 1-1.5 cm of stem. Fruit stalks are important for maintaining fruit quality, the following stages of harvesting vegetables: unplug the plant from the planting hole, add vegetables to a plastic basket. Try not to stack too much in one basket, sorting. Crops are collected, then selected with the following criteria: vegetables are collected in the basket. Choose the good one, then tie it according to its size, tomatoes are uniform in size with a maturity level of 3/4. Good fruit is put in a basket, crops that are bent, deformed, too large. And stripped immediately accepted. Fish is an important part of the aquaponics system. This is because the organic fertilizer needed by plants is sourced from fish metabolism. There are several types of fish that have been tested for aquaponics, including: catfish, catfish, and gouramy.

Business Analysis

The business opportunities for fresh vegetables and fish products can be said to be very bright in line with the rising market trend in big cities. Business analysis needs to be studied first before starting a cultivation business with an aquaponic system. Although the calculation presented is not exactly 100% due to price fluctuations in each region, this data is obtained based on experience in the field. For example, the plant used is kale, while the fish is catfish. Following are the calculations:

Investment (1 unit of aquaponic)	Rp 7.500.000
Expenses :	
Plant (Kale)	
Water spinach seeds for 230 planting holes	Rp 3.000
Electricity/month	Rp 7.000
Depreciation of media planting	Rp.15.000
Total expenses / month	Rp. 25.000
Fish (catfish)	
Fish seeds measuring 9-10 cm 600 tails @ Rp400 Rp 240.000	
Feed 60 kg @Rp.8.000	Rp 560.000
Total Expenses	Rp 800.000
Calculation	
Plant (Kale)	
Amount of Kale = 100 ikat	
Price of Kale	= Rp 3.000 /bond
Capital/bond of kale (Rp 25.000 : 100 bonds)	=Rp 250
Profit (Rp 3000 – Rp 250)	=Rp 2.750
Total profit of plant (Rp 2.750 X 100 bonds)	=Rp 275.000/ month
	=Rp 550.000/2 months
Fish (catfish)	
Number of fish harvested	=Rp 50 kg
Price of fish / kg	=Rp20.000,-
Capital /kg (Rp 800.000 : 50 kgs)	=Rp 16.000,-
Profit / kg (Rp20.000 – Rp 16.000)	=Rp 4.000,-
Total Profit (Rp 4.000 x 50 kgs)	=Rp200.000

So the total profit of vegetables and fish in 2 months is as follows:

= Rp 550.000,- +Rp200.000 = Rp 750.000

CONCLUSIONS

Considering that the number of food insecurity in Indonesia is still around 10%, even though Indonesia's territory is very fertile, the use of land is not effective and productive, and even many productive agricultural lands have become industrial and residential areas. In our opinion this activity is very important to be carried out in order to popularize the "aquaponics system" in addition to increasing the number of urban farmers, the community can also become independent of the need for food consumption, especially in the family environment. But this aquaponics can also be used as a household business, so that it can increase income for the family.

Recommendation

There are some suggestions that we can convey: this activity is very good to be applied to urban areas for a wider scale, considering that this activity uses equipment, the funds provided are still insufficient. We recommend that the budget for the next Real Work Lecture activity be adjusted.

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