

# UNVEILING A NEW PARADIGM: EXPLORING INNOVATIVE STRATEGIES IN COMMUNITY PREFERENCES FOR FOOD SECURITY PROGRAMS AND STRENGTHENING LOCAL ECONOMY

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## ABSTRACT

Through the implementation of the categorical analysis method Probit, the research aims to analytically examine the preference model of the Karangwidoro Village community through the dimension of participation probability in the food security program initiative, as well as to formulate a model approach strategy aimed at revitalizing community motivation factors. The results showed that distance affects people's motivation to participate in food security programs. That is, 95 meters is the maximum distance of community domicile to be able to influence the subjectivity of public interest, and there are methods of approach to encourage community motivation, namely through the SSA and ZOPP methods

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## 1. INTRODUCTION

Climate change is likely to affect the frequency and intensity of extreme events. The magnitude of impacts of extreme events on agriculture is already high (FAO,2015). The main challenge related to food security is highlighted in the current conditions. Intensifying climate anomalies threaten the substantial continuity of food supplies. The balance of existing food supply is inherently linked with agricultural capabilities. As an essential factor in the continuity of community existence, food supply focuses on the substance of agricultural matrices. The condition of food security in various regencies in East Java indicates vulnerability. However, in its development, there are several regencies in East Java that still fall into the categories of low, moderate, and resilient food security. To address the complexity of these challenges, awareness of the importance of empowering communities through strengthening local economic potential is paramount.

Regarding the local economy, Karangwidoro Village is one of the villages whose community's economic strength is supported by the availability of natural resources. Karangwidoro Village is located in the Dau District, Malang Regency, East Java Province. Based on the variety of village potentials, the agricultural sector is the most dominant sector, with the majority of the village population earning a living as farmers. The agricultural condition in Karangwidoro Village is dominated by citrus and rice commodities. With the dominance of citrus and rice cultivation, the emergence of dependence on single-crop varieties is feared; on the other hand, post-harvest conditions will lead to unproductive land. Referring to Mukhlis et al. (2021), their study explicates a model for enhancing the economic value of communities through the Circular Economy Business Model approach. Their findings demonstrate that this model can yield economic growth while ensuring environmental sustainability. This is underpinned by the agricultural waste from citrus and other crops, which can be recycled into fertilizers. However, under these circumstances, the local potential may become dependent on single-crop varieties, posing challenges to establishing food security initiatives that can drive local economic growth and get around the lack of space for large-scale urban farming (Goldstein et al., 2017). Manikas et al. (2023) stress the importance of monitoring and assessing food security, with available indicators often proving challenging to comprehend. They recommend measuring food security at the individual level (or at least at the household level) through a set of food security indicators. These dependent benefits of urban agriculture can include social components such as food security, community development (Dimitri et al., 2016).

Currently, it is known that Karangwidoro Village has initiated a food security program through integrated hydroponic vegetable processing activities. Karangwidoro Village is one of the villages in

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Malang Regency that has adopted hydroponic urban farming using the Deep Flow Technique method (Okuputra et al., 2022). The village authorities have partnered with ROTASI Institute, an independent organization focusing on the Center for Rural Development Studies and Community Empowerment. Hence, this paradigm implies implicitly building a harmonious interplay between the local economic structure and the economic values reflected in social realities. Modibedi et al. (2021) in their study reveal the importance of establishing a "community garden" program, as it can contribute to food availability by providing fresh vegetables for urban farmers and households. Grebitus, (2021) explain, gender, age, and income affect community gardening. Subjective knowledge also influences participation in urban agriculture (Alemu & Grebitus, 2020). Whether at home or in a community garden, this is called "small-scale urban farming (McDougall et al., 2019).

Additionally, Septya et al. (2022) note that the existence of community-managed garden commodities can provide economic opportunities for the local community. Ogunniyi et al. (2021) explain that the dimension of food stability is related to the consistency of food availability and access for people, as reflected in food production and prices in specific geographical locations over a certain time. The series of research findings above illustrate the relationship between food security initiatives and efforts to improve the local economic conditions. Strengthening the local economy is not merely focused on income and economic capacity but also accommodates access to food, natural resources, and social empowerment.

Based on the outlined discussions, this research establishes general and specific objectives. The general objective is to analytically examine the preference model of the Karangwidoro Village community through the dimension of participation probability in urban farming initiatives. The specific objective aims to direct the formulation of model approach strategies that aim to rejuvenate community motivation factors to aid in the development of food security programs and reinforce the emerging economic values of the Karangwidoro Village environment.



**Figure 1.** Location of food security program  
Source: Author's,2023

## 2. METHOD

This To achieve the objectives of this research, an In-Depth Interview was employed to measure and deeply understand the perspectives and preferences of the community as respondents, considering indicators such as the duration of daily work activities and the distance from home to the location of the food security program. Additionally, the specific application of the probit analysis method was utilized. This approach is used to link binary variables (occurring/not occurring) with their predictive factors. The Probit model is represented by the cumulative normal distribution function ( $\Phi$ ), depending on parameters  $\alpha$  (intercept) and  $\beta$  (regression coefficient) that connect the predictor variables ( $X$ ) with the probability of the event occurring.

The research location for this study is in Karangwidoro Village, Malang Regency, East Java Province. The research is quite clear, using quantitative and qualitative approaches, with primary data sources. The research instrument used was a questionnaire given to respondents. The population and sample in this study are residents of Karangwidoro Village. The sample in this study consisted of stakeholders from Karangwidoro Village who were within a maximum distance of 300 meters from the location of the food security program, the number of samples used was 32 people, with a random sampling method approach.

The Probit model is represented by the cumulative normal distribution function ( $\Phi$ ), which depends on the parameters  $\alpha$  (intercept) and  $\beta$  (regression coefficient) that link the predictor variables ( $X$ ) to the probability of the event occurring. Mathematically, it can be expressed as follows (Winarno,2017):

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$$li = C + \beta\chi_1 (X \text{ hour} ) + \beta\chi_2 (X \text{ distance}) \dots\dots\dots (1)$$

**3. RESULTS AND DISCUSSION**

**Analysis of Situation**

Amidst the complexity of food security issues, Karangwidoro Village in Malang Regency has demonstrated extraordinary commitment. Through an innovative integrated hydroponic-based program, the village has not only succeeded in increasing local food production but has also promoted social and economic welfare at the community level. With the strategic partnership forged between the village and ROTASI Institute, they have laid a strong foundation to tackle the existing challenges. The location was carefully selected, considering accessibility to infrastructure and connectivity to the market, while also taking into account the active role of the local community. This collaborative effort is expected to set a precedent for surrounding communities in addressing serious food security challenges while ensuring ecological, economic, and social sustainability at the local level. Karangwidoro Village has truly set a new standard for sustainable development in an era of global uncertainty.

Figure 1 depicts the current location chosen as the center for food security activities, which is the main focus of the collaborative program between the ROTASI Institute and local stakeholders in Karangwidoro Village. The mapping of this area shows a wide variety of plants cultivated in the hydroponic garden system, with the population dominated by lettuce, water spinach, collard, and mustard greens, effectively representing diversified vegetable cultivation that has the potential to enhance local food security. Thus, this visualization reflects a commitment to realizing sustainable and diversified agriculture as a strategic step to address future food security challenges.



**Figure 2.** Location of food security program  
Source: Author’s,2023

**Probit Analysis**

In the context of this research, the probit analysis approach is adopted to measure variables with qualitative dichotomous characteristics. The initial step of this approach involves a series of in-depth interviews with respondents selected in a representative manner, with the primary aim of identifying and analyzing their participation tendencies and preferences regarding the food security program. By utilizing the probit approach, community participation tendencies can be articulated precisely in binary form, representing their explicit choices as 'yes' or 'no'. Before conducting probit analysis, a crucial initial step is to obtain a comprehensive understanding of the description of the collected data. The main focus of the probit regression calculations will be directed towards the average values of the key determinant variables. Therefore, presented below are descriptive results closely related to the context of this research.

**Table 1.** Descriptive Analysis

	<b>JAM</b>	<b>JARAK</b>
Mean	29.87500	94.62500
Median	30.00000	79.00000
Maximum	35.00000	250.0000
Minimum	25.00000	28.00000
Std. Dev.	1.621429	51.05832
Skewness	0.112444	1.279704
Kurtosis	6.637096	4.479209
Jarque-Bera	17.70539	11.65150

Probability	0.000143	0.002951
Sum	956.0000	3028.000
Sum Sq. Dev.	81.50000	80815.50
Observations	32	32

Source: Data Processed, 2023

Based on the previously presented Table 1, it is observed that the average value for the working hours variable is 29.87, or 30 hours, while for the variable measuring the distance from home to the location of the food security program, it is 94.62, or 95 meters. Both these values will serve as the basis for calculations in the implementation of the probit regression for this research. Furthermore, the probit approach specifically provides a solid methodological foundation for understanding and measuring the factors that significantly influence respondents' decisions in the context of their participation in the food security program. This study employs two measurement variables, namely working hours and the distance of residence from the location of the food security program. Through this approach, researchers can identify and analyze the impact of independent variables on the probability of community participation more scientifically and measurably. Thus, this method serves as a critical instrument in analyzing community preferences and behavior with a high level of accuracy and confidence, providing a strong basis for more informative and evidence-based decision-making in the context of developing the food security program in Karangwidoro Village. The following section presents the results of the probit analysis.

**Table 2.** Probit Results

Dependent Variable: PARTISIPASI

Method: ML - Binary Probit (Newton-Raphson / Marquardt steps)

Date: 10/08/23 Time: 11:27

Sample: 1 32

Included observations: 32

Convergence achieved after 5 iterations

Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-3.108640	5.008713	<b>-0.620647</b>	0.5348
JAM	0.162964	0.167173	<b>0.974818</b>	0.3297
JARAK	-0.017853	0.007632	<b>-2.339192</b>	<b>0.0193</b>
McFadden R-squared	0.235560	Mean dependent var		0.562500
S.D. dependent var	0.504016	S.E. of regression		0.439412
Akaike info criterion	1.235263	Sum squared resid		5.599402
Schwarz criterion	1.372676	Log likelihood		-16.76421
Hannan-Quinn criter.	1.280811	Deviance		33.52842
Restr. deviance	43.86011	Restr. log likelihood		-21.93005
LR statistic	10.33169	Avg. log likelihood		-0.523882
Prob(LR statistic)	0.005708			
Obs with Dep=0	14	Total obs		32
Obs with Dep=1	18			

Source : Author,2023

From the results in the table above, it is known that the two variables have respective probability values of 0.3297 for the working hours variable and a probability value of 0.0193 for the variable measuring the distance from the residence to the location of the food security program. Based on these probability results, it can be justified that the working hours variable does not have a significant influence, whereas the variable measuring the distance from the residence to the location of the food security program has a significant impact. From these results, the mathematical calculation of the probit regression can be formulated as follows:

$$\begin{aligned} \text{Probit} : C + \beta\chi_1 (X \text{ hour}) + \beta\chi_2 (X \text{ distance}) \\ : - 3.108640 + 0.162 ( 30 ) + 0.017 (95) \\ : - 3.10 + 4,86 + 1,615 \\ : 3,37 \end{aligned}$$

As the probability value of the working hours variable is not significant, being greater than the alpha value (0.05), the calculation formula can be simplified as follows:

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Probit :  $C + \beta\chi_1 (X \text{ hour}) + \beta\chi_2 (X \text{ distance})$   
: - 3.108640 + + 0.017 (95)  
: - 3.10 + 1,615  
: - 1,48

From the calculated probit value of -1.48, it is then compared with the Z-table value with an alpha value of 0.05 or 5 percent. Thus, the probit value is determined to be 0.0735. The probit value of 0.0735 is then converted into the percentage form of probit, which can be calculated using the following formula:

\* Probit Probability =  $1 - 0.0735 = 0.92$  or 92 percent.

Therefore, from the above probit calculation, it can be concluded that the probability or likelihood of the community residing within 95 meters of the location of the food security program will increase the participation probability by 92 percent. Thus, if the local community's residence is more than 95 meters from the location of the food security program implementation, it will decrease the probability of participation in the program. These results can support Grebitus, (2021) socio-demographic study, the amount of income that influences community parks, with this indicator also being able to be supplemented with another indicator, namely the location of the domicile of the surrounding community. This strongly indicates that geographical distance has a significant influence on the community's motivation for the program.

### **Community Development Strategy**

The participatory community empowerment method holds undeniable significance in shaping the dynamics of engagement between the community and policymakers. This approach emphasizes the empowerment of individuals and groups in identifying and formulating contextually relevant solutions. By respecting local capacity and empirical knowledge, this method facilitates more holistic planning, stimulates collective problem-solving initiatives, and ensures sustainable implementation.

According to Nasdian (2014), there are several approaches, including Environmental Scanning (ES) aimed at providing the capacity to explore the entire program cycle for all stakeholders, Strategic Scenarios Analysis (SSA) encompassing an assessment of future probabilities, Customer Analysis (CA) focusing on customer preference needs, Critical Strategic Issue (CSI) used to evaluate short-term issues, Logical Framework Approach (LFA) employed to systematically organize information for ease of observation, Participatory Impact Monitoring (PIM) as a project-based approach, Focus Group Discussion (FGD) for conducting group interviews, and the Zielobjectiev Orienterte Project Planning (ZOPP) approach, which is a planning method that prioritizes consistent thinking.

The steps of the community development method have been understood, and the preference model has been identified through probit analysis. Thus, to facilitate the narrowing down of the most appropriate strategies derived from interviews with one of the stakeholders, the following is the result of an interview with Mr. Effendi, a hydroponic garden activist and caretaker.

"... hydroponic cultivation emerged during the time of Covid. People with irregular jobs faced difficulties during the pandemic. Eventually, a collaboration was established with ROTASI Institute, accommodated by Mr. Imam and Ms. Isnawati, the leaders of ROTASI Institute, to create a food security program here. The hope was to assist the food needs of the residents. Many plants were grown, especially kitchen ingredients, vegetables, tomatoes, chilies, and several other plants..."

From Mr. Effendi's explanation, it can be concluded that the hydroponic garden is expected to encourage the community to meet their basic food needs. Thus, during the pandemic, it became an initiator of the food security program in Desa Karangwidoro. Mr. Effendi added, "... this garden has been running for about two years since the pandemic. Now the garden has started to develop to the point where we can sell it at the Car Free Day in Malang City. However, a new problem has emerged, namely the continuation of the program and the distribution of harvests to ensure that the sales proceeds can be used to purchase high-quality seeds, fertilizers, or garden maintenance...". The growing benefits of urban agriculture that depend on urban agriculture can include social components such as food security, community development (Dimitri et al., 2016). So that with the efforts initiated now, it is hoped that this benefit will grow.

Based on the analysis of the situation, observations, statistical analysis, and interviews conducted, this research successfully filtered and selected two main methods, namely Strategic Scenarios Analysis (SSA) and Zielobjectiev Orienterte Project Planning (ZOPP), as suitable approaches in the context of this project. Referring to the contributions of Stace and Dunphy (in Nasdian, 2013), there is an emphasis on the importance of environmental evaluation, where SSA provides an evaluation of future probabilities

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related to various aspects such as markets, technology, labor, stakeholders, and competitors. This approach is not meant to predict the future precisely but to position the future context based on the current understanding. This approach provides a relevant framework for addressing the complex challenges faced in this project, emphasizing an in-depth understanding of the consequences of the decisions made and optimizing results through a structured and measurable approach.

The adoption of the ZOPP framework proves to be a suitable response to the complexity of this project. ZOPP encourages planning focused on achieving clear and measurable goals, ensuring that every step taken is in line with the established end vision. In the planning process, ZOPP encourages stakeholders to comprehensively identify risks while observing potential emerging opportunities. In this way, the project team can design effective strategies to address identified barriers while efficiently utilizing resources. In this way, the project team can design effective strategies to overcome identified obstacles while utilizing resources efficiently. Referring to Alemu & Grebitus,(2020), the existence of a structured project can also influence the subjectivity of the surrounding community to participate.

Through the synergistic approach of SSA and ZOPP, this project can minimize risks and optimize the final results to achieve its main goal of enhancing sustainable agricultural product distribution. Additionally, this approach also ensures that the efforts made can be efficiently integrated with production sustainability in the context of hydroponic gardens. Thus, the implementation of the synergy between SSA and ZOPP provides a solid foundation for the continuity and success of the project in addressing complex food security challenges.

#### 4. CONCLUSION

In response to these challenges, Desa Karangwidoro has launched a food security program based on urban farming with a hydroponic approach. Collaboration with the ROTASI Institute has incentivized active community participation in promoting food security through urban farming practices. Probit analysis revealed that the presence of the community within a 95-meter radius from the center of the program activity increases the probability of participation by 92 percent. Conversely, if the distance exceeds 95 meters, the probability of participation tends to decrease. The findings of this analysis, supported by in-depth interviews with stakeholders, shed light on the challenges faced. Based on these findings, community development strategies were formulated by adopting two main approaches, namely SSA and ZOPP. These approaches aim to position future developments based on the current situation while ensuring that the project team can address identified barriers while optimizing the use of resources. Here are three recommendations based on the presented issues,(1) Improve accessibility and information dissemination: Spread program information widely and conduct intensive urban farming training. Use social media and outreach activities to reach a wider audience. (2) Foster local partnerships and support: Establish close partnerships with community organizations, village governments, and NGOs to strengthen participation and program implementation. (3) Develop follow-up plans and regular evaluations: Plan regular evaluations of the program's impact and challenges and adjust strategies and policies based on the evaluation results to ensure efficient resource utilization.

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