Interdisciplinary Journal of Global and Multidisciplinary
IJGAM
ISSN xxxx-xxxx
+62852-3430-9925 https://jurnal-ijgam.or.id/ admin@jurnal-ijgam.or.id
Diterbitkan Oleh PT. RADJA POS MEDIA
Vol. 1, No. 3, October 2025 | Page. 235 - 245

IMPLEMENTATION OF TRI DHARMA OF HIGHER EDUCATION THROUGH SOCIALIZATION OF HYDROPONIC SYSTEM TO RESIDENTS OF BENDUNG VILLAGE

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Keywords:

Food Security,
Hydroponics,
Community Empowerment

Abstract

The limited availability of agricultural land in urban areas demands innovation in space utilization to support food security. The KKM 05 students of Bina Bangsa University carried out a community service program in Bendung Village, Kasemen District, Serang City as an implementation of the Tri Dharma of Higher Education. This program aims to provide knowledge and practical skills on the hydroponic system as an efficient and environmentally friendly farming method. The implementation team applied observation, socialization, training, and mentoring methods, while data were collected through participatory observation and documentation. The results of the program indicate that the community experienced an improvement in understanding and skills in applying simple hydroponic methods using easily accessible materials. The impacts include the utilization of limited land, the enhancement of household food security, and the creation of opportunities for community-based economic development. This program also promotes collective awareness of the importance of agricultural innovation and strengthens collaboration between academics and the community. The program's sustainability is recommended through additional training, the formation of hydroponic farmer groups, and the integration of digital technology to develop into an adaptive, sustainable, and economically valuable urban farming model.

INTRODUCTION

Tri Dharma of Higher Education becomes guidelines main for lecturers in operate their role towards society, which in In its implementation, lecturers can collaborate with students in the Community Service program To the Community. One of form real from this devotion is empowerment public through implementation knowledge knowledge and technology. In the middle issue resilience food as well as limitations land in the area urban, system agriculture hydroponics present as solution innovative solutions that can be applied practically and efficiently by the community. Resilience food No only covers availability material food, but also reflects ability society to produce as well as access sufficient, healthy and sustainable food.

Ward Weir is villages / sub-districts in the sub- district Kasemen, Serang City, Banten Province. Subdistrict weir own area of 402,204 ha/m2. Condition topographical Bendung Subdistrict is an area where the majority of its population own eye livelihood as Farmers and Workers farmer.

Table 1
Area and Land Use of the Subdistrict Weir

Region	An area
Settlement	50 Ha
Office	2 Ha
Agriculture	300 Ha
Plantation	15 Ha
Farm	- Ha
Fishery	2 Ha
Public facilities	3 Ha
Mining	- Ha
Etc	32 Ha

Through characteristics flat topography. The majority its population Work as farmers and workers farmers, which shows that sector agriculture Still become support main life economy public local. Based on usage data land, part of it large area of the sub-district Weir used for agricultural activities covering an area of 300 hectares, followed by land settlement covering an area of 50 hectares, as well as use others such as plantations, fisheries, and facilities general.

Based on Table 1, the Subdistrict The dam is located in the sub-district Kasemen, Serang City, Banten Province, has condition flat topography and inhabited by the majority of the population Work as farmers and workers farmer. Based on usage data land, part of it large area is used for agricultural activities, followed by arable land settlements and sectors others. However Thus, a number of land empty like a yard House residents and surrounding areas facility general Not yet utilized optimally. This condition shows existence potential big in utilization land narrow as a growing medium plants that can support effort strengthening resilience food local, KKM 05 students of Bina Bangsa University with the supervising lecturer carry out community service activities to public

through socialization system hydroponics to inhabitant Bendung Subdistrict. This activity aims give education and skills practical in cultivation plant without land, pushing utilization land limited, and grow awareness will importance independence food. This system does not need large and applicable land with cost as well as relative care low, so it is very suitable for the environment urban and residential areas inhabitant.

Realize existence potential, KKM 05 students of Bina Bangsa University with the supervising lecturer carry out community service activities to public through socialization and education about system agriculture hydroponics to inhabitant Bendung Subdistrict. This activity is designed to provide knowledge practical about the method match plant without land, increase awareness public will importance resilience food based House stairs, and push utilization land empty to be more productive. Resilience food is a condition in which every individual own adequate, safe, nutritious and economically affordable access to quality and healthy food, in order to meet need nutrition as well as undergo an active and healthy life (Iqbal et al., 2024) .

Agriculture is a human effort in utilise source Power biological with plant plants that can produce and be used for life. The role of agriculture is very important for life Indonesian nation (Dwi Prasetyani & Alma Evangelista Mahendrastiti, 2022) . One of the form innovation in field growing agriculture rapidly currently is hydroponics, namely method cultivation plant without use soil. Hydroponics developed as solutions to limitations land and water to support more agriculture efficient and friendly environment, especially in the area urban and land limited.

Cultivation plant hydroponics is method that uses water media that is given nutrition as replacement land, can increase productivity and efficiency water use (Iqbal et al., 2024) . In addition, farmers can control plant nutrient needs more precision through this system, at the same time reduce risk attack common pests and diseases is on the ground. This system can also be applied on land narrow, like a yard home or urban area. Thanks to superiority said, hydroponics become solution modern, environmentally friendly agriculture environment and potential support resilience food in the future.

With holding this activity, residents expected No only get new insights regarding technique match modern planting, but also capable make system hydroponics as opportunity economy, both individually and in group. With Thus, this activity is not only represent implementation real from the Tri Dharma of Higher Education, but also become step strategic in build an empowered, independent and caring society to environment.

More from that, it is hoped that this program can continue continue and encourage creation habit match productive planting in the environment House stairs, at the same time strengthen resilience food local sustainably. Collaboration between students, lecturers, and the community in this activity proves that synergy between knowledge knowledge and needs public capable produce applicable, appropriate, and effective solutions impact directly on the increase quality life inhabitant.

METHOD STUDY

Community service activities to This community uses approach descriptive qualitative which aims to provide education and skills practical to public through method socialization, training, and mentoring. The location of the activity was held at Fans Hydro Sayurku, Jl. Komp. Tegal Padang, Drangong, Taktakan District, Serang City, Banten, with weave direct cooperation together Hydro Fans as partners implementer in support educational and practical activities system agriculture hydroponics.

a. Activity Stages

This community service activity was carried out in a number of stages as following :

- Initial Observations
  Community service team do observation field and interviews short with the village apparatus as well as community to identify potential, problems and needs inhabitant related farming on land narrow.
- Program Planning
  Based on results observation, team designing activities in the form of socialization and training system hydroponics simple that can be applied in the yard House inhabitant.
- Socialization and Education
  The activity begins with delivery material on resilience food, agriculture hydroponics, benefits, and technique basic principles that can be applied by the community. The material is delivered interactively using presentation and discussion media.
- Training Practice Hydroponics
  Participant given training direct method create and maintain installation hydroponics simple use easy equipment within reach, such as a bottle used and PVC pipes.
- Evaluation
  After training, an evaluation is carried out in the form of discussion and Q &A to measure understanding participants. The evaluation process is carried out through discussion and Q& A of a nature interactive between team implementers and participants. Questions submitted focus on understanding about principle base hydroponics, the benefits obtained, and procedure implementation technique hydroponics simple. The results at this stage are used as basis for assessing achievement of training objectives, in particular related mastery knowledge and readiness participant in apply technique hydroponics independently.

b. Data collection technique

Data collected through :

- Observation participatory during the activity
- Documentation in the form of photos, videos, and notes field

c. Data analysis

Data were analyzed qualitatively descriptive with examine results observation and interviews, then serve narrative information to describe the process and impact from community service activities to public.

RESULTS AND DISCUSSION

Community service activities community activities carried out by KKM 05 students at Bina Bangsa University with the supervising lecturer in the sub-district Weir has succeed give new knowledge and skills to society about the system agriculture hydroponics. Through observation, documentation, and evaluation of activities, seen existence improvement understanding inhabitant to technique match plant without land as well as its implementation in life daily.

Series socialization This hydroponics was carried out at Fans Hydro Sayurku, Serang City, starting with with conduct a survey regarding problems that exist in the sub-district Dam. Existing problems among them, the availability surrounding pages House

residents who can be used for planting with use system hydroponics. From the problem the get a clear picture about potential land narrow in the target area, at the same time identify problems such as limitations knowledge inhabitant related method agriculture alternative. After conducting the survey, then coordinate together with the Field Supervisor (DPL) and other parties sub-district. Coordination results give motivation and ideas for holding activities socialization about system hydroponics. This activity is expected to provide outlook about system modern agriculture that does not requires a large area for planting vegetables, no need land as a planting medium, using fertilizer, produce more vegetables plenty and fresh compared to land, more efficient in water use, free from contamination.

Figure 1
Coordination With Bendung Subdistrict

Figure 2
Coordination with DPL

At the stage program planning, team designing socialization and training activities hydroponics simple and adaptable with condition local. Election method hydroponics consider efficiency use land, facilities care, as well as potential improvement availability food family. Program design also takes into account availability affordable materials and equipment as well as easy obtained community, such as used bottles /gallons and PVC pipes.

Figure 3. Socialization Hydroponics Figure 4. Socialization Hydroponics Process of Delivering Material from the Results of the Practical Process

Stage socialization and education carried out interactively with using presentation media to convey material on resilience food, principles hydroponics, benefits, and techniques basic. This activity was successful push participation active participant through discussion sessions that provide opportunity to ask questions and share experience. Apart from that, delivery interactive materials and use simple language make participant more easy understand content material, so they feel sure to try apply technique hydroponics independently in their respective environments.

Figure 5. Socialization Hydroponics Question and answer session

Stage evaluation provide an overview of the level understanding and ability participant in apply material as well as skills that have been delivered. Through discussion and question and answer session, team evaluate understanding participant at a time identify problem technical issues they face. The results of the assessment show that part big participant capable explain return principles the basics taught and plan to try apply method hydroponics independently in their environment.

Based on technique Data collection is carried out through observation participatory and documentation (photos, videos, and notes) field), obtained corroborating visual and narrative evidence activity results. Analysis qualitative descriptive of the data show that training hydroponics capable increase knowledge and skills inhabitant in utilise land narrow to fit planting. In addition, this program has the potential give benefit term long in support resilience food House stairs and building awareness public will importance innovation agriculture friendly environment.

Hydroponics is method cultivation plants that do not use land as a planting medium. This method uses alternative media such as rockwool, charcoal husk, sand, or gravel for support root plants. Water solution containing nutrition important given as source food main for plants. This technique allows farmer control precisely need nutrients, light, and water, so that plants can grow more fast and healthy. Plants

hydroponics cultivated with using water containing media nutrition, where this technique is known own cost relative implementation high (Collins et al., 2021).

Training hydroponics using simple tools such as bottles used and PVC pipes proven increase Spirit participant in learning. Easy and affordable method make public aware that land small ones who have not been there for a long time utilized can be changed become a production field food at a time source income addition.

Results of mentoring show that part public has start apply system hydroponics at home with guidance from team devotion. They experienced improvement ability in manage system and understand aspect important things like lighting, nutrients, and water. In addition, hydroponics also provides mark educational, making it as activity family involving various generation.

Factors the main one that directly influence development plant hydroponics is sources of water, fertilizers and substances nutrition, type of planting media, availability oxygen, as well as quality seeds. In addition, the elements environment such as temperature, light, and humidity levels humidity also plays a role important (Rahman et al., 2022). Profit match hydroponic planting can be seen from various fields, such as economics, technology and the environment life social society. (Al Endy, 2015) The following is profit match plant hydroponics :

A. Economy
   Can help improvement income family when consistent do it and, hydroponics can be source new income for individuals or groups, especially in urban areas with land limited. Plants hydroponics usually experience more growth faster and longer harvest time short Because arrangement nutrition and environment growth is carried out in a controlled manner. This condition allows improvement frequency harvest in One years, so that results production and turnover become more tall compared to with system agriculture conventional.
B. Technology
   Hydroponics give contribution big to development technology with integrate agriculture and digital systems, such as automatic sensors, Internet of Things (IoT), and control applications nutrition and lighting. This technology improves efficiency in water and fertilizer use as well as support creation environmentally friendly farming environment. In addition, hydroponics utilized as means education and research in the STEM field, so that allows implementation experiment scientific from school level up to college high. Needs will agriculture continuous precision increase push growth industry technology agriculture, and make hydroponics as solution innovative for cultivation plants in urban areas and fields narrow.
C. Environment
   Hydroponics give benefit big for environment life with save water usage up to 90% compared with method agriculture conventional. This system does not need land as a planting medium, so reduce risk degradation land and erosion. In addition, hydroponics minimize use pesticides and herbicides, which contribute to the decline pollution land and water. System This cultivation also produces more waste little and can be applied in urban areas without must change function land green. With closed and efficient control, hydroponics support creation agriculture environmentally friendly sustainability environment.

Socialization hydroponics play a role important in increase understanding public to resilience food, preservation environment and potential economy family, especially in

the area with land limited such as Bendung Subdistrict. Overall, this activity has become form real implementation of the Tri Dharma of Higher Education at the same time step beginning in create change social based science and technology.

Implementation hydroponics give impact double, namely improvement capacity public as well as formation room collaborative between academics and citizens. The spirit of cooperation in look for solution agriculture sustainable depicted clear through dynamics ongoing discussions and training. The community demonstrated improvement solidarity and concern to issue food local through this activity. They started form group small to share experience in practice hydroponics, at the same time create opportunity formation cooperative or community House stairs. This fact indicates that devotion to public capable grow movement collective that continues develop.

Tri Dharma of Higher Education, especially in aspect devotion society, proven capable bridging the academic world with reality social society. Through involvement directly, students do not only apply knowledge from lectures, but also develop interpersonal and leadership skills. The sustainability of this activity in the future is highly dependent on the support various parties, such as universities, government local, and sector private sector. If combined with mentoring program intensive training periodic, and micro capital assistance, then hydroponic activities potential grow become movement economy a more diverse society wide. System hydroponics, as form continuous innovation developed, potential become part important in support resilience food adaptive local to global challenges such as change climate, crisis food, and urbanization. This agricultural model simultaneously reflect principles development sustainable which emphasizes efficiency, innovation, and empowerment society holistically.

To support sustainability, citizens Ward Weir start apply method hydroponics that shows potential term long in change pattern think agriculture, from method traditional going to more modern system efficient and friendly environment. Enthusiasm public in follow training and practice direct participate strengthen their capacity in manage resilience food independently. Participation cross generation in practice hydroponics show that this activity is not only give benefit economic and environmental, but also functional as an educational medium family that can strengthen connection between members family. Involvement directly to children and teenagers make this activity as science and technology learning facilities in applicable and relevant context.

System hydroponics open opportunity for formation business small based community, such as the establishment of cooperative farmer hydroponics House stairs or production fresh vegetables for the local market. With existence training entrepreneurship and mentoring sustainable, this system has the potential become foundation economy alternative in the middle limitations land agriculture.

This community service activity reflects importance collaboration between college height and society in create solution innovative based local approach development public through method hydroponics can be applied in other areas with characteristics similar, especially in supporting the resilience agenda food national and development goals sustainable development (SDGs), namely points second (without hunger), points eleventh (sustainable cities and communities), and points third twelve (handling change climate).

Spirit and impact positive of this program encourages the need step strategic in the form of creation of a planned and systematic sustainability program. The implementation team can develop a follow-up program through formation center education hydroponics

based society, which will functioning as receptacle training open for inhabitant local and community from other regions. Involvement generation young people can also be improved through integration hydroponics into school extracurricular activities, so that education modern agriculture can begin since early. The community also needs to be encouraged to take advantage of digital technology and systems agriculture smart, so they don't only become perpetrator practice hydroponics, but also plays a role as innovator local in development agriculture city. With this approach, socialization activities hydroponics No stop as devotion term short, but rather develop become foundation ecosystem agriculture independent, sustainable and participatory urban development.

CONCLUSION

Community service activities to community service carried out by KKM 05 students of Bina Bangsa University in the sub-district Weir succeed increase understanding as well as skills inhabitant in implement system hydroponics as solution innovative to overcome limitations land. Implementation this method does not only support resilience food sustainable local, but also open opportunity business based community as well as give benefit economic, environmental, and educational.

Participation active society, including involvement cross generation, shows that hydroponics capable become means empowerment family at a time increase awareness collective about importance independence food. This program also represents implementation the real Tri Dharma of Higher Education in bridging the academic world with public through devotion that utilizes technology appropriate.

To ensure program sustainability, is required support in form training continued, mentoring intensive, and collaboration from various parties so that hydroponics can develop become foundation economy alternative at a time movement friendly social environmental and adaptive to global challenges such as change climate and urbanization.

To support sustainability of the hydroponic program in the sub-district Dam, required regular mentoring and training further development to improve ability public in manage This system is independent. The formation of group farmer hydroponics or cooperatives based community also needs to be done in order to create mark better economy big at a time expand access marketing. Utilization digital technology becomes aspect important to support promotion, marketing results harvest, and functioning as an educational medium sustainable. The success of this program will more optimal if supported by collaboration with government local, sector private sector and institutions education in provision of capital, equipment, as well as access network Integrating hydroponics into school or extracurricular activities can be an effective strategy for introducing modern agriculture to generation young since early. In addition, research advanced about efficiency costs, productivity, and impact socio-economic term long work needs to be done so that this program can develop become a model of agriculture sustainable urban development and providing more benefits wide for public.

BIBLIOGRAPHY

Al Endy. (2015). *No Title* (Aditya Lutfi (ed.); pertama). Derwati Press.

Alamiyah, S. S., Dewi, S. B., Dwi Prakoso, A. H., & Yulaicho, M. R. (2021). Urban Farming Dan Ketahanan Pangan Di Masa Pandemi: Pengenalan Teknik Budidaya Hidroponik Di Kelurahan Kertajaya Surabaya. *Journal Publicuho*, *4*(3), 864–873. https://doi.org/10.35817/jpu.v4i3.20044

Collins, S. P., Storrow, A., Liu, D., Jenkins, C. A., Miller, K. F., Kampe, C., & Butler, J. (2021). *No Title 済無No Title No Title No Title*. *3*(1).

Dwi Prasetyani, & Alma Evangelista Mahendrastiti. (2022). Pelatihan Tanaman Hidroponik Sebagai Langkah Mewujudkan Ketahanan Pangan Di Kecamatan Boyolali. *J-ABDI: Jurnal Pengabdian Kepada Masyarakat*, *1*(10), 2629–2634. https://doi.org/10.53625/jabdi.v1i10.1601

Gharini, P. P., & Sukadana, I. W. (2022). Pemanfaatan Teknologi Hidroponik untuk Meningkatkan Ketahanan Pangan Masyarakat Dharma Santi di Masa Pandemi. *Jurnal Kreativitas Pengabdian Kepada Masyarakat (Pkm)*, *5*(4), 1050–1056. https://doi.org/10.33024/jkpm.v5i4.4813

Iqbal, M., Kahar, K., Kamaludin, A., Lingkungan, J. K., & Bandung, P. K. (2024). Menanam dengan metode hidroponik untuk memperkuat ketahanan pangan di kelurahan sukarame. *Jurnal Pengabdian Masyarakat Kesehatan Indonesia*, *3*(2), 457–464.

Linda dkk. (2021). Hidroponik_Sebagai_Sarana_Pemanfaatan_La. *Jurnal Lepa-Lepa Open*, *1*(3), 503–510.

Madusari, S., Astutik, D., Sutopo, A., & Handini, A. S. (2020). Ketahanan Pangan Masyarakat Pesantren. *Jurnal Pengabdian Masyarakat Teknik*, *2*, 45–52. https://doi.org/10.24853/jpmt.2.2.45-52

Putra, I. G. M. A. P. A., & Pradhana, I. P. D. (2023). Program Sosialisasi Pengembangan Tanaman Hidroponik Di Desa Kampung Kusamba Guna Menigingkatkan Ketahanan Pangan. *Abdimas Galuh*, *5*(1), 774. https://doi.org/10.25157/ag.v5i1.10034

Rahman, N. A., Umar, M. Z., Putri, R. M. E., & Fevria, R. (2022). BUDIDAYA HIDROPONIK TANAMAN PAKCOY (Brassica rapa L.) MENGGUNAKAN SISTEMNUTRIENT FILMS TECHNIQUE (NFT). *Prosiding SEMNAS BIO 2022 UIN Syarif Hidayatullah Jakarta*, 743–750.