ISSN:1533-9211
SEYBOLD REPORT
www.seybold-report.com

An Intervention Model on Community-Based Disaster Approach Towards Pandemic Resiliency

Sheila C. Poonon
Department of Agribusiness Management, College of Agriculture,
Central Mindanao University, Philippines

ISSN: 1533 - 9211

Abstract

This paper focuses on the initiatives of academe and research consortium in Northern Mindanao, Philippines, to respond to the Government's call for Bayanihan to Heal as One Act (RA 11469), Technology Transfer Act of 2009 (RA 10055), and the U.N. Sustainable Development Goals. This paper aims to develop an intervention model using a community-based approach during the pandemic. Specifically, it highlighted the series of strategies and activities toward implementing the intervention model. Using descriptive research design and data gathering through interviews, Focus Group Discussions (FGD), consultative meetings, and site validation. Findings reveal that a collaborative effort is essential in crafting an intervention project before its actual process.

Seven steps were identified in the development of an intervention model using a community-based approach such as the call for implementing agencies, development of the project conceptual framework, development of project implementation process framework, setting up of the project deliverables, identification of the project sites and beneficiaries, identification of technologies, and identification of potential linkage and partners. In conclusion, an intervention model for a community-based approach is a process involving partnership as a support system that should be need-based and disaster-specific; thus, it will need a different approach for its successful implementation. An intervention model must be properly designed to address the specific challenges and needs of the beneficiaries for any community-based project to be sustainable.

CORRESPONDING AUTHOR:

Sheila C. Poonon
poononsheila@yahoo.com

KEYWORDS:

Community-based, disaster, resiliency, intervention model, sustainability

Received: 02 August 2024
Accepted: 26 August 2024
Published :04 September 2024

TO CITE THIS ARTICLE:

Poonon, S. C. (2024). An intervention model on community-based disaster approach towards pandemic resiliency. *Seybold Report Journal*, *19*(9), 26-40. DOI: 10.5281/zenodo.13625029

1. Introduction

COVID-19 virus not only attacked our health but also caused even more destruction in the local and global economies, affecting numerous industries, including agriculture. When the lockdown transpired, boundaries were closed, human mobility was restricted (Palo et al., 2022; Sridhar et al., 2022), market demand for agricultural products was limited (Mead, 2020), there was an abrupt shift from physical stores to online platforms (Carolina Farm Stewardship Association, 2020), and an increase in farm inputs prices (Sridhar et al., 2022) were among the identified impacts of the pandemic to the agricultural sector and the country's food supply chain.

MinDA (2011) stated that Mindanao's economy contributed 18% to the national economy, particularly in agriculture, as the island is predominantly agricultural. The closure of borders during the pandemic limited access to markets, causing agricultural produce to rot and be damaged (World Bank, 2020). Furthermore, Mead (2020) reported that the pandemic also caused the limited market demand for agricultural produce, resulting in low purchase prices. TLocal Government Units (LGUs) prefer canned goods and other market goods to provide basic needs to communities. Low sales of agricultural produce are nightmares for farmers who depend on these sales to purchase more farm inputs. The abrupt shift in distribution channels from physical stores to online platforms also posed a threat, especially for farmers who need to be better equipped with the online setup. Travel restrictions and border closures have resulted in limited access to farm inputs, resulting in low production of agricultural produce. The price surge of numerous farm inputs like seeds and fertilizers (Aromolaran & Muyanga, 2020) added to this burden.

Community empowerment is a strategy that ought to improve a community's ability to recognize, impel, and confront its challenges (Yoo, 2004). In line with this approach is community capacity, which is the development and utilization of transferable knowledge, skills, processes, and resources that impact the goals and objectives of the community. Yoo (2004) further stated that individuals who participated in the process of boosting a community's capacity hone their capabilities to connect with others, recognize beneficial resources, and identify strategies that the community can use. Further, community-based food systems aid communities in making connections, resource sharing, and funding to respond to the current health crisis (Ammons et al., 2021). Farmers benefit from economies of scale, more considerable investible funds, abilities, and reduced input costs if they do community-based group farming (Sridhar et al., 2023).

The community-based disaster approach is a concept that is widely used in disasters like floods, climate change challenges, and even in the agriculture sector (Ariyaningsih & Shaw, 2023). Community-based adaptation (CBA) research continues to grow significantly, which "embodies adaptation practice that is small-scale, place-based, and often grassroots-driven, engages development practitioners, and most importantly, is community-based" (Schipper et al., 2014). Concentrating on the local scale makes it possible to recognize and integrate the community's context more fully, existing local knowledge, and current skills (Smit & Wandel, 2006; Ensor & Berger, 2009). Moreover, a sustainable community-based agricultural system provides a tool for managing and protecting natural resources with a focus on technological development as it aspires to meet the challenges of ending hunger, advancing the environment, and promoting social sustainability (FAO, 2014).

By Bayanihan to Heal as One Act, also known as RA 11469, DOST-PCAARRD launched the GALING-PCAARRD Kontra CoViD-19 Program. In line with this, the Northern Mindanao Consortium for Agriculture, Aquatic, and Natural Resources implemented a Quick Response Project (QRP) to help the people face the challenges brought about by the COVID-19 pandemic.

On the other hand, the Technology Transfer Act of 2009, otherwise known as R.A. No. 10055, entails the "transfer, promotion, dissemination, and effective use, management, and commercialization of intellectual property, technology and knowledge resulting from research and development (R&D) funded by the government for the benefit of national economy and taxpayers" (Philippine et al.et al. Act, 2009). Technology transfer is the Act of transferring scientific discoveries from one organization to another, usually through licensing efforts for intellectual property rights (IPRs) for further commercialization and expansion (Aridi & Cowey, 2018). Bugayong et al. (2022) also stated that this involves a wide range of processes that involve transferring knowledge, experiences, and materials among numerous stakeholders. Moreover, implementing technology transfer should include awareness of the local environment, constant stakeholder engagement, building linkages, flexibility and receptiveness, and a strategic communication plan.

This initiative will also respond to Sustainable Development Goals of no poverty, zero hunger, and sustainable cities and communities.

2. Aims, Objectives, and Methodology of the Paper

This paper aims to provide valuable insights into the process of developing an intervention model for establishing community-based farms based on experience as a response to the pandemic.

A descriptive research design was utilized since it does not prove any theory but highlights how different stakeholders in Northern Mindanao started and developed community-based farms, fish ponds, and school-based farms. Northern Mindanao Consortium for Agriculture Aquatic and Natural Resources Research and Development (NOMCAARRD) takes the lead for this initiative with Central Mindanao University as its Base Station located in Dologon, Maramag, Bukidnon with the participation of the Consortium Member Institution (CMI's) of NOMCAARRD.

The researcher used interviews, focus group discussions (FGD), consultative meetings, and site validation to gather data. FGD and interviews are known and commonly used qualitative approaches to gain a deeper understanding of numerous issues. Parker and Tritter (2006) stated that focus group discussion and interview are simultaneously seen as synonyms, especially with semi-structured one-to-one and group interviews. However, interviews are more into one-to-one discussions wherein the researcher takes on the role of an "investigator." In contrast, in a focus group discussion, the researcher takes on the role of a "facilitator" or "moderator," usually in a group interview setting (Nyumba et al., 2018).

The study utilized primary data from FGD with the CMI representatives to develop the project title, a framework for the implementation process, the technologies available for transfer, and the list of the proposed project beneficiaries. A consultation with farmers and the fisherfolk community will be needed to determine their willingness to participate in the program as project beneficiaries. A consultative meeting with the Department of Agriculture was also conducted to validate the beneficiaries and assure them they genuinely required the project's support. Also, the role of LGUs in the implementation was discussed. A series of consultative meetings were held online with the participating CMIs to discuss the final beneficiaries, technologies, and project implementation strategies. Validation of the project sites is highlighted as a crucial element for its success, focusing on matching the proposed project site and the feasibility of proposed interventions of the technologies to be introduced, thus increasing the project's chances of success.

3. Results and Discussions

3.1 Call for implementing agencies

NOMCAARRD initiated a call for CMIs to participate as implementing agencies. Four (4) NOMCAARRD CMIs responded to the call and expressed verbal interest in taking the challenge as an implementing agency. The CMIs that responded are strategically located in four out of five Provinces in Northern Mindanao, which clearly shows a project spanning the Region. Table 1 reflects the names of participating CMIs and their corresponding addresses.

Table 1. List of NOMCAARRD CMI's who participated in the project

Name of CMI	Address
Central Mindanao University (CMU)	Dologon, Maramag, Bukidnon, Philippines
Northwestern Mindanao State College of Science and Technology (NMSCST)	Labuyo, Tangub City, Misamis Occidental, Philippines
Camiguin Polytechnic State College (CPSC)	Balbagon, Mambajao, Camiguin, Philippines
Mindanao State University – Naawan (MSU Naawan)	Poblacion, Naawan, Misamis Oriental Philippines

3.2 Identification of Farmers/Fisherfolks Challenges that Need for Quick Action

After a series of consultation meetings, the project titled "Responding to COVID-19 Challenges for the AANR Sector: A NOMCAARRD Initiative". It mainly aims to transfer technology generated by Consortium Member Institutions (CMI) to empower further farmers and fisherfolks regarding agricultural productivity and farm enterprise sustainability and contribute to the economic and social landscape. Specifically, it aims to transfer technology and innovation to end users, strengthen agriculture stakeholders' collaboration to ensure fair use of resources and resource sharing, develop sustainability plans, and recommend policies and other interventions to address supply chain gaps. It is anchored on the problems and challenges faced by farmers and fisherfolks during the pandemic, the framework of the project, and the technology transfer challenges of the CMI (universities). As discussed in the rationale, problems, and challenges of the farmers in terms of boundary closure, lower demand for the products, and shift from the buying strategies of the consumers and prices of farm inputs. About this, universities are generating farming technologies from time to time. They claimed to need still to improve in terms of technology transfer endeavors.

Regarding resources, both the university and the farmers/fisherfolks have available resources that could be pooled and explored for efficient use. Actions needed are identified based on the farmers' and universities' problems/challenges and resources. Proper implementation outcomes will include an established agri-based enterprise, a more active technology transfer initiative of the university, and a policy recommendation to help find long-term solutions to farmers'/fisherfolks' problems and challenges not only during the pandemic. Looking at the long-term effect of the study is a sustainable agri-based enterprise. Figure 1 shows the conceptual framework of the project.

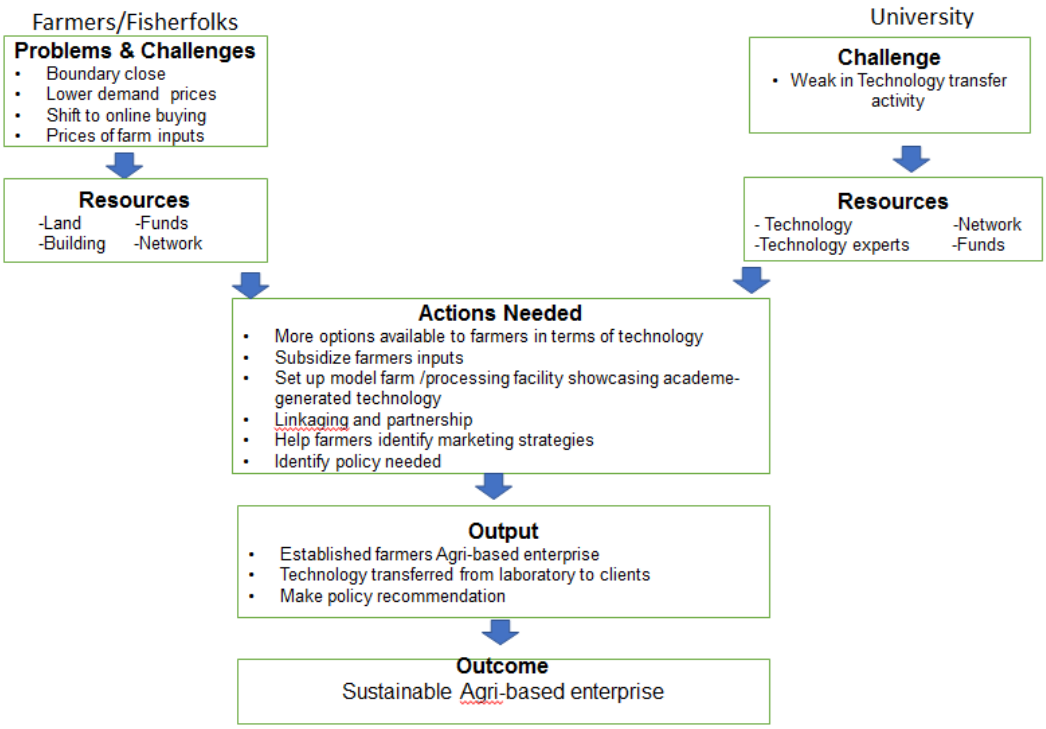

Figure 1. Conceptual framework of the study

3.3 Development of the Framework for the Project Implementation Process

A comprehensive project implementation process, illustrated in Figure 2, was developed to ensure the smooth and effective implementation of the project. This process consisted of two distinct phases: the pre-implementation phase and the implementation phase.

The pre-implementation phase is a crucial preparatory stage, which includes identifying potential challenges and risks, efficiently allocating resources, tapping potential partners, preliminary leg working activities, and detailed timelines. It serves as a proactive measure to address issues before they become significant hurdles, contributing to the project's overall success. The pre-implementation preparations included coordinating operations and courtesy calls to LGUs. Conducting a hybrid platform for the activities was used since LGUs and other stakeholders had unique COVID-19 protocols to follow.

The project plan will be implemented in t

he implementation phase, adhering to the roadmap laid out in the pre-implementation phase. The significance of this framework in the project implementation cannot be overstated. It provides a well-defined path for executing the project, enhances risk management, ensures the optimal allocation of resources, and facilitates precise time management. These benefits collectively reinforce the project's prospects for success, ultimately building the credibility and

integrity of the project and conducting a baseline survey to gather data essential for future comparisons of the project's social and economic effectiveness. The capability-building activities will include mentoring, seminars, training, and field visits. Beneficiaries of these activities were meant to acquire knowledge and expertise about the specific technology, thereby maximizing its utility. Linkage was also done by linking farmers and fisherfolks with target buyers or markets, technology experts, and financial institutions. Finally, as an ongoing process, monitoring will gather data on the beneficiaries' enterprise progress and check for the possible problems of the beneficiaries, including the technical aspect. The specific data to be collected will be the cost of production, sales, job generation, and social and environmental impacts. Furthermore, with the documentation and analysis of the technology adoption process, policy recommendations were drawn, creating more technology transfer activities and resulting in more job creation.

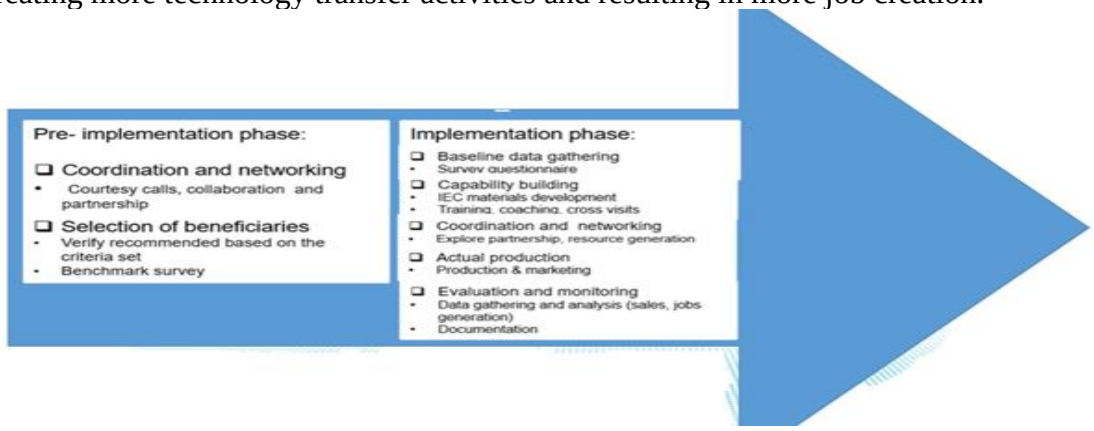

Figure 2. Project implementation process framework

3.4 Setting up of the Project Deliverables

By setting clear and measurable quantitative project deliverables, project managers can improve project efficiency, enhance stakeholder satisfaction, and increase the likelihood of successful project completion. Quantitative project deliverables are specific, measurable outcomes that can be quantified or counted. Setting clear and measurable deliverables is essential for successful project management for several reasons, which include clear focus and direction, effective measurement and tracking, improved decision-making, and enhanced stakeholder communication.

Table 2 shows what the project is expected to accomplish in terms of the 6 P's: Product, People and Services, Places and Partnership, Publication, Patents, Policy, and Social and Environmental Impact in its two-year implementation period.

Table 2. Project's deliverable

Products	Year 1	Year 2
	At least 1,080 kgs of fresh mushroom	at least 2,160 kgs of fresh mushroom
	At least 39,830 kgs of fresh vegetables	at least 39,830 kgs of fresh vegetables
	At least 5,400 sacks of vermicompost	at least 10,800 sacks of vermicompost
	At least 250 bottles (500mL) of organic concoctions and extracts	at least 250 bottles (500 mL) of organic concoctions and extracts
	At least 720 kgs of tilapia	at least 1,440 kgs of tilapia
People and Services	49 trainings for farm enterprises	20 consultation meetings
	365 farmers/fisherfolks trained	365 farmers/fisherfolks trained
	19 farm enterprises supported/mentored	19 farm enterprises supported/mentored
	10 POTs and technologies transferred	
	20 consultation meetings conducted	
Places and Partnership	27 Memorandum of Agreements (MOAs) forged	
Publication	15 IEC and promotional materials	19 enterprise sustainability plans
		five (5) process documentation reports
		four (4) journal materials produced
		19 enterprise sustainability plans
Patents	8 IEC Materials copyrighted	
Policies	Four policy inputs in support of COVID-19 initiatives drafted	
Social Impact	New technologies disseminated	
	Help promote organic farming (R.A. No. 10068)	
	Facilitate the technology transfer mandate of the university (R.A. No. 10055) and its extension endeavor.	

	Help in SUC leveling and other accreditation.
	Create a sustainable agri-based enterprise.
	New technologies disseminated for farmers/beneficiaries
Economic Impact	Increase farmers/fisherfolks' income by at least 7%
	Increase job generation

3.5 Identification of the Project Beneficiaries

Establishing community-based farms and fish ponds as a tool for development is considered the community development tool that strengthens the capability of rural communities to manage farm resources while guaranteeing the participation of the locals. These tools create more opportunities and prospects to drive the community's livelihood to greater heights (Paladan, 2020). Additionally, introducing community-based fish ponds can increase fish production, even stream necessary nutrients to low-income families, and enhance the general well-being of low-income and poor households. The introduction of this approach had a substantial and positive effect on the income, employment, and subsistence of beneficiaries (Haque & Dey, 2017).

Nair and Hamzan (2015) stated that there are four steps to starting and developing community-based farms. First, assess community needs. Second, educate and prepare the community. Third, identify and establish leadership. Lastly, plan and design quality products. The project will modify the mentioned steps to meet the needs of and address the unique situation of the Region. One significant modification of the project is including school farms to be managed by the students and the Parents-Teachers and Community Association (PTCA). A total of twenty-one (21) sites were identified across the Region, composed of ten (10) community-based farms, five (5) community-based fish ponds, and nine (9) school-based farms. The careful selection process for project beneficiaries in Bukidnon, Misamis Oriental, Misamis Occidental, and Camiguin was commendable to ensure the inclusion of those who could benefit from the project. The criteria employed, such as organization registration, minimum membership, and available land for farming and ponds, created a well-structured approach, laying the foundation for effective intervention and economic empowerment to ensure that diverse beneficiary groups, such as farmers, fishermen, teachers, students, and women's groups, were included in the project.

The main criteria for selecting the beneficiaries are willingness to collaborate or partner with the academic community through signing a Memorandum of Agreement (MOA). Other essential criteria depend on the discretion of the CMI, such as: (1) Member farmers are enrolled in the Registry System for Basic Sectors for Agriculture (RSBSA); (2) organizations are registered with the Securities and Exchange Commission (SEC); or (3) Cooperative Development Authority (CDA), if applicable; (4) endorsement from the barangay captain; and (5) ownership of a land and other production facility.

Figure 3 is the map of Northern Mindanao showing the identified sites of the community-based farms, school-based farms, and fish ponds. Colored areas -The provinces of Bukidnon, Camiguin, Misamis Oriental, and Misamis Occidental are the Provinces to be covered by the project, while the colored area - the Province of Lanao del Norte, is not covered.

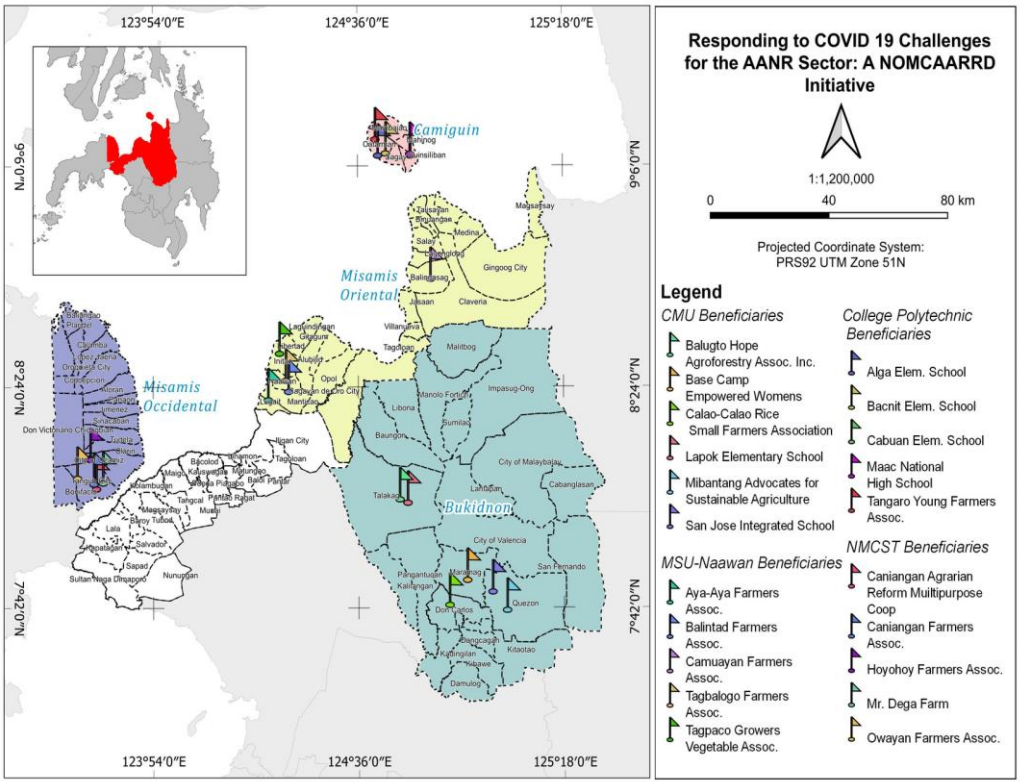

Figure 3 shows a map of Northern Mindanao showing the identified project sites.

3.6 Technologies identified for transfer to the beneficiaries

Shahi (2024) expressed that technologies used in community-based farms are elevating productivity, efficiency, and sustainability, which aligns with the ballooning demand for organic products. The development and transmission of these productivity-enhancing technologies have shown significant benefits since they have significantly increased the productivity and financial gains of the recipients. The project has improved the competitiveness and sustainability of the beneficiaries within their enterprises. This occurrence has subsequently contributed substantially to the holistic advancement of the agricultural sector.

Data from FGD revealed diverse agricultural technologies available for transfer to the beneficiaries. Identifying the technologies was based on the technology generated and or with experts from the CMIs. Table 3 presents the technologies identified. CMU and NMSCST share a common emphasis on "Pinakbet" vegetable production, mushroom production, and vermicomposting, promoting sustainable agriculture practices. CPSC also chooses "Pinakbet" vegetables and the production of organic concoctions and extracts. MSU-Naawan showcased their

technology in tilapia production, highlighting their commitment to aquaculture. These diverse technologies emphasize equipping beneficiaries with tools and knowledge for sustainable and innovative agricultural practices.

Table 3. Technologies available for transfer to the beneficiaries

Name of CMI	Technology
Central Mindanao University (CMU)	Pinakbet vegetable production/ Mushroom production/ Vermicomposting
Northwestern Mindanao State College of Science and Technology (NMSCST)	Pinakbet vegetable production/ Vermicomposting
Camiguin Polytechnic State College (CPSC)	Pinakbet vegetable production/ Organic concoction and extracts
Mindanao State University – Naawan (MSU Naawan)	Tilapia Production

3.7 Identification of Potential Linkage and Partners

Establishing linkages and partnerships is essential in community-based projects because it is one way to achieve the community-based enterprise's goals and objectives. These partners will provide a wide range of services, including support, funds, research, training, legal backing, infrastructure, and even knowledge transmission (Seixas & Berkes, 2010). By cooperating with educational institutions through extension officers, farmers can enhance their skills and knowledge and increase their production (Yusoff et al., 2017).

A Memorandum of Agreement (MOA) will be forged between the project and beneficiaries. The MOA serves as a roadmap for the project, ensuring that all parties are on the same page and that the project is executed efficiently and effectively. It specifies the clear definition of roles and responsibilities, establishment of mutual rights and obligations, agreement on project scope, goals, and objectives, outline of project timeline and deliverables, and allocation of resources, ultimately leading to successful project implementation.

On the other hand, forging of partnerships between Government and non-government organizations. Linking is an important element of successful collaborative projects. Connecting and coordinating different stakeholders can create more efficient, impactful, and sustainable initiatives. Table 4 shows the initial list of organizations to be tapped to join the collaborative effort. The nature of partnerships will be identified regarding the provision of experts, technologies, support funds, input subsidies, and/or project funding.

Table 4. Initial list of potential partners

Organization
Central Mindanao, University (CMU), Musuan, Maramag, Bukidnon
Mindanao State University (MSU-Naawan) Naawan, Misamis Oreintal
Camiguin Polytechnic State College, Misamis Oriental
Northern Mindanao State College of Science and Technology, Misamis Occidental
East West Seed Company Inc.

Department of Education Camiguin, Mambajao, Camiguin
Philippine Council for Aquatic, Natural Resources and Research Development (PCAARRD)
Local Government Units

4. Conclusions

Though community-based models are familiar and many authors continuously explored their utility, a specific model for this approach is necessary depending on the type of beneficiaries, technologies available, and potential partners in the area. Environmental scanning is needed to identify the needs of the proposed beneficiaries. Therefore, using the community-based approach is a process involving seven steps: call for implementing agencies, development of the project conceptual framework, development of project implementation process framework, setting up of the project deliverables, identification of the project sites and beneficiaries, identification of technologies, and identification of potential linkage and partners. An agency must take the lead; the role of NOMCAARRD in this model is to initiate the call for other stakeholders to participate. It is also important to note that a concrete project and implementation are in place to serve as the blueprint of the project. Identifying sites, beneficiaries, and technologies is essential to match the intervention and their need. Partners are needed as a support system to ensure project success.

Acknowledgment

The author would like to acknowledge the CMU administration, NOMCAARRD, participating CMIs, LGUs of Bukidnon, Camiguin, Misamis Oriental, Misamis Occidental, and PCAARRD.

Conflicts of Interest

The author has disclosed no conflicts of interest.

Author's Affiliation

Sheila C. Poonon
Department of Agribusiness Management, College of Agriculture, Central Mindanao University, Philippines

HOW TO CITE THIS ARTICLE

Poonon, S. C. (2024). An intervention model on community-based disaster approach towards pandemic resiliency. *Seybold Report Journal*, *19*(9), 26-40. DOI: 10.5281/zenodo.13625029

REFERENCES

Ammons, S., Blacklin, S., Bloom, D., Brown, S., Cappellazzi, M., Creamer, N., Cruz, A., Hynson, J., Knight, G., Lauffer, L., Liang, K., Menius, L., Piner, A., Smallwood, A., Stout, R., Stover, C., Thraves, T., & Ukah, B. (2021). A collaborative approach to COVID-19 response: The Center for Environmental Farming Systems community-based food system initiatives. *Journal of Agriculture, Food Systems, and Community Development*, *10*(2), 297–302. https://doi.org/10.5304/jafscd.2021.102.004

Aridi, A., & Cowey, L. (2018). Technology transfer from public research organizations: A framework for analysis. *World Bank*. https://documents1.worldbank.org/curated/en/384851539285043693/pdf/Technology-Transfer-from-Public-Research-Organizations-A-Framework-for-Analysis.pdf

Ariyaningsih, & Shaw, R. (2023). Community-based approach for climate resilience and COVID-19: A case study of a climate village (Kampung Iklim) in Balikpapan, Indonesia. *Land, 12*(3), 650. https://doi.org/10.3390/land12030650

Aromolaran, A. B., & Muyanga, M. (2020). Impact of COVID-19 on food systems and rural livelihoods in Nigeria. *Agricultural Policy Research in Africa.* DOI: 10.19088/APRA.2020.005

Bugayong, I. D., Hayashi, K., Orden, M. E. M., Llorca, L., Agustiani, N., Hadiawati, L., Siregar, I. H., Pantin, F. L. A. (2022). Technology transfer in the agriculture sector: Implementation experiences of WeRise in Indonesia and the Philippines. *FFTC Journal of Agricultural Policy, 3.* https://doi.org/10.56669/JAXM4782

Carolina Farm Stewardship Association. (2020). *From 'scrambling' to 'devastated': The impact of COVID-19 on farms in North and South Carolina.* https://www.carolinafarmstewards.org/wp-content/uploads/2020/06/CFSA-COVID-19-Survey-Report_Final.pdf

Ensor, J., & Berger, R. (2009). Understanding climate change adaptation: Lessons from community-based approaches. https://doi.org/10.3362/9781780440415

Food and Agriculture Organization of the United Nations. (2014). *Building a common vision for sustainable food and agriculture: Principles and approaches.* FAO. http://www.fao.org/3/a-i3940e.pdf

Haque, A. B. M. M., & Dey, M. M. (2017). Impacts of community-based fish culture in seasonal floodplains on Bangladesh's income, food security, and employment. *Food Security, pp. 9,* 25–38. https://doi.org/10.1007/s12571-016-0629-z

Mead, D., Ransom, K., Reed, S. B., & Sager, S. (2020). The impact of the COVID-19 pandemic on food price indexes and data collection. *Monthly Labor Review,* U.S. Bureau of Labor Statistics. https://doi.org/10.21916/mlr.2020.18

Mindanao Development Authority. (2011). *Mindanao 2020 peace and development framework plan (2011 – 2030).* https://tile.loc.gov/storage-

services/service/gdc/gdcovop/2017357118/2017357118.pdf

Nair, V., & Hamzah, A. (2015). Successful community-based tourism approaches for rural destinations: The Asia Pacific experience. *Worldwide Hospitality and Tourism Themes*, *7*(5), 429-439. http://dx.doi.org/10.1108/WHATT-06-2015-0023

Nyumba, T. O., Wilson, K., Derrick, C. J., & Mukherjee, N. (2018). The use of focus group discussion methodology: Insights from two decades of application in conservation. *Methods in Ecology and Evolution*, *9*(1), 20–32. https://doi.org/10.1111/2041-210X.12860

Paladan, N. (2020). Community-based approach in developing farm tourism. *Open Access Library Journal, p. 7*: e7043. https://doi.org/10.4236/oalib.1107043

Palo, A. S., Rosetes, M., & Carino, D. (2022). COVID-19 and food systems in the Philippines. *Australian Centre for International Agricultural Research*. https://www.aciar.gov.au/publication/covid-19-and-food-systems-indo-pacific/7-covid-19-and-food-systems-philippines

Parker, A., & Tritter, J. (2006). Focus group method and methodology: Current practice and recent debate. *International Journal of Research & Method in Education, 29*(1), 23–37. https://doi.org/10.1080/01406720500537304

Philippine Technology Transfer Act. https://legacy.senate.gov.ph/republic_acts/ra%2010055.pdf. 2009.

Seixas, C. S., & Berkes, F. (2010). Community-based enterprises: The significance of partnerships and institutional linkages. *International Journal of the Commons*, *4*(1), 183-212. https://www.jstor.org/stable/26523019

Shahi, J. (2024). *Technological innovations in organic farming*. LinkedIn. https://www.linkedin.com/pulse/technological-innovations-organic-farming-globallaunchbase-nv3rc/

Smit, B., & Wandel, J. (2006). Adaptation, adaptive capacity, and vulnerability. *Global Environmental Change*, *16*(3), 282-292. https://doi.org/10.1016/j.gloenvcha.2006.03.008

Sridhar, A., Balakrishnan, A., Jacob, M. M., Sillanpää, M., & Dayanandan, N. (2023). Global impact of COVID-19 on agriculture: Role of sustainable agriculture and digital farming. *Environmental Science and Pollution Research*, *30*(15), 42509-42525. https://doi.org/10.1007/s11356-022-19358-w

Yoo, S., Weed, N. E., Lempa, M. L., Mbondo, M., Shada, R. E., & Goodman, R. M. (2004). Collaborative community empowerment: An illustration of a six-step process. *Health Promotion Practice, (5)*3, 256–265. https://www.jstor.org/stable/26735237

Yusoff, N. H. B., Hussain, M. R. M., & Tukiman, I. (2017). Roles of the community towards urban

farming activities. *Planning Malaysia Journal*, *15*(1), 271-278. https://doi.org/10.21837/pm.v15i1.243

https://www.ceicdata.com/en/philippines/psna-5th-revision-gross-domestic-product-per-capita-2018-price/gdp-per-capita-2018p-northern-mindanao

https://www.sdg's.un.org