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Innovative Development of Community-Engaged Process to Increasing Capability Community Toward Sustainable Community Resources Management in the Context of Northern Thailand

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Abstract

The objectives of this research were 1) to analyze the community's capacity to develop community-engaged process innovation and 2) to evaluate community-engaged process innovation to enhance community capacity for sustainable community resource management in the context of Northern Thailand. This research employed Participatory Action Research (PAR). The samples used in the research were divided into two groups: 1) the information providers for the community capacity analysis, consisting of 18 individuals including religious leaders, formal leaders, and school administrators, selected using snowball sampling; and 2) the process innovation evaluators, consisting of 5 faculty members and experts, selected using purposive sampling. The total number of participants was 23. The research instruments used were 1) document analysis forms, 2) unstructured interview forms, and 3) a community-engaged process innovation assessment form to enhance community capacity. Qualitative data were analyzed using content analysis, and quantitative data were analyzed using statistical software to present results in the form of means and standard deviations. The analysis results were then presented in a Descriptive Analysis. The research findings revealed that; 1) the guidelines for developing community capacity to foster community-engaged process innovation comprise two components: 1) Guidelines for analyzing community capacity, which include three steps: 1.1) Assessing community capacity, 1.2) Designing and developing innovation, and 1.3) Applying innovation for sustainable community resource management. And 2) Guidelines for sustainable community resource management, which include three steps: 2.1) Community

empowerment, 2.2) Operational improvement system, and 2.3) Performance measurement. Moreover, the evaluation of community-engaged process innovation to enhance community capacity towards sustainable community resource management in the context of Northern Thailand revealed that the community-engaged innovation process, also known as the EDA & CIM model, was evaluated as being of the highest quality.

Keywords: Social Innovation Development, Community Engaged Process, Capability Community, Sustainable Community Resources Management, Sustainable Development Goals

1. Introduction

According to Sustainable Development Goal (SDG) 1, which aims to reduce economic poverty and other dimensions of poverty (as defined by each country), efforts must encompass all groups, including men, women, children, the poor, and vulnerable populations. Additionally, SDG 4 advocates for equitable and inclusive education that promotes lifelong learning opportunities for everyone. Achieving quality education reinforces the well-established belief that education is one of the most effective drivers of sustainable development. It shares a common goal of eradicating gender inequality and inequity, aspiring to provide universal access to high-quality education and foster skill development within local communities. This approach leverages the environment as a vital learning resource and integrates knowledge across various disciplines, while ensuring a safe and supportive learning environment free from violence. The goal is to guarantee that all learners acquire the necessary knowledge and skills to promote sustainable development, which includes education for sustainable development and adopting sustainable lifestyles through cultural diversity and cultural contributions to sustainable development (United Nations, 2015; Mangkhang, 2021).

Community-engaged pedagogy has emerged as a crucial mechanism for driving the Sustainable Development Goals (SDGs). This approach focuses on enhancing learning capacity to sustainably develop communities through Community-Engaged Research (CER), which integrates knowledge and community resources to address current issues and human needs within existing resource constraints. This concept has received international recognition, with 193 UN member states adopting it as a shared framework that emphasizes the importance of comprehensively considering social, economic, and environmental impacts. As a result, all sectors, particularly government entities, must urgently implement strategies and goals to achieve the intentions of sustainable development (Desa, 2016; Breuer et al., 2019; Achavanuntakul & Yamla, 2015; Brundtland, 1987; Keeble, 1988; Carolyn Leung Rubin et al., 2012).

Recognizing the limitations of traditional public administration, many countries have shifted to a model of integrated governance centered around principles of good governance. This innovation aims to broaden the range of participation from various sectors of society, especially civil society, to collaboratively establish policies, develop plans, and implement activities in partnership. This transformation seeks to create a more flexible, open, and responsive public administration system that better meets societal needs by facilitating the exchange of knowledge and resources between the government, civil society, and other sectors, ultimately leading to equitable and sustainable development for all (Markantoni et al., 2018; Miola & Schiltz, 2019; Zahran A., 2016).

As a signatory to the United Nations' 2030 Agenda for Sustainable Development, Thailand is focused on achieving three main goals: economic growth, social inclusion, and environmental protection. However, the implementation of development policies has been characterized by a vertical and fragmented approach, resulting in a lack of connectivity between various sectors. This disconnection has led to policy implementation failures, redundancy across agencies, and insufficient planning for long-term impact analysis. Additionally, time and budget constraints in executing vertical social service projects have caused many initiatives to prioritize adherence to fixed timelines, leading to a lack of continuity after project completion. These issues negatively affect community engagement and the sustainability of development (Office of the Auditor General, 2019; Setkij, 2020; Kanokwara & Weeraboon, 2020; Department of Community Development, 2020; Digital Economy Promotion Agency, 2021; Department of Community Development, 2018). Moreover, there are challenges related to project evaluations that emphasize short-term economic outcomes rather than long-term social impact goals. The results have often not linked tangible products or technologies to innovative processes initiated by communities (Achavanuntakul, 2017; Digital Economy Promotion Agency, 2021). In a follow-up evaluation of development projects by government agencies in 74 communities, it was found that in 41 communities (55.41%), community representatives lacked sufficient capacity, which hindered consistent operation (Office of the Auditor General, 2019). Consequently, community development research does not effectively achieve its objectives and goals. Utilizing community-engaged research as an innovative approach to address these issues fosters genuine participation from community members as equal partners throughout the research process (DD Payán, MJ Zawadzki & AV Song, 2022). This participation begins with identifying research questions, designing research inquiries to address problems, making decisions, presenting new knowledge to policymakers, and creating processes that lead to improvements in the quality of life within their communities.

From a review of traditional management theories, efforts have been made to distinguish between technological and social innovation, highlighting their different motivations. Technological innovation focuses on profit generation, while social innovation aims to address social issues without seeking financial gain. This distinction reflects the varied goals and values of the two types of innovation, with social innovation being viewed as "pure innovation" primarily intended to benefit society (Pol & Ville, 2009). Social innovation is thus a creative process that employs challenging strategies to transform social

relationships and achieve established goals. This process involves systematically linked steps and activities, indicating that social innovation is not merely a concept but a practical endeavor aimed at creating tangible positive impacts on society (Pue, Vandergeest, & Breznitz, 2015). Social innovation is a creative process aimed at solving social problems, with the goal of improving the quality of life and well-being within communities. This type of innovation does not prioritize economic profit; instead, it emphasizes making a positive social impact by changing social relationships, developing new processes, or applying technology to meet the needs of vulnerable groups. Community participation and the establishment of collaborative networks are crucial elements that foster sustainable and scalable social innovation.

Given the challenges facing higher education institutions in fulfilling their social responsibility, it is essential to develop social innovations that engage communities in diverse contexts across Thailand. This approach will enable government agencies and civil society to pursue continuous development processes to alleviate poverty and educational disparities in northern Thailand. It will also enhance community participation, encouraging communities to think critically and analyze underlying issues. Communities should be empowered to set goals, plan developments, and take ownership of their progress themselves. The research questions are based on designing community-bound learning processes to enhance community capabilities for sustainable resource management in the northern region of Thailand, utilizing knowledge management as a foundational systematic design.

2. Research Objectives

1. To analyze the community's capabilities for developing community-engaged process innovations.
2. To evaluate community-engaged process innovations aimed at enhancing community capacity for sustainable resource management in the northern region of Thailand.

3. Research Methodology

3.1. Research Design

This research employed a participatory action research (PAR) methodology. Data collection and analysis were conducted through document analysis, interviews, and assessments. To ensure content validity and the suitability of the research instruments, they were reviewed by experts and pilot-tested in a similar community context. The study's findings are presented descriptively, utilizing both quantitative and qualitative data to synthesize information and provide a narrative account.

3. 2. Research Area, Population, and Sample

The research area consists of communities supported by higher education institutions under the framework of societal engagement, which aims to address significant problems and empower local communities. The goal is to leverage the potential of higher education and networks to create economic, social, and environmental value through accessible knowledge and innovative service delivery. The study focuses on six culturally diverse border communities characterized by varying levels of poverty and educational disparity: one community in Chiang Mai, one in Nan, one in Lamphun, one in Phrae, and two in Mae Hong Son. The research population comprises two groups: 1. Key informants who analyze community capabilities, including religious leaders, formal leaders, and school administrators. 2.

Evaluators of the suitability of learning process innovations, including five faculty members and experts. The researcher selects samples to facilitate data collection, resulting in a total of 23 participants, which include:

1) 18 leaders (religious, formal, and school administrators) recruited using the snowball technique. The researcher immersed themselves in the community to build relationships and mutual understanding, explaining the research objectives and scheduling data collection visits. Following this, the researcher studied the community's components, issues, and needs.

2) Five faculty members and community-bound experts selected through purposive sampling to assess the quality of the innovation process. Focus group discussions emphasize collaborative dialogue to conclude findings from knowledgeable individuals with relevant experience.

3.3. Research Instruments

In this study, the researcher synthesized and reviewed concepts and theories to develop research instruments utilizing a mixed-methods approach tailored to the community's context. The instruments include: 1) Document analysis forms. 2) Unstructured interview guides. 3) Assessment tools for evaluating the quality of community-engaged process innovations.

3.4. Data Collection

1) Documentary Study: This involved gathering information from documents, books, and journals, encompassing theories, concepts, and relevant research to support the study's analysis.

2) Situational Analysis: Qualitative data was gathered through document synthesis and research, alongside interviews with religious leaders, formal leaders, and school administrators using unstructured interview guides.

3) Design and Innovation Development: Quantitative data was collected by designing and developing community-engaged process innovations. The quality and suitability of the developed approach were verified by experts in community-bound education using assessment tools for evaluating the quality of these innovations.

3. 5. Data Analysis

1) Qualitative Data: The research team analyzed qualitative data in line with the study's objectives using content analysis and interpretation to summarize key issues according to data groups and analyze relationships among the information.

2) Quantitative Data: The researcher utilized data from assessment tools, which were analyzed using appropriate statistical software for descriptive analysis. Results were expressed as mean values and standard deviations to present statistical findings effectively.

4. Research Findings

The analysis of community capabilities for sustainable community development revealed that the ability of communities to manage local resources sustainably, particularly in the northern region of Thailand, can be explained as follows:

Table 1. Analysis of Community Capabilities Based on Minority Community Case Studies

Community context	Community Potential & Capital
1. The Mae Taman community in Chiang Dao District, Chiang Mai Province (Ethnic group: Tai Yai) is situated in the Thai-Myanmar border area, accessible through the Kiuw Phawok checkpoint that connects to several important cities in Myanmar, such as Nakongmu, Huai, Kan, Tuan, Sad, Pan, Tongji, and Mandalay, which serve as trade centers in northern Myanmar. The community is approximately 203 km away from the Chiang Mai provincial government center. The community context includes natural ecological resources and is located in a valley surrounded by mountains on all four sides, near the Mae Taeng River and the Mae Taman watershed. A highlight of this community is its wisdom in training elephants and cows for tourism purposes along the banks of the Mae Taeng River, involving ox-drawn carts. The community organizes activities to enjoy the scenic views along natural farmlands and offers bamboo rafting to appreciate the nature on both sides of the river. However, there are limitations due to community enterprises that have emerged from vertical policies which analyzed the community context, impacting the economic strengthening of specific networks benefiting economically prepared community leaders, thus making it difficult to distribute income widely.	   **Cultural Products** **Medicinal Herbs for Elephants** The formula consists of more than 13 types of herbs, including banana, rice husk, grass, wild taro, areca palm, bitter vine, salt, tamarind, elephant sugarcane, and pineapple root. This mixture serves as a tonic for elephants, promoting strength and appetite. It acts as a mild laxative and can help alleviate various illnesses. After consumption, elephants become stronger and healthier, and it is often used for elderly or sick elephants. Another remedy, known as boiling medicine for fomentation, can treat symptoms of swelling or water retention in elephants. If applied for 10 days, the swelling will typically subside. **Elephant Dung Paper** The concept here is that paper is made from wood pulp. Therefore, if one uses animal dung, which is decomposed plant matter, or even materials from plants such as sugarcane, bamboo leaves, bananas, and grass, and processes them by hand just like traditional Thai paper, it transforms what was once waste into a valuable resource. Instead of discarding elephant dung without any benefit, we can recycle and repurpose it.
2. The Mae Hae community in Mae Sariang District, Mae Hong Son Province (Ethnicity: Pga Kha Ya) is a border community between Thailand and Myanmar, located near the border trading post at Ban Sao Hin, adjacent to the Kayah State of Myanmar, which is ethnically diverse. The community is approximately 327 km away from the administrative center of Chiang Mai Province. The context of the community possesses rich ecological resources, situated over 1,500 meters above sea level, characterized by a complex landscape of high	  **Cultural Product** **Backstrap woven fabric**, the weaving of the Karen ethnic group is a traditional method called backstrap weaving. This involves using a small weaving device

Community context	Community Potential & Capital
mountains and cool weather year-round. There are tourist spots accessible at any time throughout the year, such as Doi Sing and Doi Wa Kluh Jo or Pa Wi Hok, along with other attractions like the Mae Suwan Noi Waterfall, the Phakluay Orchids Waterfall, and the Mae Um Long Hot Springs. However, the area faces significant disparities in digital life. Although vertical policies have introduced technology and innovations for community development, there is still a lack of training organized to empower the community to effectively utilize such tools.	called a backstrap loom. The characteristic of this backstrap weaving method is that the weaver must sit on the floor, with both legs stretched straight forward parallel to each other. There is a strap (the strap may be made of leather, or fabric folded into many layers, or strong twisted rope) that is attached to the warp threads and wrapped around the back of the weaver's waist. The other end is tied to a house pillar, a tree trunk, or any strong post. Weaving with a backstrap loom uses the weaver's body movements to control the tension of the warp threads as needed. Fabric woven with a backstrap loom will have a narrow width.
3. The Subpong community in Pang Mapha District, Mae Hong Son Province (ethnic groups: Tai Yai, Lisu, Hmong) is situated in a border area between Thailand and Myanmar. It features a border trade facilitation point at Ban Mai Lan, adjacent to the Wa market, which connects to Shan State in Myanmar. The area experiences significant vulnerability due to conflicts among various ethnic groups along the border. The community is located approximately 185 kilometers from the provincial government center in Chiang Mai. The community context includes natural and cultural resources, with most of the area characterized by high plains intermixed with mountains and a river flowing through it. An archaeological site, the Phi Man Cave, reveals cultural practices dating back 3,000 years. There is ethnic diversity and a significant presence of minority groups, along with rich cultural traditions such as the Gin Wa (Dancing Jakh), Poi Sang Long, and Tongsom Tor Luang (offering rice to the spirits). Limitations and development strategies are typically designed unilaterally due to language barriers between the indigenous people and government personnel, resulting in communication difficulties and unequal service access, along with decision-making under risks.	  **The Poi Sang Long tradition** originates from the strong faith and adherence of the Tai people to Buddhism. They believe that a young man's dedication to monastic life through ordination in Buddhism is a great merit. Sponsors are willing to sacrifice any amount of worldly possessions, such as belongings, money, and gold, to support these young men in their opportunity to encounter the spiritual wealth of Buddhism, which is ordination. This involves renouncing gain, honor, praise, and happiness, with the aim of following the Noble Eightfold Path towards Nirvana.   **Local Market** Interesting Aspects: Tourists will enjoy observing the traditional attire of various hill tribe people, such as the Lisu and Karen, who come to shop at this market. Additionally, the goods on display are noteworthy, including a wide variety of local vegetables like *dok jiao* (Siamese Cassia flowers), sweet potatoes, yams, galangal shoots, dried goods, pickled foods, fermented soybeans, and various spices.

Community context	Community Potential & Capital
4. The community of Ban Phakerd, Muang District, Nan Province (Lanna people: Thai Yawan, Thai Lue, Thai Yong) is located in a border area with a permanent crossing point at Huai Gon, opposite the town of Nam Ngum. This location can connect to the economic trade corridor via the railway in China and the Chaiyaburi Airport in the Lao People's Democratic Republic. The community is approximately 327 km from the administrative center of Chiang Mai Province. The community context includes cultural resources and serves as a valuable learning source for life practices passed down for over a century, through the preservation of priceless artifacts in the local museum. Most of the exhibits are everyday items used by people in the past. Visitors can also view 2,323 units of Lanna written scriptures on palm leaves (Tua Mueang), categorized into 20 sections that contain discoveries of Lanna herbal medicine. However, it was found that the significant role of community members in participating in various activities related to the care, preservation, and restoration is limited to just specific groups. This results in a segmented development impact on diverse beneficiaries that is not consistent.	 This is a way of life that has been passed down for over a hundred years in a local museum. The local community collaboratively created this museum to serve as a learning resource about the Nan way of life through the preservation of valuable ancient artifacts from the temple. Most of the items on display are everyday objects used by people in the past. These items were donated to the temple by devout individuals. In addition, visitors can view 2,323 bundles of palm-leaf manuscripts in Lanna Dhamma script (Tua Mueang), divided into 20 categories. These include Nan folk scriptures, the Nan Chronicle (Wat Phra Koet version), and a bilingual (Tua Mueang and Thai script) Nan folk book (Wat Phra Koet version), among others.
5. The Wang Chien community in Mueang District, Phrae Province (Lanna people: Thai Yuan, Thai Lue, Thai Yong) is located in an area designated for the development of the Den Chai-Chiang Khong double-track railway project. This railway serves as a trade route connecting northern Thailand with Laos and southern China. The community is approximately 175 kilometers away from the Chiang Mai provincial government center.The community is rich in cultural resources, including a network of traditional healers. Phrae city serves as a central market for herbal medicine, offering ancient medical texts and over 100 rare herbs, such as the northern rice herb, southern rice herb, and seven-layer wall herb. The community also possesses traditional knowledge in techniques like bone setting, massage, and other methods to alleviate muscle pain, tendon injuries, joint pain, and conditions such as hemiplegia and paralysis. However, limitations arise from the community enterprises, which are a result of a top-down policy analyzing the community context for economic improvement. Most of these enterprises consist of community leaders who are economically prepared within the network of beneficiaries. Consequently, achieving a consistent distribution of income has become a challenge.	 **The Treatment Process by Lanna Traditional Healers: Tok Sen** "The traditional Lanna medical system has evolved from techniques involving rubbing, blowing, and pressing ('ched, pao, haek') to alleviate muscle pain and fatigue, as well as to treat conditions related to bones, joints, muscles, and tendons. This form of treatment releases tension faster than traditional Thai massage because it focuses on stimulating key points or lines in the body. Some practitioners also incorporate 'tok sen' (a percussive massage technique involving tapping along energy lines) alongside the massage. 'Tok sen' causes the deeper lines to spring up, which can facilitate the treatment of various tendons more easily. 'Tok sen' involves rhythmically tapping deep lines to create a recoiling effect and stimulates muscles and tendons, increasing blood circulation."

Community context	Community Potential & Capital
	 **Yum Khaang** This is a treatment method for pain relief. The treatment involves soaking the feet in a liquid made from the herb *Pu Loei* (known as *Phlai* in central Thailand), which is ground and mixed with water in an appropriate ratio and sesame oil. The feet are then placed on a hot iron plate called "Khaang" that has been heated over a charcoal stove. Following this, the therapist will step on various parts of the patient's body experiencing pain, massaging, and rubbing all over. The pressure from the feet that have been in contact with heat helps stimulate various nervous systems to become more aware and function better, as well as relax muscles and improve blood circulation. The entire treatment process takes approximately 2-3 hours, depending on the patient's condition, and follow-up sessions may be necessary as scheduled.   **Herbal products** from Choktavee Osot primarily use raw materials sourced from nature in the northern region of Thailand. These materials undergo production processes that adhere to the manufacturing standards set by the Ministry of Public Health and are supervised by pharmacists. Currently, there are six registered herbal medicines categorized under traditional medicine, which include antifa medicine, digestive aids, herbal uterine tonics, herbal balms, and two forms of herbal powder for hemiplegia (one in powder form and one for brewing). "Our production emphasizes the Lanna formula by utilizing local herbs that can be found naturally or purchased from local communities. For beauty, we adapt herbs like turmeric, tamarind leaves, and soapberry leaves, which possess anti-inflammatory properties and also help nourish the skin. These herbs can be further processed and packaged into round shapes called 'herbal compress balls.' These compress balls are used as a herbal treatment to enhance blood circulation, help eliminate waste from the body, relieve muscle tension, and alleviate pain, practices that have been around since ancient times.

Community context	Community Potential & Capital
6. The Pa Pi community, located in Ban Thi District, Lamphun Province (consists of Lanna people, including Thai Yuan, Thai Lue, and Thai Yong). This community is situated within the development area of Chiang Mai International Airport 2 , which aims to connect to the Chiang Mai Blue Line light rail system. This project is designed to promote trade and investment in line with Thailand's master plan for establishing commercial airports, with an investment budget of 70 billion baht. The community is approximately 31 kilometers away from the Chiang Mai provincial government center. The cultural context of the community includes rich resources, notably the use of over 730 traditional herbal medicine recipes from the local healer, Phai Liang Khwang Suya Yai. These remedies address various health issues, including "San Nibat" (high fever that may lead to seizures), "Makhae Kut" (tumors and various types of cancer), and "Kiew Thong" (abdominal pain and cramps). However,the community faces challenges due to external organizations supporting the involvement of community members in activities. The roles of analyzing and evaluating the community are primarily carried out by outsiders. Consequently, community members have little involvement in the design and planning of development initiatives. As a result, there is a lack of ownership within the community, and development activities cease once the project period concludes.	  **Ancient Sites: Kuu Heung and Kuu Pha Lan** Heritage Sites in the Western Lanna Region. The Fine Arts Department has announced the registration of the ancient sites Kuu Heung and Kuu Pha Lan. The site Kuu Pha Lan is significant, resembling Kuu Heung's round base with bulbous features, supporting the shrine's core. There are conduits designed for water drainage, adorned with stucco patterns in the walls of these conduits, featuring peony motifs and entwined floral patterns throughout, often found in Lanna-style artistic designs. Kuu Heung showcases intricate floral designs at its facade, with significant symbols: to the east, a rabbit (representing the moon); to the west, a peacock (representing the sun); to the north, a Dharma wheel; while the south side has collapsed and remains unidentified. The dating period is established by comparing the designs and architectural features, likely ranging from the late 21st Buddhist century to the early 22nd Buddhist century. The artistic style is similar to the high relief sculptures of Wat Phra That Jed Yod.   **Cultural Product** **The Tai Lue woven fabric from Ban Thi, featuring the "Kha Chae Long Tu" (lost key in the cabinet)** pattern, originated from household frugality, leading to the creation of self-made clothing. However, this pattern was typically woven onto *pha lop* (bed sheets) rather than clothing items like *pha sin* (sarongs). This was because weaving patterns onto clothing was not commonly practiced to save time and prioritize functionality for everyday use. The "Kha Chae Long Tu" (lost key in the cabinet) pattern's inception began with the discovery of this specific fabric design on a cloth wrapping a

Community context	Community Potential & Capital
	pap (palm leaf manuscript) containing scriptures donated to a temple. This discovery prompted a search for individuals who recognized and could weave this unique pattern. Its distinctiveness led to its registration as a cultural heritage by Lamphun Province.  **Ban Mueang of the Three Tai Groups and Tukta of the Three Tai Groups** The history of the settlement of various groups of people in Ban Thi District is as follows: The Tai Yong people (Lue people of Mueang Yong) were forcibly relocated from Mueang Yong Khemarat, Kengtung State to Lamphun and expanded their community to Ban Thi around the years 1805-1814 AD (B.E. 2348-2357). The Tai Lue people were forcibly relocated from Sipsongpanna, Jinghong (pronounced by the people of Ban Thi as Mueang Jeng Hong, or Jinghong, or Jeng Hung, or the current Chiang Rung) in Yunnan Province, People's Republic of China, around the years 1814-1825 AD (B.E. 2357-2368). And the Tai Yuan people settled here, fleeing poverty and floods, having migrated from the areas of Ban Ko Klang and Ban Wang Sing Kham, Pa Daet Subdistrict, Saraphi District, Chiang Mai Province, around the years 1877-1887 AD (B.E. 2420-2430).

The analysis of the community's contextual setting has uncovered the potential of community resources that higher education institutions have utilized with technology to develop community power for knowledge and innovation exchange. Each community possesses distinct spatial contexts, including borderland communities and remote areas with both temporary and permanent border trade points, as well as semi-urban communities that support future economic corridor projects. This is illustrated in the map showing all six communities as follows:

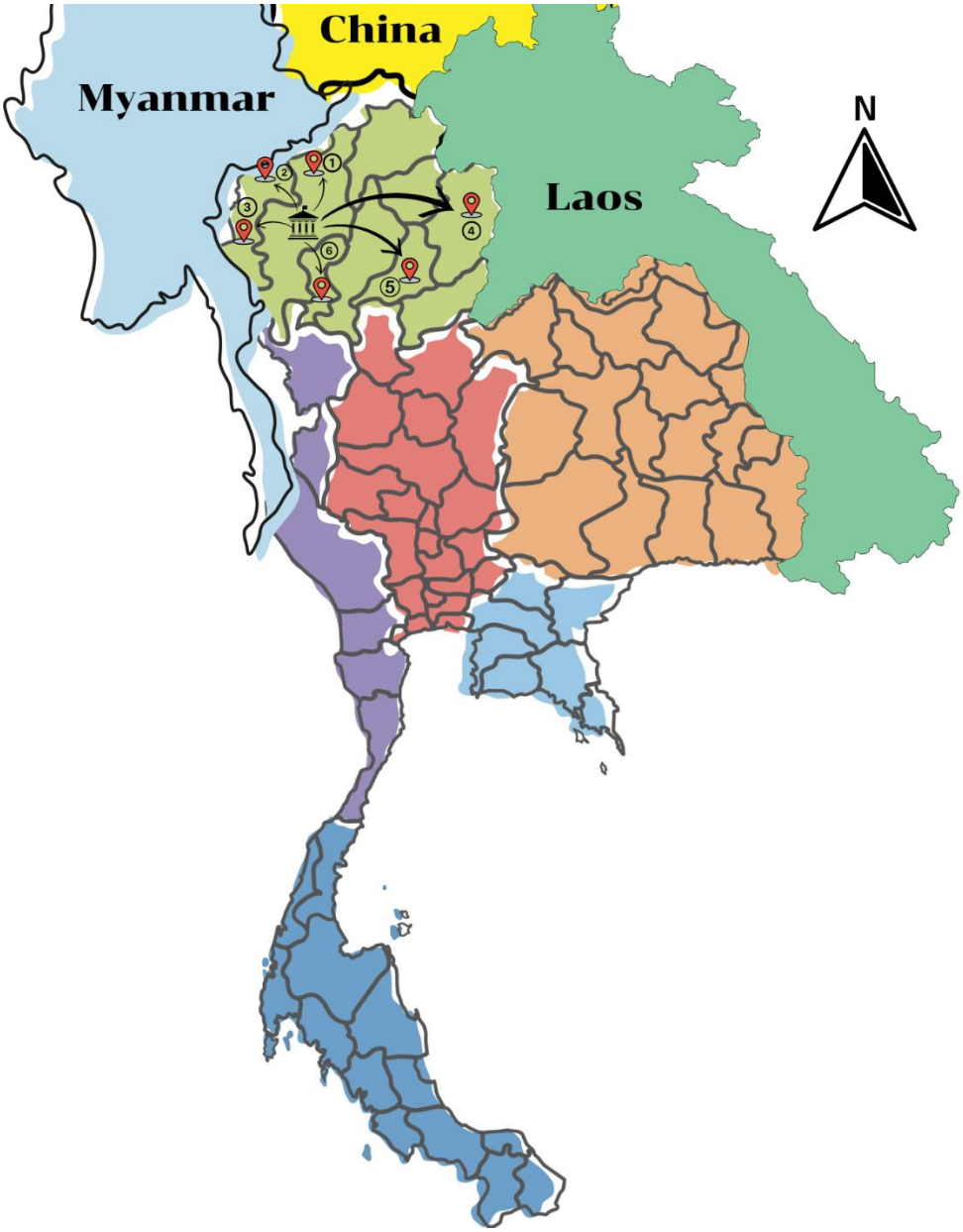

Figure1. Mapping Community Context, Capital, and Potential in the Northern Region of Thailand

From the analysis of community capabilities using a case study of a minority community context, the researcher identified key findings regarding strategies to enhance community capacity for developing community-engaged process innovation. This approach consists of two main components: 1) The framework for analyzing community capacity, which includes three steps: 1.1) Assessing community capacity 1.2) Designing and developing innovations 1.3) Applying innovations for sustainable community resource management 2) The framework for sustainable community resource management, which comprises three steps: 2.1) Community empowerment 2.2) Operational improvement systems 2.3) Measuring operational performance Thus, to enhance community capacity for sustainable resource management in the northern region of Thailand, it is essential to establish a strong societal foundation through community-engaged learning. This approach aims to foster the knowledge, understanding, and skills necessary for participatory resource management and environmental awareness. Community-engaged learning focuses on experiential learning, transmitted through local wisdom and knowledge exchange among community members, while integrating appropriate scientific and technological knowledge. This enables communities to adapt effectively to various challenges. Therefore, promoting community-engaged learning is fundamental to building strong communities capable of sustainable resource management.

The evaluation of community-engaged process innovation aimed at enhancing community capacity for sustainable resource management in the northern region of Thailand revealed the development of a model called the “EDA & CIM model.” This model consists of two components: 1) The EDA process, which analyzes community capacity, and 2) The CIM process, which focuses on sustainable community resource management.

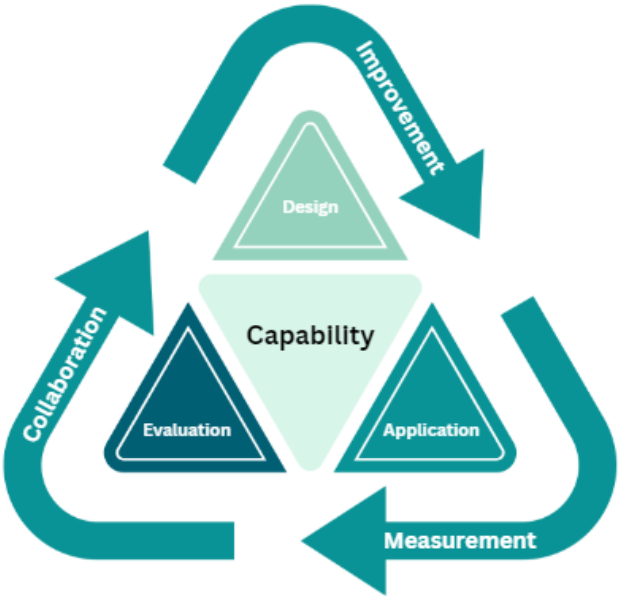

Figure 2. EDA & CIM model Source: Researcher (2023)

The EDA process involves analyzing community capabilities to discover potentials for sustainable community development. It consists of three main steps:

1) Evaluation of Community Capability (E) : Research has found that vertical policy implementation has limitations, leading to communities lacking participation in learning, decision-making, and planning processes, which ultimately hinders sustainable social development and self-reliance. The evaluation of community capability aims to analyze and assess various dimensions of community potentials, such as social, economic, and environmental resources. This evaluation seeks to identify strengths, weaknesses, and opportunities for development, promoting community self-reliance and strengthening community sustainability through the active participation of community members in determining developmental directions that align with their needs and potentials. The information gathered from this evaluation can be effectively used for community development planning, resource allocation, and monitoring the outcomes of various development projects.

2) Design and Innovation Development (D) : Research indicates that vertical policy implementation also has its constraints, resulting in an inability to generate community-driven momentum. Communities often lack the internal motivation to collaborate with authorities in operations, and there is a lack of long-term sustainability goals and community ownership. Design and innovation development combines design science with sustainable community development, focusing on community participation to identify problems and create solutions that meet genuine needs, understanding the social, cultural, and economic contexts of the community. This process leads to innovations that promote self-reliance, enhance community capabilities, and improve the overall quality of life for community members in an equitable manner.

3) Applications of Innovation for Sustainable Community Resource Management (A) : Research shows that vertical policy implementation limits community access to technologies and tools necessary for long-term sustainable resource management. Resource management often remains fragmented across different sectors, leading to a lack of synergy for community transformation. The application of innovation for sustainable community resource management is a crucial factor in modern community development. Information and communication technologies (ICT) such as Geographic Information Systems (GIS), mobile applications, and online platforms enable communities to access resource information, plan management strategies, and monitor outcomes effectively. Additionally, sensor technologies contribute to precise monitoring and management of natural resources such as water, soil, and forests. The application of these technologies fosters community participation in resource management, enhances transparency, and encourages long-term sustainability.

The CIM process focuses on sustainable community resource management through learning that engages the community, thereby enhancing community capabilities in managing resources sustainably. It consists of three essential steps:

1) Collaboration of Commune (C): This process unites local individuals with shared interests in local development, potentially including researchers, experts, or external stakeholders. The outcome is a consensus on the community's essential needs. Community collaboration is a vital mechanism for strengthening community resilience, particularly through community-engaged learning. This approach encourages members to exchange knowledge, experiences, and skills, resulting in collective learning that aligns with the community's context and needs. Community-engaged learning helps members develop the necessary skills to manage resources, solve problems, and pursue sustainable development. Therefore, community collaboration is a fundamental foundation for building a strong and sustainable community.

2) Improving Community Resource Management Operational Systems (I): This process emphasizes setting goals and monitoring essential outcomes by fostering internal motivation, which results in enhanced management systems that guide the community toward sustainable resource management. Improving operational systems should prioritize community-engaged learning to create a structure that genuinely responds to the needs and context of the community. Encouraging community

member participation at all stages—from planning and execution to evaluation—facilitates knowledge exchange among members and helps develop critical skills for sustainable resource management. Moreover, employing information technology for data management and communication will enhance operational efficiency and support transparent, participative decision-making within the community.

3) Measurement of Community Resource Management Performance (M): This process involves refining procedures and identifying knowledge gained from practices, resulting in deeper insights and new action guidelines for subsequent development cycles. Measuring the performance of community resource management is a crucial process that reflects

After the researcher developed the community-engaged process innovation, the researcher evaluated the appropriateness of the community-engaged process innovation by experts. The results are as follows:

Table 2. Results of the evaluation of the appropriateness of community-engaged process Innovation (n=5)

No	Evaluation list	$\bar{x}$	SD	Translation results.
1	Community-engaged process innovation helps promote the empowerment of local people.	4.80	0.45	the most
2	Community-Engaged Process Innovation Enhancing Community Capacity to Achieve Goals Successfully in the Community Context	4.60	0.55	the most
3	Community-engaged process innovation: promoting collaboration with community members in a participatory manner.	4.40	0.89	a lot
4	Community-engaged process innovation helps communities identify weaknesses and discover opportunities for community development.	4.80	0.45	the most
5	Community-engaged process innovation empowers community voices, placing them at the center of the community design process.	4.60	0.89	the most
6	Community-engaged process innovation fosters collaborative decision-making in the management of community resources.	4.80	0.45	the most
7	Community-engaged process innovation encourages cross-sector collaboration between the government and the community.	4.20	1.10	a lot
8	Community-engaged process innovation promotes sustainable practices.	4.80	0.45	the most
9	Community-engaged process innovation enhances the skills and knowledge of community members in various fields.	4.60	0.89	the most
10	Community-engaged process innovation facilitates community discussions for sustainable development.	4.40	0.55	a lot
	Total average	4.60	0.67	the most

From Table 2, it can be seen that the developed community-engaged process innovation has an overall suitability at the highest level ($\bar{x}$= 4.60, SD = 0.67). When considering each item, it was found that there are 4 key issues with the highest evaluation score ($\bar{x}$= 4.80), which include: 1) community-engaged process innovation helps promote the empowerment of local people; 2) community-engaged process innovation helps the community identify weaknesses and discover opportunities for community development; 3) community-engaged process innovation promotes a collaborative decision-making process in managing community resources; and 4) community-engaged process innovation promotes sustainable practices. This shows that community-engaged process innovation is suitable for enhancing community capacity towards sustainable community resource management.

5. Discussion

The guidelines for developing community capacity for sustainable community development comprise two components: 1) Guidelines for analyzing community capacity, which involve three steps: 1.1) Assessing community capacity, 1.2) Designing and developing innovations, and 1.3) Applying innovations for sustainable community resource management. 2) Guidelines for sustainable community resource management, which include three steps: 2.1) Community empowerment, 2.2) Operation improvement system, and 2.3) Performance measurement. This aligns with the concept of Schwartz (2020), who proposed that community capacity is the ability to achieve goals successfully within the community context, representing a collective effort. Often, individuals cannot achieve larger community outcomes alone; they require community capacity, which includes both individual motivation and support from members, working towards the same direction. This is consistent with the ideas of Reason & Bradbury (2008), who suggested that collaboration with community members through a horizontal participatory

approach to identify problems, co-create solutions, and implement interventions enhances community capacity and their ability to drive positive change. This also aligns with Chambers' (1994) concept of Participatory Rural Appraisal, which emphasizes enabling community members to comprehensively assess their strengths, needs, and resources, and promotes active participation to ensure that assessment outcomes reflect the perspectives of beneficiaries within the community. Furthermore, Norris, et al. (2008) proposed Resilience Assessment Frameworks, highlighting the community's capacity for adaptation, learning, and reflection. This approach helps communities identify weaknesses and discover opportunities for community development. Therefore, developing community capacity for sustainable community development must focus on fostering collaboration among all sectors, utilizing appropriate and efficient processes to facilitate sustainable community resource management.

The evaluation of the community-engaged process Innovation to enhance community capacity towards sustainable community resource management in the Northern region of Thailand revealed that the community-engaged process Innovation, also known as the "EDA & CIM model," achieved the highest level of quality in process innovation evaluation. This is consistent with the concept of Lynam (2007), who proposed the importance and necessity of community engagement in natural resource management, supporting the development of various approaches and methods, and promoting the participation of community members and decision-making related to natural resource management and policies to improve methods and approaches that foster community participation, with each community demonstrating effectiveness in different contexts. This aligns with Jetske (2008) view that community engagement builds trust and is a crucial factor in the participation of community members in community resource management. Community resource management should consider how the outcomes will promote community development. Promoting participation in community resource management indicates the extent to which a community has the capacity to sustainably manage its resources. Moreover, Hassan & Reid (2014) proposed the concept of Social Labs as community science labs, which are collaborative workspaces where beneficiaries from all sectors come together to seek innovations and methods for solving community problems. This should emphasize the ability of the system (ecological and social) to reduce external friction and empower communities to have space for exchange and adaptation to global social changes. The developed community-engaged process Innovation achieved the highest level of quality in the evaluation, with experts pointing out that the developed learning process innovation is a "social innovation" that helps promote social learning in managing community resources sustainably. This is consistent with the perspective of Pue, Vandergeest, & Breznitz (2015), who presented social innovation as a process of creating and implementing challenging strategies to transform social relationships and achieve defined goals. This process consists of systematically linked steps and activities. Therefore, social innovation is not just a concept but a practical action to create a tangible positive impact on society. It also aligns with the concept of Mangkhang, et al (2021), who proposed that education for sustainable development must focus on enhancing the capacity of local communities to develop participatory self-reliance and self-management with knowledge and ethics, without negatively impacting quality of life and the environment, and must aim to build efficient area-based educational equity cooperation networks, creating a central space for joint learning among all sectors.

6. Recommendations

Based on the research findings, the researchers offer the following recommendations.

6.1. Recommendations from the Research

1. Higher education institutions should establish plans for producing and developing community-engaged researchers based on community potential.
2. Community development institutions and Chiang Mai University must collaborate to develop joint plans with agencies that utilize researchers to create curricula for developing researchers and community developers, aimed at training educational personnel and the general public to enhance community capacity for sustainable community resource management in Thailand.
3. Chiang Mai University should develop community-engaged research innovations, including online courses, to enhance community capacity for sustainable community resource management for diverse ethnic communities in remote areas.
4. Community management units should encourage the Community Development Fund to exchange community management innovations and establish networks with teacher training institutions to serve as community science labs and integrate Community Engaged Education into teacher training curricula to promote knowledge and experience competencies according to professional teacher standards.

6.2. Recommendations for Future Research

1. A manual for the community-engaged research innovation curriculum should be developed to foster participation as equal partners of the community in sustainable community development.
2. Innovations and learning media should be developed to promote lifelong learning capacity for sustainable community development in culturally diverse communities in Thailand.
3. Community-engaged process Innovation should be studied for learners in alternative education settings in Thailand.
4. An integrated curriculum should be developed to promote entrepreneurial citizenship for learners in alternative education settings in Thailand.

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