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School+home Cacao project model: A participatory action research on enhancing literacy, nutrition, and livelihood

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Abstract

This participatory action research project aims to empower communities within the service areas of the College of Teacher Education of Cagayan State University at Lasam, Philippines, by harnessing the potential of cacao as a transformative agricultural commodity for enhancing literacy, nutrition, and livelihood. Adopting a multi-dimensional approach, the project targets students, teachers, and parents to create a holistic impact on education, health, and economic well-being. The project framework encompasses three pillars focusing on literacy, nutrition, and livelihood. The project enhances students' and teachers' knowledge and skills in cacao processing, production, and nutrition through experiential learning, leading to improved understanding among all stakeholders. Baseline data guided targeted interventions and skill development. The development and distribution of innovative cacao-based products, such as cacao powder, tablets, dark chocolate bars, spicy cacao balls, and chocolate spread, not only provide wholesome snacks but also foster sustainable community development and entrepreneurship. Promoting consumption of these nutritious, locally-sourced products improves community health. The project empowers families in the target community to engage in cacao processing, resulting in higher monthly incomes and enhanced livelihoods. Creating an alternative income source contributes to the community's overall economic prosperity and resilience. The findings from this project extend beyond the specific university and community involved, as the model can be replicated in other similar contexts. The integration of cacao into educational, nutritional, and livelihood aspects demonstrates the potential for this commodity to become a catalyst for sustainable development in various communities. To ensure sustainability and expansion, careful planning and implementation of mechanisms will build on the project's initial achievements during its early stages.

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Introduction

The Poverty reduction has been a central focus in the post-2015 development agenda for the Millennium Development Goals (MDGs) and the Sustainable Development Goals (SDGs). However, the Philippines continue to face challenges in combating poverty, with millions of Filipinos living below the national poverty threshold. Despite efforts, various administrations have struggled to achieve significant poverty reduction. The country aims to attain upper middle-income status by 2022 and reduce rural poverty from 30 percent to 20 percent, lifting approximately 6 million Filipinos out of poverty. Aligned with the Sustainable Development Goals, the Philippines is committed to eradicating extreme poverty by 2030, making notable progress towards a more prosperous and equitable society.

According to the 2018 Family Income and Expenditure Survey (FIES) by the Philippine Statistics Authority (PSA), poverty incidence is most prevalent among households whose heads are engaged in agriculture, with a rate of 28.4%. Impressively, nearly three-quarters (73.4%) of the poor households are headed by individuals involved in agriculture, construction, transport and storage, wholesale and retail trade, mining and quarrying, as well as other services. Construction and other services contribute significantly to this segment, accounting for 11.4% and 9.1% respectively, highlighting the need for targeted poverty alleviation efforts in these sectors (Reyes, 2021). Agriculture plays a vital role in enhancing the living standards of people, particularly the most vulnerable, in a sustainable and holistic manner (FAO, 2017). Despite its significance, agriculture encounters various challenges, including low yields, price fluctuations, and limited knowledge, all of which can have adverse effects on education, health, and livelihood opportunities in rural areas (Joffe, 2007; Gizaw *et al.*, 2022; Miladoniv, 2023). The challenges faced by agriculture, such as low yields, price fluctuations, and limited knowledge, contribute to the persistent poverty in these households. These challenges hinder the sector's ability to provide stable livelihoods and adequate

income, ultimately impacting the living standards of people, especially those in rural areas. Targeted poverty alleviation efforts are necessary to address these challenges and uplift the living conditions of vulnerable communities dependent on these industries.

Status of Cacao Production in the Philippines

Cacao (*Theobroma cacao*) is an important agricultural commodity in the Philippines, with its production and export contributing to the country's economy and livelihood of farmers. The cultivation and export of *Theobroma cacao* contribute to economic growth, foreign exchange earnings, and employment opportunities within the agricultural sector. As a high-value crop, cacao's popularity has surged globally due to its use in chocolate production and other confectionery products, creating a strong demand in international markets. The growth of the cacao industry has empowered local farmers, providing them with a sustainable livelihood and encouraging further investments in *Theobroma cacao* farming and processing. The government and various organizations have also been actively promoting and supporting *Theobroma cacao* cultivation, research, and market development to enhance the industry's competitiveness and ensure its continued positive impact on the Philippine economy and rural communities.

Cacao production can positively impact agriculture and the living standards of people, especially in rural areas. As a high-value crop, cacao offers several benefits that address some of the challenges faced by the agricultural sector. The cacao industry has emerged as a promising opportunity for the Philippines' agriculture sector, with its competitive advantage in cacao production and its ability to meet the increasing supply and demand gap in domestic and export markets. Cacao growers stand to significantly increase their earnings through processing, making cocoa a crucial crop that provides income, employment, and raw materials for various industries, offering potential for poverty alleviation. In the data of the Philippine Statistics Authority

(PSA) dated January 2023 to March 2023, Cacao (dried beans with pulp) production during the first quarter of 2023 declined to 2.35 thousand metric tons. This indicates a decrease of -1.4 percent from the 2.38 thousand metric tons recorded output in the same period of last year. Davao Region produced 1.80 thousand metric tons or 76.7 percent share to the country's total cacao production during the quarter. The remaining 23.3 percent was the combined output of the other fifteen regions.

Despite agriculture's vital role in enhancing living standards, poverty incidence remains high among households engaged in this sector, particularly in industries like cacao production. The challenges faced by agriculture, including low yields, price fluctuations, and limited knowledge, hinder its ability to provide stable livelihoods and adequate income. In response to these challenges, the cacao industry in the Philippines has emerged as a promising avenue for the agricultural sector, offering potential for poverty alleviation and improved living conditions. However, recent data indicates a decline in cacao production, which highlights the need for targeted efforts to address the challenges and harness the full potential of cacao as a transformative agent for sustainable development and inclusive growth in rural areas. By addressing the obstacles faced by agriculture, particularly in the cacao industry, the Philippines can take significant strides towards reducing poverty and uplifting the well-being of its vulnerable communities dependent on these sectors.

Connecting Basic Education and Cacao Industry for Sustainable Rural Development

By establishing strong connections between basic education schools and the cacao industry while effectively addressing the challenges in cacao production, the Philippines can fully unlock the potential of cacao as a catalyst for sustainable development and inclusive growth in rural areas. The active involvement of schools in promoting cacao farming and processing can lay the foundation for a promising future, where enhanced agricultural practices and increased cacao production bring positive changes to the lives of communities and drive economic development. Moreover, this engagement

will instill in young learners a deep appreciation for agriculture, showcasing its pivotal role in Filipino food production from an early age. By fostering this understanding and connection, the next generation will be encouraged to value and actively support the agricultural sector as a vital pillar of national progress. Empowering basic education schools to engage with the cacao industry also opens up opportunities for interdisciplinary learning. Integrating cacao-related topics into various subjects, such as science, mathematics, and business studies, can provide students with a holistic understanding of the industry's impact on the economy, environment, and society. This project draws inspiration from the School Plus Home Gardens Projects in the Philippines conducted by Calub *et al.* (2019), funded and implemented by the Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA), University of the Philippines Los Baños (UPLB) and Department of Education Division of Laguna Sta. Cruz, Laguna, Philippines.

Moreover, by incorporating real-life examples from cacao farming and processing, students can develop critical thinking skills and problem-solving abilities, preparing them to tackle complex challenges in the agricultural sector and beyond. This collaborative approach between schools and the cacao industry can extend beyond the classroom. Field trips to cacao farms and processing facilities, along with educational workshops led by local farmers and industry experts, can offer valuable hands-on experiences. These interactions foster a deeper appreciation for the efforts and contributions of cacao growers, inspiring students to explore potential career paths in agriculture or related fields. In turn, this can create a cycle of knowledge exchange and mutual benefit, where the cacao industry gains fresh perspectives and ideas from the youth, and students gain practical insights and a sense of purpose in contributing to sustainable rural development.

According to the World Declaration on Education for All poor health and nutrition has significant implications for education. They can lead to low school enrollment, increased absenteeism, poor academic performance, and early school dropouts (UNESCO, 1990).

A survey conducted by the Food and Nutrition Research Institute of the Philippines in 2013 revealed alarming figures among 5 to 10-year-old children, with 29% classified as "underweight" and 30% as "stunted" (FNRI, 2013). These health issues directly impact the learning and academic performance of these school-aged children, compromising their educational outcomes and overall development. Introducing this collaboration to basic education schools can possibly address significant issues and gaps in health, livelihood, and literacy. Firstly, there is a growing concern about the nutrition and health status of school-aged children in the Philippines.

Malnutrition, particularly undernutrition, remains a prevailing issue, affecting children's physical and cognitive development (Fajardo-Gacal *et al.*, 2020). By promoting cacao-based products and incorporating cacao-related topics into the curriculum, students can be exposed to the nutritional benefits of cacao, which is rich in antioxidants, vitamins, and minerals, that contribute to overall well-being (Patino-Hernandez *et al.*, 2019). Moreover, the experiential learning activities in cacao farming and processing can create awareness about the importance of diversified and nutritious food sources, potentially improving dietary habits and health outcomes among students and their families.

The project's focus on creating an alternative source of income for families through cacao processing can help address livelihood challenges in rural communities. In many rural areas, including the Municipality of Lasam, limited economic opportunities and income disparity persist, leading to vulnerability among households (Mallari *et al.*, 2019). By empowering families with cacao processing skills and supporting small-scale cacao enterprises, the project contributes to poverty alleviation and the development of sustainable livelihoods (Villanueva *et al.*, 2020). This initiative aligns with the goal of inclusive growth, as it offers income-generating possibilities beyond traditional agriculture and provides rural communities with a chance to participate in higher-value added activities.

The collaboration between basic education schools and the cacao industry can address gaps in literacy and education. There is a need for more innovative and practical approaches to education that connect classroom learning with real-world applications (Ogena, 2019). By integrating cacao-related topics into various subjects, such as science, mathematics, and business studies, students gain a deeper understanding of how agriculture can positively impact the economy and society. This interdisciplinary learning approach fosters critical thinking and problem-solving skills, equipping students with relevant knowledge for their future roles as informed and responsible citizens (Guina, 2020).

As partners in the School + Cacao Industry collaboration for sustainable rural development, the Department of Education (DepEd) plays a crucial role in supporting and promoting this initiative. DepEd's mandate is to provide quality basic education that is accessible to all Filipino learners, ensuring that they are equipped with the necessary knowledge and skills for their personal and societal development. By actively engaging with the cacao industry and incorporating cacao-related topics into various subjects, DepEd can help foster interdisciplinary learning and provide students with a holistic understanding of the industry's impact on the economy, environment, and society. This aligns with DepEd's goal of developing well-rounded learners who are not only academically competent but also socially aware and environmentally conscious. Furthermore, DepEd can facilitate field trips to cacao farms and processing facilities, along with educational workshops led by local farmers and industry experts. These experiential learning opportunities can enrich students' understanding of agriculture and rural development, exposing them to real-life examples and challenges faced by cacao growers. By doing so, DepEd contributes to the development of critical thinking skills and problem-solving abilities among students, empowering them to contribute meaningfully to the country's agricultural sector and sustainable development. Through this partnership, DepEd plays a vital role in nurturing the

next generation of informed and engaged citizens who value and actively support the agricultural sector as a vital pillar of national progress.

The Role of Cagayan State University's Cacao Processing Center in the Cagayan Valley Region

The Cacao Processing Center of Cagayan State University at Lasam plays a crucial role in advancing the cacao industry in the Cagayan Valley Region of the Philippines. Recognizing the potential for sustainable development and global market demand, the university has taken the initiative to establish a niche-program focused on Cacao Processing. Through this program, in collaboration with the Department of Science and Technology (DOST), the university's cacao processing center engages in research and development (R&D) activities to create innovative cacao products. The center's vision extends beyond local recognition; it aims to gain international acclaim for its cutting-edge cacao processing research, development, and extension programs. By leveraging its expertise and resources, the center contributes to enhancing the region's competitiveness in the cacao industry on a global scale. Through continuous improvement and the adoption of best practices, the center strives to position the Philippines as a key player in the international cacao market.

This participatory action research project further strengthens the role of the Cagayan State University's Cacao Processing Center by fostering collaboration among various stakeholders. By adopting participatory development approaches, the project engages not only the university but also local communities, government agencies, and other relevant stakeholders. This collaborative effort aims to create sustainable business enterprises centered around cacao production and processing. With a shared vision and strong commitment from all involved parties, the project endeavors to drive positive changes in the communities served by the College of Teacher Education at Cagayan State University. The project's ultimate goal is to create a lasting impact on literacy, nutrition, and livelihood in the region. By integrating cacao-related topics into

the curriculum and promoting experiential learning activities, the university empowers students and teachers with knowledge and skills in cacao processing, production, and nutrition. Through this multifaceted approach, the university and its cacao processing center contribute not only to the economic development of the region but also to the well-being and prosperity of the local communities. By embracing sustainability and fostering synergy among stakeholders, the Cagayan State University plays a pivotal role in advancing the cacao industry, promoting rural development, and achieving inclusive growth in the Cagayan Valley Region.

Relevance of the Project

The contribution of this paper lies in its conceptual framework for the School + Home Cacao Project, which addresses the interconnected issues of health, literacy, and education in rural communities particularly in Municipality Lasam, Cagayan, Philippines. By presenting a comprehensive approach that combines the efforts of schools and homes, this paper offers a novel perspective on using the cacao industry as a transformative agent for sustainable development. The conceptual framework provides valuable insights into how cacao farming and processing can positively impact the well-being of communities, foster experiential learning opportunities for students and teachers, and create alternative livelihoods for families. Through its innovative approach, this literature bridges the gap between health, literacy, and education, demonstrating the potential for the cacao industry to serve as a catalyst for holistic community development and poverty reduction in the region. The project's relevance to higher education institutions and policy implications lies in its capacity to inspire transformative and inclusive approaches to education, research, and community engagement, fostering a positive impact on rural communities and contributing to the country's sustainable development goals. From a policy perspective, the School + Home Cacao Project demonstrate the potential of participatory action research in creating sustainable solutions for rural development.

Policymakers can draw insights from this literature to design and implement programs that promote community-based initiatives, interdisciplinary collaboration, and entrepreneurship in the agriculture sector. Despite the potential of agriculture to uplift communities, challenges hinder its full impact on livelihoods and well-being in the Municipality of Lasam, Cagayan, Philippines. Limited knowledge and skills related to cacao processing and production among parents, low level of awareness of students and teachers, coupled with a lack of diversified nutritious food sources, contribute to limited economic opportunities for families in the area.

To address these gaps and foster sustainable development, the participatory action research project of Cagayan State University in Lasam aims to harness the transformative potential of cacao production and processing technologies. By connecting school and community households, the project seeks to enhance economic well-being through enterprise development, nutrition, and education, contributing to improved food security, cacao value addition, and community organization. Aligned with national and global development goals, including the Sustainable Development Goals (SDGs) and local mandates, the project aims to create a holistic impact through experiential learning, workshops, and small-scale cacao enterprises, empowering communities in a Philippine state university setting.

Problem Gap Analysis

The School + Home Cacao Project Model seeks to address the core problem of low literacy levels, poor nutrition, and limited livelihood opportunities in the target community. The multifaceted root causes include limited educational opportunities, insufficient access to quality education, and inadequate teacher training; nutritional deficiencies due to limited awareness and access to nutritious food options, and lack of knowledge on food processing; and prevalent unemployment and low income resulting from limited livelihood options and economic instability.

The far-reaching effects encompass reduced academic performance, health issues, and economic struggles among community members. Moreover, cultural barriers, resource constraints, infrastructural limitations, and environmental factors present additional challenges. Through targeted interventions, the project aims to overcome these gaps and empower the community, leveraging cacao-based initiatives to enhance literacy, nutrition, and livelihood, fostering sustainable and transformative development for the overall well-being and future prospects of the community.

Objectives

The School + Home Cacao Project Model's objectives are closely aligned with the identified problem gap analysis, aiming to comprehensively address the core problem and its root causes. The project's primary goal is to engage and empower selected schools and homes through Cacao Backyard Farming and Processing in the Municipality of Lasam, Cagayan. The specific aims of the project include: (1) Enhancing the knowledge and skills of students, teachers and parents in cacao processing, production, and nutrition through experiential learning activities; (2) Increasing the diversity and availability of nutritious food within the local community by promoting cacao-based products; and (3) Creating an alternative source of income for families through cacao processing. These objectives directly tackle the issues of limited educational opportunities, nutritional deficiencies, and unemployment, with the aim of fostering sustainable and transformative development for the overall well-being and future prospects of the target community.

Expected Outputs, Outcomes and Impact of the Project

Expected Output

The School + Home Cacao Project Model aims to produce significant outputs directly impacting the target community. Through experiential learning activities, at least 500 students, 50 teachers, and 100

parents will acquire enhanced knowledge and skills in cacao processing, production, and nutrition. The promotion of diverse cacao-based products will contribute to better community nutrition and access to nutritious food options. Engaging selected schools and homes in cacao backyard farming and processing creates alternative income opportunities for at least 100 families, fostering improved economic prosperity and resilience.

Expected Outcome

The project is expected to achieve several outcomes in the target community. Improved literacy levels will result from a 20% increase among students, leading to better academic performance and personal growth. Enhanced community nutrition will be achieved through a 15% reduction in nutritional deficiencies via the promotion and consumption of cacao-based nutritious products. Families engaged in cacao processing will experience a 30% increase in monthly incomes, boosting economic prosperity. The cacao backyard farming and processing initiatives will drive sustainable community development, fostering small-scale businesses and entrepreneurship.

Expected Impact

The School + Home Cacao Project Model's outputs and outcomes will create a transformative impact on the target community. Equipping students, teachers, and parents with cacao-related knowledge and skills will enhance economic prospects and promote healthier food choices through widespread cacao-based product distribution. Establishing cacao backyard farms and resource centers will significantly contribute to community economic growth and educational development. The project's quantifiable outcomes, such as improved literacy, enhanced nutrition, increased income, and sustainable community development, showcase its potential for scalable and replicable impact, making a substantial difference in the overall well-being and future prospects of the target community.

Materials and methods

The Methodology Framework of this Research, Development and Extension (RDE) project, as shown in Figure 1, outlines the systematic approach and methodologies employed to achieve the project's objectives. The framework consists of several interconnected steps that guide the implementation of the School + Home Cacao Project. The School + Home Cacao Project follows a systematic and integrated approach, beginning with Project Planning and Design, which involves key stakeholders to define objectives, scope, and target beneficiaries. This collaborative effort ensures a well-structured and strategic project. Next, the Community Engagement and Needs Assessment actively involves the local community and stakeholders to tailor interventions based on their specific needs and resources related to cacao farming and processing. The project utilizes Experiential Learning Activities to enhance the knowledge and skills of students and teachers in cacao processing, production, and nutrition. Through hands-on engagement, participants gain a deeper understanding of cacao cultivation and processing. Furthermore, the Promotion of Cacao-based Products encourage diversification and improved availability of nutritious food within the community, highlighting the nutritional benefits of cacao. By providing Cacao Processing Training and Enterprise Development, the project creates an alternative source of income for families, supporting the establishment of small-scale cacao enterprises for economic well-being and sustainable livelihoods. Throughout implementation, systematic Monitoring and Evaluation mechanisms ensure progress assessment and data-driven decision-making for project effectiveness. Lastly, the project focuses on Knowledge Sharing and Replication to inspire other communities or institutions with project outcomes, best practices, and successful strategies. The school + Home Cacao Project's comprehensive and integrated Methodology Framework aims to empower and uplift the lives of individuals and families in the Municipality of Lasam and beyond through education, health, and economic well-being initiatives.

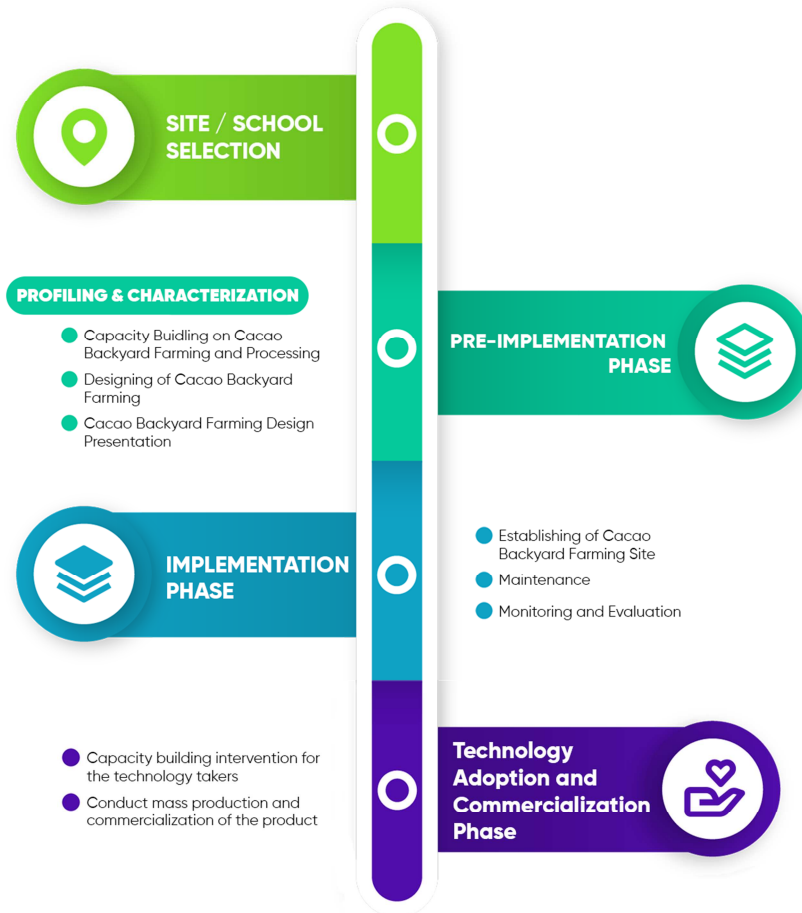


Figure 1. Methodology Framework of the Project

Pilot Schools

In the Municipality of Lasam, Cagayan, Philippines, the School + Home Cacao Project identified Magsaysay Elementary School and Ignacio B. Jurado Elementary School as the pilot schools for its sustainable rural development initiative. The selection criteria for these schools were based on their willingness to participate in the project, the prevalence of nutritionally deficient pupils, and the availability of garden space and a water source, following the approach employed by Calub et al. (2019). The pupils selected in this project were the intermediate graders from Grade IV- VI. To establish the profile of these pilot schools and their students, various assessments were conducted, including interviews, mini surveys, and site validations. These assessments gathered information on student demographics, nutritional status, existing school gardens, and household socioeconomic characteristics of undernourished pupils. Throughout the project, focused group discussions and

participatory methods were used to monitor progress and document changes in the involvement of the pilot schools, local government units (LGUs), parents, and teachers from the Department of Education. Moreover, the region's favorable agro-climatic conditions in Lasam contribute to the potential success of cacao cultivation. With a tropical climate and well-distributed rainfall, along with temperatures ranging from 25°C to 32°C, Lasam provides an ideal environment for cacao trees to thrive. Additionally, the rich organic matter in the soil further supports healthy cacao plant growth and enhances yields. The active involvement of stakeholders, including the Cagayan State University's Cacao Processing Center and collaboration with the Department of Science and Technology (DOST), further support the promotion of cacao farming and processing in the area. These combined factors make Lasam a suitable and promising region for cacao production and contribute to the School + Home Cacao Project's goal of sustainable rural development and inclusive growth.

Implementation

The School + Home Cacao Project was approved and launched in July 2020, during the pandemic, and has continued to sustain its activities to the present. Despite the challenges posed by COVID-19 restrictions, the project successfully adapted and implemented its activities. The implementation was divided into three phases to ensure a comprehensive approach. In the preliminary phase, pilot schools were selected, and various assessments and planning workshops were conducted, including evaluating existing school gardens and baseline studies on the nutritional status of children. Additionally, garden plans were prepared, curricula were reviewed, and necessary inputs and structures were acquired. During Phase 2, the project focused on establishing and maintaining the cacao areas, integrating agriculture and cacao processing concepts into the current curriculum through the development of lesson plans, and organizing core groups while establishing linkages and cross-visits. Continuous monitoring of project sites ensured that activities were progressing as intended. In Phase 3, the project aimed to consolidate and expand its impact. This phase included strengthening the engagement of schools and homes in cacao farming and processing,

as well as further promoting sustainable practices and knowledge sharing within the community. Throughout all phases, the project maintained a participatory and collaborative approach, engaging various stakeholders and partners to create a sustainable and transformative impact on literacy, nutrition, and livelihood in the Municipality of Lasam, Cagayan.

Results and discussion

Specific Objective 1. Enhancing the knowledge and skills of students and teachers related to cacao processing, production, and nutrition through experiential learning activities.

Table presents the Baseline data on the Knowledge, skills and attitudes of students and teachers were assessed related to cacao processing, production, and nutrition. Prior to the implementation of the School + Home Cacao Project, baseline data were collected to assess the current knowledge and skills of students and teachers regarding cacao processing, production, and nutrition. This data will serve as a starting point to measure the effectiveness of the project's experiential learning activities in enhancing their understanding of the subject matter.

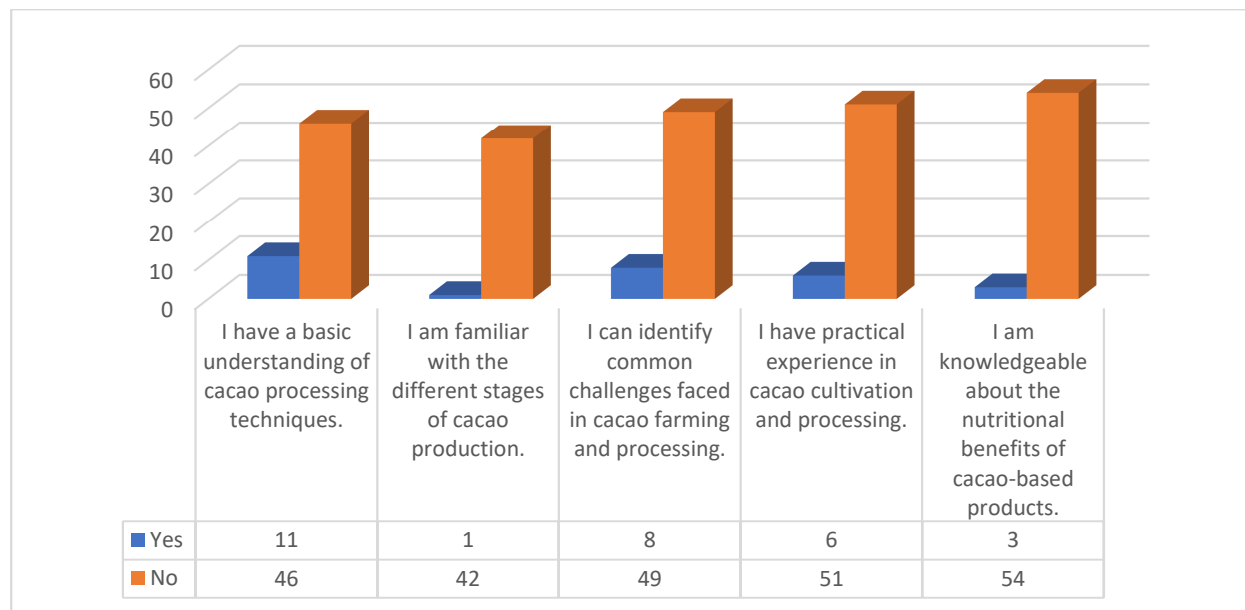


Figure 1. Baseline data on the Knowledge, skills and attitudes of students and teachers were assessed related to cacao processing, production, and nutrition (N=57).

The baseline data presented in Figure 1 provides valuable insights into the knowledge, skills, and attitudes of students, teachers and parents related to cacao processing, production, and nutrition in the context of the School + Home Cacao Project. The data shows the number of respondents who answered "Yes" and "No" to specific questionnaire statements. It is evident that there is room for improvement in various aspects of cacao-related knowledge and skills among students, teachers and parents. Firstly, the data reveals that only 11 out of 57 respondents (approximately 19%) reported having a basic understanding of cacao processing techniques. This indicates a relatively low level of familiarity with the technical aspects of cacao processing among the participants. Similarly, only one respondent (around 2%) claimed to be familiar with the different stages of cacao production. This suggests that there is a need for more education and training on cacao farming and processing to enhance the knowledge base of both students and teachers. Secondly, when it comes to practical experience, only 6 out of 57 respondents (approximately 11%) reported having hands-on experience in cacao cultivation and processing. This relatively low number of individuals with practical experience highlights the potential for experiential learning activities within the School + Home Cacao Project. Hands-on activities can provide valuable opportunities for participants to gain real-world skills and better understand the complexities and challenges faced in cacao farming and processing. Lastly, the data indicates that only 3 out of 57 respondents (approximately 5%) consider themselves knowledgeable about the nutritional benefits of cacao-based products. This finding suggests that there is room to raise awareness about the nutritional value and health benefits associated with cacao products. Educating students, teachers, and community members about the nutritional advantages of cacao can contribute to increased local consumption and utilization of cacao-based products, thereby promoting better health and nutrition within the community.

The implementation of targeted training programs, experiential learning activities, and awareness campaigns in the School + Home Cacao Project aligns with best practices in agricultural education and community development. Research studies have shown that hands-on learning experiences and practical training can significantly enhance participants' knowledge and skills in agriculture-related fields. For instance, a study by Gruber, et al. (2019) found that experiential learning approaches, such as field trips to farms and hands-on activities, contributed to a better understanding of agricultural concepts among students, leading to increased interest and motivation in pursuing careers in agriculture. Additionally, community-based participatory approaches, as applied in the School + Home Cacao Project, have been recognized as effective in empowering communities and promoting sustainable agricultural practices. A study by Cox, et al. (2016) emphasized the importance of community engagement in agriculture projects, highlighting how involving community members in decision-making and implementation fosters a sense of ownership and commitment to project goals. By actively engaging students, teachers, and parents in cacao-related activities, the project can foster a strong sense of community involvement and create a supportive network for knowledge exchange and collaboration. Moreover, promoting awareness campaigns and disseminating knowledge about the nutritional benefits of cacao-based products can have positive impacts on community health and nutrition. Research by Teng, et al. (2018) demonstrated the potential of cacao and its derivatives in improving cardiovascular health due to their antioxidant and anti-inflammatory properties. By increasing awareness of these nutritional benefits, the School + Home Cacao Project can encourage the consumption of cacao-based products, leading to potential improvements in the overall well-being of community members. By drawing insights from these studies, the project can effectively address gaps in knowledge, skills, and attitudes related to cacao processing, production, and nutrition, ultimately contributing to improved

livelihoods and community development in the Municipality of Lasam, Cagayan, Philippines.

Curriculum Integration and Impact on Learning and Community Engagement

In the School + Home Cacao Project, a total of 30 lesson plans have been collaboratively developed by teachers across multiple subjects to integrate cacao-related concepts into the curriculum. These lessons offer students a comprehensive understanding of cacao processing, production, and its broader impact. For instance, in Grade 4 Science, students explore the life cycle of cacao trees, while in Mathematics, they engage in measuring cacao pods and seeds, honing their mathematical skills through practical

applications. The English lessons encourage students to write a cacao processing procedure, fostering communication skills while delving into the intricacies of cacao production. Beyond the traditional classroom setting, the School + Home Cacao Project has fervently engaged parents and pupils through delightful cacao cooking contests. Beyond fostering a profound sense of community and camaraderie, these contests have also led to the creation of a valuable recipe book encompassing nutrition information. Currently pursuing intellectual property protection, this compilation stands to preserve and celebrate the rich culinary heritage of the community.

Table 1. Developed Lessons on Cacao Integration

Grade Level	Subject	Lesson Title
Grade 4	Science	The Life Cycle of Cacao Trees
Grade 4	Mathematics	Measuring Cacao Pods and Seeds
Grade 4	English	Writing a Cacao Processing Procedure
Grade 5	Home Economics	Creating Cacao-Based Recipes
Grade 5	Science	Understanding Cacao Fermentation
Grade 5	Mathematics	Calculating Cacao Yields
Grade 6	English	Presenting the History of Cacao
Grade 6	Home Economics	Exploring Cacao Nutritional Benefits

Home Economics classes have a strong focus on cacao, allowing students to create cacao-based recipes and explore the nutritional benefits of cacao products. The Grade 6 Science lessons delve deeper into the fermentation process of cacao, enabling students to understand the science behind chocolate production. In Mathematics, students calculate cacao yields, connecting mathematical concepts to agricultural practices. Additionally, English classes explore the history of cacao, enhancing students' appreciation for the cultural significance of this valuable crop. The development of these comprehensive lessons on cacao not only provides students with practical knowledge and skills but also fosters interdisciplinary learning, encouraging students to approach cacao from various angles. These integrated lessons enrich the learning experience and empower students to apply their knowledge to real-world scenarios, making their

education more engaging and meaningful. Through this holistic approach to curriculum integration, the School + Home Cacao Project has created a fertile ground for fostering sustainable development and community engagement.

The curriculum integration efforts in the School + Home Cacao Project have several implications supported by existing literature on experiential learning, interdisciplinary education, and community engagement. By collaboratively developing lesson plans that integrate cacao-related concepts across various subjects, the project adopts an interdisciplinary approach to education. Research by Felder and Brent (2005) suggests that interdisciplinary learning enhances students' critical thinking and problem-solving skills by encouraging them to draw connections between different

disciplines. As students explore cacao processing and production through multiple lenses, they are likely to develop a deeper and more comprehensive understanding of the subject matter. Furthermore, the hands-on and experiential learning activities included in the cacao lessons align with best practices in agricultural education. A study by Torres and Thiel (2019) highlights the importance of experiential learning in agriculture, emphasizing those practical experiences on farms and gardens can significantly enhance students' agricultural knowledge and skills. By engaging students in measuring cacao pods, exploring cacao fermentation, and creating cacao-based recipes, the project enables students to learn through direct experiences, making their education more engaging and memorable. The engagement of parents and the wider community through cacao cooking contests and the compilation of a recipe book has potential implications for community development and cultural preservation. Community-based learning initiatives have been shown to strengthen community ties and foster a sense of belonging among participants (Shields et al., 2012). By involving parents and pupils in cacao-related activities, the project creates a platform for community members to come together, exchange knowledge, and celebrate their cultural heritage through traditional recipes.

Conduct of Cacao Tree Planting Activity

The data presented in the Table 2 indicates the number of cacao seedlings planted in different sites as part of the School + Home Cacao Project. The project aimed to distribute a total of 400 cacao seedlings among three locations: Magsaysay Elementary School, IBJ Elementary School, and parents' home backyards. Magsaysay Elementary School planted 150 cacao seedlings, which accounts for 38% of the total number of seedlings distributed. IBJ Elementary School planted 160 cacao seedlings, constituting 40% of the total. Parents' home backyards received 90 cacao seedlings, representing 23% of the total distribution. The data highlights the equitable distribution of cacao seedlings among the sites, with each location receiving a proportionate share of the total number of seedlings. This distribution strategy aligns with the project's goal of engaging multiple stakeholders, including educational institutions and families, to foster a holistic and inclusive approach to cacao cultivation and production. Furthermore, the allocation of cacao seedlings to parents' home backyards signifies the project's effort to involve the larger community in promoting sustainable agriculture. By encouraging parents to plant cacao in their own backyards, the project extends its impact beyond school premises and integrates cacao farming into the daily lives of families.

Table 2. Data on the Planted Cacao Seedlings

Sites	Number of Cacao Seedlings Planted	Percentage
Magsaysay Elementary School	150	38
IBJ Elementary School	160	40
Parents' Home backyards	90	23
Total	400	100

The distribution of 400 cacao seedlings across the various sites demonstrates a collaborative effort, aligning with the participatory approach of the School + Home Cacao Project. This participatory model, which emphasizes the involvement of multiple stakeholders, including government, academia, industry, civil society, and the public, is instrumental in driving innovation and sustainable development (Carayannis *et al.*, 2018). By engaging both schools

and parents, the project is laying the groundwork for a more inclusive and sustainable impact on rural development. The data reflects the project's progress in fostering a sense of ownership and shared responsibility among stakeholders, ultimately driving the sustainable growth of the cacao industry in the region. The successful planting of 400 cacao seedlings across the different sites paves the way for continued educational and economic benefits for the

community, promoting literacy, nutrition, and livelihood through the transformative potential of cacao cultivation and processing. The successful implementation of the School + Home Cacao Project and the distribution of cacao seedlings reflect the project's potential to promote literacy, nutrition, and livelihood in the community. By fostering a sense of ownership, shared responsibility, and active community engagement, the project is contributing to the sustainable growth of the cacao industry in the region, aligning with broader national and international efforts towards sustainable development (UNDP, 2015). The lessons learned from this project can serve as valuable insights for other communities and institutions seeking to embark on similar initiatives, fostering positive changes in the agricultural sector and promoting sustainable development goals.

Specific Objective 2. Increasing the diversity and availability of nutritious food within the school and homes by promoting cacao-based products

The specific objective of the School + Home Cacao Project was to increase the diversity and availability of nutritious food within the school and homes by promoting cacao-based products. This objective was successfully achieved through the development of a range of innovative cacao-food products that catered to various tastes and preferences. The products included cacao powder, known for its versatility in culinary applications, as well as cacao-tablets, dark chocolate bars, spicy cacao balls, and a delectable chocolate spread. These products not only offered wholesome snack options but were also nutritious and appealing to both children and adults in the community.

To protect the innovations and foster an environment for sustainable development and local entrepreneurship, the project took a crucial step in registering the intellectual property rights for these cacao-based products under the Intellectual Property Office of the Philippines (IPOPIL). This legal protection ensures that the community's efforts in developing these products are recognized and

safeguarded, promoting an atmosphere of innovation and creativity. The project actively engaged students and parents by extending the distribution of these cacao-food products, incorporating them into the feeding program, especially cacao champorado. This approach effectively promoted the consumption of nutritious and locally-sourced food within the school and homes, improving the dietary diversity and overall nutrition of the community. To ensure that the cacao-based products met the preferences of the community, sensory and acceptability testing was conducted. The project team gathered valuable feedback from the target audience on taste, quality, and overall satisfaction with the products. This feedback-driven approach enabled the team to make necessary improvements and tailor the products to suit the preferences of the community, enhancing their acceptability and impact. Through these comprehensive efforts, the School + Home Cacao Project are one the process of significantly contributing and improving the availability of wholesome food choices within the community. The nutritious cacao-based products, developed and distributed in a locally relevant manner, have elevated the nutritional status and well-being of community members. Moreover, the active involvement of students, parents, and the community in the development and distribution of these products has fostered a sense of ownership and active participation, cultivating a sustainable impact on community development and local entrepreneurship. By leveraging the transformative potential of cacao-based products, the project has successfully enhanced the dietary diversity and overall food security of the community, creating a more resilient and healthier community.

Specific Objective 3. Creating an alternative source of income for families through cacao processing.

To initially achieve this specific objective, the School + Home Cacao Project focused on empowering families in the target community by providing them with opportunities to engage in cacao processing as an alternative source of income. The project aimed to enhance the livelihoods of families through the value

addition of cacao, transforming it from raw produce to processed products with higher market value. The project conducted comprehensive training sessions and workshops for parents at the CSU Lasam Cacao Processing center. The training modules included hands-on learning in cacao processing techniques, covering post-harvest handling, fermentation, drying, and bean selection. These intensive sessions equipped families with the necessary skills to process cacao beans effectively and efficiently. Furthermore, parents were provided with essential tools and equipment for cacao processing, enabling them to set up small-scale processing units in their homes or within the community.

The project also played a pivotal role in establishing strong linkages between cacao farmers and local markets. By facilitating access to buyers and creating stable market channels for their processed cacao products, families were able to ensure a steady income flow from their cacao ventures. The School + Home Cacao Project have achieved remarkable success in creating an alternative source of income for families through cacao processing. By actively engaging 30 families in cacao cultivation and processing activities, the project provided them with a sustainable means to supplement their livelihoods. The establishment of cacao plantations across 5 hectares not only expanded the community's agricultural practices but also fostered a sense of ownership and responsibility among the families involved. As a result of their dedication and hard work, the participating families collectively produced 2,000 kilograms of cacao beans, which served as the raw material for various cacao-based products developed as part of the project.

The significant impact of the project will be observed in the substantial increase in the participating families' monthly income. On average, each family generated an additional income per month through cacao processing activities. This additional income can played a vital role in improving the families' financial situation and overall quality of life. Moreover, the income diversification offered by cacao

processing helped reduce the families' reliance on traditional income sources, making them more resilient to economic fluctuations. The School + Home Cacao Project's success in creating an alternative source of income for families not only fosters economic growth and empowerment at the individual level but also contributes to the sustainable development of the entire community. By promoting cacao processing as a viable livelihood option, the project has demonstrated the transformative potential of agriculture-based enterprises in improving the lives of rural families and creating a more economically prosperous and resilient community. Through this specific objective, the School + Home Cacao Project has not only enhanced the livelihoods of families but also paved the way for a more sustainable and economically vibrant future for the entire community.

Way forward on Project Sustainability through Policy Formulation

The School + Home Cacao Project will take significant steps towards ensuring its sustainability and long-term impact by engaging in policy formulation and collaborating with local government and educational institutions. These efforts will aim to institutionalize and promote the adoption of cacao as a valuable commodity at both the barangay and municipal levels. By integrating cacao-related policies into the local governance framework and education system, the project will create conducive environment for continued support and development of the cacao industry.

Barangay Ordinance/Resolutions

The project will initiate the drafting of a barangay ordinance and resolution adopting cacao as a commodity, a crucial step in formalizing the recognition of cacao's significance within the community. This legislative action will help protect and promote cacao-related activities, including cultivation, processing, and marketing, by providing a clear legal framework and support from the barangay level. The ordinance will also establish mechanisms for providing resources and assistance to cacao

farmers and entrepreneurs, ensuring that the cacao sector receives the necessary support for its growth and sustainability.

Municipal Ordinance

Collaborating with the Local Government of Lasam, the project will develop a municipal ordinance declaring cacao as a municipal commodity, a bold move that will elevate the status of cacao in the municipality. This ordinance will attract investments and grants for cacao-related initiatives and encourage public-private partnerships in cacao processing and marketing. By designating cacao as a municipal commodity, the local government will prioritize its development, leading to increased opportunities for economic growth and livelihood enhancement for the community members.

DepEd Curriculum Contextualization and localization

Another critical aspect of project sustainability will be the incorporation of cacao-related topics into the curriculum of the Department of Education (DepEd). The project will integrate cacao processing, production, and nutrition lessons into various subjects, ensuring that knowledge about cacao is passed down to future generations. This integration will empower students with skills relevant to the local agricultural industry, fostering a sense of pride and ownership over their cultural heritage and local resources.

Public-Private Partnership

To further strengthen the project's sustainability, the project will explore fostering public-private partnerships. Engaging private companies and stakeholders in the cacao value chain will lead to increased investments, technological advancements, and market access for cacao-based products. These partnerships will not only stimulate economic growth but also provide opportunities for knowledge exchange and capacity building among community members.

Continuous Research and Development

Continuous research and development efforts will be essential to support the sustainability of the cacao industry. Collaboration between CSU Lasam and other

research institutions will lead to innovations in cacao cultivation, processing techniques, and product development. This research-driven approach will ensure that the cacao industry remains resilient to challenges and competitive in the global market.

Way forward on Sustaining and Scaling up Project Success through Intra- and Inter-Networking

Intra-School Networking

Building upon the successful model of the School + Home Cacao Project, the pilot schools will be encouraged to extend their impact by adopting three sister schools within their respective municipalities. This approach will aim to "pay forward" the success and benefits of the school and home cacao gardens projects to a broader community. Through this intra-school networking initiative, the pilot schools will share their knowledge, experiences, and best practices with the sister schools, fostering a collaborative environment for collective growth and development. To ensure effective collaboration, the original pilot schools and sister schools will participate in a workshop to develop Joint Action Plans. These action plans will serve as guiding documents for their collaborative activities, outlining the specific goals and strategies to be pursued collectively. By fostering partnerships among schools, the project will facilitate the exchange of ideas and resources, creating a supportive network that amplifies the impact of the School + Home Cacao Project. Moreover, the intra-school networking approach will empower schools to take ownership of their growth and development, instilling a sense of responsibility and agency among educators and students alike.

Inter-Networking

This inter-networking approach will involve creating connections and partnerships with other educational institutions, government agencies, non-governmental organizations, and private entities. By forming a broader network of stakeholders, the project will gain access to additional resources, expertise, and opportunities for expansion. Through inter-networking, the project will tap into the knowledge and support of institutions like CSU Lasam and the Local

Government of Lasam. These partnerships will provide a strong foundation for knowledge exchange and capacity-building initiatives, enhancing the project's effectiveness and sustainability. Additionally, collaborating with external organizations will allow for greater outreach, enabling the project to extend its impact to new communities and regions. By leveraging both approaches, the School + Home Cacao Project will create a transformative and enduring impact on education, nutrition, and livelihoods within the community and beyond.

Conclusion

The School + Home Cacao Project serves as a transformative participatory action research initiative that empowers communities within the service areas of Cagayan State University at Lasam, Philippines. By harnessing the potential of cacao as a versatile agricultural commodity, the project successfully enhances literacy, nutrition, and livelihood in a holistic manner. Through experiential learning, students and teachers acquire valuable knowledge and skills in cacao processing, production, and nutrition, resulting in improved understanding among all stakeholders. The distribution of innovative cacao-based products contributes to sustainable community development and entrepreneurship while promoting better community health. Furthermore, by empowering families to engage in cacao processing, the project creates an alternative income source that bolsters the community's overall economic prosperity and resilience. The model's replicability in similar contexts underscores its potential as a catalyst for sustainable development in various communities. Moving forward, careful planning and implementation of mechanisms will ensure the project's continued sustainability and expansion, building upon its initial achievements and leaving a lasting positive impact on the community and beyond.

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