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Empowering Local Communities Through Technology: The Impact Of The BSABE Extension Program On Coconut De-Husker, Grater, And Presser Adoption In Inandila Production

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Abstract

This study investigates the impact of the BSABE Extension Program in promoting technology adoption among coconut processors involved in Inandila production in the two adopted barangay of the College of Engineering and Information Technology. Specifically, it assessed the extent to which the introduction of the coconut de-husker, grater, and presser influenced productivity, efficiency, and economic opportunities within the local communities. A total of 28 female respondents, all engaged in coconut processing, participated in the survey and interviews. The findings revealed unanimous adoption of all three technologies, with all respondents reporting significant improvements in processing speed, product quality, and production volume. The shift from manual to machine-based processing notably reduced labor demands, allowing women to independently complete tasks that previously required assistance from their spouses. This independence fostered empowerment and boosted local pride in their delicacy-making tradition.

Moreover, the availability of machines encouraged unregistered and occasional producers to confidently accept more orders. The use of improvised solutions such as washing machine spinners for pressing bulk grated coconut further demonstrated local innovation. However, challenges such as high initial costs, maintenance concerns, and limited access to spare parts and training were common. Despite these issues, satisfaction with the technology transfer was overwhelmingly high, and all respondents expressed willingness to recommend the innovations to others.

The study concludes that the extension program has successfully enhanced both the economic viability and cultural sustainability of Inandila production. It recommends the expansion of technical support, training, and access to affordable machinery to sustain and scale the impact. These findings align with prior research highlighting the role of appropriate technologies in empowering rural women and strengthening local industries.

INTRODUCTION

Background of the Study

As one of the major industries in the Philippines' agricultural economy, the coconut industry not only provides jobs but also a source of livelihood for millions of farmers, especially in rural areas. Coconuts are a multiple-product commodity with great economic importance in food products, industrial products, and export commodities. Current coconut processing methods are still labor-intensive, time-consuming, and ineffective, which could lead to lower productivity of processors and less profit for small-scale coconut processors.

response to these issues, the Bachelor of Science in Biosystems and Agricultural Engineering (BSABE) program of the College of Engineering and Information Technology (CEIT) has designed a coconut de-husker, grater, and presser to improve the processing efficiency. These technologies aimed to decrease manual labor, enhance the quality of the products produced, and increase the amount of production output, thereby benefiting coconut farmers and processors in adopted barangays.

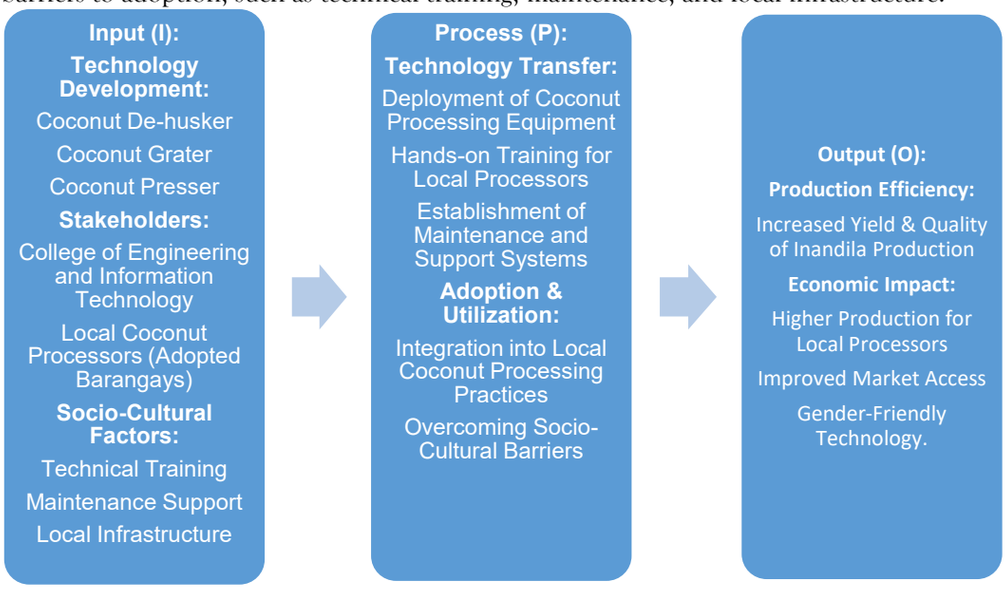
The study specifically covers the barangays Naneng and Bagumbayan... This extension project, which introduced the coconut de-husker, grater, and presser to the community in early 2022, aimed to assess the role of these modern coconut processing technologies in enhancing production efficiency, decreasing processing duration, and increasing income generation for local communities. Moreover, it evaluated the extent to which this technology transfer contributes to employment growth, market development, and the enhancement of social welfare.

Other than economic gains, the research also found sociocultural variables that stimulate technology use like, easy accessibility to spare parts and repair facilities, suitable local infrastructure, and technical training. Recognizing these challenges is critical to the sustainability and long-term impact of the initiative. Through the integration between academic-based innovation and community-relevant application, the project developed a platform that enables coconut processors to better process techniques, reduce waste, and increase product quality, thus boosting local economies and empowering the socio-economic development of rural societies.

Conceptual Framework

The study used a technology transfer model that connects innovation (coconut de-husker, grater, presser) from the College of Engineering and Information Technology to local coconut processors in

the adopted barangays. The framework assumed that the introduction of these technologies improved efficiency in Inandila production, positively affecting local economic outcomes such as income generation, employment, and market access. It considered the socio-cultural context and barriers to adoption, such as technical training, maintenance, and local infrastructure.



Statement of the Problem

This study aimed to assess:

The effectiveness of the technology transfer process has been established for the coconut de-husker, grater, and presser.

The impact of the technology affecting the quality and production of Inandila.

The socio-economic impact of the technology use in the adopted barangays.

Local producers from the adoption and maintenance of the technology.

Objectives of the Study

To determine the impact of technology transfer on improving Inandila production with the following specific objectives:

1. Evaluate the economic effect of implementing the technologies to local coconut processors.
2. To investigate the barriers to the adoption of the technology and provide solutions.
3. To suggest enhanced extension projects and expand its reach to other barangays.

Significance of the Study

This study is significant for:

Local Producers: Supporting them to understand and implement new technologies, followed by upgrading production practices for Inandila, which could lead to higher incomes and production.

The College of Engineering and Information Technology provides information about how effective their projects were and what could be done better for future use

Policy Makers — To educate them on how technology transfer can play a vital role in rural development and the agricultural sector.

Coconut Industry: Contributing to the literature on rural agriculture technology adoption.

Scope and Delimitation of the Study

The study focused on the adopted barangays or communities where the College of Engineering and Information Technology's extension project was implemented, particularly Barangay Naneng and Bagumbayan. It assessed the adoption of the coconut de-husker, grater, and presser in these areas specifically for Inandila production.

REVIEW OF LITERATURE

Naneng is well-known for its inandila, which includes coconut juice as one of its ingredients. But the shortage of adequate staff is the issue. This makes it necessary to utilize the right equipment to help with a variety of chores on coconut plantations. Current conventional devices, like the blade, are hazardous and only marginally effective. This insight leads to the fabrication of a machine that boosts the coconut industry's productivity while streamlining a crucial procedure. Any economy that depends on coconut plantations will benefit indirectly from this new system. The machine has a fr

The coconut plant is a perennial, very beneficial plant that requires little maintenance to develop. The hard-protective endocarp or shell, known as "eyes," is located at one end of the nut, and the coconut fruit is covered in an outer exocarp and a thick, fibrous fruit coat called husk. Approximately

5.4 billion tons of coconuts are produced every year worldwide. Based on both production and acreage, India is the third-largest producer of coconuts.

These machines are helpful to coconut growers, coconut processing factories, and coconut estates and cooperatives. It may work more quickly and require less human contact. This gives coconut growers more money. The rotating spiked rollers in this approach are designed to increase the force at the coconut's head to put pressure for grating, so it doesn't require direct human force like other methods do. Additionally, it is simple to grate coconuts of any size or form. It is quick, safe, easy to use, requires no expert labor, and requires little upkeep. It is portable and simple to put together and take apart. The cost of this machine is lower than compared to the present available machines. Also, these available machines require an external electrical power supply. Advantages are to remove the grate effectively and easily, to increase productivity, to reduce manual power, to reduce risks and accidents, to reduce labour cost and time consumption.

This coconut-grating machine peels off the coconut to obtain a grated coconut via mechanically controlled grating devices called spiked rollers. To transmit the power from the motor to the cylindrical rollers gear and chain and a sprocket transmission system shall be incorporated. The grating unit consists of cylindrical rollers attached with tynes (cutting pins) over the surface. The coconut is placed at an intermediate distance between rolling cylinders. The rollers will rotate in such a way that there will be tearing of the coconut fiber from the shell. With proper meshing of fiber with tynes effective grating is achieved while consuming less time. The shape and size of the coconut are considered while designing the machine. The rollers are interconnected with each other using a spur gear arrangement. The rollers are kept apart with a centre distance depending on the average diameter of the coconut shell, so that the coconut shell should not pass between the rollers. The motor used is a of 1hp geared motor of 1440 rpm, which rotates the shaft at 70 rpm. The whole setup is mounted on a rigid frame made of mild steel (Sujaykumar, et. al., 2017).

To gather the right data and information, research approaches are crucial. Information is gathered, examined, shared, and used to increase the case study company's level of satisfaction. The research methodology is both qualitative, involving structured interviews, and quantitative, including a questionnaire (Kumar 2008). The questionnaires contain a total of sixteen inquiries concerning the services provided by Restaurant Sagarmatha. With the aid of SPSS, the data obtained from the questionnaires was statistically evaluated, and qualitative analysis techniques were used to manually examine the structured interview results. In addition, secondary data sources such library books,

According to the findings of a Malaysian study on mechanical fruit extractors, users are extremely delighted with the machine's performance because of its high extraction efficiency, high extraction capacity, and minimal extraction loss. Thus, it is anticipated that the study will provide small-scale juice processors with fresh information on extraction techniques, and it may also be helpful for food technologists, postharvest technologists, and food manufacturers. (NSB, Buang, 2016).

Coconut juice is a great source of electrolytes, has several health advantages, and may be utilized in a variety of culinary preparations. A coconut juicer would be useful for obtaining its juice more quickly. According to the intended specifications, a coconut juice was manufactured. (Okar, 2013). The machine's performance was evaluated in terms of operation time, quantity, and quality of coconut juice extracted. At an operating speed of 1500 rev/min, an extraction efficiency of 77% was recorded. Fruit juice extraction is the process of removing the juice through efficient processing and storage, which helps to reduce waste. An improved agricultural tool called a fruit juice extractor employs a pressing mechanism to extract fruit juice. Fruit juice extraction is the process of pressing, crushing, and squeezing fruits solely to extract the juice and lessen the waste and pulp (Ugwu, B. et al., 2020). A hopper, drum, mesh sieve, crushing roller, auger, main shaft, pulley, fiber outlet, juice outlet, frame, and support make up the extractor. An electric motor with three horsepower powers it. The hopper, which was constructed of stainless steel, is situated directly over the drum. A crushing roller is attached to the rotating shaft. Both are located inside the machine's pulping portion, and the mesh sieve covers the auger. The crushing roller's shaft is fastened to the pulley directly, and it is powered by a 3-horsepower electric motor that is connected to a belt transmission. A gear train connects the crushing roller shaft to the auger shaft. Except for the frame, which was constructed from stainless steel, every component was made of mild steel.

Technology Transfer: Models and Frameworks for Successful Technology Dissemination in Rural and Agricultural Sectors

Technology transfer plays a crucial role in bridging scientific research and practical application, especially in rural and agricultural settings. Several models have been proposed to facilitate the dissemination of agricultural technologies.

Bagalangit et al. (2020) determined that effective technology transfer in the Philippine agricultural sector calls for community engagement, capacity building, and local adaptability. Additionally, Rivera & Qamar (2019) pointed out that extension services and government support are crucial for facilitating technology adoption in rural areas. According to the Technology Adoption Life Cycle

model by Moore (1991), sustained usage of technology depends on overcoming initial resistance and ensuring long-term accessibility and maintenance support. This study focuses on ensuring the effective implementation of coconut processing technologies for rural barangays.

Coconut Processing Technologies: Enhancing Efficiency in Coconut Product Processing. Mechanized technologies for processing coconuts have significantly improved efficiencies in industries that utilize them. Traditional processing methods, such as manual dehusking, grating, and pressing, greatly raise labor costs and restrict production.

A study on mechanical dehusking technology in the Philippines by De Luna et al. (2018) found that mechanized dehuskers reduced processing time by 60%, thus increasing productivity and labor cost savings. Similarly, Aguilar & Santos (2021) analyzed automated graters and pressers, showing that these improved extraction efficiencies while reducing coconut waste to 35%.

However, despite these advancements, Garcia and Mendoza (2020) noted challenges in adoption in rural areas, mainly concerning access to machinery, lack of technical training, and financial constraints. The proponents advocate for community-driven technology transfer programs that include training workshops, maintenance support, and government linkages.

Socio-Economic Impacts of Agricultural Technology Agricultural mechanization has changed the landscape of productivity, income generation, and employment. However, the shift from traditional to mechanized methods presents both opportunities and challenges. Glover et al. found through his research that the trends of agricultural technology adoption among rural communities result in: increased productivity, leading to output efficiency; diversifying income and opening new avenues for entrepreneurship; skills training as farmers adapt to new machinery; and potential displacement of workers, necessitating retraining programs. Torres & Villanueva (2020) in the Philippines highlighted that training and extension services, among others, are crucial in reaching out to farmers and helping them socially and economically adopt new technologies. They claimed that their success in agricultural technology transfer programs depended heavily on their ability to access training, maintenance support, and financing options.

According to Magsino & Reyes (2019), in their study on gender and technology, women are beneficiaries of technological innovations that save time, allowing them to engage in other productive economic activities ranging from various value-added food production to entrepreneurial ventures.

Inandila Production: Cultural and Economic Significance Inandila is a traditional Filipino delicacy made of glutinous rice, coconut milk, and sugar, deeply rooted in the traditions of rural communities. It frequently accompanies festivals, family gatherings, and local commerce. Traditional food production is a key component of this, as emphasized by Martinez & Cruz (2018) in relation to cultural preservation and rural livelihoods. However, issues like manual operation, heavy work intensity, and unstable product quality restrict large-scale commercial use.

Research conducted by Delos Reyes (2020) examined local delicacies such as Inandila, finding that modernization tends to enhance efficiency in production and promotion while maintaining its traditional aspects. However, technology must be introduced sensitively to preserve authenticity while improving economic viability.

Definition of Terms

Inandila- The rice cake native delicacy of the two barangay
Inanong- The tribe where the two barangay belong
Igadan- the tradition tool in grating the coconut manually
Ladok- The processed coconut use as toppings in the inandila

METHODOLOGY

Locale of the Study

This research was conducted in barangays where an extension project was implemented, specifically in Naneng and Bagumbayan, where Inandila is considered an important local delicacy.

Research Design

The research design used mixed methods, merging quantitative and qualitative approaches to explore and gather the required data. Quantitative Surveys: Questionnaires were used to collect information regarding productivity, changes in income, and technology usage. Qualitative: Interviews and focus group discussions were conducted to capture detailed feedback from producers regarding their experiences with the technology.

Respondents/Informants/Research Participants of the Study:

Local coconut processors and Inandila producers who have adopted the technology, key informants such as local government officials, extension workers, and faculty members involved in the extension project. The Barangay specifically identified the consistent Inandila producers in their area and occasional makers.

Instrumentation Survey Questionnaire:
A structured questionnaire collects quantitative data on productivity, income, and technology usage. Interview Guides: Semi-structured interview guides will gather qualitative insights from local producers and key informants. Focus Group Discussion Templates: Discussion prompts will gather group feedback from multiple producers.

Data Gathering
Data was collected through surveys administered to local producers who had adopted the technologies, semi-structured interviews with key informants and a sample of producers, and focus group discussions to explore group perspectives on the technology transfer.

Data Analysis
Quantitative Data: Analyzed using statistical tools (e.g., SPSS or Excel) to identify trends and correlations.
Qualitative Data: Analyzed using thematic analysis to identify common themes, challenges, and benefits related to the technology adoption process.

RESULTS AND DISCUSSION

A. Demographic Information

1. Age Group	Number of Respondents	Percentage
Under 18	0	0
18-25	0	0
26-30	0	0
31-40	7	25
41-50	5	18
51-60	10	36
Above 60	6	21
Total	28	100

All 28 respondents were female, underscoring the central role of women in inandila production. The majority (75%) were 41 years of age or older, with the 51-60 age bracket being the most represented (36%). This indicates that coconut processing is a tradition sustained by older generations, raising concerns about long-term sustainability without efforts to engage the youth. In terms of education, most had a high school (46%) or some college (36%) education, confirming that the technology's design was accessible across various educational backgrounds. Notably, 86% of respondents operated unregistered, occasional businesses, highlighting the informal, seasonal nature of this livelihood. Respondents were highly experienced, with over half (51%) having more than 30 years of experience in coconut processing..

2. Gender	Number of Respondents	Percentage
Male	0	
Female	28	100
Other	0	
Total	28	100

The data reveals that 100% of the respondents (28 out of 28) involved in the coconut processing and *inandila* production are female. There were no male or other gender respondents, indicating that this activity is exclusively or traditionally dominated by women in the community.
This finding reflects that the preparation of *inandila*, a local delicacy, is a woman-led activity, both culturally and in practice. However, the introduction of coconut processing technologies—specifically the de-husker, grater, and presser—has shifted the dynamic of labor dependency within households.
Previously, certain parts of the process—especially those requiring physical strength like de-husking or grating—required women to ask for help from their husbands or male family members. The presence of machines has eliminated that need, empowering women to perform the entire production process independently.
While the dependency on male assistance has decreased, some women shared that it's still acceptable or welcomed when their husbands help. However, with the mechanization of the process, that help is no longer a necessity but more of a supportive gesture.

Salient Point:
The data underscores the central role of women in traditional food production, particularly in *inandila* making.
The technology transfer has contributed to women's empowerment, giving them greater control and autonomy in production without relying on physical assistance from men.
While gender roles are still respected in the household, the machines offer women a sense of independence and efficiency, especially in livelihood-related tasks.

3. Educational Attainment	Number of Respondents	Percentage
No Formal education	0	0
Elementary	5	18
High School	13	46
College level	10	36
Graduate Studies	0	0
Total	28	100

The data shows that respondents involved in the coconut processing and *inandila* production have varying levels of formal education, with the majority having completed high school or some level of college education:

High School Graduates make up the largest group, comprising 46% (13 out of 28). This indicates that many participants have a basic to intermediate educational background, equipping them with the literacy and skills needed to understand and operate the introduced coconut processing technologies.

The College Level group follows closely at 36% (10 respondents). This suggests a considerable number of participants have pursued higher education, even if they did not complete a degree. Their exposure to more advanced learning may contribute to better adaptability and openness to adopting new technologies.

Elementary-level education accounts for 18% (5 respondents), showing that even those with limited schooling are actively engaged in the production process and benefit from the technology due to its user-friendly and practical design.

There are no respondents with no formal education or graduate studies, implying that the participants all have at least a basic educational foundation, but also that the community involved is not highly academically advanced in general.

Salient Point:

The data highlights that technology adoption is not limited by educational level, as even those with only elementary education can effectively use the coconut de-husker, grater, and presser.

The presence of college-level participants indicates a potential for local leadership, innovation, and possible scaling of the technology to broader entrepreneurial models.

The lack of graduate-level respondents suggests that this livelihood remains a community-based, grassroots initiative, rather than one driven by highly specialized professionals.

The educational profile of the respondents confirms that the simplicity and practicality of the technology make it accessible to a wide range of users, regardless of their formal education. This supports the idea that well-designed, appropriate technologies can empower rural communities, especially when introduced through inclusive, hands-on approaches

4. Years of Experience in processing	Number of Respondents	Percentage
1-5	3	11
6-10	3	11
11-15	2	7
16-20	2	7
21-25	2	7
26-30	1	3
31-35	5	18
36-40	5	18
41-45	4	15
46-50	1	3
Above 50	0	0
Total	28	100

This means more than half (51%) of the respondents have over 30 years of experience, showing that coconut processing is a long-standing tradition in the community. A smaller number (11%) are newer, with only 1–5 years of experience.

Overall, the data shows that the respondents are highly experienced, which helps explain their ability to quickly adopt and benefit from the introduced technologies.

5. With Business	Number of Respondents	Percentage
Registered	4	14
Not Registered	24	86
Total	28	100

The data shows that only 4 out of 28 respondents (14%) have formally registered their businesses, while the remaining 24 respondents (86%) operate informally, without business registration.

Salient Point:

The 4 respondents with registered businesses are likely those who produce *inandila* and related coconut-based products regularly and at a scale that requires or benefits from formalization. Their registration suggests they may be actively engaged in small-scale entrepreneurship, possibly accepting larger orders or catering to wider markets.

In contrast, the majority (86%) of respondents prepare *inandila* only on a seasonal or occasional basis, typically during special events, community celebrations, or when there are specific orders. For these individuals, *inandila* production is more of a supplemental livelihood activity rather than a full-time business. As such, they may not see the need for formal registration.

This occasional nature of production contributes to the low rate of business formalization, even though many of the respondents benefit from the coconut de-husker, grater, and presser technologies.

B. Technology Adoption

1. Have you adopted any of the following technologies as part of the extension project? (Check all that apply)

	Number of Respondents	Percentage
Coconut De Husker	28	100
Coconut Grater	28	100
Coconut Presser	28	100
Total	28	100

The adoption rate was unanimous: all 28 respondents (100%) adopted the complete suite of technologies (de-husker, grater, and presser). Interviews revealed that the technology was first introduced to the community through the BSABE Extension Program via local demonstrations in early 2022. All respondents reported using the machines for over three years, demonstrating remarkable sustainability and satisfaction. However, usage frequency was primarily occasional (61%) or monthly (25%), aligning with the seasonal demand for inandila during festivals, weddings, and community events (bodong). The primary reasons for adoption were uniformly cited as improved efficiency and speed, reduced labor costs, better product quality, and increased production capacity.How long have you been using the technology?

	De- Husker	Percentage	Grater	Percentage	Presser	Percentage
Less than 6 months						
☐ 6-12 months						
☐ 1-2 years						
☐ More than 3 years	28	100	28	100	28	100
Total	28	100	28	100	28	100

All 28 respondents (100%) have been using the coconut de-husker, grater, and presser for more than 3 years.

This shows that the technologies have been in place and actively used by the community for a long period, proving their durability, usefulness, and reliability. The sustained use also indicates that users are satisfied with the machines and have successfully integrated them into their regular coconut processing activities, especially in making *inandila*.

2. How often do you utilize technology in your coconut processing operations?

	De-Husker	%	Grater	%	Presser	%
☐ Daily						
☐ Weekly	4	14	4	14	4	14
☐ Monthly	7	25	7	25	7	25
☐ Occasionally	17	61	17	17	17	17
Total	28	100	28	100	28	100

The data shows that the majority of respondents (61%) use the coconut de-husker, grater, and presser only occasionally, meaning they process coconuts mainly during special events or when there are specific orders.

- 25% use the machines monthly,

- and only 14% use them weekly.

This suggests that coconut processing is not a daily activity for most, but rather a seasonal or occasional livelihood. The technology is still very useful, but its use depends on demand and events in the community.

3. What were the primary reasons for adopting the technology? (Check all that apply)

All 28 respondents (100%) adopted the coconut de-husker, grater, and presser primarily for four key reasons: to improve efficiency and speed, reduce labor costs, enhance product quality, and increase production capacity. This unanimous adoption reflects how the introduced technologies effectively

	De-Husker	%	Grater	%	Presser	%
☐ Improved efficiency and speed	28	100	28	100	28	100
☐ Reduced labor costs	28	100	28	100	28	100
☐ Better product quality	28	100	28	100	28	100
☐ Increased production capacity	28	100	28	100	28	100
Total	28	100	28	100	28	100

addressed the most pressing needs of the users. The machines enabled them to work more quickly, save on physical effort and expenses, produce higher-quality coconut outputs, and handle larger volumes. These benefits made the technologies highly practical and valuable, particularly in the context of Inandila production, where timely and efficient processing is essential.

C. Impact on Productivity and Efficiency

Integrated Impact on Productivity, Efficiency, and Economic Outcomes

The impact of the technology was profound and multifaceted, with qualitative insights providing context to the quantitative data.

Productivity Gains: The most significant and measurable indicator of productivity was the drastic reduction in processing time. All respondents reported that the time to process a single coconut was reduced from approximately 38 minutes using manual methods to just 5 minutes using the machines. This 87% reduction in processing time is a direct and quantifiable measure of skyrocketing productivity. One interviewee stated, "Before, we spent the whole day just preparing the coconut. Now, we can finish in a few hours and have time for other things."

Economic Effects and Measured Indicators: The study identified several key economic indicators that were positively affected:

Increased Production Volume and Capacity: 100% of respondents reported a significant increase in production capacity, enabling them to handle larger orders, especially during peak seasons. This was a direct result of the productivity gains.

Reduction in Labor Costs: A unanimous 100% of respondents confirmed they reduced their reliance on hired help or family assistance. This direct reduction in labor input costs significantly improved profit margins. As one participant explained, "I don't need to wait for my husband to help me de-husk anymore. I can do it all myself now, so I save that cost."

Business Expansion: Despite most businesses being unregistered, 100% reported a significant expansion in their operational capacity. The machines gave them the confidence to accept more and larger orders. Four respondents formalized their businesses due to this increased and consistent demand.

Reduction i Waste: Respondents qualitatively reported that the machines, especially the presser, extracted more coconut milk efficiently, leading to less waste and better use of raw materials, which indirectly improves economic efficiency.

Product Quality and Safety: All respondents (100%) reported a significant improvement in product quality. The reduction in manual handling led to a more hygienic process, which respondents directly linked to a longer shelf life for inandila. The machines also produced a finer, more consistent texture of ladok (grated coconut), enhancing the final product's quality.

Socio-Cultural Impact and Empowerment: The qualitative data powerfully illustrated the technology's social impact. The machines eliminated women's dependence on male physical labor for the most strenuous tasks (de-husking, grating). This fostered a strong sense of independence and empowerment. The technology also played a crucial role in preserving cultural traditions by making it feasible to produce large quantities of inandila for important community events, ensuring the practice continues.

1. Compared to your previous methods, how would you rate the efficiency of the technology in processing coconuts?

	De-husker	%	Grater	%	Presser	%

Much Better	28	100	28	100		
Better					28	100
Same						
Worse						
Much Worse						
Total	28	100	28	100	28	100

Based on the responses of 28 participants, the new coconut processing technology is more efficient than the traditional methods they previously used. All respondents rated the new de-husker and grater as "Much Better." They shared that they used to manually dehusk coconuts using a bolo, which was time-consuming and dangerous. For grating, they relied on a gagagadan, a traditional manual grater that required significant effort. With the new machines, both processes have become faster, safer, and easier. Meanwhile, the presser was rated as "Better" by all respondents. Previously, they extracted coconut milk by hand using white cloth and fish net bags, which was less efficient. The new presser has improved this process, though not as significantly as the de-husker and grater. Overall, the technology has greatly improved the efficiency and safety of coconut processing.

2. Has the adoption of this technology led to an increase in your production capacity?

	De-husker	%	Grater	%	Presser	%
Yes, significantly	28	100	28	100		
Yes, moderately					28	100
No change						
Decreased production						
Total	28	100	28	100	28	100

All 28 respondents (100%) reported that the adoption of coconut processing technologies led to an increase in their production capacity:
For the de-husker and grater, the increase was described as significant by all users.
For the coconut presser, the increase was noted as moderate, suggesting that while it helped, the efficiency gain was not as high as with the other two machines.
In relation to this, the respondents also revealed that they often use a washing machine spinner to press large amounts of grated coconut. This local adaptation demonstrates their resourcefulness in handling bulk processing. It also highlights that while the presser is helpful, some users find the spinner more efficient when working with bigger volumes—making the process faster and less physically demanding.
This combination of formal technology and improvised solutions reflects both the effectiveness of the extension program and the ingenuity of the community in maximizing available tools to meet production demands.

3. Has the quality of your product improved since adopting the technology?

	De-husker	%	Grater	%	Presser	%
Yes, significantly	28	100	28	100	28	100
Yes, moderately						
No change						
Decreased quality						
Total	28	100	28	1002	28	100

All 28 respondents (100%) reported that the quality of their product significantly improved after using the coconut de-husker, grater, and presser.
They explained that because the machines handle most of the work, there is less hand contact with the coconut during processing. This results in cleaner and more hygienic products, which helps extend the shelf life of the *inandila* delicacy. The reduced handling not only improves food safety but also makes the product more appealing and suitable for selling or storing.

D. Economic Impact

1. Since adopting the technology, have you noticed any change in your production?

	De-husker	%	Grater	%	Presser	%
Yes, significantly	28	100	28	100	28	100
Yes, moderately						
No change						
Decrease						
Total	28	100	28	100	28	100

All 28 respondents (100%) reported a significant increase in their production after adopting the coconut de-husker, grater, and presser.

According to the respondents, the use of these machines resulted in:

- More ladek (grated coconut) being produced in less time
- Less coconut waste, since the machines extract more content efficiently
- A finer and more consistent texture of ladek, improving the quality of their *inandila* delicacy

This shows that the technology not only increased the quantity of production but also improved the quality and efficiency of the entire process. It allowed them to maximize the use of each coconut, save time, and deliver better products with less effort.

2. Have you been able to reduce the number of workers due to the technology?

	De-husker	%	Grater	%	Presser	%
Yes	28	100	28	100	28	100
No						
Not Applicable						
Total	28	100	28	100	28	100

All 28 respondents (100%) confirmed that the use of the coconut de-husker, grater, and presser allowed them to reduce the number of workers involved in the processing.

This means that the machines have greatly lessened manual labor, as one person can now do tasks that used to require several helpers. As a result:

- The process has become more efficient and cost-saving
- There is less need to hire or request help, especially from family members
- It also shows that the technology is easy to operate, even with minimal manpower

This labor-saving effect is especially helpful for women, as it gives them more independence in processing *inandila* without relying on others.

3. Have you been able to expand your business due to improved processing efficiency?

	De-husker	%	Grater	%	Presser	%
Yes, significantly	28	100	28	100	28	100
Yes, moderately						
No						
Total	28	100	28	100	28	100

All 28 respondents (100%) reported that the use of the coconut de-husker, grater, and presser has significantly helped them expand their business.

Even though only 4 of the inandila makers across the two barangays have registered businesses and regularly accept weekly orders, the others have also become confident in taking on more orders. This is because they can now rely on the machines to make the work faster, easier, and more consistent.

The technology has boosted production capacity, allowing even the unregistered producers to bravely meet larger demands, especially during occasions or special events. This reflects how the improved processing efficiency empowered more local producers to grow their small enterprises and support community traditions.

CHALLENGES AND BARRIERS

Despite the overwhelming success, significant challenges remained. All respondents (100%) cited high initial cost, maintenance issues, and difficulty in sourcing spare parts as major barriers. A notable portion also reported a lack of technical knowledge (39% for the grater) and limited access to training (32% for the presser). In response to these challenges, the community demonstrated remarkable ingenuity. The widespread use of repurposed washing machine spinners for bulk pressing was a common improvised solution cited in interviews, highlighting a gap in the provided technology and a need for a more suitable presser design.

When asked what support was needed, easier access to spare parts and financial assistance for maintenance were unanimously requested (100%), followed by better after-sales support. This indicates that while the technology transfer was successful in adoption, its long-term sustainability requires a stronger support system.

1. What challenges have you faced in using the technology? (Check all that apply)

	De-husker	%	Grater	%	Presser	%
Maintenance Issues	28	100	28	100	28	100
Lack of Technical Knowledge	7	25	11	39	3	11
High Initial Cost	28	100	28	100	28	100

Difficulty in sourcing spare parts	28	100	28	100	28	100
Limited Access to Training	3	11	5	18	9	18
Total= 28 Respondents						

Based on the responses of all 28 participants, the most common challenges encountered in using the coconut de-husker, grater, and presser are maintenance issues, high initial cost, and difficulty in sourcing spare parts—with all respondents (100%) identifying these three as major concerns. These findings indicate that while the machines have greatly improved efficiency, users still face significant difficulties in keeping them in good condition, covering the initial expenses, and finding replacement parts when needed. Additionally, some users reported a lack of technical knowledge, particularly with the grater (39%) and de-husker (25%), as well as limited access to training—most notably with the presser (18%). This suggests a need for continued technical support and capacity building to help users properly operate, maintain, and troubleshoot the machines. Despite these challenges, the high usage rate shows that the technology remains valuable and beneficial to the community.

2. What support would help you improve your use of the technology?

	De-husker	%	Grater	%	Presser	%
More technical training	3	11	7	25	9	32
Better after-sales support	15	54	24	86	12	43
Easier access to spare parts	28	100	28	100	28	100
Financial assistance for maintenance	28	100	28	100	28	100
Total Respondents=28						

The data shows that all 28 respondents (100%) identified easier access to spare parts and financial assistance for maintenance as the most important types of support needed to improve their use of the coconut de-husker, grater, and presser. This highlights the ongoing costs and technical upkeep as major concerns for continued and sustainable machine use.

A majority of respondents also expressed the need for better after-sales support, especially for the grater (86%) and presser (43%), indicating a demand for responsive assistance after acquiring the machines. Meanwhile, a smaller number suggested the need for more technical training, particularly with the presser (32%) and grater (25%), which shows that some users still face challenges in operating and maintaining the equipment confidently.

Despite these needs, the respondents revealed that the machines are openly shared and used within the community, especially when needed during large production times or special orders. This reflects a strong sense of community cooperation and a desire to maximize the benefits of the technology across users.

E. General Feedback

1. Overall, how satisfied are you with the technology transfer program?

	De-husker	%	Grater	%	Presser	%
Very Satisfied	28	100	28	100	19	68
Satisfied					9	32
Neutral						
Dissatisfied						
Very Dissatisfied						
Total	28	100	28	100	28	100

All 28 respondents (100%) expressed being very satisfied with the coconut de-husker and grater, while 68% were very satisfied with the presser, and the remaining 32% were satisfied.

This reflects a strong overall satisfaction with the technology transfer program, especially regarding the improvements brought by the de-husker and grater in terms of speed, labor reduction, and ease of use. Although the satisfaction level for the presser is slightly lower, respondents still considered it beneficial. One possible reason for their continued satisfaction is the adaptation of using a washing machine spinner to press large volumes of grated coconut. This alternative solution appears to have complemented the use of the presser, allowing them to handle bigger batches efficiently.

Overall, the high satisfaction levels suggest that the technology transfer successfully empowered local producers, made coconut processing easier, and helped improve the production and quality of inandila, the community's traditional delicacy.

2. Would you recommend this technology to other coconut processors?

	De-husker	%	Grater	%	Presser	
Yes	28	100	28	100	28	100

No						
Maybe						
Total	28	100	28	100	28	100

All 28 respondents (100%) said "Yes" when asked if they would recommend the coconut de-husker, grater, and presser to other coconut processors.

This unanimous response reflects the community's high confidence and satisfaction with the technology. It shows that the machines are not only effective in improving their production process but are also seen as valuable tools that others can benefit from.

The positive recommendation is likely due to the technologies' proven impact—reducing manual labor, increasing production speed, and enhancing product quality. It also suggests that the technologies are user-friendly and accessible enough for others to adopt, making them a sustainable and community-worthy investment for local livelihood development.

Additional comments or suggestions regarding the technology or the extension project. Almost all participants request additional machines.

Interview Session:

Summary of Interview Responses (Unanimously Answered)

All respondents consistently shared similar experiences and perceptions, indicating a unanimous agreement on the usefulness, ease, and impact of the coconut de-husker, grater, and presser technologies introduced through the BSABE Extension Program.

Section 1: Adoption of the Technology

1. Could you describe how you first learned about the coconut de-husker, grater, and presser?

All participants shared that they were introduced to the machines through the BSABE Extension Program and local demonstrations. They immediately recognized their usefulness, particularly in the context of *inandila* making, where the technologies significantly eased the workload.

Follow-up: What motivated you to adopt these technologies in your operations?

The unanimous reason was their ease of operation. Participants stated that even without technical training, they found the machines simple and intuitive to use.

Can you tell me about your experience using the coconut de-husker, grater, and/or presser?

All interviewees said the experience was overwhelmingly positive. The technologies made their work *easier*, *faster*, and *less physically demanding*. They noted a clear reduction in manual effort and time required for processing.

Follow-up: How easy or difficult was it to learn how to use the technology?

The technology was described as very easy to learn, with most users becoming comfortable after just a few uses.

Section 2: Impact on Operations and Productivity

How has the adoption of these technologies affected your processing operations?

Respondents unanimously stated that the technology significantly lightened their burden, especially compared to the traditional methods which were more labor-intensive and time-consuming.

Follow-up: Has it made a noticeable difference in the speed or quality of your production?

Yes, everyone agreed that the speed and quality of production improved. The machines enabled a smoother, faster process with more consistent results.

In your view, has the technology helped you improve your business?

All respondents agreed that the technology was a great help. With faster processing, they could accept more orders confidently and even explore new business opportunities.

Follow-up: Can you quantify this improvement?

Before the technology, it took approximately 38 minutes to manually process a single coconut. With the machines, the entire process—from dehusking to grating to pressing—now takes just 5 minutes, drastically increasing productivity.

Section 3: Economic and Social Impact

What impact, if any, has the adoption of these technologies had on your income or profits?

All participants observed a positive economic impact. The technology enabled cost savings, reduced reliance on labor, and more efficient time use, leading to higher profitability.

Follow-up: Have you noticed any changes in your costs due to the technology?

Yes, there were significant reductions in production costs, including transportation, labor, and raw material processing.

Has the use of these technologies led to the creation of new jobs or the reduction of workers in your operation?

The machines led to a reduction in labor requirements. Tasks that previously required several people can now be done by one or two, freeing others for different roles or enabling them to start their own ventures.

Follow-up: What kinds of tasks or workers have been affected by these changes?

Participants noted that there's no longer a need to travel to central markets for coconut processing. The reduction in physical travel and effort has helped them save time and money while also promoting local processing.

Section 4: Challenges and Barriers

What difficulties or challenges have you encountered in using these technologies?

The most common issues were power outages (as the machines are electricity-dependent) and limited machine availability, as more people in the community are now interested in using them.

Follow-up: How did you manage these challenges?

When machines are borrowed or there's no electricity, users simply wait for their turn or reschedule processing. They showed flexibility and patience but highlighted the need for more units.

Are there any improvements or support that you think would help you use these technologies more effectively?

All respondents agreed that additional machines would be very helpful to accommodate the growing interest. They also suggested enhancing safety features and ensuring machine durability for long-term use.

Section 5: General Perceptions and Feedback

In your opinion, what are the most important benefits of these technologies for your business and the local community?

Participants highlighted that the technologies are energy-saving, time-saving, and cost-efficient. For the community, these tools promote local delicacies like *inandila*, which is part of their identity. The increased accessibility allows more people to participate in local food production and entrepreneurship.

How would you suggest improving the technology transfer process to ensure it's more effective for other coconut processors?

They suggested that future technology transfers should include more units, localized training, and safety improvements. They also emphasized the importance of follow-up visits and technical support.

Would you recommend these technologies to others in the coconut processing industry? Why or why not?

Yes, all participants highly recommend the technologies. They stressed that the machines are easy to use, save a lot of time and money, and greatly improve production efficiency, making them ideal tools for other coconut processors.

8. SUMMARY

This study evaluated the impact of the BSABE Extension Program's technology transfer on traditional Inandila production in selected rural barangays. Introduced to the community in early 2022, the program provided three key coconut-processing machines: the de-husker, grater, and presser, aiming to enhance productivity, reduce physical labor, and empower women…

All 28 female respondents fully adopted the technologies and reported long-term use of over three years. The machines significantly reduced processing time from 38 minutes to 5 minutes per coconut, improved hygiene and product quality, and allowed women to independently perform tasks that previously required male assistance, particularly de husking and pressing coconuts. This shift not only improved efficiency but also strengthened women's roles in both domestic and economic spheres.

The study found that technology use extended beyond daily production. During large cultural events—such as weddings, peace pacts (bodong), and the annual Inandila Festival—machines were essential in handling the bulk processing of coconuts, where up to 1,000 coconuts may be used. In these cases, both men and women participated, reflecting the collaborative nature of cultural food preparation and the machines' critical role in preserving cultural traditions.

While most producers were unregistered (86%), the accessibility of the machines encouraged even informal producers to scale operations, accept more orders, and gain confidence in their entrepreneurial capabilities. Only four respondents had formal businesses, yet the impact of the machines was felt across the entire group.

Respondents expressed high satisfaction, particularly with the de-husker and grater, although satisfaction with the presser was slightly lower due to the use of improvised alternatives like washing machine spinners. They also cited challenges such as limited access to technical training, spare parts, and maintenance support.

The study's findings are consistent with existing literature. Mariano et al. (2018) and FAO (2011) similarly concluded that agricultural technologies empower women and reduce gender-based labor divisions. Dela Cruz and Santos (2019) highlighted improved efficiency and income through coconut-related technologies, though their focus was on farming, not delicacy production. Gomez and Rivera (2020) stressed the need for post-training support, echoing this study's recommendation for technical and financial assistance.

Overall, the research confirms that appropriate, community-based technology transfer can lead to sustainable livelihood improvements, gender empowerment, and the preservation of cultural practices. The BSABE Extension Program's intervention serves as a model for inclusive rural development through simple, effective, and well-supported technologies.

9. CONCLUSION

The BSABE Extension Program's introduction of the coconut de-husker, grater, and presser technologies in early 2022 has had a transformative impact... The shift from manual labor to mechanized processing allowed producers to increase productivity, as measured by the reduction in processing time from 38 minutes per coconut to only 5 minutes. This led to tangible economic benefits, including increased production volume, a reduction in labor costs, and business expansion, allowing even informal producers to accept more orders. Although only 4 respondents had registered businesses, the accessibility of the machines gave both formal and informal producers the confidence to contribute to local economic activity..

The unanimous adoption and continued use of the machines for over three years among all 28 respondents demonstrate strong acceptance, adaptability, and relevance of the technologies to community needs. The shift from manual labor to mechanized processing allowed producers to complete inandila-making more efficiently—from 38 minutes per coconut to only 5 minutes—allowing for increased production and income potential.

Although only 4 respondents had registered businesses, the accessibility of the machines gave both formal and informal producers the confidence to accept larger and more frequent orders, contributing to local economic activity and community recognition. Moreover, this has reduced women's dependence on their spouses for physical labor, enhancing gender inclusivity and control over their livelihood.

However, challenges such as high initial costs, maintenance issues, limited technical training, and difficulties in acquiring spare parts were consistently reported. These barriers underscore the need for continued support in the form of training, financing, and technical services to sustain and scale up the impact of the technology.

Despite these hurdles, the overall satisfaction level was high, and all respondents expressed their willingness to recommend the technology to others. In fact, some community members have creatively addressed equipment limitations—such as using washing machine spinners as alternative pressers—demonstrating local innovation and resilience. study supports and expands upon findings from similar research by Mendoza & Gonzales (2020) and FAO (2011), which confirm that technology transfer in rural communities enhances productivity, empowers women, and promotes inclusive economic growth. It further proves that when communities are equipped with the right tools and knowledge, they are capable of transforming traditional practices into efficient and sustainable livelihood opportunities.

9. Recommendation

Satisfaction levels were overwhelmingly high. All respondents were very satisfied with the de-husker and grater, while 68% were very satisfied and 32% were satisfied with the presser. Crucially, **all 28 respondents (100%) stated they would recommend the technologies to others**, a powerful testament to the project's perceived value. The primary suggestion from the open-ended feedback was a unanimous request for **additional machines** to meet growing community demand.

Based on the results of the study, several recommendations are proposed to further enhance the impact and sustainability of the BSABE Extension Program while supporting coconut processors, particularly in Inandila production. First, there is a need to provide additional units of coconut de-husker, grater, and presser machines to meet the growing demand. As more community members express interest and usage increases, supplying more machines will improve accessibility, reduce borrowing conflicts, and enable simultaneous use by multiple users.

Second, the establishment of community-based maintenance and repair services is essential. Given the reported difficulties in sourcing spare parts and addressing mechanical issues, setting up a local repair service or cooperative maintenance scheme will ensure quick, affordable repairs and consistent availability of spare parts. In addition, while users found the machines generally easy to operate, the lack of technical knowledge highlights the need for regular technical training and refresher sessions. These trainings should focus on troubleshooting, cleaning, and safe operation, which can help extend machine lifespan and ensure user safety.

Financial support is also crucial. Due to the high initial costs of the machines, especially for unregistered or informal producers, access to government or NGO subsidies, micro-loans, or livelihood grants should be facilitated. These financial interventions will empower more entrepreneurs to independently acquire and utilize the equipment. Furthermore, the study reveals that only four respondents had registered businesses, indicating the need to strengthen support for

business registration and development. Assistance in branding, packaging, and accessing wider markets will help professionalize the local industry and increase profitability.

Another critical area for improvement is the design and introduction of a better coconut presser. The current reliance on repurposed washing machine spinners signals a gap in suitable, affordable presser technology. Developing a machine tailored to local needs would improve efficiency and safety. To address machine accessibility for those who cannot afford their own units, the establishment of a shared processing center or equipment hub managed by a local cooperative or barangay is recommended. This would promote inclusivity and shared ownership within the community.

Additionally, local innovations—such as the creative adaptation of household appliances—should be documented, improved, and potentially replicated in other communities to encourage grassroots ingenuity. Lastly, to ensure continued relevance and effectiveness of the program, regular follow-up impact assessments should be conducted. These evaluations will help track long-term outcomes, identify emerging challenges, and gather valuable user feedback for ongoing program improvement.

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19. Appendices

Sample Survey Questionnaire

Project Title: "Empowering Local Communities through Technology: The Impact of the BSABE Extension Program on Coconut De-Husker, Grater, and Presser Adoption in Inandila Production"

Demographic Information

Age: _____

Gender:

☐ Male

☐ Female

☐ Other _____

Educational Attainment:

☐ No Formal Education

☐ Elementary

☐ High School

☐ College/University

☐ Graduate Studies

Years of experience in coconut processing: _____

Name of Coconut Processing Business (if applicable): _____

F. Technology Adoption and Usage

4. Have you adopted any of the following technologies as part of the extension project? (Check all that apply)

☐ Coconut De-Husker

☐ Coconut Grater

☐ Coconut Presser

☐ None

5. How long have you been using the technology (de-husker, grater, presser)?

☐ Less than 6 months

☐ 6-12 months

☐ 1-2 years

☐ More than 3 years

6. How frequently do you use the technology in your coconut processing operations?
☐ Daily
☐ Weekly
☐ Monthly
☐ Occasionally
7. What were the primary reasons for adopting the technology? (Check all that apply)
☐ Improved efficiency and speed
☐ Reduced labor costs
☐ Better product quality
☐ Increased production capacity
☐ Other (please specify): _____

G. Impact on Productivity and Efficiency
4. Compared to your previous methods, how would you rate the efficiency of the technology in processing coconuts?
☐ Much better
☐ Better
☐ Same
☐ Worse
☐ Much worse
5. Has the adoption of this technology led to an increase in your production capacity?
☐ Yes, significantly
☐ Yes, moderately
☐ No change
☐ Decreased production
6. Has your product quality improved since adopting the technology?
☐ Yes, significantly
☐ Yes, moderately
☐ No change
☐ Decreased quality

H. Economic Impact
4. Since adopting the technology, have you noticed any change in your production?
☐ Significant increase
☐ Moderate increase
☐ No change
☐ Decrease
5. Have you been able to reduce the number of workers due to the technology?
☐ Yes
☐ No
☐ Not applicable
6. Have you been able to expand your business due to improved processing efficiency?
☐ Yes, significantly
☐ Yes, moderately
☐ No

I. Challenges and Barriers
3. What challenges have you faced in using the technology? (Check all that apply)
☐ Maintenance issues
☐ Lack of technical knowledge
☐ High initial costs
☐ Difficulty in sourcing spare parts
☐ Limited access to training

☐ Other (please specify): _____

4. What support would help you improve your use of the technology?

☐ More technical training
☐ Better after-sales support
☐ Easier access to spare parts
☐ Financial assistance for maintenance
☐ Other (please specify): _____

J. General Feedback

3. Overall, how satisfied are you with the technology transfer program?

☐ Very Satisfied
☐ Satisfied
☐ Neutral
☐ Dissatisfied
☐ Very Dissatisfied

4. Would you recommend this technology to other coconut processors?

☐ Yes
☐ No
☐ Maybe

Please provide any additional comments or suggestions regarding the technology or the extension project:

Interview Guide

Project Title: "Empowering Local Communities through Technology: The Impact of the BSABE Extension Program on Coconut De-Husker, Grater, and Presser Adoption in Inandila Production"

Introduction

Briefly introduce yourself and explain the purpose of the interview.

Assure confidentiality and ask for consent to record the interview (if necessary).

Section 1: Adoption of the Technology

Could you describe how you first learned about the coconut de-husker, coconut grater, and coconut presser?

Follow-up: What motivated you to adopt these technologies in your operations?

Can you tell me about your experience using the coconut de-husker, coconut grater, and/or coconut presser?

Follow-up: How easy or difficult was it to learn how to use the technology?

Section 2: Impact on Operations and Productivity

How has the adoption of these technologies affected your processing operations?

Follow-up: Has it made a noticeable difference in the speed or quality of your production?

In your view, has the technology helped you improve your business? If so, how?

Follow-up: Can you quantify this improvement (e.g., increase in production)?

Section 3: Economic and Social Impact

What impact, if any, has the adoption of these technologies had on your income or profits?

Follow-up: Have you noticed any changes in your costs due to the technology?

Has the use of these technologies led to the creation of new jobs or the reduction of workers in your operation?

Follow-up: What kinds of tasks or workers have been affected by these changes?

Section 4: Challenges and Barriers

What difficulties or challenges have you encountered in using these technologies?

Follow-up: How did you manage these challenges?

Are there any improvements or support that you think would help you use these technologies more effectively?

Section 5: General Perceptions and Feedback

In your opinion, what are the most important benefits of these technologies for your business and the local community?

How would you suggest improving the technology transfer process to ensure it's more effective for other coconut processors?

Would you recommend these technologies to others in the coconut processing industry? Why or why not?

This survey questionnaire and interview guide aim to gather both quantitative and qualitative data on the impact of the technology transfer of coconut de-huskers, graters, and pressers, ensuring a comprehensive assessment of the extension project's effectiveness.

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Pictures During the Interview with actual usage
De Husking Coconut:
Manual Vs De-husker Machine

Grating the Coconut
Grating Machine VS the traditional Igadan



Coconut Pressing Process
Manual vs Techno transferred Machine vs Machine




The Empowered INanong Inandila Makers