

Coconut Meat Scraper

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Publication history:

Received: September 8, 2026

Revised: October 4, 2026

Accepted: October 7, 2026

Published: October 8, 2026

International Journal of Sustainable and Integrated Studies, Vol. 1, No. 3, pp. 1–8, October 2026.

Abstract

This study developed and evaluated a portable, semi-mechanized Coconut Meat Scraper intended for Macapuno and regular-size coconuts to reduce manual effort and improve processing efficiency, safety, and convenience. The study was anchored on the Theory of Manual Linkages, Anthropometry and Design, and the Theory of Human Power Efficiency and followed an Input-Process-Output framework. A descriptive-developmental research design was employed, involving prototype design, fabrication, testing, revision, and evaluation. Fifteen residents of Sitio Embasi, Brgy. Perez, Kidapawan City, North Cotabato, were purposively selected based on their knowledge of Macapuno and experience in manual coconut processing. A self-developed 10-item, five-point Likert-scale questionnaire was used, with data analyzed through frequency count and mode. Performance testing showed average processing times of 2:08 minutes for one Macapuno, 8:09 minutes for three, and 12:00 minutes for five, producing average outputs of 0.5, 1.8, and 2.8 kilograms, respectively. The device received a general mode of 5, or Highly Acceptable, for design, safety, and convenience. Identified limitations involved sensor performance, stability during heavy-duty use, accommodation of different coconut sizes and maturities, power-source switching, electrical and scraper protection, and speed control. The study concluded that the device is workable and highly acceptable and recommended improvements addressing these limitations. The study aligns with SDG 8—Decent Work and Economic Growth, SDG 9—Industry, Innovation and Infrastructure, and SDG 12—Responsible Consumption and Production. Its sustainability impact includes supporting small-scale processors through reduced labor and processing time, promoting practical technological innovation and community productivity, and recognizing opportunities for productive use of coconut-processing residues.

Keywords: Acceptability, Coconut Meat Scraper, Convenience, Macapuno, Product Output, Safety, Semi-mechanized Processing, Sustainability, Time of Operation, Workability

1. Introduction

The coconut industry is an important component of agricultural and local economies, but coconut meat extraction continues to rely heavily on labor-intensive manual methods. Recent coconut-processing studies continue to describe manual grating and extraction as time-consuming and physically demanding, particularly for household and small-scale processors (Ramadhan & Fauzi, 2022; Ab Hamid & Rusli, 2023; Khan et al., 2024). Manual processing also involves physical exertion, repetitive movements, safety risks, and concerns regarding hygienic consistency. These limitations establish the need for a coconut meat scraper that can improve processing efficiency while emphasizing safety, convenience, stability, and ease of use. The present study therefore focuses on the design and construction of a portable coconut meat scraper intended particularly for macapuno and regular-size coconuts. Its workability is evaluated through time of operation and product output, while its acceptability is assessed in terms of design, safety, and convenience. The device uses a motorized scraping mechanism while

retaining manual positioning and handling of the coconut shell, making it a semi-mechanized rather than fully autonomous system.

Traditional coconut scraping remains a demanding process despite its long-standing use in household and small-scale commercial applications. Recent work on coconut grating and meat extraction reports that manual processing requires substantial effort and time and can expose operators to injury risks, while mechanized alternatives can reduce labor and improve throughput (Karunakaran et al., 2023; Khan et al., 2024; Owuama et al., 2025). Manual practices may also expose users to repetitive strain, physical fatigue, and inconsistent hygiene because of direct contact during processing. These limitations have encouraged the development of mechanical and semi-automated alternatives that reduce dependence on manual labor. In response, the study develops a coconut meat scraper designed to improve the extraction process through mechanical operation, structural stability, and practical construction. Its main objective is to develop the device through design, construction, and testing. Workability is determined through time of operation and product output, while acceptability is evaluated in terms of design, safety, and convenience. The device is designed to be portable and simple to operate. Its materials include a 12 volts DC motor, scraper, bolts, nuts, stainless steel basin and macapuno strips. Although scraping is motorized, coconut positioning and handling remain under the control of the operator. The device is therefore limited to a semi-mechanized process and is intended only for macapuno and regular size coconut.

Existing studies demonstrate a continuing transition from traditional manual scraping toward mechanized and automated coconut processing, including the development of automatic coconut grinding systems intended to mechanize conventional coconut-processing operations (Abd. Hamid & Samsudin, 2023). Dissanayaka et al. (2022) developed an automated coconut scraping and milk-extracting machine with automated blade movement and safety features, while Khan et al. (2024) described an automated scraper using an adjustable blade and three-dimensional clamping movement. More recent designs have emphasized sensor-based activation, protective covers, improved clamping, portability, and adaptation to different coconut sizes (Maa et al., 2024; Tan, 2025; Zulhazmi, 2025). For small-scale processing, recent work also emphasizes affordable construction, locally available materials, and appropriate technology (Ab Hamid & Rusli, 2023; Adedipe, 2024). Safety is particularly important because conventional scraping and grating place the operator close to moving cutting components. Recent Philippine ergonomic research found high postural risk and discomfort among coconut-grating workers, particularly in the upper limbs and back (Salazar et al., 2024). Workability is likewise influenced by motor power, rotational speed, clamping, machine stability, and the adequacy of the available power source. Asbanu et al. (2025), in evaluating solar-powered coconut grating, found that the available photovoltaic capacity must be sufficient for the power requirements of the grating motor. Yeap (2025) reported that insufficient motor power can prevent effective scraping under load, while Ariswanto and Saleh (2024) examined blade-speed variation as a factor in grating productivity. Similarly, Gumay and Afan (2023) found that increasing the rotational or cutting speed of a modified coconut grater increased its grating capacity, demonstrating the importance of operating speed to machine productivity. Maa et al. (2024) showed that an improved ball-joint clamping mechanism can substantially increase grating capacity. The practical value of mechanization extends to productivity and community-based processing: recent coconut-processing studies report gains in throughput, efficiency, and reduced labor when mechanical systems replace manual operations (Omidiji et al., 2023; Adedipe, 2024; Atienza et al., 2025). Coconut processing also has an environmental dimension because residues and by-products can be incorporated into more circular processing strategies (Karunakaran et al., 2023; Ramirez et al., 2023).

At the local level, the proposed coconut meat scraper is relevant to macapuno makers, small-scale vendors, schools, and communities. The development of coconut-processing equipment for village-level applications also illustrates the continuing relevance of locally oriented mechanization in Philippine coconut production (Velasco, 2025). For macapuno makers, mechanized extraction may reduce the time and labor required compared with traditional manual methods. For small-scale vendors, more efficient coconut processing may support increased daily productivity and income. Schools, teachers, students, and future researchers may also use the project as a basis for learning, research, construction, and further technological development. At the community level, easier coconut scraping may encourage more efficient production practices in traditional coconut-based industries. Recent work on small-scale coconut processing emphasizes accessible mechanization, locally available materials, user-friendly operation, and cost-effective equipment for households, microenterprises, and farmer groups (Azadi et al., 2022; Ab Hamid & Rusli, 2023; Adedipe, 2024; Caguay, 2025). This supports the relevance of simple and accessible technologies that address the practical requirements of community and small-scale coconut processing. Contemporary scraper and grater designs illustrate different approaches to coconut meat processing, including automated blade movement, three-axis clamping, integrated grating and milk extraction, sensor-based activation, and protective enclosures (Dissanayaka et al., 2022; Omidiji et al., 2023; Maa et al., 2024; Tan, 2025). Collectively, these technologies demonstrate continuing efforts to improve mechanical extraction through controlled movement, specialized cutting mechanisms, structural support, and adaptation to coconut geometry.

The study is anchored on three theoretical and design perspectives addressing the relationship between human effort and mechanical design. The Theory of Manual Linkages explains how components such as cranks and

pivots transmit human movement into a mechanical task. Budynas and Nisbett (2020) is retained as an essential mechanical-design source because its linkage principles are foundational and remain directly applicable to machine mechanisms. Applied to the coconut meat scraper, the theory supports the coordination of mechanical components necessary to produce an effective scraping action. The second basis is Anthropometry and Design. Recent ergonomics literature confirms that anthropometric information is central to fitting tools and products to user dimensions, capabilities, comfort, and safety (Fu & Luximon, 2022; Susana et al., 2022). This principle supports the study's assessment of convenience and safety by emphasizing an ergonomic interaction between the operator and the device. The third basis is Human Power Efficiency: the device should accomplish more useful work while reducing unnecessary physical effort and fatigue. Recent coconut-processing research similarly treats reduced operator effort, ergonomic risk, and improved productivity as key outcomes of mechanization (Salazar et al., 2024; Owuama et al., 2025). Conceptually, the study follows an Input-Process-Output framework. Inputs consist of ideas, references, materials, tools, related literature, methodology, and labor. These inputs proceed through planning, designing, fabricating, constructing, testing, revising, and evaluating, culminating in the coconut meat scraper as the intended output.

The literature establishes that traditional coconut scraping is associated with prolonged processing, substantial human effort, ergonomic strain, and potential injury (Karunakaran et al., 2023; Khan et al., 2024; Salazar et al., 2024). Safety remains particularly important because the operator works near scraping components, which has led recent designs to incorporate clamps, protective covers, sensors, and other controls (Dissanayaka et al., 2022; Tan, 2025). Motor performance is another practical concern because it affects the machine's ability to process coconut meat efficiently without stalling; Yeap (2025) specifically identified insufficient motor power as a limitation during scraping under load. Although previous technologies demonstrate automated, semi-automated, and specialized coconut extraction mechanisms, the present study focuses on a portable and simple coconut meat scraper suitable for macapuno and regular-size coconut processing. It retains manual coconut positioning while mechanizing the scraping action and evaluates performance through time of operation and product output, as well as user acceptability through design, safety, and convenience. The rationale for the project therefore rests on addressing the practical limitations of traditional coconut scraping through a mechanically assisted device intended to reduce physical exertion, improve extraction efficiency, maintain operational stability, and provide a practical option for small-scale coconut processors. The project is particularly relevant to macapuno makers and small-scale vendors because improved processing efficiency may reduce labor requirements while supporting productivity and income.

Based on the scope and literature presented in the study, the coconut meat scraper is most directly aligned with SDG 8 – Decent Work and Economic Growth, SDG 9 – Industry, Innovation and Infrastructure, and SDG 12 – Responsible Consumption and Production. SDG 8 is relevant because the proposed device seeks to reduce labor-intensive coconut processing while improving productivity among macapuno makers and small-scale vendors. Recent studies of coconut mechanization report reduced manual effort, higher throughput, and improved safety or ergonomic conditions compared with traditional processing (Adedipe, 2024; Salazar et al., 2024; Owuama et al., 2025). SDG 9 applies through the development of a practical mechanical innovation for coconut processing. The project translates mechanical design, fabrication, testing, and evaluation into a portable coconut meat scraper, consistent with recent work emphasizing affordable, locally adaptable mechanization for small-scale processors (Ab Hamid & Rusli, 2023; Adedipe, 2024). SDG 12 is supported by the study's discussion of productive coconut processing and the potential utilization of coconut-processing residues. Recent coconut agroindustry literature highlights opportunities for value addition and more circular use of coconut by-products and processing residues (Ramirez et al., 2023; Karunakaran et al., 2023).

The study contributes primarily to socio-economic, technological, community, educational, and environmental sustainability. Socio-economically, a more efficient coconut scraping process can support macapuno makers and small-scale vendors by reducing processing time and labor while potentially increasing productivity and income. Recent studies show that small-scale coconut-processing machines can improve capacity, efficiency, and economic feasibility when designed around locally available materials and accessible mechanisms (Adedipe, 2024; Caguay, 2025). At the community level, access to easier coconut processing may encourage the adoption of efficient practices in traditional coconut-based production. Technologically, the study demonstrates the application of mechanical design to a routine agricultural processing activity. Its emphasis on portability, usability, safety, convenience, and workability connects engineering innovation with the practical requirements of small-scale users. The device also provides an educational contribution because students can learn from its construction process, teachers may use its results as a basis for similar studies, schools may strengthen research and industry collaboration, and future researchers may use the project as a reference for related designs. The study further relates to environmental sustainability through the potential productive use of coconut-processing residues, consistent with recent work on circular and value-adding coconut agroindustry pathways (Ramirez et al., 2023; Karunakaran et al., 2023). Thus, the project links small-scale technological innovation with improved working conditions, community productivity, educational development, and opportunities for more responsible use of coconut-processing by-products.

2. Material and methods

2.1 Research Design

The study employed a descriptive-developmental research design. The developmental component involved designing and constructing the coconut meat scraper, including preparing the concept design, selecting materials, fabricating the frame, installing the motor, scraper, sensor, foot pedal, and other components, and modifying the prototype based on problems identified during testing. The descriptive component involved testing the device's workability in terms of time of operation and product output using different quantities of Macapuno and evaluating its acceptability in terms of design, safety, and convenience. The device was developed from pictorial, isometric, orthographic, and exploded design drawings. Its major components included an Arduino, motor frame, relay, switch, power supply, scraper cover, metal sheets, battery, metal frame, foot pedal, stainless container, scraper, shafting, motor, and ultrasonic distance sensor. The orthographic design specified an 18-inch width and 24-inch depth in the top view, while the front and side views indicated a total height of approximately 30 inches and other dimensions necessary for constructing the device. Construction involved preparing the technical design and materials, measuring and cutting the angle bars, welding the frame and plain sheet, preparing the motor support, installing the stainless steel basin and ultrasonic distance sensor, mounting the 12volts DC motor and step-down transformer, positioning the switch pedal, fabricating and installing the scraper, completing the electrical connections, and starting and monitoring the assembled device. Development was conducted over seven weeks through planning, designing, constructing, testing and revising, and evaluating. During prototype testing, several operational problems required modification. The original motor was replaced with a more powerful unit because it could not continuously rotate the scraper. The spacing of the scraper teeth was adjusted because coconut meat became lodged between them, while the blade was redesigned with a curved shape to better follow the coconut shell. Blade geometry is an important consideration in coconut-grating performance; Lorenza (2025), for example, investigated the redesign of coconut grater blades through a reverse-engineering approach to improve the performance of the grating process. The sensor connection was also secured to prevent unintended stopping. The completed prototype consisted of angle bars, metal sheets, a stainless steel basin, 12-volt DC motor, shafting, scraper blade, foot pedal, Arduino, relay, power supply, battery, and ultrasonic distance sensor.

2.2 Locale of the Study

The study was conducted in Sitio Embasi, Brgy. Perez, Kidapawan City, North Cotabato. The area was selected because coconut farming is a primary livelihood. Barangay Perez is situated in the highland area near the base of Mount Apo and is described in the study as suitable for coconut production. Sitio Embasi served as the specific community where primary data collection and actual testing of the coconut meat scraper were conducted.

2.3 Respondents of the Study

The respondents were fifteen (15) selected residents of Sitio Embasi, Brgy. Perez, Kidapawan City, North Cotabato. The respondents had knowledge of Macapuno and experience in processing coconut manually, making them relevant participants for evaluating the developed coconut meat scraper.

2.4 Sample and Sampling Procedure

The study employed purposive sampling to select respondents. Residents were chosen based on their knowledge of Macapuno and experience in manually processing coconut. This procedure enabled the researchers to obtain evaluations from participants familiar with the activity for which the coconut meat scraper was developed.

2.5 Research Instrument

A self-developed questionnaire served as the primary research instrument for evaluating the coconut meat scraper in terms of design, safety, convenience, and workability. The questionnaire contained ten (10) items assessed using a five-point Likert scale through which respondents indicated their level of agreement. For acceptability, the five-point scale classified a rating of 5 as Highly Acceptable, indicating that the device effectively fulfilled its functions and provided a positive user experience. A rating of 4 was Acceptable, indicating satisfactory functioning with possible minor improvements; 3 was Moderately Acceptable, indicating some usability issues; 2 was Fairly Acceptable, indicating significant usability concerns requiring attention; and 1 was Not Acceptable, indicating difficulty in use and possible failure to meet basic functionality requirements.

2.6 Data Gathering Procedure

Data gathering proceeded through the development, testing, revision, and evaluation of the coconut meat scraper. The researchers initially prepared the technical design, procured the required materials, fabricated the mechanical structure, and integrated the electronic components. The device was then tested and operational defects were identified and corrected before evaluation. Testing assessed the device's workability using different quantities of Macapuno, with time of operation and product output recorded for evaluation. Following revisions, the prototype scraped one piece of Macapuno in an average of 2:08 minutes, three pieces in 8:09 minutes, and five pieces in 12:00 minutes, with output increasing as the number of coconuts increased. After workability testing, selected respondents evaluated the device in terms of design, safety, and convenience using the self-developed five-point

Likert-scale questionnaire. The responses were gathered, tallied, analyzed, and interpreted to determine the performance and acceptability of the coconut meat scraper.

2.7 Data Analysis Techniques

The data obtained from the respondents were tabulated, analyzed, and interpreted using frequency count and mode. Frequency count determined the number of respondents selecting each acceptability category: Highly Acceptable, Acceptable, Moderately Acceptable, Fairly Acceptable, and Not Acceptable. The mode identified the most frequently occurring response for each questionnaire item and was used to determine the common level of acceptability of the coconut meat scraper in terms of design, safety, and convenience.

3. Results and Discussion

3.1 Development and Workability of the Coconut Meat Scraper

3.1.1 Design and Construction of the Coconut Meat Scraper

The Coconut Meat Scraper was designed with a dual-activation safety system consisting of a foot-pedal switch and an automated proximity sensor. The scraper operates only when the operator presses the pedal and the sensor detects a coconut within the scraping zone. A built-in battery with a manual switch allows operation during power interruptions, while a voltmeter indicates the remaining battery voltage. The device stops operating when battery voltage reaches 10 volts or lower. The constructed system integrates the motor-driven scraper, distance sensor, foot pedal, battery, and electronic controls, and underwent designing, testing, revising, and evaluating before becoming fully functional. The design provides greater operational control by requiring both intentional foot-pedal activation and coconut detection before the scraper rotates. This configuration reduces the possibility of accidental activation while allowing the operator to control the coconut during scraping. The battery system further supports continued operation during power outages, while the integrated electronic and mechanical components provide a controlled alternative to continuously rotating traditional scraping mechanisms.

3.1.2 Workability in Terms of Time of Operation

Performance testing showed that the Coconut Meat Scraper was workable across different quantities of Macapuno. The narrative results reported an average processing time of 2:08 minutes for one piece weighing approximately 1.3 kilograms, 8:09 minutes for three pieces weighing approximately 3.5 kilograms, and 12:00 minutes for five pieces weighing approximately 5.7 kilograms. All tested quantities were successfully scraped and considered workable, indicating that the device could process increasing quantities of Macapuno. The findings indicate that mechanized scraping can facilitate the processing of larger quantities of coconut while reducing dependence on manual effort. This is consistent with recent coconut-processing studies in which mechanized graters, scrapers, and integrated extraction systems improved processing capacity or reduced labor compared with manual methods (Ramadhan & Fauzi, 2022; Omidiji et al., 2023; Adedipe et al., 2026).

3.1.3 Workability in Terms of Product Output

Product output increased with the number of Macapuno processed. One piece produced an average of 0.5 kilograms of coconut meat, while three pieces produced an average of 1.8 kilograms. Processing five pieces resulted in an average output of 2.8 kilograms. These results demonstrate that the device remained functional as the quantity of coconut processed increased. The increasing output indicates that the Coconut Meat Scraper can process varying quantities of Macapuno and produce greater amounts of scraped meat as input increases. Together with the successful time-of-operation trials, the results demonstrate the device's workability for coconut meat extraction under the tested conditions.

3.2 Acceptability of the Coconut Meat Scraper

3.2.1 Acceptability in Terms of Design

The 15 respondents rated the design of the Coconut Meat Scraper as Highly Acceptable, with a general mode of 5. Thirteen respondents (87%) gave the highest rating to the durability and suitability of the materials for food preparation. Twelve (80%) gave the highest rating to its professional appearance, balanced structure, and ability to separate coconut meat from the shell. Eleven (73%) gave the highest rating to secure component fastening and replaceability of worn parts. Nine (60%) gave the highest rating to easy assembly or storage and cleaning, eight (53%) to the quality and durability of the frame, and seven (47%) to easy replacement of the scraping head. These findings indicate that respondents considered the device structurally reliable and practical for food preparation. Secure components, replaceable parts, ease of cleaning, and manageable assembly contribute to continued usability and maintenance (Azadi et al., 2022). Recent coconut-machine development likewise emphasizes stable frames, accessible components, user-friendly construction, and maintainability as important design considerations (Ab Hamid & Rusli, 2023; Khan et al., 2024). The results therefore support the suitability of combining durable materials with a practical and user-oriented structure.

3.2.2 Acceptability in Terms of Safety

Safety was rated Highly Acceptable by the 15 respondents, with a general mode of 5. Eleven respondents (73%) gave the highest rating to the positioning of the scraping component for minimizing cuts, the use of food-grade materials, and the device being safer than traditional manual tools. Ten (67%) gave the highest rating to the minimal risk of the coconut shell slipping, while nine (60%) rated the machine highly for stability and secure components during heavy use. Eight (53%) gave the highest rating to sensor-based blade deactivation, sense of security and control, and manageable force without muscle strain. Seven (47%) gave the highest rating to stability without bouncing during high-pressure scraping. The dual-activation mechanism further prevents operation unless both coconut detection and foot-pedal activation occur. The findings indicate that the Coconut Meat Scraper provides a controlled operating environment through its stable structure, blade positioning, food-grade materials, and dual-activation system. These safety-oriented features are consistent with the general principles of occupational health and safety management, particularly the reduction of workplace hazards and risks emphasized in ISO 45001 (International Organization for Standardization, 2018). These findings align with recent coconut-processing research showing that manual grating can expose workers to substantial ergonomic and safety risks and that newer machines increasingly incorporate clamping, protective covers, sensors, and automation to reduce operator exposure to moving cutting parts (Dissanayaka et al., 2022; Khan et al., 2024; Salazar et al., 2024; Tan, 2025). Thus, the respondents' evaluations support the device as a safer alternative to traditional scraping methods.

3.2.3 Acceptability in Terms of Convenience

Convenience was also rated Highly Acceptable by the 15 respondents, with a general mode of 5. Thirteen respondents (87%) gave the highest rating to reduced scraping time and simple operational instructions. Twelve (80%) rated the device highly for effectively removing meat from different coconut sizes, while eleven (73%) gave the highest rating to consistent scraping results and greater convenience than traditional methods. Ten (67%) gave the highest rating to ease of cleaning and maintenance and reduced scraping time compared with manual processing. Nine (60%) gave the highest rating to ease of use with little effort, suitability for non-technical users, and the usefulness of the foot pedal in freeing the hands to control the scraping angle. These results indicate that the device improves convenience by reducing physical effort and processing time while maintaining simple operation. Foot-pedal control allows users to concentrate their hands on positioning the coconut, supporting easier handling during scraping. Recent designs similarly emphasize user-friendly controls, reduced manual effort, shorter processing time, and convenient handling as core benefits of mechanized coconut scraping and grating (Ab Hamid & Rusli, 2023; Khan et al., 2024; Tan, 2025). Overall, the findings support the Coconut Meat Scraper as a convenient and time-saving device for the evaluated users.

4. Conclusion & Recommendations

The study concluded that the developed Coconut Meat Scraper is a workable and highly acceptable device for simplifying Macapuno scraping while reducing manual labor and physical strain. The device integrates a 12-volt DC motor, fabricated scraper, step-down transformer, Arduino, ultrasonic sensor, and foot-pedal safety control, with a rust-resistant stainless steel scraping blade supported by a heavy-duty angle bar frame. Performance testing showed an average processing time of 2:08 minutes for one piece of Macapuno weighing 1.3 kilograms, 8:09 minutes for three pieces weighing 3.5 kilograms, and 12:00 minutes for five pieces weighing 5.7 kilograms. Product output averaged 0.5 kilograms, 1.8 kilograms, and 2.8 kilograms, respectively. The device was also highly acceptable in terms of design, safety, and convenience, indicating that it can provide a faster, easier, safer, and more comfortable coconut meat scraping process.

The Coconut Meat Scraper may be further improved by using a more effective sensor, adding rubber suction feet or a heavier base, and securely attaching the device to the floor to minimize movement during heavy-duty operation. The scraper should accommodate different coconut sizes and maturities, including young coconut, and incorporate automatic switching between AC and DC power during power interruptions. A protective scraper cover, covers for wiring and other electrical components, and variable speed control responsive to the foot pedal are also recommended. Structural hygiene and aesthetic cleanliness of the equipment should likewise be maintained.

Based on the areas identified for improvement, the current Coconut Meat Scraper has limitations involving sensor performance, stability during heavy-duty scraping, accommodation of different coconut sizes and maturities, automatic switching between AC and DC power, protection of the scraper and electrical components, and control of scraping speed. These limitations indicate that further refinement of the device is needed to improve its stability, versatility, electrical protection, and operational control.

5. Compliance with ethical standards

The authors conducted the study with consideration for the appropriate and responsible involvement of the selected respondents in evaluating the Coconut Meat Scraper. The authors purposively selected fifteen residents

of Sitio Embasi, Brgy. Perez, Kidapawan City, North Cotabato, based on their knowledge of Macapuno and experience in manual coconut processing. The respondents evaluated the device in terms of design, safety, and convenience using a self-developed questionnaire, and the authors used the gathered responses to assess the performance and acceptability of the developed device.

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