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Developing Sawdust into Decorative Pieces

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***Abstract:** This study investigated the potential of transforming sawdust waste into decorative keychains using resin as a binding material, focusing on material optimization, production challenges, and product acceptability. Conducted at Cebu Technological University, the research was guided by principles of sustainability and waste utilization to reduce environmental impact while producing functional items. A mixed-method approach was used, combining experimental and descriptive survey designs. The experimental phase determined the most effective sawdust-to-resin ratio in terms of strength, finish, and cost efficiency. The descriptive phase assessed product acceptability among students based on appearance, durability, functionality, environmental value, and marketability. Results showed that the 60:40 sawdust-to-resin ratio produced the best outcome, offering strong bonding, smooth texture, and balanced cost. Production challenges included curing time, air bubbles, and mixing inconsistencies, while resin contributed significantly to production cost. Overall, respondents rated the product as highly acceptable across all criteria.*

I. THE PROBLEM AND ITS SCOPE INTRODUCTION

A. Background of the study

Sawdust is a major wood waste of wood working industries as result of cutting, sanding, and processing woods. This is commonly discarded, contributing to environmental concerns. While saw dust has been known for compost, fuel briquettes or particle boards. However, this discarded resource has a potential way into the new opportunities to develop it in a new transformed decorative product.

Discoveries states that sawdust is an excellent choice for crafting, given its versatility and availability. It's a by-product of woodworking and is often discarded, making it an environmentally friendly option. Moreover, it can be used to create a variety of products, such as wooden figurines, decorative items and even jewelry. Creating wooden handicrafts from sawdust is a creative and eco-friendly way to repurpose wood waste. Sawdust-based crafts can be both beautiful and functional. They provide an opportunity to reduce waste and contribute to sustainable practices. (Mak 2023)

B. Rationale of the Study

The increasing waste of sawdust has always been a problem in many factories that makes wood furniture. Sawdust, which is the residue made from cutting woods into lumber using saw (Bajpai 2018), is a waste product of woodworking operations such as sawing, sanding, milling and routing. It is composed of very small chips of wood. These operations can be performed by woodworking machinery, portable power tools or by use of hand tools (Wikipedia.org). Saw dust are commonly seen when working with woods, according to Ratu, the furniture industry still produces sawdust waste which, if not managed properly, can become a source of environmental pollution. Not only its waste, but it also has potential dangers for workers. Cebu Technological University offers several courses that works with woods, therefore producing a lot of saw dust waste. The shops saw dust waste can't par on that of a factory but it still possesses a problem. Wood dust particles can affect the health of workers/students and can cause occupational diseases (PAK). Exposure to wood dust has been associated with health issues due to the natural chemicals in wood or substances in the wood, such as bacteria, molds, or fungi. The very reason why wearing PPEs are necessary.

Also, improper disposal of wood sawdust in the environment poses several ecological and health challenges. Unmanaged sawdust negatively aU̓ects both terrestrial and aquatic ecosystems. It changes the soil makeup, making it less fertile due to reduced nitrogen levels. When disposed into water bodies, sawdust increases the BOD, depleting oxygen levels that are particularly in the name of waste management, and produces greenhouse gases such as CO_2 and methane, contributing to climate change and air pollution (Maier, 2023). The increasing saw dust waste possesses a concerning problem that every factory company is facing every day. Several research has tried different approach in finding solution as to solve the problem. Various technology has been established to lessen saw dust waste and change is transforming the world; climate change and resource depletion compel the construction industry to adopt sustainable practices.

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This shift focuses on developing energy-efficient, eco-friendly buildings that reduce waste and conserve natural resources. The construction sector, accounting for almost 40 % of carbon dioxide emissions from global energy-related activities, has enormous potential to minimize its environmental footprint (Karlsson et al., 2021). Sustainable approach by making saw dust into a new piece reduces emissions and saves costs through waste minimization, healthier spaces, and resilient communities. A key step in achieving sustainability is using industrial by-products in construction materials (Mroueh et al., 2000, Siddique, 2014). This integration reduces dependence on virgin resources, lowers energy consumption, and diverts waste from landfills.

This study focuses on integrating saw dust waste into a potential furniture piece that may reduce the problem of saw dust waste especially in Cebu Technological University. By using saw dust to make furniture pieces like keychain is one of the several solutions to reduce saw dust waste and to minimize its adverse environmental impact while maximizing social and economic benefits. This approach emphasizes resource efficiency, the reduction of waste and emissions, and the creation of healthy living environments throughout the building's entire lifecycle-from planning and design to demolition or reuse (Liu et al., 2022). Not only it reduces the shops waste it also help gain profit by selling the output made from saw dust waste. This dual alignment, therefore, points to the possibility of innovative approaches such as sawdust incorporation in facilitating sustainable development in construction practice while reducing environmental impact (Adegoke et al., 2022, Prabath and Ramadoss, 2022).

C. Theoretical Background

This study is anchored on theories and concepts that support the transformation of waste materials into valuable and functional products, particularly in the context of sustainability, material science, and design. These theories explain how sawdust commonly treated as industrial waste can be repurposed into decorative pieces that are both durable and aesthetically appealing.

Waste Management Theory explains how waste materials should be properly handled, reduced, reused, or recycled in order to protect the environment and improve resource efficiency. It emphasizes the importance of turning waste into useful resources instead of simply discarding them. In this study, sawdust, a common waste in woodworking shops, will be innovated into furniture pieces such as keychains. Sawdust is usually produced as excess material when cutting or shaping wood, and instead of being discarded, it will be given a new purpose through recycling and innovation

This approach not only reduces waste but also provides an opportunity to produce useful and marketable products. Recycling is considered one of the most environmentally friendly methods of managing wood waste. A large portion of wood waste comes from used furniture and other wooden items, which can potentially be reused instead of thrown away. By applying this method, the FCM shop in Cebu Technological University - Main campus can also maintain a cleaner and less dusty environment, since sawdust will be repurposed into keychains rather than left as waste.

D. Conceptual Framework

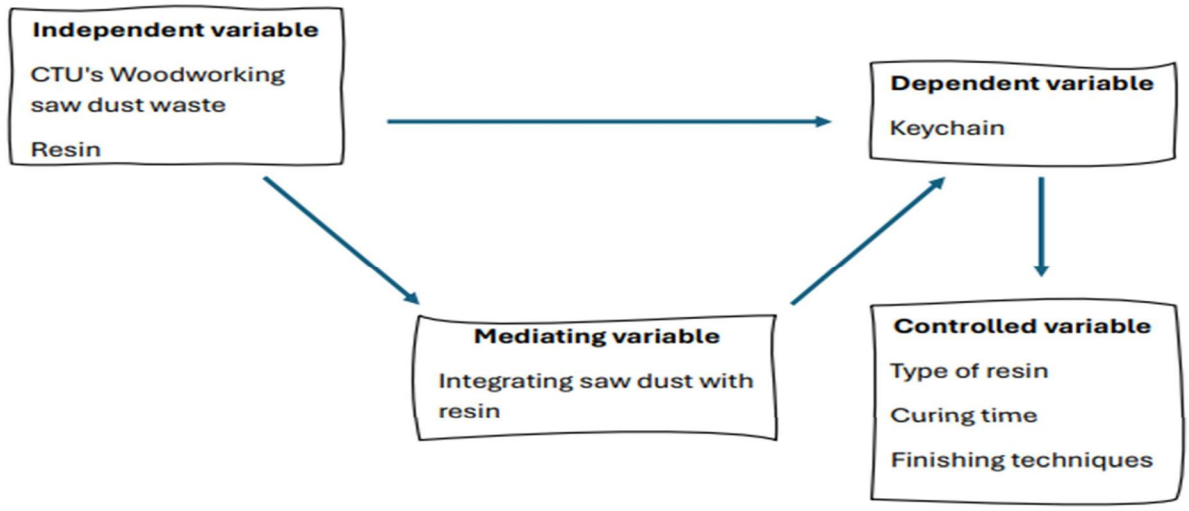


Figure 1. Conceptual Framework

E. Statement of the problem

This study aims to develop sawdust into decorative keychains using resin as a binding material in the Furniture and Cabinet Making Shop in Cebu Technological University for A.Y 2025 – 2026. This research explores the potential of minimizing the sawdust waste by crafting them into creative products.

Specifically, this study sought to answer the following questions:

1) What is the ideal ratio of sawdust and resin in producing decorative keychains

- Saw dust
- Resin

2) What challenges and limitations are encountered in the production process?

- Curing Time
- Production problem
- Cost

3) What is the level of acceptability of sawdust-resin keychains among respondents in terms of:

- Appearance
- Durability
- Functionality

F. Scope and Limitation of the Study

This study focuses on developing a decorative piece, particularly keychains, using sawdust and resin as a binding material. The research is conducted in the Furniture and Cabinet Making shop of Cebu Technological University – Main Campus during the S.Y. 2025– 2026.

The study uses an experimental research design to determine the ideal ratio of sawdust and resin. It involves with material preparation, mixing, molding, curing, and finishing. The resulting products are evaluated in terms of durability, appearance, functionality, and overall quality. In addition, by using descriptive survey to assess the level of acceptability of the finished keychains. The respondents of the study consist of thirty 30 FCM students from first year to third year levels. They are selected to provide feedback on the product in terms of appearance, durability, functionality, environmental value, and cost and marketability.

The study has several limitations. Variations in the sawdust, such as particle size, type of wood, and moisture content, may affect the consistency and quality of the keychains. The curing process and environmental conditions in the workshop may also influence the hardness and durability of the products. The sample size of thirty student respondents may limit the generalizability of the survey results regarding acceptability and marketability.

Finally, time and resource constraints prevented extensive experimentation with larger batches, alternative adhesives, or commercial-scale production. Despite these limitations, the study provides valuable insights into the sustainable utilization of sawdust in decorative applications and offers practical recommendations for small-scale woodworking and eco-friendly product development.

G. Significance of the study

This study was primarily conducted to recommend the saw dust as a decorative material that would help all the woodworkers to reduce waste in woodworking shops not only those in CTU Main Campus. The benefits of this study will hold significance to the following:

- Woodworkers. This study provides them with an innovative way to utilize saw dust by product of their work, thus minimizing waste. By innovating the waste into something useful, they will learn to create less trash and help environment.
- Students. This study encourages students to apprehend about sustainability. Through this research, student learn practical ways to protect the environment and use resources wisely.
- Community. This research helps local people understand the environment better. Environmental awareness and responsible waste management within the community, with everyone helps together to be sustainable and creative.
- Future Researcher. This study can serve as a foundation for future researchers who wish to improve or expand the idea, exploring other possible uses of sawdust or similar waste materials to create new eco-friendly products.

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H. Definition of Terms

The following operational definitions are provided in order to help readers comprehend the terms used in this study and to provide a shared frame of reference.

- Sawdust. The fine wood particles produced during woodworking operations such as cutting, sanding, drilling, or shaping.
- Resin. A synthetic liquid substance that becomes solid when combined with a hardening agent.
- Molding. A shaping technique in which the sawdust–resin mixture is poured or pressed into forms.
- Finishing Techniques. Methods applied after curing to improve the appearance and texture of the product, including sanding, polishing, or coating.
- Decorative Pieces. Objects created mainly for aesthetic or ornamental purposes.
- Durability. The capability of the produced item to resist breakage, wear, or deformation.
- Sustainability. The practice of reducing environmental impact by reusing or repurposing materials.
- Wood Waste. Discarded by-products from woodworking activities, including shavings, scraps, and dust.
- Waste Reduction. The process of decreasing the amount of waste through reuse or repurposing.
- Workability. The degree to which the sawdust–resin mixture can be easily shaped or handled.
- Aesthetic Quality. The visual characteristics of the finished product, such as smoothness, color, and overall design.
- Keychain. The decorative sample product created for this study. It serves as the basis for assessing durability, functionality, aesthetic appeal, and overall feasibility of using sawdust as material.

II. REVIEW OF RELATED LITERATURE AND STUDIES

This chapter presents relevant literature and studies that support the development of decorative products using sawdust combined with resin. The discussion focuses on sawdust as wood waste, environmental concerns, resin as a binding material, sustainability, and previous research related to waste-based products. These sources help establish the foundation of the present study.

A. Related Literature

According to Wilson R. Nyemba (2018), the woodworking industries was producing a lot of timber waste every month—about 367 kg—and nearly half of the wood ended up as shavings and sawdust because of old machines and inefficient methods. With the city failing to collect the waste, the company tried burning it, but this caused air pollution complaints from neighbors. Selling or even giving away the sawdust didn't work because buyers couldn't transport it, and taking the waste to a dumping site only added to costs. As a result, waste management became a major cost and environmental challenge that the research aimed to address.

Sawdust is produced during woodworking processes such as cutting, sanding, and shaping of wood. It is commonly treated as waste and is often disposed of improperly. Bajpai (2018) described sawdust as a by-product that accumulates rapidly in furniture shops and wood-processing facilities. If unmanaged, sawdust becomes a source of environmental pollution and health risks, particularly respiratory problems among workers exposed to fine wood particles. Maier (2023) explained that sawdust disposal affects both land and water ecosystems. When dumped into soil, sawdust alters nutrient composition and reduces soil fertility. When released into water bodies, it increases biological oxygen demand (BOD), leading to oxygen depletion that harms aquatic organisms. Decomposing wood waste also produces greenhouse gases that contribute to climate change. These environmental impacts highlight the importance of repurposing sawdust instead of discarding it. Resin is commonly used in composite materials to bind loose particles and enhance strength and durability. Siddique (2014) stated that waste-based composites require appropriate binders to improve their mechanical properties and workability. Resin provides structural integrity by filling gaps between particles, making the mixture moldable and suitable for decorative and functional products. The ratio of resin to filler material significantly affects the final product's hardness, stability, and surface quality. Studies have shown that increasing resin content improves strength but may increase production cost, while insufficient resin can lead to weak and brittle products. This supports the need to experiment with different sawdust–resin ratios in developing decorative keychains. Sustainability promotes the efficient use of resources and the reduction of waste through recycling and upcycling. Karlsson et al. (2021) emphasized that industries contribute significantly to environmental degradation, and sustainable material development helps reduce carbon emissions and resource depletion. The use of industrial by-products such as sawdust reduces the demand for virgin materials and minimizes landfill waste.

Liu et al. (2022) highlighted that sustainable practices in material development not only benefit the environment but also offer economic opportunities through the creation of alternative products. Transforming sawdust into decorative pieces aligns with sustainable development goals by reducing waste while producing useful and marketable items.

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Mak (2023) discussed the creative potential of sawdust in making decorative and artistic products. Crafting from sawdust provides an eco-friendly alternative to conventional materials while encouraging creativity and innovation. Decorative items made from recycled materials also increase awareness of environmental responsibility among communities and students.

Small decorative products such as keychains are practical for experimental studies because they require minimal material, are easy to mold, and allow for testing of different material ratios and finishing techniques. These characteristics make keychains suitable as prototype products for waste-based material research.

Mroueh et al. (2000) found that industrial by-products can be effectively incorporated into construction and composite materials without compromising performance. Their study supports the idea that sawdust can be used as a filler material when combined with appropriate binders such as resin.

Adegoke et al. (2022) reported that waste-based materials can be transformed into durable and functional products while reducing environmental impact. Their findings show that repurposing waste contributes to sustainability and can generate alternative income sources.

Prabath and Ramadoss (2022) examined resin-bonded composite materials and found that material ratios, curing time, and finishing techniques influence hardness, stability, and surface quality. This directly supports the present study's focus on determining the ideal sawdust–resin ratio and proper production methods for decorative keychains.

Local studies in furniture and cabinet-making programs emphasize the importance of material experimentation and waste utilization in workshop-based learning. Previous research conducted in technical institutions shows that recycled wood materials can be transformed into functional craft products, promoting sustainability and practical skills among students.

Studies in Philippine woodworking education also highlight that proper finishing techniques, such as sanding and polishing, improve aesthetic quality and durability of handmade products. These findings support the inclusion of finishing methods as controlled variables in the present study.

B. Synthesis

The reviewed literature and studies show that sawdust is a widely available waste material that poses environmental and health risks when improperly disposed of. Research supports the use of resin as a binding agent to improve the strength and workability of waste-based composites. Sustainability frameworks encourage the reuse of industrial by-products to reduce waste and promote eco-friendly production.

Although many studies focus on sawdust for construction materials and fuel briquettes, limited research explores its application in small decorative products such as keychains. This gap justifies the present study, which aims to develop decorative pieces from sawdust and resin, determine appropriate material ratios, and evaluate their contribution to waste reduction and sustainable practices in Cebu Technological University.

III. RESEARCH METHODOLOGY

This chapter outlines the systematic procedures utilized in the development and evaluation of decorative pieces derived from wood sawdust and resin. It details the experimental design, materials, and specific laboratory techniques required to transform waste wood byproducts into functional aesthetic composites.

A. Research Design

The study employs a combination of experimental and descriptive survey to fully evaluate the development of sawdust resin keychains.

The researchers use an experimental research design to determine the possibility of transforming sawdust into decorative furniture pieces using resin as adhesive. Different scale mixture of sawdust and resin is tested to get the ideal ratio. The experimental design allows controlled manipulation of variables such as the proportion of materials, curing time, and molding techniques to observe their effects on the final product.

On the other hand, a descriptive survey design is utilized to evaluate the level of acceptability of the finished products among respondents. After producing the keychain's, selected respondents are asked to assess the product using a structured questionnaire. The survey focuses on key factors such as appearance, durability, functionality, environmental value, and cost and marketability.

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B. Research Instrument

This study used several research instruments to collect and evaluate data. First, a structured questionnaire, which will be distributed to the FCM students in CTU Main, to be used to evaluate the finished keychains in terms of appearance, durability, functionality, environmental value, and cost or marketability. Second, an observation checklist, it utilizes during the experimentation to monitor and record the curing time, material ratios, defects, hardness, and other relevant measurements. Third, measuring tools, it is to maintain precise ratios while doing the experimentation of these induced scales and measuring cups. Lastly, photographic documentation, this helps to capture images of the keychains at various stages, providing visual evidence for quality assessment and analysis.

C. Research Environment

This study is conducted in Cebu Technological University (CTU) located at M.J. Cuenco Ave, Cor R. Palma Street, 6000 Cebu. Where we utilized the FCM shop's saw dust waste into a new decorative piece. This is to further innovate a new way to minimize the saw dust waste thus minimizing the wood waste problem. The respondents are the FCM students which will be given a survey questionnaire in their major class to get a more thorough understanding of the impact of the study, ultimately driving improvements and innovation.

D. Research Respondents

The respondents of this study are the FCM students in CTU, where we will give survey questionnaires to thirty FCM students from 1st year to 3rd year students. Ten questionnaires for the first year, ten questionnaires for 2nd year students, and ten questionnaires for the 3rd year students, to get an unbiased result and opinions on why this study is relevant.

E. Data Gathering Procedure

The researchers sent a transmittal letter to the Dean of College of Technology to seek approval of conducting a survey to the students of Furniture and Cabinet Making students. The researchers also ask for permission from the major professor of FCM to give a survey questionnaire to the students. Upon receiving the approval, the researchers will distribute 20 item survey questionnaires to the students in their respective major class time. The researchers will give clear instructions on how to answer the survey and explain how this will help to further improve the study. The retrieval of the survey questionnaire will be done immediately. Results were collected and tabulated using the Micro excel program. The raw data will be then analyzed and interpreted.

IV. PRESENTATION, ANALYSIS, AND INTERPRETATION OF DATA

This chapter presents the analysis and interpretation of data gathered from the experimental testing and survey conducted on sawdust-resin decorative keychains.

Table 1 below presents the experimental result of sawdust to resin used in producing decorative keychains.

Table 1 - The ideal ratio of sawdust and resin

Trial	Sawdust	Resin	Observation
Ratio 1	50mL	50mL	Durable but heavy and required more resin.
Ratio 2	60mL	40mL	Balanced texture, stronger bonding, smooth finish.
Ratio 3	70mL	30mL	Product become brittle and it crack.

In terms of the ratio of sawdust and resin, based on experimental observation, the ratio of 60:40 (sawdust to resin) produced the most favorable results among all tested mixtures. It provided the best balance in terms of durability, appearance, and material efficiency. The 50:50 ratio showed acceptable strength but was less economical due to higher resin usage, while the 70:30 ratio failed to meet durability requirements due to brittleness and cracking.

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The findings indicate that the 60:40 sawdust-to-resin ratio is the most effective combination for producing decorative keychains, as it achieves optimal balance between strength, finish quality, and cost efficiency.
Table 2 below presents the challenges and limitations encountered during the production of sawdust-resin keychains.

Table 2 - Challenges and limitations arise in the production.

Category	Observation
Longer curing delayed production time	
Uneven mixing, air bubbles, and cracking occurred	
Resin increased the total production expense	

The production process revealed several technical and material-related challenges. Curing time significantly affected production efficiency, as longer curing periods delayed output but improved structural strength. Production issues such as air bubbles and uneven mixing affected product consistency and appearance. Among all challenges, material cost particularly resin was the most significant limitation. Although challenges were encountered during production, these issues can be managed through proper technique, improved mixing methods, and controlled curing conditions. Despite limitations, the use of sawdust remains a viable and sustainable approach for decorative product development.
Table 3 shows the result of response to the survey that is conducted.

Table 3 – Level of Acceptability of Sawdust-Resin Keychains

Item	A. Appearance	SD (1)	D (2)	N (3)	A (4)	SA (5)
1	Fine sawdust produces better quality keychains.	0%	0%	36.70%	46.70%	16.70%
2	The moisture content of sawdust affects the final product.	0%	0%	23.30%	53.30%	23.30%
3	Uniform particle size of sawdust improves durability.	0%	0%	13.30%	66.70%	20%
	B. Functionality					
4	The amount of resin affects the strength of the keychain.	0%	0%	16.70%	66.70%	16.70%
5	Too much resin reduces the eco-friendliness of the product.	0%	0%	13.30%	63.30%	23.300%
6	Proper mixing of resin ensures better finishing.	0%	0%	12.00%	23.30%	66.70%
	C. Durability					
7	A balanced ratio of sawdust and resin improves product quality.	0%	0%	26.70%	50%	23.30%
8	The ideal ratio is important for achieving durability and aesthetics.	0%	0%	6.70%	30.30%	60%

The survey results indicate a consistently high level of acceptance of sawdust-resin keychains in terms of appearance, functionality, and durability. Across all indicators, there were no responses under "Disagree" or "Strongly Disagree," showing a clear positive perception among respondents.

A. Appearance

For Item 1, 46.7% of respondents selected "Agree" and 16.7% selected "Strongly Agree," while 36.7% remained neutral, indicating that a majority (63.4%) believe fine sawdust improves product quality. In Item 2, 53.3% agreed and 23.3% strongly agreed (76.6% total agreement) that the moisture content of sawdust affects the final product. Similarly, Item 3 shows 66.7% agreement and 20.0% strong agreement (86.7% total), demonstrating a strong consensus that uniform particle size improves durability.

B. Functionality

For Item 4, 66.7% agreed and 16.7% strongly agreed (83.4% total agreement) that the amount of resin affects product strength. Item 5 reveals that 63.3% agreed and 23.3% strongly agreed (86.6% total) that excessive resin reduces eco-friendliness. Item 6 recorded the highest level of strong agreement, with 66.7% selecting "Strongly Agree" and 23.3% selecting "Agree" (90.0% total agreement), emphasizing the critical importance of proper mixing of resin.

C. Durability

In Item 7, 50.0% agreed and 23.3% strongly agreed (73.3% total agreement) that a balanced ratio of sawdust and resin improves product quality. Item 8 shows 33.3% agreement and 60.0% strong agreement (93.3% total agreement), indicating a very strong consensus that the ideal ratio is essential for achieving durability.

The findings demonstrate that the majority of respondents consistently selected "Agree" and "Strongly Agree," with total agreement levels ranging from 63.4% to 93.3% across all items. The highest levels of agreement were observed in aspects related to proper resin mixing (90.0%) and ideal material ratio for durability (93.3%), highlighting these as the most critical factors. Overall, the results confirm that both material characteristics (particle size, moisture content, and ratio) and resin management (amount and mixing process) play a significant role in determining product quality, functionality, and durability.

V. SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATION

This chapter presents the summary of findings, conclusions, and recommendations of the study. The study focused on developing sawdust into decorative pieces, particularly keychains, using resin as a binding material. It also evaluated the ideal ratio of materials, production challenges, and the level of acceptability of the product.

A. Summary of Findings

The primary objective of this study was to develop a decorative product using sawdust and determine its effectiveness in terms of quality, production, and sustainability.

Based on the experimental results (see Chapter 4, page 21), three different ratios of sawdust and resin were tested. The 50:50 ratio produced a durable output but required more resin, making it costly. The 70:30 ratio resulted in a brittle product that easily cracked. Among all trials, the 60 mL sawdust and 40 mL resin ratio was identified as the most effective, as it provided a balanced texture, strong bonding, smooth finish, and cost efficiency.

In terms of production challenges (page 21–22), the study found that curing time significantly affected the production process. Longer curing time improved product hardness but delayed production. Other issues encountered included uneven mixing, air bubbles, cracking, and lack of proper tools. Resin was also identified as the main factor contributing to production cost.

The survey results showed a high level of agreement among respondents regarding the acceptability of the product. In terms of appearance, most respondents agreed that fine sawdust, proper moisture content, and uniform particle size improve product quality.

For functionality, respondents strongly agreed that the correct amount of resin and proper mixing are essential for product strength and finishing, with agreement reaching up to 90%.

In terms of durability, the results showed very high agreement (up to 93.3%) that the proper ratio of sawdust and resin is crucial in achieving a strong and long-lasting product.

Overall, the findings indicate that sawdust-resin keychains are acceptable in terms of appearance, functionality, and durability, and are considered a viable product.

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VI. CONCLUSION

Based on the findings of the study, it can be concluded that sawdust can be successfully developed into decorative pieces such as keychains using resin as a binding material.

The study confirmed that the ratio of sawdust and resin plays a significant role in determining the quality of the product. The 60:40 ratio was found to be the most ideal, as it provides a balance between durability, appearance, and cost efficiency.

Although the production process faced challenges such as curing time, mixing difficulties, and cost of materials, these issues can be managed through proper techniques and planning. Despite these limitations, the product showed strong acceptability among respondents.

Furthermore, the study highlights the potential of sawdust as an alternative material for decorative products. It contributes to waste reduction, promotes sustainability, and provides an opportunity for innovation in woodworking practices.

VII. RECOMMENDATIONS

Based on the conclusions of the study, the following recommendations are proposed; Future researchers should explore other ratios and alternative binding materials to further improve product quality and reduce cost. Proper mixing techniques and tools should be used to avoid defects such as air bubbles and cracking during production. The curing process should be improved by controlling time and environmental conditions to enhance efficiency and product quality. Woodworking shops should consider utilizing sawdust waste in creating decorative or functional products to reduce environmental impact. The product may be improved further in terms of design, finishing, and packaging to increase its marketability. Larger-scale studies with more respondents are recommended to validate the acceptability and commercial potential of the product.

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APPENDICES

APPENDIX A

Republic of the Philippines
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COLLEGE OF TECHNOLOGY

Survey Questionnaire

Research Title: DEVELOPING SAW DUST INTO DECORATIVE PIECES
Location: Furniture and Cabinet Making Shop, Cebu Technological University
A.Y.: 2025–2026

Instructions: Please answer the following questions honestly. Your responses will be used for research purposes only.

Part I: Respondent Profile
Name:_____
Age: _____
Gender: ☐ Male ☐ Female ☐ Prefer not to say
Role: ☐ Student ☐ Instructor ☐ Technician ☐ Other: _____
Experience in woodworking: ☐ Beginner ☐ Intermediate ☐ Advanced

Part II: Ideal Ratio of Sawdust to Resin

Direction: Rate the following statements using the scale below:
1 – Strongly Disagree
2 – Disagree
3 – Neutral
4 – Agree
5 – Strongly Agree

Items	A. Appearance	1	2	3	4	5
1	Fine sawdust produces better quality keychains.					
2	The moisture content of sawdust affects the final product.					
3	Uniform particle size of sawdust improves durability.					
	B. Functionality					
4	The amount of resin affects the strength of the keychain.					
5	Too much resin reduces the eco-friendliness of the product.					
6	Proper mixing of resin ensures better finishing.					
	C. Durability					
7	A balanced ratio of sawdust and resin improves product quality.					
8	The ideal ratio is important for achieving durability and aesthetics.					

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APPENDIX B

Request for Approval to Conduct Research Survey

April 21, 2026

Dr. Janice A. Alivio
Dean, College of Technology
Cebu Technological University

Dear Ma'am,

Good day,

We are a 3rd year students, writing to respectfully request approval to conduct our research survey as part of our study entitled "Developing saw dust into decorative pieces". This research is being undertaken in partial fulfillment of the requirements for Bachelor of Industrial Technology major in Furniture and Cabinet Making at Cebu Technological University.

The primary objective of this study is to develop a decorative piece using saw dust, a common wood waste portion in wood working shop at Cebu Technological University. This innovative approach aims to address both sustainability and high-value use for sawdust waste. To achieve this, we intend to administer a survey to thirty FCM students of CTU , which will involve answering a set of structured questions designed to gather relevant data for analysis.

Rest assured that all information collected will be treated with strict confidentiality and will be used solely for academic purposes.

Thank you very much for your time and consideration. I am hoping for your kind approval of this request.

Respectfully yours,
Kristine Dale Restauro
Research Leader

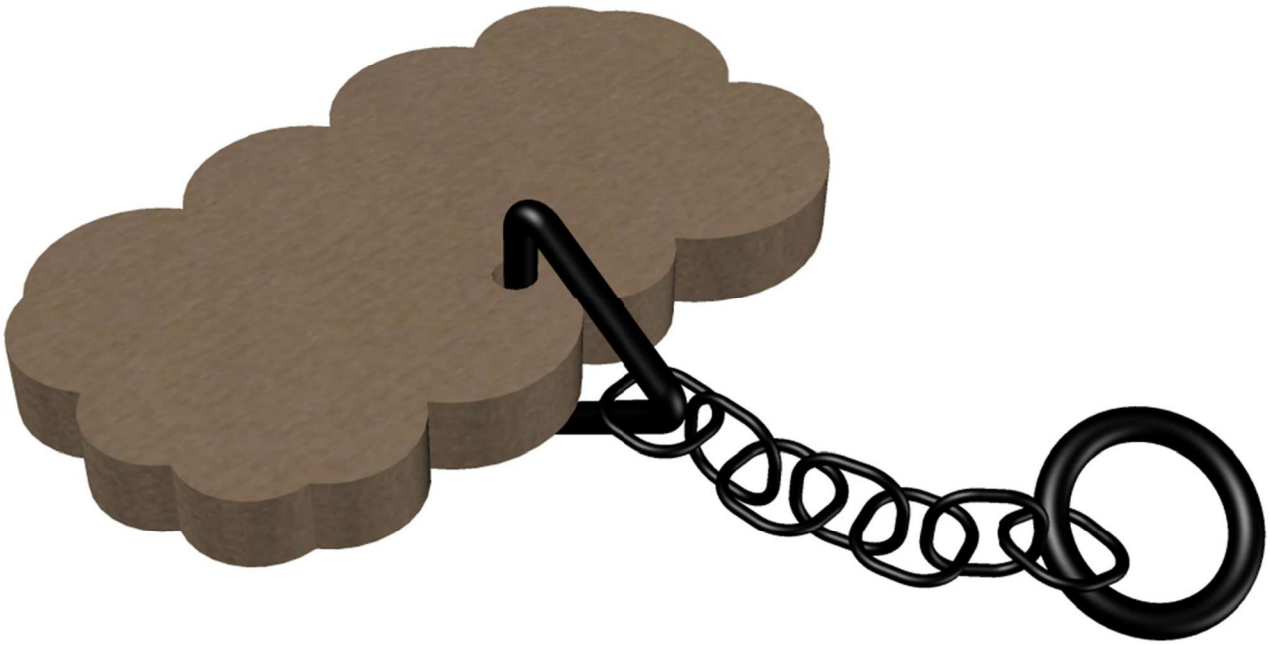
Noted by:
Dr. Mario Pardillo
Research Adviser

Recommending Approval:
Dr. Janice A. Alivio
Dean of College of Technology

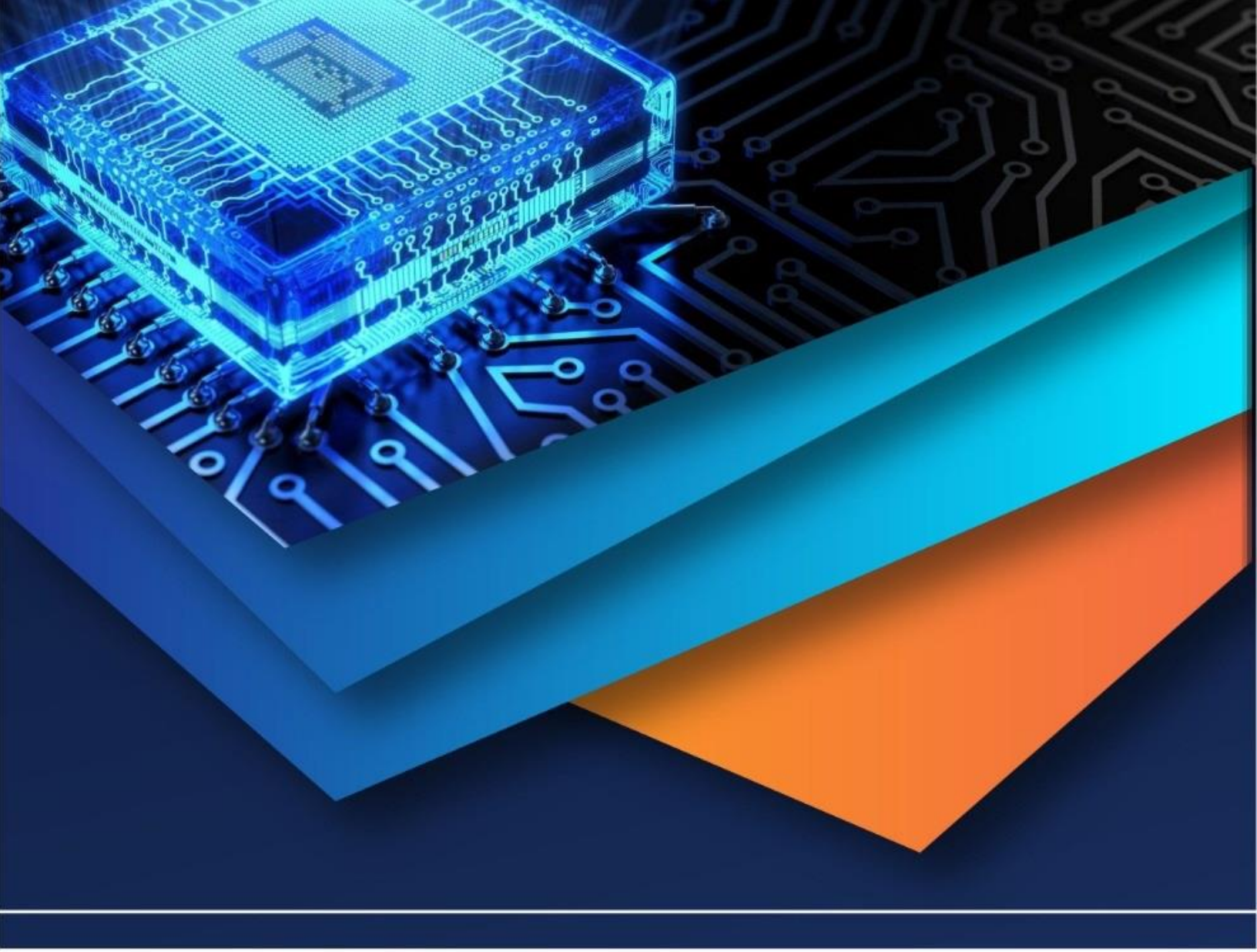
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APPENDIX C



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