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Innovation in Material and Production of Rattan Craft in Padang, West Sumatra

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Abstract

Innovative advancements in material processing, design, and production methodologies are pivotal in overcoming the challenges facing the craft business industry. These challenges include inefficiencies in production, limited global market reach, and growing environmental concerns. By adopting advanced techniques and sustainable practices, the industry can unlock new opportunities, particularly in nations rich in natural resources such as Indonesia. Rattan, a prominent material in the craft and furniture sectors, exemplifies how local resources can drive both economic growth and environmental sustainability. Sustainable practices such as responsible harvesting, recycling, and the use of non-toxic finishes position the industry as a leader in green manufacturing. These practices not only protect natural resources but also align with global trends emphasizing sustainability, further enhancing market appeal. This paper is an attempt to explore and review the advancements, challenges, and opportunities within the craft business industry, with a particular focus on material and production. By examining the integration of traditional craftsmanship with modern technologies, the study aims to highlight how innovative methodologies can enhance production efficiency, product quality, and market competitiveness. This paper also delves into the role of local resources, such as rattan, in shaping the craft industry's future, emphasizing their potential to drive economic growth while supporting environmental sustainability.

Keywords: Innovation, Alternative Material, Craft Production, Rattan, Padang Craft Industry

1. Introduction

Rattan is one of the most prominent forest products, second only to timber in recognition. Its popularity stems from its unique characteristics: a distinctive shape, ease of handling, strength, and remarkably sharp edges. These attributes make rattan a preferred raw material in the furniture industry. However, despite its significant potential, the utilization of rattan resources has not been matched by proportional industrial growth. The development of the rattan industry in Indonesia has been relatively slow, even though the country boasts abundant raw material availability [1].

To address these challenges, the Indonesian Ministry of Trade issued Regulation No. 35/M-DAG/PER/11/2011 on November 30, 2011. This regulation governs the export of various forms of rattan, including raw, semi-processed, and unfinished products. This policy aims to encourage domestic processing, adding value to the rattan industry and fostering its growth. The need for Manau rattan is increased by the Government Regulation, namely, in order to support domestic rattan production, chairs and study tables for schools are being procured using Manau rattan material, this program is called the Comfort School with Rattan Program. With this regulation, it is estimated that the need for rattan will increase by around 100,000 tonnes of semi-finished rattan. The rattan plant has been known to the Indonesian people for quite a long time and this plant has long been used as a raw material for various handicrafts and the domestic furniture industry. Currently, the rattan processing industry has spread to various countries, such as China, South Korea and Europe. Selling prices for rattan crafts, especially those produced by craftsmen in Indonesia, ranging from hundreds to thousands of US dollars on the market international. Indonesia is the largest rattan producing country in the world, it is estimated that 80% of rattan raw materials worldwide are produced by Indonesia [2], [3], [4].

Other rattan producing countries such as the Philippines, Vietnam and other Asian countries. Rattan producing areas are the islands of Kalimantan, Sumatra, Sulawesi and Papua with the potential for Indonesian rattan around 622,000 tons/year. West Sumatra Province is the province that produces the most rattan raw materials on the island of Sumatra and is ranked 6th, the province that produces the most rattan in all of

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Indonesia. So, West Sumatra province has the potential to produce processed rattan, either in the form of semi-finished processed rattan or ready-to-use rattan [5] ,[6].

In the city of Padang, the Manau rattan processing industry is classified as a small and medium industry and is under the auspices of the Department of Industry, Trade, Mining and Energy of the City of Padang. 2014 data released by the Department of Industry, Trade, Mining and Energy of the city of Padang shows that there are 11 Manau rattan processing industries in the city of Padang spread across 11 sub-districts. The average production capacity produced by Manau rattan processing companies in the city of Padang is 48 tons per year. This, of course, is not comparable to the needs of the Manau rattan industry, which is spread throughout Indonesia, such as the need for Manau rattan on the island of Java, namely Cirebon and Semarang or the need for the Manau rattan industry in the local area of West Sumatra itself. There is a good opportunity to develop the Manau rattan processing industry to develop and improve quality to meet domestic and international requirements. Processed products from the rattan manau processing company in Padang City are mostly sent to West Sumatra, Jambi and Bengkulu. Apart from that, after the issuance of regulations regarding the ASEAN Single Market policy since December 2015, the market potential for selling Manau rattan has also increased. Based on a comparison of the need (demand) and supply of rattan available in Indonesia, there is a gap [6], [7].

The supply as much rattan is as possible 622,000 tons/year is not comparable to the demand of 619,538 tons per year for semi-finished rattan and 533,658 tons per year for finished rattan. Therefore, considering the large demand for rattan, this makes this a very good opportunity to increase production and the existence of rattan processing and the rattan furniture industry in the city of Padang to take advantage of this market opportunity In fact, before the government issued a regulation prohibiting the export of semi-finished Manau rattan products, the processed industrial products were exported to South Korea. The Manau rattan processing industry only produces semi-finished processed products from Manau rattan in small, medium and large sizes. To vary rattan craft products with local cultural content, materials such as acrylic paint, brushes, samples, pictures, handmade products from rattan. Education, training and practice of diversifying rattan craft products with regional cultural content are ways to carry out community service program activities. To solve a partner's problem, the following things must be done: (1) determine what problems are a priority for the partner; (2) using the right approach to solve partner problems; (3) create a work plan supported by partner participation; and (4) increasing education, training and practice of diversifying rattan craft products related to regional culture [8], [9].

Material of Rattan Crafts

CV. ABC is currently capable of making rattan crafts, including parcel fruit baskets with an average quantity of 120-150 units per month with a selling price of between 10,000 and 40,000 rupiah per piece depending on the size. Apart from fruit baskets, rattan furniture are also a commonly made craft product, with an average quantity of 70-90 units per month with a selling price of between 100,000 and 500,000 rupiah per piece. The sample of rattan product as in Figure 1.

Figure 1 Furniture made from Rattan

Natural Rattan

Rattan stems are cylindrical, with a smooth outer surface and a spongy core. They can grow up to hundreds of meters in length, depending on the species. Its flexibility allows it to be bent and shaped without breaking, while its durability ensures longevity in various applications. Unlike bamboo, which is hollow, rattan is solid, contributing to its strength and making it ideal for crafting robust furniture and structures [4], [10].

Moreover, rattan is lightweight, making it easy to transport and handle. This property enhances its appeal in the furniture industry, where ease of manufacturing and movement are critical. Additionally, its porous surface readily absorbs paints and varnishes, allowing for aesthetic customizations to suit modern and traditional designs. Natural rattan is harvested from rainforests, where it regenerates quickly, making it a renewable resource. Farmers typically cut the stems while leaving the root system intact, allowing the plant to regrow. This sustainable harvesting method supports forest conservation, as rattan grows best in biodiverse environments. Promoting rattan cultivation can incentivize the protection of forests, thereby preventing deforestation for agricultural or industrial purposes [7], [11].

However, challenges arise from overharvesting and habitat loss due to illegal logging and land conversion. To address these issues, certification systems like the Forest Stewardship Council (FSC) encourage sustainable management practices, ensuring rattan is sourced responsibly. The most common use of rattan is in the furniture industry. Its strength and pliability make it suitable for crafting chairs, tables, and shelves. Woven rattan is often used for creating intricate designs in baskets, mats, and other household items. These products have gained global recognition for their durability and aesthetic appeal, blending traditional craftsmanship with modern utility [11], [12].

Rattan's robust yet lightweight nature makes it an excellent choice for constructing frameworks, particularly in rural areas. It is used to build walls, roofs, and temporary shelters, especially in regions where alternative materials are scarce. With growing concerns over environmental degradation, rattan is being promoted as a substitute for plastic and synthetic materials. Its natural biodegradability ensures minimal environmental impact compared to non-renewable alternatives. In addition to traditional uses, rattan is finding applications in industrial products such as tool handles, walking sticks, and sports equipment. Artists and designers also value rattan for its ability to create intricate, nature-inspired installations and sculptures [12], [13].

Rattan contributes significantly to the economies of producing countries, particularly in Southeast Asia. It supports rural livelihoods by providing income to farmers, harvesters, and artisans involved in the supply chain. In Indonesia, for instance, the rattan industry is a vital source of employment, with production canters in Kalimantan, Sumatra, Sulawesi, and Papua contributing to the country's dominance in the global rattan market. Export restrictions imposed by governments, such as Indonesia's 2011 regulation on raw rattan exports, aim to promote domestic processing and value addition. By encouraging local manufacturing, these policies seek to enhance economic benefits and strengthen global competitiveness in finished rattan products. The natural rattan industry, despite its significant potential, is confronted with various challenges that threaten its sustainability and competitiveness. Overharvesting and deforestation are among the most pressing issues, as unsustainable harvesting practices deplete rattan resources and disrupt forest ecosystems. This overexploitation not only diminishes rattan's availability but also impacts biodiversity and the livelihoods of communities that rely on these resources [5], [6], [14].

Furthermore, the rise of synthetic rattan poses a significant challenge to the natural rattan market. Synthetic rattan, often made from plastic materials, offers benefits such as greater weather resistance, durability, and uniformity. These attributes make it particularly attractive in certain markets, where consumers prioritize low maintenance and longevity. Consequently, synthetic alternatives increasingly overshadow natural rattan, reducing its demand and market share. Another hurdle is the limited awareness of rattan’s ecological benefits and unique properties in global markets. While rattan is an environmentally friendly material that promotes sustainable development, its advantages are often overlooked in favour of other materials. This lack of visibility hinders its potential to compete effectively, particularly in markets where environmental consciousness is a growing trend. To address these challenges, innovations in rattan processing and product design are crucial. Advanced treatment techniques, such as steaming and chemical coating, enhance the material's durability and resistance to pests. Additionally, blending rattan with other materials like metal or glass creates contemporary designs that appeal to modern consumers [12], [15].

Promoting rattan as an eco-friendly alternative in global markets can further boost its demand. Certifications ensuring sustainable sourcing, coupled with marketing campaigns emphasizing its renewable nature, can attract environmentally conscious consumers. Natural rattan is a remarkable resource with diverse applications, from furniture and crafts to construction and industrial uses. Its sustainability, combined with its economic importance, makes it a key player in the transition toward environmentally friendly materials. By addressing challenges through sustainable practices and innovations, the rattan industry can continue to thrive, benefiting both local communities and global markets. With proper management, rattan has the potential to remain an integral part of the craft business and sustainable development initiatives worldwide [13], [16], [21].

Synthetic Rattan

Another alternative material to rattan is synthetic rattan. At first glance, when you look at furniture made from synthetic rattan, it is very possible that you cannot differentiate this basic material from real rattan. In appearance, woven from synthetic rattan looks the same as that made from real rattan. However, of course the type of synthetic rattan is different from natural rattan. If natural rattan is a type of plant used as a basic material for various furniture, synthetic rattan comes from processing plastic materials through manufacturing processes. This type of synthetic rattan cannot be taken directly from nature, but rather goes through a long process managed by the manufacturer's sophisticated machines. This variety of synthetic rattan from natural materials can also be divided into two raw materials, namely polyethylene and another type called polyvinyl chloride (PVC). From the processing of this

plastic material, three types of synthetic rattan strands can be produced. There is a polystrap type which is wide and flat. There is a type of polycore which is slightly round in shape. One more thing, there is a polypeel model that resembles a semicircular shape [2], [3], [17], [18].

Synthetic rattan emerged because natural rattan was very popular in society. From the past until now, it cannot be denied that many people continue to hunt for rattan furniture for their furniture needs. This type of rattan material has many advantages and is able to provide a luxurious and classic impression at the same time. These three types give craftsmen more freedom to weave synthetic rattan into various beautiful handmade products. Synthetic rattan emerged because natural rattan was very popular in society. From the past until now, it cannot be denied that many people continue to hunt for rattan furniture for their furniture needs. This type of rattan material has many advantages and is able to provide a luxurious and classic impression at the same time [6], [7], [18].

On the one hand, the large demand for rattan makes rattan woven crafts a promising business potential. However, on the other hand, there are concerns that nature will not be able to provide the need for rattan according to current community orders. This is because rattan plants have a relatively long growing time, even though demand continues to flow all the time. To meet the demand for rattan, we are starting to look for alternative materials so that everyone can still get their dream rattan woven crafts. Plastic is the answer to creating artificial rattan that is very similar to the original, which is now known as synthetic rattan. Not only is it popular with the public because its texture and model resembles natural rattan, synthetic rattan is often the main choice because it is considered more environmentally friendly. With synthetic rattan, the survival of rattan plants will be better maintained, thus preventing this population from becoming extinct [8], [11].

Production of Rattan Crafts

The production of rattan crafts uses minimal tools and without any product diversification carried out by rattan craftsmen. The potential can be further increased with product diversification strategies such as adding lampshade products and rattan flower vases with various shapes, designs, carvings, colours and patterns that are unique and characteristic of regional culture. Apart from adding products, diversification can also be done by adding artistic value to products that have been produced so far, such as the fruit baskets. Creating rattan crafts is an intricate process requiring precision and care. The process begins with the preparation of raw rattan. First, whole rattan stems are cleaned thoroughly to remove impurities. Once cleaned, the rattan is split into thin strips, which are suitable for weaving. This step ensures the material is both flexible and manageable for the subsequent crafting process [5], [7], [20].

The next phase involves softening the rattan strips. These are soaked in hot water to make them pliable and easy to weave. This step is essential, as untreated rattan can be stiff and challenging to work with. Once softened, the craftsmen prepare the framework of the desired product. This framework, typically made from sturdier rattan segments, provides structural integrity to the final craft. With the framework in place, the weaving process begins. Artisans carefully interlace the rattan strips over the framework, creating intricate patterns and designs. This stage requires significant skill and attention to detail, as the quality of the weaving determines the aesthetic and functional appeal of the finished item [4], [5], [19].

After completing the weaving, a finishing touch is applied. Craftsmen coat the woven rattan with varnish or paint, enhancing its durability and giving it a polished, vibrant appearance. The varnish not only protects the rattan from wear and tear but also adds a touch of elegance to the final product. Once dried, the rattan craft is complete and ready for sale. This methodical process showcases the craftsmanship and cultural heritage inherent in rattan-based products, making each piece unique and valuable. Rattan production has undergone significant advancements, driven by the need for sustainable practices, enhanced product quality, and the increasing global demand for eco-friendly materials. Innovations in harvesting, processing, and product design have transformed the rattan industry, making it more efficient and competitive [1], [3], [11].

The rattan industry has seen substantial advancements aimed at ensuring sustainability, improving processing techniques, and embracing innovation to meet modern demands. Sustainable harvesting practices have become essential to preserve rattan resources for future use. Methods like selective cutting, where only mature rattan is harvested to allow younger stems to regenerate, and certifications from organizations such as the Forest Stewardship Council (FSC), which promote responsible sourcing, are helping mitigate the effects of overharvesting. Additionally, the integration of rattan cultivation into agroforestry systems not only reduces deforestation but also enhances biodiversity by combining rattan with other crops [6], [8].

Processing techniques have also evolved to enhance rattan's usability and durability. Heat treatments, such as steaming and boiling, are commonly used to make rattan pliable for crafting intricate designs. Chemical treatments, including anti-fungal and anti-pest coatings,

extend the product's lifespan, particularly in humid climates. Modern mechanical processes, like precision splitting and sanding, reduce waste and improve efficiency, enabling better utilization of raw materials [5], [7].

Material innovations have further expanded rattan's versatility. Blending natural rattan with other materials, such as metals or recycled plastics, has led to contemporary designs appealing to modern aesthetics. Synthetic rattan, often made from polyethylene, is gaining popularity due to its weather-resistant properties, making it ideal for outdoor furniture. Additionally, eco-friendly, biodegradable coatings align with consumer preferences for sustainable and non-toxic products [3], [16].

Digitalization and automation are transforming rattan production. Computer-aided design (CAD) facilitates precision in crafting intricate patterns, enabling mass production without compromising design quality. Automation in tasks such as weaving and frame a Assembly has enhanced efficiency and reduced labour costs. Moreover, the rise of e-commerce platforms allows rattan producers to reach global markets and cater to environmentally conscious consumers [21].

Finally, ongoing research and development focus on uncovering new applications for rattan. Scientists are enhancing its tensile strength and flexibility, making it suitable for industrial applications. Efforts to develop closed-loop systems for recycling rattan waste are also contributing to a circular economy, reducing environmental impact and ensuring long-term sustainability. These advancements collectively position rattan as a resilient and innovative material in the global market [22], [23], [24], [25].

Conclusion

Local rattan entrepreneurs show great potential, particularly in producing versatile household furniture like tables and chairs in various styles, including barrel and chairs. These affordable products meet both domestic and international market demands, showcasing their wide appeal. With over 80 models, rattan's charm and accessibility make it a favourite among diverse consumer groups. Innovations in the rattan industry amplify this potential. Sustainable practices, like selective cutting and agroforestry integration, ensure resource longevity while supporting biodiversity. Advanced processing techniques, such as heat treatments and anti-fungal coatings, enhance product durability and global competitiveness. Material innovations, including blending rattan with other materials and synthetic rattan's rise, expand design options for modern and outdoor applications. Digitalization and automation have further improved production efficiency, precision, and market access, especially through e-commerce platforms. Research continues to uncover new applications and sustainable recycling systems, positioning rattan as a leader in sustainable craft production. By combining traditional craftsmanship with modern innovation, local entrepreneurs are well-placed to strengthen their global presence, drive economic growth, and ensure the industry's sustainability.

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