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# Strategy of Production Efficiency and Improving the Quality of Wooden Sofa Legs in the Manufacturing Industry

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**ABSTRACT**

This study relates to the challenges faced by the wood furniture industry, specifically in the production of wooden sofa legs, which encounter issues with production efficiency and product quality. Many small and medium-sized enterprises still rely on manual processes that are time-consuming and result in products with varying quality. **This research aims** to formulate production efficiency strategies that can improve product quality without compromising costs or quality standards. The method used is a descriptive qualitative approach with a case study of a small furniture industry in Pacitan, East Java, through observations, interviews, and documentation, and data analysis using the Miles and Huberman model. The **gap** in this research lies in the lack of in-depth studies on the production of wooden sofa legs in the context of small and medium-sized industries in Indonesia, particularly in the application of lean manufacturing principles and quality control. The **novelty** of this research is the integration of lean manufacturing principles and quality control tailored to the specific conditions of small furniture industries, providing strategic recommendations that are practical for industry players. **The results and discussion** show that the application of the 5S system and production layout improvements successfully increased efficiency and reduced waste, while the implementation of strict quality control at each stage of production improved product consistency. The study also found that worker training and the application of Standard Operating Procedures (SOPs) significantly improved product quality.



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## 1. INTRODUCTION

In facing the challenges of globalization, the wooden furniture industry in Indonesia is faced with the demands to produce components such as wooden sofa legs with high efficiency without sacrificing quality. One of the main obstacles in this industry is limited resources, time-consuming manual work processes, and weak quality control systems applied to most small and medium enterprises (SMEs). The production process that still relies on individual skills causes significant quality variations, which have an impact on the instability of

production results. Based on these conditions, this study aims to formulate a production efficiency method that maintains or even improves product quality, and adapts the method according to the characteristics of the local furniture industry. This is directly related to the achievement of SDG 9 (Industry, Innovation, and Infrastructure), which emphasizes the importance of developing sustainable and innovative industrial infrastructure.

This study aims to provide solutions to the challenges faced by the wooden furniture industry, especially in the manufacture of sofa legs. The main focus of this study is to formulate a more efficient production method that can be applied in the context of the small to medium-scale furniture industry. The methods in question include the principles of lean manufacturing, a strict quality control system, and increasing worker capacity through informal training in the field. In addition, this study aims to explain how an adaptive managerial approach can improve efficiency without sacrificing product quality standards. This study also leads to the implementation of SDG 12 (Responsible Consumption and Production), which encourages more efficient production and reduces waste of resources. By promoting efficient use of materials, minimizing waste, and reducing environmental impact, the proposed production model contributes directly to the broader goal of sustainable industrial development. Moreover, the strategies outlined in this research are not only applicable to sofa leg manufacturing but can be extended to other components and sectors within the furniture industry, thus amplifying their impact. In terms of practical contributions, this study offers actionable guidelines for industry players ranging from small workshop owners to mid-sized factory operators on how to optimize production workflows, implement effective quality assurance practices, and foster a culture of continuous improvement. These guidelines are intended to be simple yet impactful, taking into account the typical resource constraints and contextual challenges of Indonesian furniture SMEs.

From a theoretical perspective, the study enriches existing literature on production management, lean systems, and quality control in the context of traditional industries that are undergoing modernization. It highlights the intersection between industrial efficiency and sustainable development, offering new insights into how localized, context-specific adaptations of global best practices can yield significant improvements in performance and competitiveness. Ultimately, the innovations and recommendations presented in this study are expected to yield tangible benefits not only for individual businesses but also for the wider industry ecosystem [1]. Improvements in product quality, operational efficiency, and environmental sustainability will enhance the global competitiveness of Indonesian furniture products, positioning them more strongly in international markets. At the same time, the study supports the development of a more resilient, innovative, and sustainable furniture industry, capable of adapting to future challenges while contributing to inclusive economic growth.

The wood furniture industry is a sector that plays an important role in the Indonesian economy, not only because of its capacity to absorb labor, but also because of its significant contribution to non-oil and gas exports. The furniture sector in developing countries relies heavily on operational efficiency and product quality to be able to compete in the global market [2]. Meanwhile, sofa legs are an important element in the structure and function of furniture because they are the main support points that determine stability and aesthetics. In practice, Indonesian furniture SMEs face major challenges related to irregular workflows, technological limitations, and low levels of product standardization. Therefore, this study is very relevant in finding solutions to improve the efficiency and quality of wooden furniture products, with the hope of meeting the demands of an increasingly competitive global market [3]. This study also contributes to the achievement of SDG 9 and SDG 12 by encouraging improvements in production quality that can be applied by furniture SMEs in Indonesia. With better efficiency and stricter implementation of quality control, the Indonesian wooden furniture industry can reduce resource waste, increase competitiveness, and contribute to sustainable local economic growth [4]. The application of lean principles and quality control in the production of wooden sofa legs is expected to be an applicable model for other furniture industries, providing a positive impact on the Indonesian economy as a whole [5].

## 2. LITERATURE REVIEW

### 2.1. Wooden Furniture Industry in Indonesia

The wooden furniture industry is one of the strategic sectors in the Indonesian economy, which is included in the creative industry subsector [6]. This sector has experienced significant growth in recent years, driven by increasing domestic market demand and exports to various destination countries such as the United States, Japan, and Europe. According to data from the Ministry of Industry of the Republic of Indonesia (2023), the furniture industry contributes a significant non-oil and gas export value and is able to absorb a large number

of workers, especially in production center areas such as Jepara, Pasuruan, and Cirebon. The main challenge in this industry lies in the ability to maintain product quality amidst market competition and limited technological resources [7].

Despite its significant contribution and strong potential, the wooden furniture industry continues to face structural and operational challenges that hinder its competitiveness. One of the most pressing challenges is the industry's struggle to consistently maintain high product quality, especially in the face of increasingly competitive global markets [8]. International buyers demand products that are not only aesthetically pleasing but also meet strict standards of durability, sustainability, ergonomics, and environmental compliance. Meeting these standards is often difficult for many small- and medium-scale furniture producers in Indonesia, who operate with limited access to modern machinery, production technology, and formal training programs for their workforce.

In addition, the sector must also address sustainability issues, including the sourcing of legal and certified timber, managing waste from production processes, and aligning with global sustainability standards such as the Forest Stewardship Council (FSC) and Sustainable Development Goals (SDGs). In particular, SDG 12 Responsible Consumption and Production calls for industries to optimize resource usage, reduce material waste, and implement cleaner production techniques. Aligning with these global agendas is not only ethically and environmentally imperative but also strategically necessary, as sustainability is becoming a non-negotiable requirement in international trade agreements and buyer specifications.

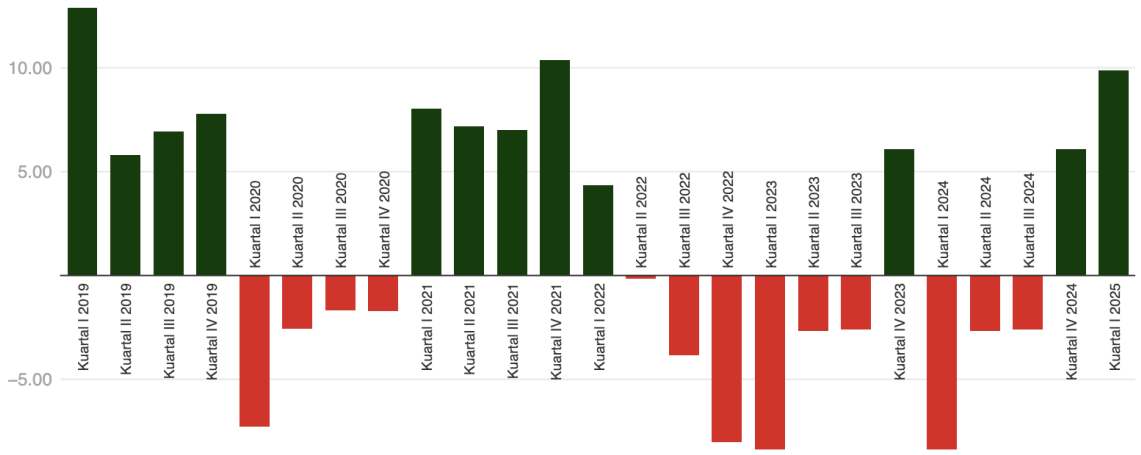


Figure 1. Furniture industry growth/contraction
Sumber: Emanuella Bungasmara Ega Tirta, CNBC Indonesia

Figure 1 above shows the surge in growth of the Indonesia International Furniture Expo (IFEX) 2025, which was held in early March, attended by more than 600 exporters, attracted 15 thousand from 115 countries, and recorded a potential on-the-spot transaction of US$ 350 million. The exhibition area reached 60,000 m², making it the largest in Southeast Asia. This surge in interest reflects strong demand from the global market, while also indicating that the national furniture industry has competitiveness and appeal that has not faded at least until tariffs are actually implemented [9].

## 2.2. Wooden Sofa Legs as Product Components

Wooden sofa legs are an integral part of furniture that has two main functions, namely as a structural support and a visual element that strengthens the product design [10]. This component must be able to withstand static and dynamic loads, and appear attractive in terms of aesthetics, both in terms of color, shape, and surface finishing [11]. The sofa leg production process includes several critical stages such as cutting raw materials, turning, sanding, to final processes such as coloring and coating. Each stage has a significant impact on the final quality of the product [12]. Therefore, strict control and consistent production techniques are required so that the final result can meet the quality standards expected by the market [13].

Figure 2. Wooden Sofa Legs

The wooden sofa legs seen in Figure 2 above are one of the important components in making furniture products, especially for sofas. The process of making these wooden sofa legs involves several stages, including cutting and smoothing the wood parts to ensure the quality and stability of the final product. These legs have a simple yet functional shape, with the ends equipped with metal nails to add strength and durability [14]. In addition, the use of wood as the main material provides a natural aesthetic touch that adds decorative value to the sofa. With skilled craftsmanship, each part of these wooden sofa legs is carefully produced to ensure that the resulting product is not only strong, but also has a visual appeal that supports the overall furniture design.

### 2.3. Production Efficiency: Lean Manufacturing and 5S

The concept of lean manufacturing is a systematic approach that aims to identify and eliminate waste in the production process [15]. Waste can appear in various forms, such as waiting time, unnecessary movement, overprocessing, and defective products. One practical method in implementing lean is the 5S approach, which consists of several interrelated steps [16]. Seiri (Sort) focuses on separating necessary and unnecessary items in the work area. Seiton (Set in Order) aims to organize tools and materials for easy access. Seiso (Shine) emphasizes the importance of maintaining a clean workplace to increase efficiency [17].

Furthermore, Seiketsu (Standardize) aims to standardize work procedures to make them more structured and easy to follow, while Shitsuke (Sustain) focuses on establishing a disciplined work culture [18]. Consistent application of the 5S principle has been proven to increase work process efficiency, reduce work accidents, and speed up production cycle times in the furniture manufacturing industry [19]. With this approach, companies can minimize waste and significantly increase productivity [20].

### 2.4. Product Quality Control and Improvement

Product quality is a crucial factor in the furniture industry because it is directly related to customer satisfaction and business sustainability. Quality control is carried out to ensure that each product unit complies with the specified technical specifications [21]. Common steps used include standardizing work processes, training workers to improve technical skills, and using precision measuring instruments such as calipers or special jigs in turning and drilling processes [22]. The importance of integration between quality control and lean principles in driving operational efficiency while maintaining consistent product quality, especially in the SME sector which is vulnerable to quality fluctuations. 2.5 Design Framework This study is based on a framework that connects the theory of production efficiency (Lean Manufacturing) with the concept of quality control in the context of the wooden furniture industry [23]. The aim is to analyze how both approaches can be applied in an integrated manner to the process of making wooden sofa legs. This framework is the basis for compiling observation and interview instruments and as a reference in analyzing field data [24].

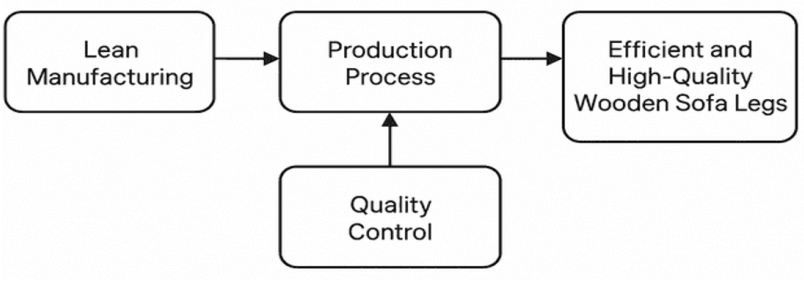


Figure 3. Illustrates the relationship

The Figure 3 above illustrates the relationship between three important elements in the production process of furniture components, especially wooden sofa legs. The process begins with the implementation of Lean Manufacturing, which aims to increase efficiency by reducing waste in production [25]. Lean Manufacturing is then directly related to the Production Process, where the production of wooden sofa legs is carried out efficiently using structured methods [26]. On the other hand, Quality Control is an element that ensures that each product produced meets the established quality standards, leading to the creation of Efficient and High-Quality Wooden Sofa Legs [27]. By integrating these three elements, it is hoped that the company can produce products that are not only efficient in the production process but also have well-maintained quality.

## 3. RESEARCH METHODOLOGY

This study uses a descriptive qualitative approach, which aims to explore in depth the phenomena and practices of efficient production strategies and quality improvement in the manufacturing process of wooden sofa legs. This approach is considered appropriate because it is able to capture the reality and dynamics of the field naturally, including perceptions, work practices, and obstacles faced by industry players directly [28]. This research was conducted in a wooden sofa leg manufacturing business unit located in Pacitan Regency, East Java. This location was chosen because it is one of the local furniture production centers that still maintains manual and semi-manual production patterns [29]. The selection of this location provides a representative picture of the condition of the local furniture industry that relies on manual skills, which is the main focus of research related to production efficiency and quality improvement on a small industrial scale [30].

Figure 4. Production and operational quality control

In Figure 4 several key actors are directly involved in the production process, namely the owner or main manager of the business who acts as a decision maker, the production foreman who is in charge of supervising the daily technical process, and production line workers who are responsible for technical implementation from cutting to finishing the product [31]. The involvement of these various actors is important to get a comprehensive picture of the process, strategy, and challenges faced in production, so that this research can provide more comprehensive results and can be implemented well in the local context [32].

### 3.1. Data Collection Techniques

The data collection technique was carried out triangulatively, namely by combining various methods to obtain valid and contextually rich information. The techniques used include:

- Participatory observation: Direct observation of daily production activities in the workshop, especially at the stages of turning, smoothing, and painting sofa legs.
- In-depth interviews: Conducted in a semi-structured manner with business owners, foremen, and employees to obtain data on work strategies, efficiency, quality control systems, and challenges faced.
- Documentation: Collecting visual evidence such as photos of the work process, layout plans, and SOP documents or internal standards if available.

### 3.2. Data Analysis Techniques

The collected data were analyzed using the [33] model, which consists of three main stages:

- Data reduction: Filtering and simplifying information from observations and interviews to focus on the theme of production efficiency and quality.
- Data presentation: Arranging selected information in the form of narratives, matrices, or process flow diagrams to facilitate the extraction of meaning.
- Conclusion drawing and verification: Interpreting the meaning of findings and cross-checking initial data so that conclusions can be scientifically justified.

### 3.3. Data Validity Test

To maintain the validity and legitimacy of the findings, this study applies the following strategies:

- Triangulation of sources and techniques: Comparing data from various sources (owners, foremen, workers) and with different techniques (observation, interviews, documentation).
- Member checking: The results of the interviews and initial interpretations are shown back to the informants for clarification and correction.
- Audit trail: The entire process of data collection and analytical decisions are documented in detail so that they can be audited and traced back.

## 4. RESULT AND DISCUSSION

### 4.1. Profile of Wooden Sofa Leg Industry

The object of this research is a medium scale manufacturing company located in Pacitan Regency, East Java. This company is engaged in the production of wooden sofa legs with a make-to-order scheme, namely based on orders that are adjusted to client specifications, both from the domestic market and limited exports. The company employs around 15 permanent workers, with a semi-manual production system, which means that the use of simple machines still depends heavily on the skills of the workforce. The production facility consists of four main zones raw material sorting, cutting, turning, and finishing areas. The work process is mostly carried out in one production area without adequate partitions, with direct supervision from the foreman. This characteristic is the basis for examining the implementation of efficiency and quality improvement strategies in conditions of limited resources.

### 4.2. Production Efficiency Strategy

The implementation of lean manufacturing principles in the company has begun with the implementation of the 5S approach, which aims to increase efficiency and reduce waste in the production area. Sort (Seiri) separates irrelevant items in the work area to reduce clutter and maintain focus on the production process. Set in Order (Seiton) arranges production tools and raw materials based on their frequency of use, making it easier for operators to access them quickly. Furthermore, Shine (Seiso) prioritizes cleanliness of the work area by maintaining cleanliness at the end of each work shift, which not only reduces the risk of accidents but also maintains product cleanliness standards.

In addition, Standardize (Seiketsu) ensures that the layout and work rules are standardized so that work between shifts becomes more consistent. Finally, Sustain (Shitsuke) aims to build work discipline by routinely conducting briefings and direct monitoring by foremen. The initial effects of implementing 5S are seen in the reduction in search time for tools and materials, as well as reduced idle time because workers can more easily access production resources. In addition, increased space efficiency allows the production flow to be neater and more structured, which leads to increased productivity. Before the intervention, the production layout used a cross-flow (zigzag) scheme that caused materials to be moved inefficiently between processes. This not only slowed down production cycle times but also increased the risk of miscommunication between operators. After the reorganization, the layout was changed to a linear flow based on the sequence of work processes, cutting, turning, grinding, finishing.

### 4.3. Quality Improvement Strategy

To ensure consistent product quality, the company began implementing a Quality Control (QC) system that is carried out at every stage of production. Inspections are carried out manually using measuring tools such as calipers and visual checks for wood cracks, scratches, or surface defects.

Another important step is the preparation of Standard Operating Procedures (SOPs) for critical stages such as cutting and turning. These SOPs are displayed visually in the work area and are the main reference in training and the production process. The existence of SOPs helps reduce quality variations between workers and between shifts. The company realizes that product quality is highly dependent on the skills of the workforce.

Training is carried out directly by senior foremen during a one-week work orientation period. In addition, there is a job rotation system to increase the flexibility and skills of workers across processes. As a result, work errors and defective products have decreased significantly in the last 3 months (based on daily production records).

### 4.4. Production Obstacles and Field Solutions

During the observation and interview process, several major obstacles were found that affect the smoothness and consistency of the wooden sofa leg production process. These obstacles include:

Table 1. Production Constraints and Field Solutions

| Production Constraints | Field Solutions Implemented |
|---|---|
| Unstable quality of raw materials. | Business owners conduct stricter supplier selection and initial inspection (manual sorting) of incoming wood. |
| Limited production tools and machines. | To overcome the limitations of automated tools, routine maintenance and work schedule adjustments are carried out so that the tools are optimally available. |
| Limited technical skills of new workers. | There is no formal apprenticeship system; however, training is carried out informally directly in the field by foremen or senior workers when new workers start work. |

Table 1 illustrates the challenges faced in the production process in the wood furniture manufacturing sector, along with practical solutions implemented in the field. Each production obstacle, such as the instability of raw material quality, limited production tools and machines, and the lack of technical skills of new workers, was answered with steps designed to improve production efficiency and quality. The solutions implemented included stricter supplier selection to ensure better raw materials, routine maintenance of production tools to avoid damage, and the implementation of informal training directly in the field to improve the skills of new workers. These steps aim to effectively address operational challenges and improve overall production results.

## 5. MANAGERIAL IMPLICATIONS

The managerial implications of this study provide guidance that can be directly implemented by production managers, business owners, or operational supervisors in the wood furniture industry. First, the application of lean and 5S principles is proven not to require large technology investments, but rather requires consistency in supervision, work area arrangement, and maintaining team discipline. Therefore, management must emphasize the importance of efficient work habits and a clean and tidy work culture as a foundation for

improving performance. Second, the results of this study emphasize that SOPs and quality control based on work stages need to be used as the main guidelines in production management. Managers need to develop simple but functional work procedures, accompanied by short but continuous training to maintain consistent quality standards. Third, it is important for managers to periodically evaluate the production layout, because poor workflow configuration can cause invisible waste. Rearranging the layout based on the actual process flow has been shown to increase productivity and facilitate supervision.

This study encourages wood furniture industry leaders especially those in resource constrained settings to shift from intuition based management to process and data driven decision making. Even small enterprises can benefit from the use of basic performance indicators, such as defect rates, lead times, and labor efficiency, to guide operational improvements. Emphasizing both efficiency and quality in tandem is not only crucial for meeting client expectations but also serves as a strategic foundation for business sustainability, especially in an era marked by intensified global competition, rapid shifts in consumer preferences, and growing environmental standards.

In essence, the implications of this study call for a transformational mindset among managers, urging them to treat operational excellence not as a luxury, but as a necessity even within the limitations of small-scale industries. By embedding lean practices, fostering team discipline, standardizing procedures, and optimizing layout design, the wood furniture industry can achieve greater resilience, competitiveness, and long-term viability in both local and international markets.

## 6. CONCLUSION

This study shows that production efficiency and quality improvement strategies are not contradictory, but can instead be integrated harmoniously in the manufacturing process of wooden sofa legs. The application of lean manufacturing principles, reorganization of production layouts, use of Standard Operating Procedures (SOPs) at every critical stage, and increasing the capacity of Human Resources (HR) through informal training have been proven to have a positive impact. Some of the results achieved include reducing cycle time and unproductive movements, reducing product defect rates, and increasing the consistency of overall output quality.

Given the typical conditions of small industries that have minimal automation and rely on worker skills, process-based strategies and work discipline have proven to be more effective than high-tech approaches. This approach is more appropriate to the available resources and can provide more tangible results in improving efficiency and quality. In addition, direct involvement of business owners and active supervision from foremen are also determining factors in the success of implementing continuous efficiency and quality strategies, ensuring that improvements are consistent and integrated in every stage of production.

This study also confirms that operational approaches such as 5S and Quality Control (QC) can be adjusted to local characteristics without losing their essence. The integration of efficiency and quality not only impacts the production aspect, but also customer trust in products and business competitiveness in the furniture market. The right approach, which is adjusted to local conditions and the characteristics of small industries, will strengthen the sustainability and growth of businesses in an increasingly competitive market. The integration of efficiency and quality improvement also extends beyond internal operations to influence external business performance. When production becomes more reliable and consistent, customer trust increases, and the brand image of the business is strengthened especially in a sector like furniture manufacturing, where product craftsmanship and durability are key differentiators. This reputational advantage can create new market opportunities, particularly for SMEs aiming to penetrate export markets or establish partnerships with larger retailers.

## 7. DECLARATIONS

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### 7.2. Author Contributions

Conceptualization: NL; Methodology: MA; Software: NL; Validation: MA and UR; Formal Analysis: NL. and MA; Investigation: UR.; Resources: NL; Data Curation: MA.; Writing Original Draft Preparation: MA and NL; Writing Review and Editing: UR and NL; Visualization: UR; All authors, NL, MA., and UR have read and agreed to the published version of the manuscript.

### 7.3. Data Availability Statement

The data presented in this study are available on request from the corresponding author

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### 7.5. Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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