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Decision Support System In Selecting Teak Wood Raw Materials For Furniture Production At Lestari Jati

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Abstract

The furniture industry that uses teak wood as the main raw material faces various challenges in maintaining the quality of materials and the efficiency of the production process. Teak wood is known to have advantages such as high resistance to weather and insects, good structural strength, and distinctive and elegant grain beauty. However, the quality of teak wood varies greatly depending on environmental factors, tree age, and processing process. These variations can affect the final result of furniture products, so it is important for companies to choose the right raw materials. This study aims to develop a Decision Support System (DSS) specifically designed to help Lestari Jati company in determining teak wood raw materials consistently and objectively. This DSS considers several main criteria, such as age, fiber, color, volume. The Simple Additive Weighting (SAW) method is used to give priority weight to each criterion and determine the best alternative from the available raw materials. With this system, the company is expected to be able to obtain accurate recommendations, accelerate the decision-making process, and significantly improve product quality and production efficiency, so that it can increase competitiveness in the teak wood furniture market.

Introduction

The furniture industry sector, especially those using teak wood as the main raw material, faces challenges in ensuring material quality and production efficiency (Apriyani, 2021). Teak wood is known for its durability, beauty, and structural strength, but has significant quality variations. Lestari Jati, as a furniture manufacturer, requires an effective raw material selection process to maintain product quality without ignoring the cost and availability of materials (Dendra et al., 2024; Purwanto, 2016; Wicaksono et al., 2023).

Herjuna et al. (2015) this research focuses on the development of a Decision Support System (DSS) that can assist Lestari Jati in the process of selecting teak wood raw materials. The DSS will consider various criteria. With this system, Lestari Jati is expected to be able to increase efficiency in decision making related to raw material selection and minimize the risk of errors in production (Gunawan et al., 2023; Setiawan & Cholili, 2023; Bello & Olufemi, 2024). This research will use methods such as Simple Additive Weighting (SAW) to help prioritize various alternative raw materials based on predetermined criteria. Thus, it is expected that this system can provide optimal recommendations for the company.

Prasetyo & Prasetyaningrum (2023) the selection of the right raw materials is a vital aspect in the furniture industry, especially those using teak wood as the main material. The quality of the material affects the quality of the final product, cost efficiency, and sustainability of

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production (Renna & Materi, 2021; Javaid et al., 2021; Akter et al., 2022; Psarommatis et al., 2022; Okuyelu & Adaji, 2024). Lestari Jati, as a furniture manufacturer, requires a structured system in selecting raw materials. Therefore, this study aims to design a SPK using the SAW method to assist in decision making in selecting teak wood raw materials (Prasetyo & Prasetyaningrum, 2023; Sari et al., 2018). Teak wood is known as one of the superior raw materials in making furniture because of its durability, beauty, and economic value. However, with a variety of choices available, it is often challenging to determine the type of teak wood that is most suitable for production needs. Selecting teak wood raw materials is not a simple task. Mistakes in selecting raw materials can affect the final quality of the product and the efficiency of the production process. Therefore, a system is needed that can assist the decision-making process in selecting raw materials appropriately and effectively (Oprasto, 2023; Bensch et al., 2015; Samuolaitis et al., 2024; Oprasto, 2023; Lin et al., 2023; Sarabi & Darestani, 2021).

Muhyadi (2020) decision Support System (DSS) is a solution that can be used to solve this problem (Setiawan et al., 2022). By using the Simple Additive Weighting (SAW) method, SPK can help companies to conduct a comprehensive analysis in selecting teak wood raw materials based on various criteria, such as age, fiber, color, volume, and others. In this context, the development of a Decision Support System for Lestari Jati is expected to be able to provide an optimal solution in the process of selecting teak wood raw materials (Setiawan et al., 2023; Haryanto et al., 2021; Herjuna et al., 2015; Sari et al., 2018). This system is expected to increase operational efficiency, reduce the risk of errors in raw material selection, and ensure that the products produced remain of high quality at an efficient cost (Wijaya, 2023; Anderson, 2020; Hama Kareem et al., 2022; Chukwunweike et al., 2024; Ajiga et al., 2024).

The results of this study are the creation of a web application that functions to help furniture craftsmen in choosing quality types of wood, this method has been successfully applied to provide weighting to the criteria and ranking types of wood, thus facilitating decision making, this system is effective in facilitating the process of selecting wood for furniture craftsmen, as well as suggestions for further development so that the application can be accessed from various operating systems.

Literature review

Related Research

(Purnomo & Sunardiansyah, 2021)in this study resulted in a wood supplier evaluation system in the industry using the Analytical Hierarchy Process (AHP) method to help make more objective and comprehensive decisions in selecting suppliers, which in turn can improve the company's competitiveness in a competitive market. After calculating using the Analytical Hierarchy Process (AHP) method, the best supplier identified was Indah Sentosa with a value of 0.344 or 34.420%. This shows that Indah Sentosa is the optimal choice to meet the needs of mahogany wood raw materials.

Faizin et al. (2021) the results of this study indicate that the application of the TOPSIS method in determining the best supplier at CV. Indomeuble provides clear and measurable results. Based on the analysis conducted, it was found that: Jati Lestari was identified as the best supplier with the highest preference value, which is 1, the TOPSIS method successfully ranked three suppliers based on the established criteria, namely raw materials, expertise in wood construction, delivery, work tools, and price, this research process uses systematic steps that include making a decision matrix, normalization, and calculating the distance from positive and negative ideal solutions. Thus, the use of a TOPSIS-based decision support system can help CV. Indomeuble in making more efficient and effective decisions in selecting quality suppliers (Fistiana et al., 2021). This journal discusses the development of an Android-

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based Decision Support System (DSS) for the selection of Hoya Carnosa ornamental plants using the TOPSIS method. This study successfully identified selection criteria including beauty, age, ease of formation, and plant condition. The test results show that the developed system can provide accurate calculation results and in accordance with expectations, making it easier for users to determine the best choice.

Wijaya (2023) the results of this study indicate that the application of the MABAC method in selecting the best wood raw materials for Minimalist Kitchen Sets at Hazira Furniture Medan produces several important findings: Selection Procedure: The selection process involves 5 main criteria, each with different subjective weights. These criteria include wood durability, wood grain, texture, weight, and price. System Accuracy: The application of the MABAC method provides an accuracy of 32.46% in determining the best wood raw materials. System Implementation: A decision support system built with Visual Basic Net 2008 can make it easier for decision makers to choose the right raw materials for Kitchen Sets. Ranking Results: This system produces alternative raw material rankings, thus facilitating the evaluation and selection process based on predetermined criteria. Thus, this study has successfully shown that using MABAC in a decision support system can improve efficiency and accuracy in selecting wood raw materials for furniture products.

Richasanty (2020) the results of the study on the Decision Support System for Selecting Tourist Attractions in Purwokerto using the AHP method show several important points: Many tourists have difficulty in getting information about tourist attractions in Purwokerto, which is based on a survey of 114 respondents. The system is designed to provide information and recommendations about tourist destinations using the Analytical Hierarchy Process (AHP) algorithm, which allows users to enter selection criteria. The system was tested using the User Acceptance Test (UAT) method with 100 respondents. The test results showed that the system was well received, with a final score of 5,660, indicating a high level of user satisfaction. Users can view tourist attraction information, give weights to criteria, and see the results of calculations and rankings of tourist attractions. The data shows that aspects of software engineering, functionality, and visual communication each received positive responses from users, indicating the success of the system in meeting needs.

Putri et al. (2023) the results of this study are the creation of a web application that functions to help furniture craftsmen in choosing quality types of wood, this method has been successfully applied to provide weighting to the criteria and to rank types of wood, thus facilitating decision making, this system is effective in facilitating the process of selecting wood for furniture craftsmen, as well as suggestions for further development so that the application can be accessed from various operating systems.

Theoretical basis

Teak (Tectona grandis Lf)

(Apriyani, 2021)Teak plants are plants that grow well in tropical and subtropical climates, such as South Asia, Southeast Asia, America, and the African continent. Teak plants are estimated to have existed since the 9th century AD. In Southeast Asia, teak plants are grown in Myanmar, Thailand, Laos, Cambodia, and Indonesia. Teak plants in Indonesia originally came from India. This plant entered Indonesia in the 19th century or around 1842. In Indonesia, teak plants grew rapidly on the island of Java. At that time, Java became a center for teak planting. The area of teak forests on the island of Java in the 1842 century was only 650,000 hectares and in 1985, the development of teak forests reached 1,069,712 hectares. Since the 9th century, teak plants have been known as trees that have high quality and high selling value

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Raw material

Prasetyo & Prasetyaningrum (2023) raw materials or raw goods are materials purchased and used in making the final product of finished goods that will be sold to consumers. Raw materials have not undergone any processing at all.

Decision Support System (DSS)

Muhyadi (2020) technical methods or methods used to make or support a decision, including the most common is the voting method. The Industrial Revolution 4.0 with the Internet of Things, Big Data and Artificial Intelligence has changed the way of thinking, acting and relating. At the time of the discussion no longer discussing what problems are faced and how to solve problems, but now more focused on information and opportunities (opportunities) what is available. In the era of 4.0, decision making is increasingly required to be faster, more accurate and more complex. Era 4.0 or commonly known as the Industrial Era 4.0 provides very drastic changes in all dimensions of human life, including changing the way of life, perspective, way of working, to how to communicate with each other. In its scale and scope, the industrial revolution 4.0 resulted in a transformation that is very different from previous revolutions, so it needs to be responded to by all stakeholders ranging from decision makers at the government level, private sector, researchers, academics to the general public.

Simple Additive Weighting (SAW)

One of the problem solving methods that can be implemented in a decision support system is by using the SAW (Simple Additive Weighting) method. The basic concept of this method is to find the weighted sum of the performance ratings on each alternative on all attributes, this method is a method that is often used to deal with MADM (Multiple Attribute Decision Making) situations. MADM itself is a method used to find the optimal alternative from a number of alternatives with certain criteria.

Gunawan et al. (2023) the basic concept of the SAW method is to find the weighted sum of the performance ratings on each alternative on all attributes. The SAW method requires a process of normalizing the decision matrix X to a scale that can be compared with all existing alternative ratings.

Setiawan et al. (2022) the Simple Additive Weighting (SAW) method is defined by the term weighted sum. The basic concept of this method is to determine the weighted sum of the performance rankings for each alternative across all attributes. The advantage of the SAW method is that it can find the weight value for each alternative, after the ranking process is carried out to determine the best alternative from some alternatives. The assessment will be more precise because it is based on the criteria values and preference weights that have been determined (Limbong et al., 2020).

MySQL

MySQL is an RDBMS (or database server) software that can manage databases very quickly, can accommodate very large amounts of data, can be accessed by many users (multi-user), and can perform a process synchronously or simultaneously (multi-threaded) (Putra, Taurusia, & Budiman, 2021). MySQL (My Structure Query Language) is one of the Database Management Systems (DBMS). MySQL functions to manage databases using the SQL language. MySQL is open source so it can be used for free. PHP programming also strongly supports or supports the MySQL database. MySQL is a multi-threaded, multi-user SQL database management system software or DMBS with around 6 million installations worldwide (Case et al., 2014).

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Methods

Widiyawati et al. (2022) this research method uses Simple Additive Weighting (SAW) in the Selection of Teak Wood Raw Materials for Furniture Production at Lestari Jati. In this study, the SAW method is used to determine the weight or level of importance of each criterion that will be used in the selection of raw materials. The steps are as follows: 1) Identify relevant criteria for teak wood selection; 2(Creating a decision matrix To calculate the normalization of each element in the matrix, the formula used is:

$$X = [x_{ij}], i = 1, \ldots, m; j = 1, \ldots, n$$

Where:

x_{ij} is the value of the alternative to the criterion.i j

is the number of alternatives.m

n is the number of criteria.

Matrix Normalization The decision to normalize a matrix for each criterion depends on its type:

If the benefit (the higher the value the better):

$$R_{ij} = \frac{x_{ij}}{x_{max}}$$

If cost (the lower the value the better):$R_{ij} = \frac{x_{min}}{x_{ij}}$

Where:

R_{ij} is the normalized value for the alternatives on the criteria.ij

$X_{ij}$is the original value of the alternative on the criterion .ij

$X_{max}$is the maximum value on the criteria (for benefits).j

X_{min} is the minimum value on the criteria (for cost).j

Calculate the average weight of each row of the normalization matrix. This value shows the weight of each criterion, the formula used:

$$W_j \geq 0,\ \sum_{j=1}^{n} w_j = 1$$

Where:

W_i is the weight of the nth criterion.j

n is the number of criteria

Calculating the Final Score (Preference Value) after normalization, the preference value of each alternative is calculated using the formula:

$$V_i = \sum_{j=1}^{m} W_j \times R_{ij}$$

Where:

V_i is the final value for the alternative .i

$W_j$is the weight of the criteria.j

R_{ij} is the alternative normalization value on the criterion .ij

$m$is the number of criteria.

The alternative with the highest value is the best choice.V_i

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Best Alternative Selection

Best alternative A∗is the one with the highest score:

$$A *= arg \max_{n1 \le i \le m} \quad Vi$$

Information:

A∗is the best alternative teak wood raw material based on SAW calculations.

Results and Discussion

The Decision Support System Application in the Selection of Teak Wood Raw Materials for Furniture Production at Lestari Jati was developed using the web-based PHP programming language using the Simple Additive Weighting (SAW) algorithm to predict wood material requirements and using 341 data using 4 features, namely age, fiber, color, volume.

Dashboard or Application Home Page

Figure 1 shows the main page display of the teak wood raw material selection application. Through this application, users (business owners) can predict the amount of teak wood raw materials needed based on customer orders.

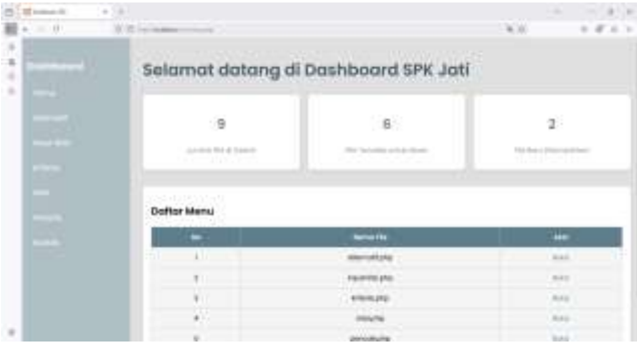

Figure 1. Dashboard

The dashboard is the main display board of the Decision support system (DSS), which should assign an easy-to-inquire overview and control panel on how to manage the raw material selection. It unifies the access to the key modules of the system, including alternatives, criteria, input values, period management, and contact functionalities. The dashboard makes it easy to navigate due to its ability to combine all the functions of a system in to one unit of entry hence increasing decision traceability. Operationally, such an interface will be seen to represent the best principles of effective Human-Computer Interaction (HCI), which is essential when ensuring that the end-user/s of such a system can effectively communicate with it, especially at the level of the production supervisors or those under procurement departments (Gunawan et al., 2023; Case et al., 2014). The UX design fits the objective of minimising mental demand and facilitating the fast access to more important options, being critical in high-tempo production settings.

Alternative Pages

In this interface, a list of teak wood raw material substitutes are available and these are broken down into their origin or source. Depending on the situation, users can insert, edit, or delete the entries. This is a very important function in reflecting real world variability in the quality and availability of teak logs, because, different sources may have different characteristics in terms of the grain, tightness of the fibers, or moisture content, etcetera. Dynamic management of alternatives can make sure that DSS can be sensitive to the changing inventory situation or supplier situation, thereby making specific material considerations far more prospective and precise. As applied to the decision theory, the said function aids in the creation of the decision

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matrix needs to realize the SAW algorithm as the raw data basis in the succeeding normalization and ranking activities (Setiawan et al., 2022; Purnomo & Sunardiansyah, 2021).

Figure 2. Alternative View

Value Input Page

Input Values in this menu consist of input options for periods, alternatives, and where to enter values for each criterion, namely: age, fiber, color, and volume.The value data will appear below after submission.

Figure 3. Value Input Display

In this section, the user is given the ability to convey certain quantitative input of each alternative with regards to the set criteria, such as age, fiber, color, and volume. Every input relates to a normalised value which will undergo SAW methodological approach. This step is one of the most important points of the DSS work flow since it converts the qualitative features of materials into the format understandable by the computer. Methodologically, this mode of input implies a multiple-attribute decision model (MADM) in which every criterion should be set by a numerical score to allow making comparisons (Limbong et al., 2020). The flexibility of the system and the real-time updating of data based on the user-driven data entry also allows it to accommodate the operational characteristics of environments where the properties of the materials can be reviewed and re-evaluated after inspection.

Criteria Page

Figure 4 And 5. Criteria View

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These opinions show the requirements needed to assess the teak wood and each of these requirements is followed by a weight measuring its degree of significance in the process of selection. Weight determination and changes are a response to the essential principle of the SAW technique, which is the multicriteria evaluation of preferences over the others when none of these is of equal importance to make the decision regarding the best selection. As an example, in an undertaking that needs strength of a structure, density of fiber can be given more weight than visual appeal. It also has these features, which enable a user to create various scenarios of production or preferences of customers by dynamically changing the weights of various criteria. This interface is a practical application of a theoretical concept of scoring utility-based as well as the one that allows keeping the system in line with strategic or client-specific priorities (Gunawan et al., 2023; Prasetyo & Prasetyaningrum, 2023).

Value Page

Values in the menuThis can be displayed by selecting the period (month) and clicking show values, then a list of values for the selected period will appear.

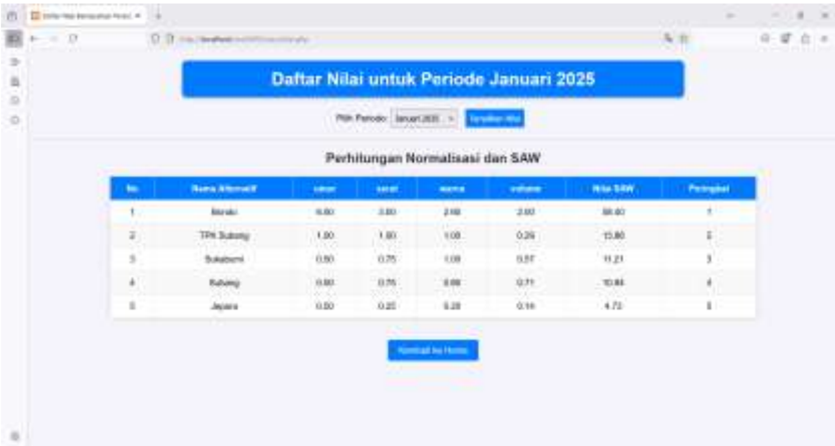

Figure 6. Value Display

This function displays the complete decision matrix of a specified time period with the raw values of every criterion of all the options at the disposal of the user. The periodical reviews and longitudinal comparison of the performance are possible due to the way the system organizes the data chronologically. Operationally this role can increase transparency and auditability of the selection process, as this is an operational analytical need critical to control of quality and regulatory responsibility on the manufacturing level. Feedback loops are also facilitated by the ability of scores to be seen, so that production teams can review the weights or criteria when real observed output is inconsistent with expectations. The given perspective also reflects major tenets of data-driven decision making since it enables users to follow the reasoning behind every suggestion that the system generates (Wijaya, 2023; Muhyadi, 2020).

Period Page

Period Management can add periods by filling in the month and year. A list of periods will appear below. Here is how it looks.

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Figure 7. Period View

Period Management view enables you to divide the type of data selection of a raw material by a month and a year. Such temporal granularity is critical in furniture production, when the quality of raw materials as well as available quantity might change on seasonal basis depending on the supply process or even environment. With the ability to define and control periods, the system makes analysis more contextual and the selections will be relevant in reference to set operating windows. Data-wise, its role also involves historical tracking of data to allow companies to analyse the decisions made in the past or perform retroactive audits of processes (Faizin et al., 2021; Prasetyo & Prasetyaningrum, 2023).

Contact Page

OnThe contact view contains contacts that contain names, emails, telephone numbers, and addresses.

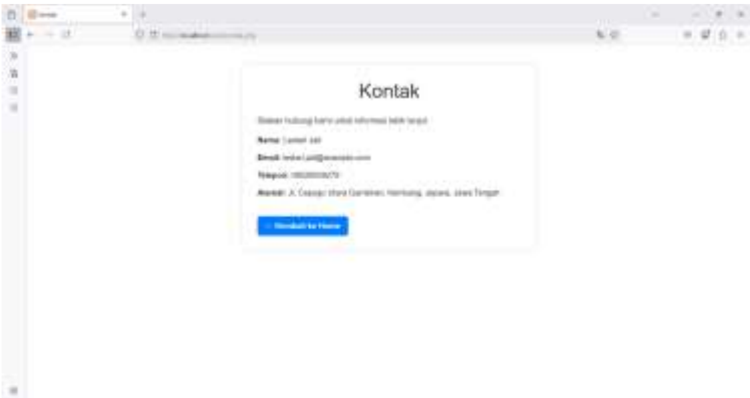

Figure 8. Contact View

Contact module is used to store important stakeholder details like name, phone, email, and address. This component makes sure that the process of making the decision is not taken out of the human network supporting the sourcing of the materials and running the system as well. It enables quick communications in those instances when data entry errors are noticed or where external verification of the suppliers is required. The given trait in design complements the overall enterprise theory of combining human knowledge with algorithmic systems, as in less-automated working processes, accountability and communication are both preserved. Also, a convenient contact directory can be used to ensure continuity of operations and role-based access, in situations where there is shift-based personnel or continuously rotating teams (Richasanty, 2020; Case et al., 2014).

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The anticipated outcome of the subject predictions in advance through SAW-based decision support to improve the accuracy of material selection in the manufacture of teak furniture.

The implementation of the Simple Additive Weighting approach to Decision Support System in the raw material selection process of teak wood furniture manufacturing in Lestari Jati can be deemed a significant move towards the digitalization of the decision architecture within the furniture sector. The implementation of such a system will help to tackle an inherent issue of this industry, i.e., subjective and inconsistent assessment of material quality that tends to contribute to inefficiency, inconsistency in their production processes, and low customer satisfaction. This system allows moving away, through the use of structured quantitative logic, and automates the actual process of making a decision, replacing the manual intuitive method. According to more research conducted in the past years, the industries where SAW based models have been used in selection processes have recorded high levels of improvements in consistency and objectivity particularly in cases where qualitative attributes have to be rated along with the quantitative aspects of the selection processes (Setiawan et al., 2022; Gunawan et al., 2023; Widiyawati et al., 2022). In this regard, the paper is able to design a model where age, fiber, color and volume of teak wood are not just descriptive variables but they are interpreted mathematically through the weights and the rating system as to which decision attribute is better than the other.

The choice of the SAW algorithm is methodologically premature on its effectiveness and interpretability on multi-criteria decision-making environment. Working quite differently than probabilistic models or rule-based systems that might introduce opacity or need large datasets, the SAW method presents an opaque method of scoring alternatives using criteria where individual alternatives are supposed to be scored against normalized and relevance-weighted criteria. The application of normalization in this situation means that volumes and years-old would be on a different scale and they should somehow be made to come to the same dimension or level upon which ranking can take place (Limbong et al., 2020; Gunawan et al., 2023). The mathematical discipline of SAW conveys decision-making actionable clarity to those in the decision-making role at Lestari Jati that will now know in precise terms how and why a given teak log is preferred over another. Furthermore, by correlating the preference (values) with productions real world attributes, the system is designed at making sure that the ultimate decision is made, as per feasible requirements of production quality, structure and aesthetical consistency. This is consistent with the adage finding that states that SAW has been more effective than heuristic selection strategies in fixing material optimization questions (Prasetyo & Prasetyaningrum, 2023; Putri et al., 2023).

The high value aspect of the developed system is that it is user-friendly and can be accessed through a web platform. The organization of functionality like the options of input, weighting of criteria, management of periods and graphical display of rankings not only makes usability more beneficial but also facilitates extended use to other working units within Lestari Jati. Such an architectural decision is critical since digital tools present a scenario where their contextualization toward human-machine collaboration is essential, in case they effectively can be deployed on a sustainable level of production processes (Case et al., 2014; Fistiana et al., 2021). The discretion to revise options, modify requirements, and control time-based assessments enables the system to change depending on the market forces or changes in internal production. Such flexibility has been reported to determine the application of decision support in the long term of SMEs and manufacturing firms (Faizin et al., 2021; Purnomo & Sunardiansyah, 2021). The web application also has a strategic role as it allows to amalgamate fractional decision-making system into centralized electronic infrastructure, subsequently enhancing the elements of openness and decreasing the reliance on single opinion.

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Its true worth to the system can only be fully understood with the respect to the fact that it helps in cutting down the risk of production that is linked to inconstancy when selecting raw materials. In furniture manufacturing, more so in the use of natural materials such as teak, quality fluctuations may in turns lead to performance variations as well as aesthetic inconsistencies, and costs of handling the finished products after manufacturing. The system can provide a probabilistic safeguard against such risks because by factoring decision criteria such as fiber uniformity and the age of the wood into a computational matrix, the system facilitates an inbuilt cushion against such risks. This is especially relevant in the modern-day industrious environment where the shift to digitalization is no longer a choice, it is a necessity to satisfy the ever-increasing market demands and green legislation. Some studies demonstrated that decision systems based on SAW and other multi- attribute models have contributed to quantifiable increases in product quality, resource allocation, and supplier trust in the production environments with similar conditions (Wijaya, 2023; Prasetyo & Prasetyaningrum, 2023). To Lestari Jati, this implies that the shift of inconsistency in the manual evaluation approach to one of data-driven selection is capable of delivering long-term dividends not only in terms of efficiency but also in its reputation capital due to its effectively high-quality results on a regular basis.

The soundness of the decision framework is also enhanced by the fact that they reflect the precedents of the supplier selection systems in the larger furniture and wood craft market. Other studies showed that it is possible to use methods such as AHP, TOPSIS, and MABAC to assess the suitability of wood and the reliability of suppliers with consideration of different aspects of mathematical modeling of preference (Purnomo and Sunardiansyah, 2021; Faizin et al., 2021; Wijaya, 2023). Experience in those cases suggests that the SAW algorithm is well-suited to an environment that demands a decision with depth but a low degree of complexity associated with its computation, creations that are especially favored by enterprises looking to elicit fast and repeatable judgments. Also, thanks to the inclusion of user-defined ratings and the ability to modify scoring criteria dynamically, the system created within the framework of the current research will enable decision-makers to tailor preferences according to the fluctuating needs of production, availability of raw materials, or customer design specifications. This dynamicity in configurability has been identified as one of the best practices in designing decision systems in industries that are resource-hungry (Muhyadi, 2020; Richasanty, 2020).

Analyzing the findings of the research, it is possible to note that the creation and deployment of this Decision Support System is not a technical solution but an operational strategic improvement. The framework helps in three interrelated organizational objectives in a straight forward manner. One is that it makes the process efficient as the available time to keep sampling and selecting the right teak logs is reduced. Second, it promotes uniformity by normalizing decision-making forms among operators. Third, it leaves an audit trail (and learning loop to refine), as all the data on the decisions made are stored and trackable. This is consistent with recent trends in industry 4.0 literature which indicates that digital systems are required to promote not only automation, but also flexible data-based optimization, and evolution (Setiawan et al., 2022; Gunawan et al., 2023). In the case of Lestari Jati, this type of system is not only a strategic potential to improve its operations but also as a means of competition in a market where speed, accuracy, and continuity is proving to be non-negotiable commodities.

Conclusion

A Decision Support System (DSS) based on the Simple Additive Weighting (SAW) method has been successfully developed to assist Lestari Jati in selecting optimal teak wood raw materials for furniture production. By considering various important criteria, this system is able to provide objective and measurable recommendations. The SAW method used

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effectively processes the criteria values with normalization and priority weights, making it easier to make decisions in determining the best raw materials. The application of this DSS not only increases the efficiency of the raw material selection process, but also helps maintain the consistency of the quality of furniture products produced by Lestari Jati. Thus, this system has the potential to increase the company's competitiveness in the teak wood furniture market through faster, more accurate, and data-based decisions.

References

Ajiga, D., Okeleke, P. A., Folorunsho, S. O., & Ezeigweneme, C. (2024). The role of software automation in improving industrial operations and efficiency. *International Journal of Engineering Research Updates*, *7*(1), 22-35. http://dx.doi.org/10.53430/ijeru.2024.7.1.0031

Akter, M. M. K., Haq, U. N., Islam, M. M., & Uddin, M. A. (2022). Textile-apparel manufacturing and material waste management in the circular economy: A conceptual model to achieve sustainable development goal (SDG) 12 for Bangladesh. *Cleaner Environmental Systems*, *4*, 100070. http://dx.doi.org/10.1016/j.cesys.2022.100070

Anderson, D. M. (2020). *Design for manufacturability: how to use concurrent engineering to rapidly develop low-cost, high-quality products for lean production*. Productivity Press.

Apriyani, I. (2021). *Test of commercial teak wood resistance to subterranean termite Coptotermes gestroi* (pp. 1–58).

Bello, O. A., & Olufemi, K. (2024). Artificial intelligence in fraud prevention: Exploring techniques and applications challenges and opportunities. *Computer science & IT research journal*, *5*(6), 1505-1520. http://dx.doi.org/10.51594/csitrj.v5i6.1252

Bensch, S., Kolotzek, C., Helbig, C., Thorenz, A., & Tuma, A. (2015, January). Decision support system for the sustainability assessment of critical raw materials in SMEs. In *2015 48th Hawaii International Conference on System Sciences* (pp. 846-855). IEEE. http://dx.doi.org/10.1109/HICSS.2015.107

Chukwunweike, J., Anang, A. N., Adeniran, A. A., & Dike, J. (2024). Enhancing manufacturing efficiency and quality through automation and deep learning: addressing redundancy, defects, vibration analysis, and material strength optimization Vol. 23. *World Journal of Advanced Research and Reviews. GSC Online Press*, *23*. http://dx.doi.org/10.30574/wjarr.2024.23.3.2800

Dendra, F. G., Amrina, E., Imansuri, F., & Nurhadi, H. Q. A. (2024). The Inventory Planning of Raw Materials for Furniture Products (Case Study: CV XYZ Furniture). *Jurnal Teknologi Dan Manajemen*, *22*(2), 49-56. https://doi.org/10.52330/jtm.v22i2.276

Faizin, M., Jamaludin, A., & Prihandani, K. (2021). Decision support system for selection of furniture suppliers in CV. Indomeuble using TOPSIS method. *Journal of Information Technology and Computer Science (INTECOMS)*, *4*(2). http://www.dataindustri.com

Fistiana, F. A., Evanita, & Riadi, A. A. (2021). Android-based decision support system for selecting Hoya Carnosa ornamental plants using the TOPSIS method. *Journal of Information Systems and Informatics Engineering Research (JURASIK)*, *6*, 305–311. https://tunasbangsa.ac.id/ejurnal/index.php/jurasik

ISSN: 2716-3865 (Print), 2721-1290 (Online)

Gunawan, R. D., Ariany, F., & Novriyadi. (2023). Implementation of the SAW method in a paper plano selection decision support system. *Journal of Artificial Intelligence and Technology Information (JAITI)*, *1*(1), 29–38. https://doi.org/10.58602/jaiti.v1i1.23

Hama Kareem, J. A., Mohammed, B. I., & Abdulwahab, S. A. (2022). Optimal materials handling equipment and defective product reduction skills in enhance overall production efficiency. *Sage Open*, *12*(4), 21582440221128769. http://dx.doi.org/10.1177/21582440221128769

Handayani, D., Lubis, H., & Samudra, T. (2014). Design and construction of website-based furniture ordering information system using RAD method (Case study in CV. Tujuh Samudra). *Journal of Information Systems, Suryadarma University*, *9*(1), 47–52. https://doi.org/10.35968/jsi.v9i1.841

Haryanto, A., Hidayat, W., Hasanudin, U., Iryani, D. A., Kim, S., Lee, S., & Yoo, J. (2021). Valorization of Indonesian wood wastes through pyrolysis: A review. *Energies*, *14*(5), 1407. http://dx.doi.org/10.3390/en14051407

Herjuna, S. A., Hisjam, M., Putri, D. N., Sutopo, W., & Widodo, K. H. (2015). A decision support application for teak log supplier to simulate scenarios of utilizing forest resources by considering the sustainability of teak log supply. In *Proceedings of the International MultiConference of Engineers and Computer Scientists* (Vol. 2).

Herjuna, S. A., Hisjam, M., Putri, D. N., Sutopo, W., & Widodo, K. H. (2015). A decision support application for teak log supplier to simulate scenarios of utilizing forest resources by considering the sustainability of teak log supply. In *Proceedings of the International MultiConference of Engineers and Computer Scientists* (Vol. 2).

Javaid, M., Haleem, A., Singh, R. P., Suman, R., & Rab, S. (2021). Role of additive manufacturing applications towards environmental sustainability. *Advanced Industrial and Engineering Polymer Research*, *4*(4), 312-322. https://doi.org/10.1016/j.aiepr.2021.07.005

Lin, G. H., Chuang, C. A., Tan, C. L., Yeo, S. F., & Wu, F. Y. (2023). Supplier selection criteria using analytical hierarchy process (AHP)-based approach: a study in refractory materials manufacturers. *Industrial Management & Data Systems*, *123*(6), 1814-1839. http://dx.doi.org/10.1108/IMDS-06-2022-0370

Muhyadi, M. (2020). Decision making techniques. *Efisiensi: Administrative Science Review*, *3*(2). https://doi.org/10.21831/efisiensi.v3i2.3796

Okuyelu, O., & Adaji, O. (2024). AI-driven real-time quality monitoring and process optimization for enhanced manufacturing performance. *J. Adv. Math. Comput. Sci*, *39*(4), 81-89. http://dx.doi.org/10.9734/jamcs/2024/v39i41883

Oprasto, R. R. (2023). Decision support system for selecting the best raw material supplier using simple multi attribute rating method technique. *Jurnal Ilmiah Computer Science*, *2*(1), 10-18. http://dx.doi.org/10.58602/jics.v2i1.12

Oprasto, R. R. (2023). Decision support system for selecting the best raw material supplier using simple multi attribute rating method technique. *Jurnal Ilmiah Computer Science*, *2*(1), 10-18. http://dx.doi.org/10.58602/jics.v2i1.12

Prasetyo, H. A., & Prasetyaningrum, P. T. (2023). Decision support system for selecting the best furniture raw material supplier using the Multi-Objective Optimization by Ratio Analysis (MOORA) method. *Technologia: Scientific Journal*, *14*(2), 100. https://doi.org/10.31602/tji.v14i2.7838

ISSN: 2716-3865 (Print), 2721-1290 (Online)

Psarommatis, F., Sousa, J., Mendonça, J. P., & Kiritsis, D. (2022). Zero-defect manufacturing the approach for higher manufacturing sustainability in the era of industry 4.0: a position paper. *International Journal of Production Research*, *60*(1), 73-91. https://doi.org/10.1080/00207543.2021.1987551

Purnomo, D. E. H., & Sunardiansyah, Y. A. (2021). Implementation of Analytical Hierarchy Process (AHP) method for wood supplier evaluation in furniture industry. *JISO: Journal of Industrial and Systems Optimization*, *4*(1), 1–7. https://doi.org/10.51804/jiso.v4i1.1-7

Purwanto, A. (2016). *Implementation of Forest Certification in Small Farm Community Forest in Gunung Kidul Regency, Indonesia* (Master's thesis, University of Twente).

Putri, A., Soekarta, R., & Amri, I. (2023). Decision support system for selecting several types of wood for furniture crafts using the Simple Additive Weighting method. *Framework: Journal of Computer Science and Informatics*, *1*(2), 156–161. http://dx.doi.org/10.32534/int.v16i2.6566

Renna, P., & Materi, S. (2021). A literature review of energy efficiency and sustainability in manufacturing systems. *Applied Sciences*, *11*(16), 7366. https://doi.org/10.3390/app11167366

Richasanty, S. S. (2020). Decision support system for selecting tourist objects using Java-based AHP method. *Elkom: Journal of Electronics and Computers*, *13*(2), 169–181. https://doi.org/10.51903/elkom.v13i2.215

Samuolaitis, M., Gabelaia, I., & Drejeris, R. (2024). Development Of An Intelligent Decision-Making Support System For The Selection Of Raw Material Manufacturers To Be Suppliers In Healthy Food Production Companies In The Context Of Global Supply Risks. *Journal of Hygienic Engineering & Design*, *46*(1).

Sarabi, E. P., & Darestani, S. A. (2021). Developing a decision support system for logistics service provider selection employing fuzzy MULTIMOORA & BWM in mining equipment manufacturing. *Applied Soft Computing*, *98*, 106849. http://dx.doi.org/10.1016/j.asoc.2020.106849

Sari, R. E., Harahap, A. Y. N., & Meizar, A. (2018, August). Analizing topsis method for selecting the best wood type. In *2018 6th International Conference on Cyber and IT Service Management (CITSM)* (pp. 1-6). IEEE. http://dx.doi.org/10.1109/CITSM.2018.8674263

Sari, R. E., Harahap, A. Y. N., & Meizar, A. (2018, August). Analizing topsis method for selecting the best wood type. In *2018 6th International Conference on Cyber and IT Service Management (CITSM)* (pp. 1-6). IEEE. http://dx.doi.org/10.1109/CITSM.2018.8674263

Setiawan, D., Hidayat, A., Supriyadi, S., & Lestari, W. (2023). Environmental ethics policy in Jepara: Optimization of handicraft designs from wood waste in the furniture industry. *Journal of the Korean Wood Science and Technology*, *51*(5), 392-409. https://doi.org/10.5658/WOOD.2023.51.5.392

Setiawan, G. W., Wahyudi, J., & Sudarsono, A. (2022). Comparative analysis of SAW method and TOPSIS method through sensitivity test approach of employee performance assessment (Case study: Central Bengkulu Transportation Agency). *MEANS (Media Information Analysis and System)*, *6*(2), 169–173. https://doi.org/10.54367/means.v6i2.1528

ISSN: 2716-3865 (Print), 2721-1290 (Online)

Setiawan, N., & Cholili, A. (2023). Cultural values as anti-fraud strategy: Lessons from Islamic schools. *Share: Jurnal Ekonomi dan Keuangan Islam*, *12*(2), 500-525. http://dx.doi.org/10.22373/share.v12i2.20120

Wicaksono, P. A., Budiawan, W., Hapsari, C. A. P., & Lestari, A. D. (2023). Strategic Design to Increase Indonesian Furniture Industry Export Competitiveness. In *E3S Web of Conferences* (Vol. 448, p. 02066). EDP Sciences. http://dx.doi.org/10.1051/e3sconf/202344802066

Widiyawati, D., Dedih, D., & Wahyudi, W. (2022). Implementation of the DEATH and SAW method in selecting tourist destinations in Karawang Regency. *Interkom Journal: Journal of Scientific Publication in the Field of Information and Communication Technology*, *17*(2), 71–80. https://doi.org/10.35969/interkom.v17i2.231

Wijaya, K. B. (2023). Decision support system for selecting the best wood raw materials for minimalist kitchen sets applying the MABAC method. *Journal of Informatics, Electrical and Electronics Engineering*, *2*(3), 99–106. https://doi.org/10.4706-5/jieee.v2i3.894

ISSN: 2716-3865 (Print), 2721-1290 (Online)