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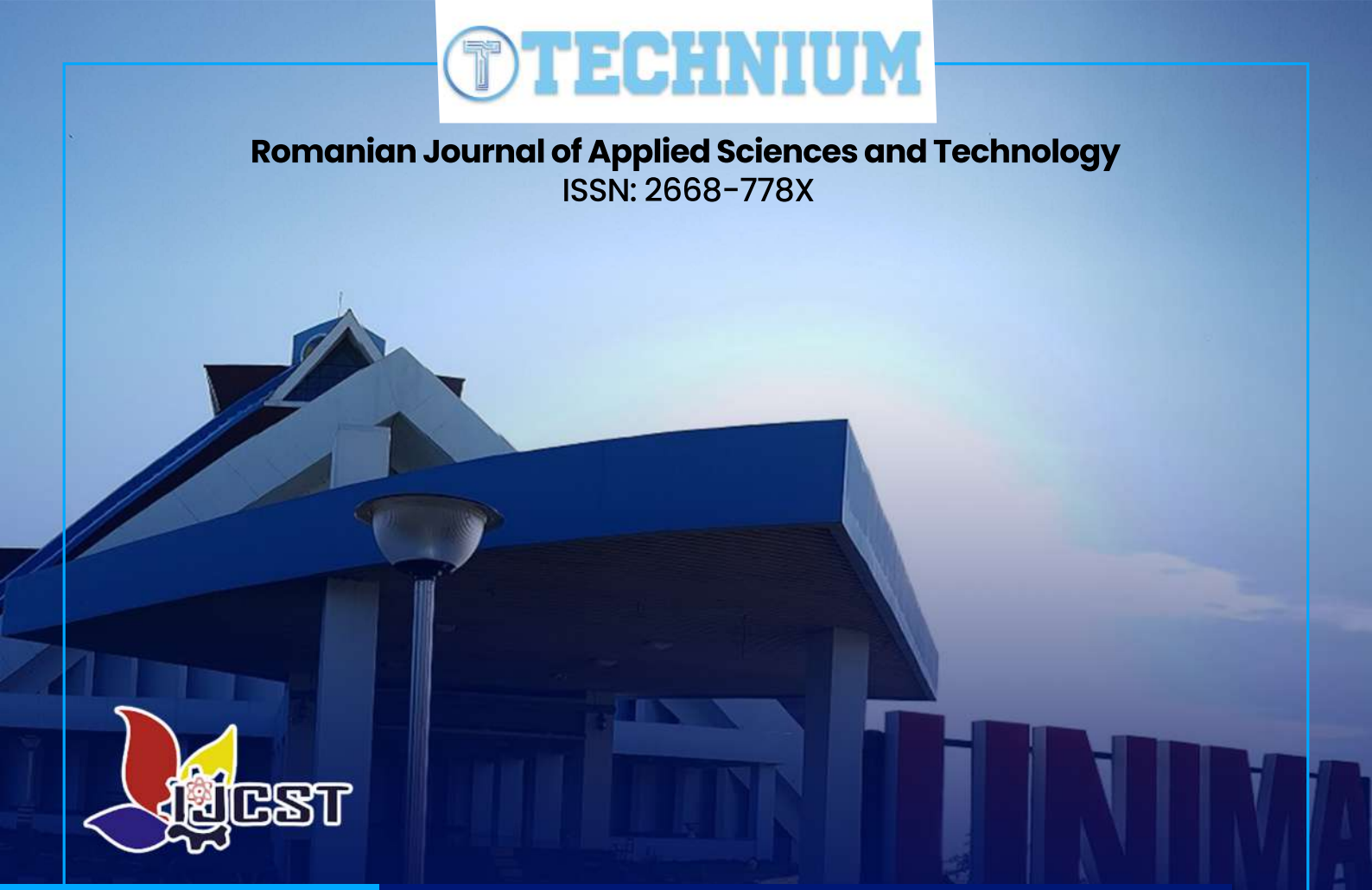

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The Green Production Strategy for the Small and Medium Size Enterprises of The Leather Sandal

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Abstract. Green production is closely related to sustainable development. The SMEs of sandal artisans who use leather raw materials for production processes with a green production perspective must manage leather raw materials and waste not to damage the environment. This paper aims to identify strategies to increase green production in leather sandal artisans' SMEs using the K-Means Cluster and Analytical Hierarchy Process Method. This research found that the best alternative strategy recommended is the evangelist strategy, a fundamental change in SMEs to protect the environment.

Introduction

Green production is one of the methods used to minimize waste and pollution caused by the production process (1–4). The green concept is making products with minimal raw materials and methods that minimize negative impacts on the environment, resources, and energy, safe for workers, society, and consumers. Green production is closely related to sustainable development, which means that in the process of making products that have economic value through a process that minimizes negative impacts on the surrounding environment, saves energy, and provides future availability. Business sustainability is associated with a triple-bottom approach that must support environmental, economic, and social factors. A business can survive in the face of competition without causing adverse impacts on the surrounding environment by implementing the three pillars (5).

East Java is one area still developing its location through its potential. This condition can be seen in many existing SMEs utilizing natural resources. A superior product from the area is the leather craft industry. Leather crafts are regarded as the unique product of East Java because they represent the leather craft industry that has been widespread in the area. Leather crafts are also located close to tanneries, areas that produce leather as a semi-finished raw material. The craftsman business has been a business that has been occupied by the local community for a long time and is hereditary. The area has many tourist attractions that can facilitate the marketing of these leather crafts. The number of leather sandal craft industries was more than a hundred units. The goods produced by leather artisans include shoes, sandals, jackets, wallets, and bags. The obstacle that leather artisans usually experience is the difficulty in finding human resources. Because before hiring, employers must provide training first, which takes a long time, about two years, so they really understand the making. So that the potential for the leather craftsman industry is so great that it will not be maximized if the performance is still poor.

Industrial sustainability is influenced by several factors related to performance. There is a need to increase the performance of SME to contribute to sustainable development. The application of sustainable development will positively affect performance, such as reducing costs, reducing time, increasing production, and increasing product quality. SME leather sandal artisans who use leather as raw material for a production process with a green production perspective pay attention to the waste left over from the process and manage raw materials and leather waste so they don't damage the environment. For this reason, research is needed on applying green production based on the principles of increasing social welfare, increasing profits in the economic field, and protecting the environment. As for the division of industrial clusters in SME leather artisans, it is necessary to divide the types of business in SME leather artisans so that the industry's sustainable development with clusters in each related SME can be designed.

The purpose of this study is to identify the factors that influence green production with leather sandals artisans in one area of East Java , determine clusters of SME leather sandals artisans based on the application of the green output, and provide suggestions for strategies to increase green production in leather sandals SMEs with clusters Lowest.

The research used the K-means Clustering and Analytical Hierarchy Process (AHP) methods. The K-means clustering method is used to determine the distribution of SME clusters according to the indicators that affect the green production of leather sandals. Next, formulate a strategy using the AHP method to determine what strategies can be applied to SME leather sandal artisans. So that SME can protect the environment by implementing a green production strategy. This research only focuses on leather sandal artisans, the products

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studied only focus on leather sandal products, and the research does not test the chemicals contained in waste. For SMEs and the government, the research results are expected to help several parties, such as craftsmen and the government, in making decisions related to policies related to the business of leather artisans. For readers, the research that has been done is expected to add information and references in further research.

Research Method

The variables used in this study include social, environmental, and economic aspects. Table 1 shows the research variables.

Table 1
Research Variables.

Variables	Definition of the variables
Employee work environment	SME provides training for employees, including the application of K3 from an environmental aspect
Environmental certification	Production of products according to specifications in protecting the environment
Pattern Making	The process of making a leather sandal pattern is carried out according to the desired size of each sandal.
Raw material cutting	The process of cutting raw materials is carried out using specific methods to obtain products that comply with the specified requirements.
Tailoring	Sewing footwear is carried out using specific methods according to predetermined requirements.
Withdrawal	The withdrawal process is carried out using specific methods to obtain products that comply with the provisions.
Product defects	Management of products that do not meet the criteria or defects
Corporate internal initiatives	Prioritizing the application of reduction (prevention and reduction) of environmental pollution compared to merely increasing profits.
Packaging	The packaging used can be recycled.
Waste management costs	The costs incurred in managing the waste left over from the manufacture of leather sandals.
Environmental regulations	The application of green production is following regulations specifically regarding: the environment.

A questionnaire was developed to measure green production in SME leather sandal artisans. Respondents from this study were 32 SME Owners of Leather Sandal Craftsmen. The questionnaire is a collection of questions arranged according to the variables determined to be filled in by the respondents. Then the questionnaire is returned to the researcher. the preparation of questionnaires using a Likert scale. In the research, the scores used for the Likert scale are significantly less, less, Sufficient, good, very good. The questionnaire used in the research was translated into questions according to the aspects of green production. The questionnaire is as follows: How is SME implementing OSH for employees, The raw material waste for making leather sandals at SME can be recycled, The process of making sandal patterns carried out according to the size desired by the consumer, The cutting process is carried out according to the design that has been described, The process of sewing leather sandals is done using the manual tool, The pulling process is carried out to combine the faces of the sandals, the soles, and the soles using a manual hammer and a sandal hood, The ability of SME to reuse or manage defective products, SMEs prioritize the reduction (prevention and reduction) of environmental pollution compared to increasing profits, The packaging used is easy to recycle, In managing waste raw materials that are wasted require costs, SME implements laws and regulations on protecting the environment.

The questionnaire validation was carried out by testing the validity and reliability tests. The validity test was carried out by correlating each indicator item score with the total score of the construct. The significance level used in the validity test is 0.05. The criteria for the tests carried out are:
H0 is accepted if r count > r table, so that it is declared valid.
H0 is rejected if r count < r table, so it is declared invalid.
The value of r table = df (N-2), the significance level carried out by a two-way test.

The validity test was carried out to determine whether the research data using the questionnaire obtained were valid. The significance level used in the validity test is 5% or 0.05 with an r-table value of 0.3494 for a sample of 32 respondents. Sample calculation by means of df = n-2 so that the sample was used to test the validity of 31 respondents. Each question item is said to be valid if r count > r table, otherwise, it is invalid if r count < r table. The analysis results on the questionnaire obtained a value of r count > r(0.05), meaning that H0 is accepted, so it can be concluded that all questions contained in the questionnaire data are valid. So that the questionnaire data can be continued to the reliability and clustering test stage.
Reliability test is conducted to see how far a measuring device can be trusted. So that the reliability test can be used to determine the consistency of measuring instruments. Test the reliability of the Cronbach's Alpha method using the following formula:

$$r_{11} = \left(\frac{n}{n-1}\right)\left(1 - \frac{\sum si^2}{st^2}\right) \quad (1)$$

Where :
r_{11} = reliabilities instrument.
$\sum si^2$ = The number of *varians* of toral scor
st = *varians* total n.
n = the number of questions

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The reliability test was carried out to test the several questions used in the questionnaire. The analysis results on the questionnaire obtained the value of r count > r table (0.05), which means that H0 is accepted, so it can be concluded that all questions contained in the questionnaire data are reliable.

SMIs are grouped based on Green production variables using the K-Means method (6,7) to find out groups of SMIs that have not applied the principles of green production.

The k-means clustering method is a non-hierarchical grouping method that can be used in grouping data. The initial step in grouping data using the K-means clustering method is to determine the number of clusters to be used in advance. The number of clusters applied in this study was two: the first Cluster SME has a high awareness of green production, and the second Cluster SME has a low understanding of green output. Next, the strategy formulation uses the analytical hierarchy process (AHP) method (8,9). The strategy is determined based on five strategies and criteria for green production (3).

Result and Discussion

The questionnaires were filled out by SME actors per the conditions carried out in entrepreneurship. The results of the answers from the questionnaire will then be grouped according to predetermined clusters. The number of members of each Cluster is shown in Table 2.

Table 2
The number of members of each Cluster.

Number of Cases in Each Cluster		
Cluster	1	6
	2	26
Valid		32
Missing		0

The first Cluster has the smallest members, which are six SMEs, while the second Cluster has 26 members, namely 26 SMEs. Most of the SMEs require the design of a green production strategy to increase awareness of the importance of protecting the environment in the production process of leather sandal artisans.

The formulation of a green production strategy for SME Leather Sandal Craftsmen with a low level of green production is determined using the Analytical Hierarchy Process (AHP) method. The structure of strategy formulation in the most down industrial Cluster because it is in accordance with the assessment of the results of the questionnaire for each SME actor in carrying out green production in his business. The hierarchical structure used in formulating the strategy consists of three levels: objectives, criteria, and alternative strategies. The formulation with AHP was carried out at the lowest Cluster that had been formed so that the strategies that should be prioritized and applied to SME Leather Sandal could be identified.

The green production strategy selection's hierarchical structure has determined the criteria for deciding the best alternative to be used. Arrangement of the hierarchy is done to make it easier to calculate the weighting of the results of the respondent's assessment. The alternative is based on literature studies (10). The criteria used consist of energy efficiency in the production process, the program implementation period (short and long term), government regulations regarding green production, the ability to partner with suppliers to obtain environmentally friendly raw materials, and consumer demands to produce green products.

The alternative strategies are evangelism strategy, pro-active strategy, responsive strategy, reactive strategy, and unresponsive strategy. Environment Pro-active strategy is a strategy that aims to anticipate competitors through systematic initiatives in the value chain. A responsive strategy is a strategy that focuses on environmental issues used when competing with low suppliers. A reactive strategy is an industry strategy that seeks to meet environmental regulatory requirements and consumer demand for environmental awareness. An unresponsive strategy is a strategy that can be applied by SMEs that have limited resources to implement green production programs. Paired weighting is done to find the best alternative by looking at the final total results of the alternatives.

Table 3
The number of members of each Cluster

	Energy efficiency in the production process	Program implementation period	Regulations from the government regarding green production	Ability to partner with suppliers to obtain environmentally friendly raw materials	Consumer demands to produce green products	Total
Evangelist	0,07	0,08	0,09	0,11	0,07	**0,42***
Pro-active	0,05	0,07	0,08	0,08	0,04	0,33
Responsive	0,04	0,05	0,05	0,05	0,03	0,22
Reactive	0,05	0,04	0,04	0,04	0,03	0,20
Unresponsive	0,03	0,04	0,04	0,04	0,03	0,18

*Largest weight

Table 3 shows the results of calculations using the AHP method. The analysis results of the criteria with the highest total weight is the evangelist strategy, with a weight of 0.42. Alternative evangelistic strategies are a top priority in increasing green production in Leather Sandal Craft SME actors. An alternative evangelism strategy is carried out by fundamentally changing the organization or actors of SME Leather Sandal Crafts so

that a production process can be implemented using environmentally friendly raw materials. There is an evangelist strategy that can motivate every business actor to do their best in the production process of leather sandals and be able to make good use of the remaining unused raw materials. This strategy can be carried out by collaborating between the government and SME Leather Sandal Craft actors. There is cooperation with the government so that training or human resource development can be carried out on the importance of green production.

Conclusion

The results of the research found that variables that affect green production in SME leather sandals include the process of making patterns, sewing processes, the ability of SMEs to handle defective products, application of reduction, use of packaging, and costs incurred in managing waste. Using the K-means clustering method, the grouping of 32 SME Leather Sandals was formed into two SME clusters based on variables related to green production. The first cluster consist of six SMEs and the secod cluster consists of 26 SMEs. This research resulted in a green production strategy for leather sandal craft SMEs using the AHP method to obtain the lowest cluster formulation strategy. The best alternative recommended is the evangelist strategy, a fundamental change for SMEs to protect the environment better. It is hoped that this research can add insight and awareness to the owners of SME Leather Sandal Crafts, to increase green production and protect the environment, supported by facilities and guidance from the government. Further research can be continued using variables adapted to Indonesian government regulations regarding green industry standards.

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