Decision support system to provide business feasibility analysis for batik entrepreneur in Lasem

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Abstract. Batik Industry of Indonesia is one of the creative economies that is currently being increased. Batik is one of Indonesia's cultural heritage that has been recognized by UNESCO, and it is interested in all levels of society. Lasem is one of the producers of Batik in Indonesia, which has coastal characteristics named Batik Tulis Lasem. Batik entrepreneurs in Lasem have a passion for developing their businesses. The main problem is when the entrepreneur does not have an information platform that can provide knowledge about business feasibility analysis. The purpose of this research is to build a decision support system that will help decision makers when developing their business. Using AHP Method, the result of this research is the criteria as a factor that influences the determination of Batik Tulis Lasem production. It states that the marketing criteria for product results are the main priority used as a determining factor. Then, it is analyzed based on the actors who play a role in product development efforts, investors, downstream industries, and financial institutions are the top priority. And it is seen based on the results of the analysis of product development goals, the main priority is to maximize profits. It is viewed based on alternative Batik products, Fabric occupies top priority.

1. Introduction

Batik Tulis Lasem is a superior product from Rembang Regency. It is one of the hand-written Batik which has a high level of complexity. The characteristic of this Batik is a coastal style with unique motifs and colors. The Batik Tulis Lasem industry has begun to penetrate the world of fashion and follow current trends. Batik innovates the using batik fabrics to create creative products so that they have added value and industrial competitiveness.

The literature studies show that Batik Tulis Lasem is not only used as a cloth product but also be used as various other types of products such as; bags, clothes, accessories, sarongs, and scarves [1]. Based on data from BPS Rembang Regency in 2018, the development of Batik Tulis Lasem has increased in the number of entrepreneurs, both native and Chinese. In addition, the number of products and also has increased. The increase in the amount of production will certainly affect the number of workers as well. Most of these workers are local people who do not have a job, so they prefer to work as Batik laborers.
The results of each year of Batik production must also be balanced by government policies, development agencies such as related agencies, especially in post-production processing and marketing activities. In general, entrepreneurs only focus on producing Batik cloth. Marketing of products by utilizing information technology has not been fully carried out by all entrepreneurs. Non-optimal handling results in low productivity of Batik Tulis Lasem, which is produced and results in low selling value only produces Batik cloth. As a result, Batik cloth which has a low price, has no added value. It is different if this cloth can be increased in value after being converted into clothes, bags, or accessories.

The availability of sufficient resources and high market demand indicate that Batik Tulis Lasem has the potential to create added value for every actor involved in the product formation process. This developed potential is expected to be responded to optimally by investors, business actors, and the government as interested parties in the Batik Tulis Lasem business so that it can increase income and overcome problems in community economic empowerment.

The development of the Batik business sector is influenced by two aspects, namely supply and demand. The supply aspect relates to the production process, which is influenced by factors such as raw materials, the number and quality of labor, availability of tools, and final product handling. Meanwhile, the demand aspect will be influenced by product price factors, consumer segments, product quality, and substitute products. The development of the Batik Tulis Lasem business is projected to provide alternative strategies that can be used to increase added value and competitiveness. Based on these phenomena, research is needed to formulate strategic steps for the development of the batik industry in order to get more value. This development strategy is to build a decision support system that is able to generate input as an alternative consideration when making decisions to develop a business.

The number of criteria and alternatives in decision making causes decision makers to experience difficulties when solving problems, so they need a tool that can help the decision-making process[2][3]. One of the tools for analyzing these criteria is multi-criteria decision making (MCDM) which can be used to solve complex decision-making problems (look for MCDM). One of the widely used decision-making methods is the Analytic Hierarchy Process (AHP). AHP has many advantages in the decision-making process because it is quite effective in simplifying and accelerating the decision-making process because it is able to make complex decisions into smaller decision parts[4][5].

The development of the Batik Tulis Lasem industry will involve various related parties such as investors, financial institutions (Banks), government, consumers, industry players, suppliers of raw materials, and research institutions. A tool or system can provide convenience in making decisions quickly, precisely, and effectively. The purpose of this research is to build a decision support system that will help decision makers when developing their business.

2. Methods

The research has been conducted in Lasem District, to be precise in Babagan Village, Rembang Regency, which is the business center for Batik Tulis Lasem. The data used are primary and secondary data obtained through field surveys, interviews, and questionnaires by experts. Experts involved in this research are people who are considered to have extensive knowledge about Batik Tulis Lasem. Secondary data were obtained from the Badan Pusat Statistik (BPS) of Rembang Regency and the results of previous studies [6][7]. The research stages in this research are as shown in Figure 1.

The stages in this research were divided into two phases starting from the preparation phase and continuing with the development phase. In the preparation stage, the process of problem analysis, literature study, identification of needs, and data collection is carried out. At the problem analysis stage, the identification of situations and conditions that occur in the research area is carried out to understand the needs and problems. At the stage of the literature study, a reference search is carried out in accordance
with the research carried out. Then at the stage of identification of needs is to separate which are primary and secondary data needs, and the end of this phase of preparation is data collection.

![Research phase diagram]

**Figure 1.** Research phase

Furthermore, in the system development phase, several processes will be carried out, namely system analysis, system design, implementation, and testing process. In the system analysis process, the researcher identifies the system requirements. Needs are identified into two, namely functional needs and
non-functional needs. Next, the design process is carried out by creating a system design model, then proceed to the implementation process and end with the testing process. At this testing stage, validation of system results is carried out with the results of decisions obtained from experts. The AHP method is used to analyze the prioritization of Batik Tulis Lasem products.

3. Result and discussion
The SPK built in this research requires primary data, namely data on criteria and alternatives for prioritization of Batik Tulis Lasem products. Secondary data required is data on demand for Batik and Batik Tulis Lasem products, the sales volume of Batik products.

The hierarchical structure that is built in the model of determining the Batik Tulis Lasem product consists of goals, criteria, actors, objectives, and alternatives to Batik Tulis Lasem products. Based on the identification, there are five products, namely cloth, sarong, shawl, clothes, accessories. The results of the identification of criteria are nine criteria used to assess the most suitable batik products to be developed, namely demand, continuity of raw materials, quality of raw materials, availability of tools and production sites, availability of funds and capital, product prices, skills and mastery of technology, human resources, and marketing of products.

The development of the Batik Tulis Lasem industry considers important criteria that affect the prioritization of batik products. The results of the analysis show that the criterion that is most influential in the development of the Batik Tulis Lasem industry is the marketing of the products as the first priority, as shown in Table 1.

Table 1. The result of AHP Calculation for model factors

| Criteria                        | Weight of AHP | Priority |
|---------------------------------|---------------|----------|
| Demand                          | 0.034         | 4        |
| Continuity of raw materials     | 0.011         | 9        |
| Quality of raw material         | 0.037         | 3        |
| Availability of tools and production sites | 0.031      | 5        |
| Funds and capitals              | 0.073         | 2        |
| Product prices                  | 0.022         | 8        |
| Skill&Technology                | 0.020         | 6        |
| Human resources                 | 0.018         | 7        |
| Marketing of products           | 0.074         | 1        |

In addition to the criteria, which are the determining criteria for the development of Batik products, actors also have an important role in determining the product determination. Based on the results of the analysis, actors who occupy top priority are investors, downstream industries, and financial institutions with a consistency ratio value of 0.074. It can be seen in Table 2.

Table 2. The result of AHP Calculation for Actors

| Actors          | Weight of AHP | Priority |
|-----------------|---------------|----------|
| Government      | 0.052         | 6        |
| Investor        | 0.257         | 1        |
In addition to the criteria and actors, objectives are also one of the important parameters in the successful development of Batik Tulis Lasem products. Table 3. It shows that maximizing profit is the main goal that has the highest weight and priority with value.

**Table 3. The result of AHP Calculation for Goals**

| Actors                  | Weight of AHP | Priority |
|-------------------------|---------------|----------|
| Maximizing profits      | 0.614         | 1        |
| Business expansion      | 0.268         | 2        |
| Labor employment        | 0.117         | 3        |

Alternative product priorities are the most. From the analysis and calculation results, it is found that the product development in the form of cloth has the highest weight, which is 0.356. This means that the most appropriate written batik product to be developed is to focus on the fabric business. The analysis results for the assessment of alternative product weights can be seen in Table 4.

The complete results of the analysis of criteria, actors, objectives, and alternative products can be seen in Figure 2.
Figure 2. The hierarchical structure and priority weight of determining Batik Tulis Lasem products.

4. Conclusion
This research has succeeded in analyzing through a decision support system to determine Batik Tulis Lasem products using the AHP method. By using the criteria as factors that influence the determination of production of Lasem Written Batik: Demand, Continuity of raw material, quality of raw material, availability of tools and production site, funds and capital, marketing and product, product price, human resources, and skills. Marketing and product are the most significant that influence business feasibility. Then, it is analyzed based on the actors who play a role in product development efforts, investors, downstream industries, and financial institutions are the top priority. And it is seen based on the results of the analysis of product development goals. The main priority is to maximize profits. It is viewed based on alternative Batik products, Fabric occupies top priority. In the future, this system can be equipped with other decision analysis models such as risk determination models.

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