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Designing a Production System for Woven 'Stagen' Products: a Community Service Practice in a Weaving Community

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ABSTRACT

A robust production system needs to be implemented across all business scales, including small-scale enterprises managed by community groups. This forms the foundation for the development of more competitive businesses. As reported in this paper, a community service program was elaborated to design a production system for a stagen weaving business group located in Moyudan, Sleman, Indonesia. To implement this production system, there are five main stages: situational analysis, production system design, workshop, implementation, and monitoring and evaluation. A pilot project was tested on four weavers with distinct characteristics. The results indicate that each of the four weavers produced different stagen patterns with significant revenue gains for weaver 1 and weaver 2 amounting to more than IDR 500.000 (360.24 meters and 237.43 meters, respectively). This program successfully achieved specific targets in line with the scope.

INTRODUCTION

Products are generated through a series of processes or activities known as the production process. The production process is a sequence of integrated tasks involving labor, materials, information, work methods, machinery, and equipment, all interrelated within an environment to transform various inputs into value-added and useful outputs (Bellinda Ayustina et al., 2023). A series of sub-systems within the production process interact to form a production system (Kembang Hapsari et al., 2018). A reliable production system yields various positive impacts such as increased production efficiency, waste reduction, improved product quality, and enhanced customer satisfaction (Nasir et al., 2015; Pristianingrum, 2017). A reliable production system is also often associated with increased operational sustainability and competitive advantage in the market (Susanti et al., 2019; Tyoso & Haryanti, 2020). Achieving a reliable production system should ideally commence from a small-scale business level, as in the case of this community service project involving the Sejati Village weaving group in Moyudan Sleman, Indonesia, which manages a stagen weaving production business group.

This community service activity will design and promote a weaving production system for the stagen weavers' group from Moyudan, Sleman, Indonesia. The designed and formalized production system will facilitate the management of the group's business. Currently, the stagen weavers group, consisting of mothers, runs the stagen business in a familial manner and only as a secondary livelihood. As a result, the products have less added value and the production outcomes are not well documented due to the overlap between business and familial relationships. In the long term, the impact is that this group's endeavor merely stagnates at the same level. On the other hand, the potential for developing stagen weaving as a traditional product is very high, especially with product differentiation possible as an embellishment in modern fashion motifs. Therefore, one of the fundamental steps to reorganize this business's management is by improving the production system.

Good practices in community service for developing production systems have been widely implemented in community business groups, as evidenced by the efforts of (Sodiq et al., 2017) and (Ginting et al., 2018). Both community services have documented models of production systems in community business groups for business development. Sodiq et al. (2017) identified the characteristics of the beef cattle farming production system and also formulated strategies for its development. The development of the applied production system aimed to enhance productivity. Meanwhile, Ginting et al. (2018) modeled the production management system of a goat farming business located in Deli Tua Village, Namorambe District. The implementation of community service activities for comprehensive production systems has also been carried out by (Aditiawati et al., 2016) and (Sutarjo & Sudibyo, 2020) for aquaculture businesses. Through the cultivation of organic pomfret, Aditiawati et al. (2016) improved the competence of business actors to understand the aquaculture production system comprehensively, from broodstock preparation, larviculture with a recirculation system, growing, preparation of organic fermented feed, to the utilization of the

produced fish. A good understanding of the aquaculture production system is foundational for the development of a vocational village model that was initiated. Meanwhile, (Sutarjo & Sudibyo, 2020) enhanced the skills and knowledge of the targeted community about the fish farming system, including environmental treatments to support the success of the production system. As the production system inevitably interacts with the supply chain management system, Subroto & Kawet (2015) evaluated the performance of the supply chain in the rice production system in Panasen Village, Kakas District.

The development of a stagen weaving production system model may undoubtedly bring numerous positive impacts. The designed production system will lay the foundation for the development of other systems such as financial bookkeeping, raw material recording, and product development as a form of product differentiation, which will surely contribute to the future growth of this business group. The scope of the production system design includes documenting the stagen weaving production process, analyzing raw material needs, tracing information flow among weavers, and identifying involved parties - supply chain analysis. Once the production system is modeled and visualized, socialization and training activities will be conducted for the weavers. Subsequently, a demonstration of production using the developed production system will be implemented, followed by the monthly monitoring and evaluation within six months. Finally, this community service activity may have two significant contributions: first, as a pilot project, the stages of this developed production system can be replicated for similar community service activities in different types of business groups; second, as a form of program continuity, a follow-up community service is highly feasible in the development of other systems such as marketing and product development.

IMPLEMENTATION AND METHODS

The target of this community service is a group of 20 weavers located in Moyudan Subdistrict, Sleman, the province of Yogyakarta Indonesia. The scope of this activity includes situational analysis, production system design, socialization and training, implementation, and monitoring and evaluation as illustrated in figure 1.

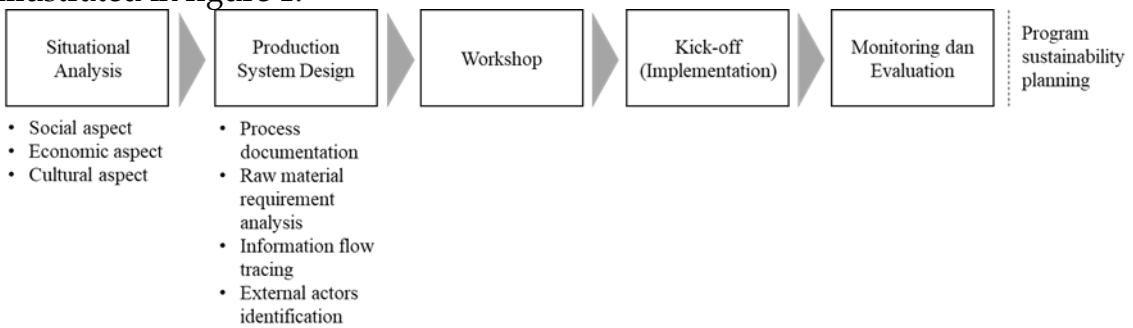

Figure 1. The Scope of this Community Service Program

Situational analysis is the mapping of the conditions of the weaver group which encompasses social, economic, and cultural aspects. This analysis is essential for understanding the overall condition of the weavers and their environment, and for recognizing the historical values that motivate weaving, enabling the service providers to grasp the challenges faced, which are not limited to economic aspects but also other dimensions. The second phase of this activity involves designing a production system. The design of the production system is the most important to this community service activity. During this phase, several sub-activities are carried out, such as documenting the production process of stagen weaving, analyzing raw material needs, tracking information flow among weavers, and identifying external actors involved, including thread suppliers and collectors of finished products. Once the production system has been successfully designed and formalized, the next stage is socialization and training. This phase also emphasizes the importance of community's commitment in managing this weaving group so that what initially operated on familial principles begins to be managed on a cooperative basis, allowing the business to grow.

The fourth and fifth stages are the implementation of the system followed by monitoring and evaluation. At this stage, the formalization of the stagen weaving production system is applied and various production system schemes are tested to achieve efficient production management. The entire program is carried out within six months, with the situational analysis to socialization and training phases conducted during the first three months, and the implementation, monitoring, and evaluation carried out over the subsequent three months. Monitoring and evaluation activities are conducted three times, under the assumption that the weavers, primarily women, have become accustomed and can adapt well to the designed production system.

RESULTS AND DISCUSSION

Situational Analysis

The situational analysis is conducted at the beginning of this community service program to map the social, economic, and cultural situation of the local community and to understand the potential that can be harnessed, while also ensuring that the implemented program is indeed on target. Based on the socio-economic conditions, the majority of the primary livelihoods of the residents in the Moyudan area of Sleman Regency are farm laborers and sand miners. Meanwhile, as a secondary activity, the women are involved in a group for weaving stagen belts to supplement their income. Although many women also engage in weaving, the lack of skills and poor supporting facilities have hindered the development of the stagen weaving business, including in terms of product development. Culturally, the practice of weaving is a tradition that has been passed down through generations and is still preserved today, organized within the stagen weaving community group. In terms of education, most of the population in the area has a low level of education, resulting in less concern for the education of the next generation. Subsequently, a more specific situational analysis is also conducted on the stagen weaving business group to identify the challenges. A summary of the situational analysis results is presented in table 1.

Table 1. A Summary of the Situational Analysis Results

Issues	Description
Social and economic	• The low competency of human resources consequently influences the perspective in embracing new principles. • As the population works as traditional farmers and sand miners, weaving activities serve as a side endeavor that has not yet significantly impacted the community in terms of economy.
Issue possessed by the community	• The absence of collaboration among parties within the weaving business group. The weaving product is made individually. • No maintenance or renewal of production equipment. • The marketing of product relies solely on collectors not end-users. • Production target is not well-documented.

Based on the situational analysis results, the challenges faced by the stagen weaving business group are indirectly influenced by the social and economic conditions of its members. To address these various issues, a long-term community service program is necessary to assist not only the weaving members but also the broader community in the region to overcome these challenges, a process that may take several years. This implies that collaborative roles among different stakeholders, including government, private sector, and universities, are critically needed. This community service activity is just a small part of a range of issues. Therefore, this community service program needs to be clearly defined in its scope, measurable, and truly implementable in the community.

The Design of Stagen Production System

The main stage in this program is the design and implementation of the weaving production system. To design this system, various activities have been arranged on a timeline, including the documentation of the production process, analysis of raw material needs, tracking information flow, and identification of external actors. The production process documentation stage involves meticulously recording each step of the stagen weaving process, from thread procurement and weaving to the storage of the finished stagen textiles. Other stages, such as the analysis of raw material needs, tracking of information flow, and identification of external actors, are conducted simultaneously. Based on the analysis of all these stages, the design of the stagen weaving production system is depicted in figure 1 and figure 2.

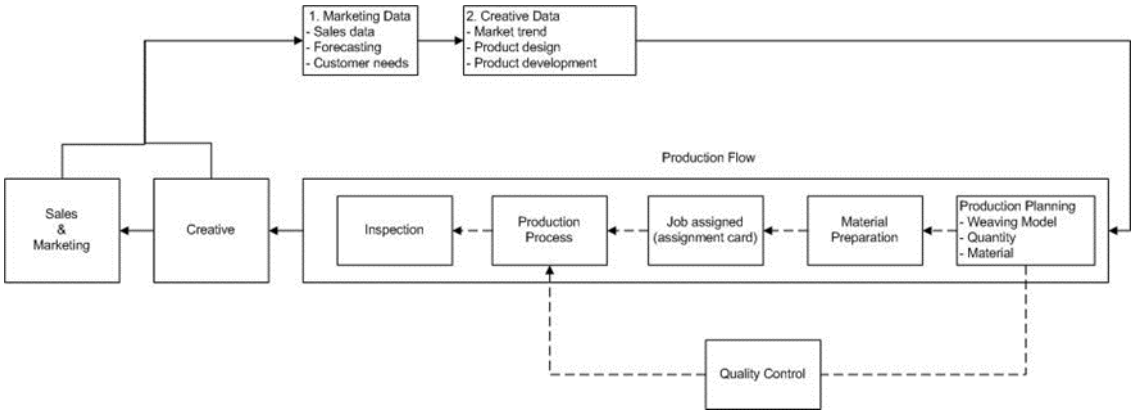

Figure 2. The Designed Weaving Production System

Figure 3. The Photos Illustrating the Application of the System

The production system depicted in figures 2 and 3 represents an ideal production system with a product development scheme. Ideally, the scheme for developing innovative stagen products should be handled specifically by a marketing and sales team. Furthermore, this team should also be trained in using technology relevant to researching fashion trends and stagen innovations that could lead to various derivative fashion products. This information will be valuable for product development and will have a direct impact on enhancing production capabilities.

In the production phase, the stagen weaving process begins with the provision of yarn. Thereafter, the weaving is carried out by the weaver women. Previously, weaving was conducted individually without coordination. The difference in this system is that with a production coordinator, each weaver receives specific tasks to weave different stagen patterns. This ensures that the production system can operate effectively with coordination or information exchange. Information flow, including customer orders, is aggregated by the coordinator so that the production coordinator can calculate the yarn requirements according to the patterns ordered by customers. In this production system, a product development coordinator is crucial to classify stagen weavings that are sold directly to the market or used as accessories for other fashion products. Currently, fashion product innovation involving woven patterns involves external parties with various specializations, while the group of weaver women focuses on producing weavings according to the requested patterns.

Thus, the developed production system model has been formalized and is ready to be socialized and implemented.

Workshop for the weavers

After the production system model has been designed, the next step is to socialize and provide training to the weavers. The socialization and training will be conducted over one day, including a demonstration of the system's implementation as shown in figure 4.

Figure 4. Photos Presenting Workshop Activities

Implementation, monitoring and evaluation

The final stage of this community service activity is the implementation of the designed production system. For the pilot project, the system is applied to four weavers over a period of one month, and then the system is evaluated. The four selected weavers work on weaving patterns according to their skills and commitment to the time available. These two factors influence the level of complexity and variation of patterns requested by buyers. The results of this pilot project is presented in table 2.

As can be seen, weaver 1 demonstrates a very high commitment to the implementation of the system, producing a total of 360.24 meters of weaving, comprising five different patterns. This is followed by weaver 2, weaver 4, and weaver 3. Although weaver 2 produces only two types of stagen compared to weaver 4, the quantity of pattern produced (measured in length) is greater than weaver 4. Meanwhile, weaver 3 can be considered a beginner, with limited variation in patterns and quantity. These four weavers were selected based on various skill levels and time commitments, making them a suitable example for the actual implementation of the system. The length of the weaving produced, of course, directly affects the weavers' income, as illustrated in figure 4.

Table 2. The total number of stagen's lengths produced after applying the system

Weaver	Pattern code	Length of weaving produced (meter)	Total (meter)
Weaver 1	Pattern A.1	123.81	360.24
	Pattern B	83.68	
	Pattern C	24.38	
	Pattern D	93.27	
	Pattern E	35.1	
Weaver 2	Pattern F	161.19	237.43
	Pattern E	76.24	
Weaver 3	Pattern G	63.19	63.19
Weaver 4	Pattern A.2	124.04	179.22
	Pattern A.3	34.76	
	Pattern D	20.42	

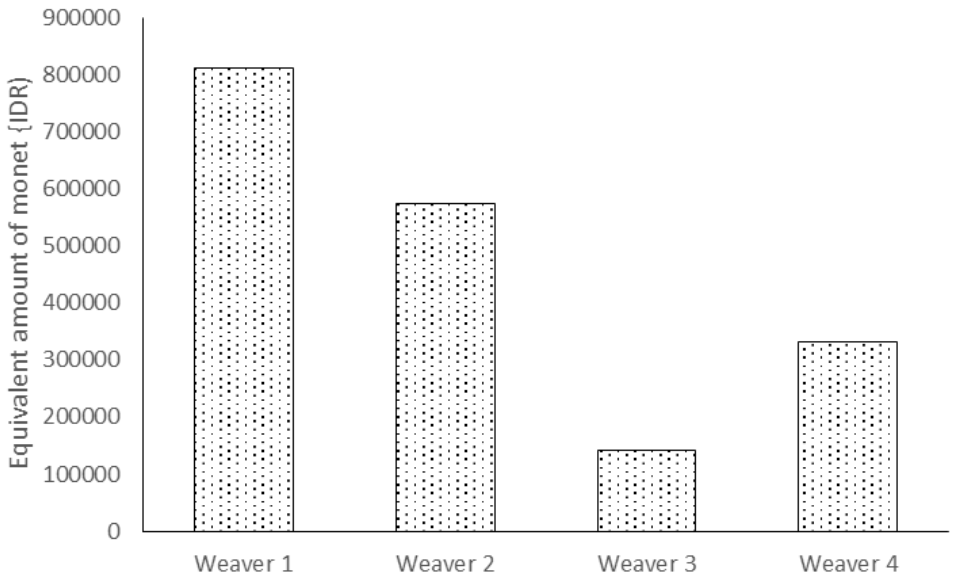

Figure 5. Equivalent Amount of Money Earned By the Four Weavers

Based on figure 4, there are two weavers who have successfully earned an income of more than IDR 500.000, namely weaver 1 and weaver 2. This demonstrates that if the system is implemented effectively, weavers can consider weaving as their primary occupation, provided all actors within this sytem have a proactive role to play in mutual development. Furthermore, the well-documented performance serves as a catalyst for continuous growth among weavers, supported by rewards that can be designed subsequently. For further community service programs, the patterns that have been developed should be differentiated in terms of rewards to appreciate the complexity of the patterns and the creativity explored by the weavers.

CONCLUSIONS AND RECOMMENDATIONS

This community service activity has designed an integrated production system and has also been piloted with a group of stagen weavers located in Moyudan District, Sleman, Indonesia. Although this activity was only conducted for six months, the short-term effects were directly felt by the weavers, notably in the form of increased income. The system trial was conducted with four weavers selected based on varying skills and time commitments. By applying this system, these weavers have produced patterns based on their assigned tasks, skill backgrounds, and time availability. Two weavers have successfully achieved an income above IDR 500.000, namely weaver 1 and weaver 2. The future challenge lies in the collective commitment of this stagen weaving business group to consistently implement the system in a regular manner. Once the system operates regularly, the development can certainly be more easily achieved. In the future, the outcomes of this community service activity can be replicated for other businesses with similar characteristics, that is, those run collectively. The sustainability of the program also becomes crucial for the development of activities to address broader issues.

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