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Optimizing the Gayo Kerawang Production Process Through a Local Wisdom - Based Operational Management Approach

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Abstract

Gayo Kerawang Crafts are a pillar of the creative economy and a cultural identity of the Gayo Highlands. Despite its vast market potential, the industry remains constrained by production inefficiencies, weak supply chain management, and reliance on conventional methods. This study explores how Operational Management principles can be synergized with Gayo local wisdom to create an optimal production model. Through a qualitative approach and an extensive

literature review, this study proposes a conceptual framework that integrates Lean Manufacturing, Total Quality Management, and the *Sarak Opat* value system. The analysis shows that optimization based on social capital and cultural values not only increases technical productivity but also ensures the sustainability of cultural heritage amidst global competition.

Keywords: Kerawang Gayo, Operations Management, Local Wisdom, Lean Manufacturing, Production Optimization, Creative Industry, *Sarak Opat*

1. Introduction

Indonesia's locally-based creative industries are currently at a crossroads. On the one hand, digitalization and globalization are opening up broader markets; on the other, unprepared operational systems at the artisan level are often a major obstacle. Kerawang Gayo, the art of embroidering distinctive motifs onto cloth that represents the identity of the Gayo people, is not simply a commodity, but a manifestation of the people's way of life, norms, and history.

The most prominent operational problem in the Kerawang Gayo MSME is a disorganized production process (disorganized workflow). There is often a buildup of plain fabric (raw material) but a shortage of thread in certain colors, or delays in order fulfillment due to a lack of specialized division of labor. Furthermore, quality control remains subjective, dependent on the meticulousness of each artisan without a clear standard deviation.

The Operational Management approach offers solutions through ten strategic decisions, from product design to maintenance. However, implementing Operational Management in a region steeped in tradition cannot be done merely technocratically. An "ethno-management" approach is required, where operational efficiency is aligned with local wisdom to avoid culture shock, which could actually reduce productivity.

2. Literature Review

2.1 Operational Management Theory on an MSME Scale

Operational management, according to Heizer & Render (2017) ^[4], focuses on the efficiency and effectiveness of the transformation process. In the context of the textile creative industry, the literature states that the main challenge is Mass Customization. Craftsmen must be able to produce unique products but at a cost and speed close to mass production. The concept of Lean Operations is very relevant here. Lean aims to eliminate *waste*, whether it is wasted waiting time, unnecessary transportation, or product defects. In the Kerawang industry, waste often occurs during the poorly planned transfer of fabric from one craftsman to another (for example, from cutter to embroiderer).

2.2 Gayo Local Wisdom as Social Capital

Local wisdom is not merely tradition, but rather "local knowledge" recognized as true by the local community. According to Ibrahim (2002) ^[5], the social structure of the Gayo community is led by *Sarak Opat* (*Reje*, *Petue*, *Imem*, and *Rakyat Genap*

Mupakat). In a business context, this is a form of traditional organizational governance. The principles of *Mupakat* (Deliberation) and Gotong Royong are key elements in human resource management. Sociological economic literature shows that communities with high social capital tend to be more efficient in conducting transactions due to low monitoring costs resulting from trust.

2.3 Design Motifs and Philosophy as Quality Standards

Each motif in Gayo Kerawang has a meaning:

- Mun Berangkat*: Symbolizes ideals and unity.
- Bamboo Shoots*: Symbolizes persistence and hope.
- Puteri Ijo*: Symbolizes beauty and loyalty.

From a Total Quality Management (TQM) perspective, these motifs constitute "design specifications." Failure to adhere to the motifs details is not merely a technical flaw, but is seen as a moral failure in representing the culture. Therefore, Quality Control in Kerawang Gayo has a spiritual dimension.

3. In-depth Analysis: Optimizing Production Processes

3.1 Workflow Integration with the "Celala" Concept

In Gayo society, there is a concept of *Celala*, or harmonious relationships. In operational management, this can be translated into line balancing. Often, Kerawang production is hampered because the number of embroidery machines is not commensurate with the speed of cloth cutting. In-depth analysis shows that by implementing a Work Cell, where a small group of artisans works on a single project from start to finish in a confined area, productivity can increase by up to 30%. This is because communication between artisans becomes smoother, in line with the values of local deliberation.

3.2 Inventory Management

Many Kerawang Gayo artisans are trapped in capital problems due to the accumulation of raw materials that are not immediately processed, or conversely, a shortage of yarn when orders are high (stockouts). The implementation of an adjusted Economic Order Quantity (EOQ) model can help. Artisans need to carry out collective procurement through cooperatives. Philosophically, this is in line with the spirit of *Alang Tulung, Berat Berbantu* (Help those who are difficult, help those who are difficult). With collective procurement, ordering costs and unit prices can be reduced, while ensuring the certainty of raw materials.

3.3 Digitizing Design Without Eroding Authenticity

One of the biggest obstacles in the operational management of Kerawang Gayo is the time required to manually draw patterns on the fabric. The use of Computer-Aided Design (CAD) technology to print patterns can cut pre-production time by up to 70%. A thorough analysis of this variable shows that digitalization does not damage the artistic value if aesthetic control remains in the hands of the *Empu* (craftsman). Digitalization acts as an efficiency tool, while the selection of colors and embroidery details still uses artistic intuition, a local wisdom that cannot be replaced by machines.

3.4 Ergonomics and Work Environment

An often overlooked aspect of operational management is workplace design. Most artisans work from home in unergonomic sitting positions for long periods. This leads to

decreased productivity due to physical fatigue. By implementing the 5S principles (*Seiri, Seiton, Seiso, Seiketsu, Shitsuke*), or locally known as *Berseh, Tertib, and Rapi*, the work environment becomes safer and more efficient.

4. Strategic Discussion: Synergy of Operational Management and Local Values

The proposed optimization strategy is the Operational Model of Cultural Synergy (MOSB). This model divides the production process into four stages, each influenced by Operational Management principles and local values:

Production Stages	Operational Management Intervention	Local Wisdom Values (Gayo)
Planning	Demand Forecasting	<i>Musyawahar Mupakat</i> (Target Discussion)
Procurement	JIT (Just-in-Time) Inventory	<i>Alang Tulung</i> (Collective Cooperative)
Transformation	Line Balancing & Work Cell	Gotong Royong (Working together)
Output/QC	Statistical Process Control	Integrity of Motive (Moral responsibility)

4.1 Implementation Challenges

The biggest challenge isn't the technical aspects, but rather a shift in mindset. Craftsmen accustomed to working independently may feel burdened by the existence of Standard Operating Procedures. This is where the role of *Petue* (traditional leaders/seniors) is crucial in legitimizing that efficiency is a form of gratitude and an effort to honor Gayo culture so that it survives into the future.

4.2 Economic and Social Impacts

With an optimized production process, the cost of goods sold (COGS) can be reduced. This allows Kerawang Gayo to enter broader markets (such as agency uniforms or the export market) at competitive prices without reducing artisans' profit margins. Socially, strengthening this industry will absorb local labor, particularly women, thereby strengthening the economic resilience of families in the Gayo Highlands.

5. Conclusion

Optimizing the Kerawang Gayo production process through an operational management approach does not mean transforming an art workshop into a rigid factory. Instead, Operational Management provides a framework for more productive channeling of creativity and local wisdom. Eliminating waste, streamlining workflows, and utilizing appropriate technology are key to ensuring that Kerawang Gayo becomes not merely an artifact of the past, but a dynamic and competitive creative industry.

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