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# Proceeding

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## 8<sup>th</sup> INTERNATIONAL SEMINAR ON INDUSTRIAL ENGINEERING AND MANAGEMENT (8<sup>th</sup> ISIEM)

*Technopreneurship as The Spirit of Innovation-Based  
Industrial Development  
Towards Global Competitiveness*



**ISIEM**

**Atria Hotel & Conference  
Malang, East Java, Indonesia  
March 17 – 19, 2015**

*Tarumanagara University, Trisakti University,  
Al Azhar Indonesia University, Esa Unggul University,  
Atma Jaya Catholic University of Indonesia,  
Pasundan University, Telkom University,  
& University of Muhammadiyah Malang*

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# PROCEEDING

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and Management (8<sup>th</sup> ISIEM)

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development Towards Global Competitiveness*

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Organized by: **Industrial Engineering Department of**

- Tarumanagara University • Trisakti University •
- Esa Unggul University • Al Azhar Indonesia University •
- Atma Jaya Catholic University of Indonesia • Pasundan University •
- Telkom University • University of Muhammadiyah Malang •

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# PREFACE

Dear Presenters and Delegates,

On behalf of the Organizing Committee, I am honored to welcome you to the 8<sup>th</sup> International Seminar on Industrial Engineering and Management (ISIEM). This seminar is organized by the Industrial Engineering Department from eight Universities, namely Tarumanagara University, Trisakti University, Esa Unggul University, Pasundan University, Atma Jaya Catholic University of Indonesia, Al Azhar Indonesia University, Telkom University and University of Muhammadiyah Malang.

This seminar is held to provide an effective forum for distinguished invited speakers, academicians, engineers, professionals and practitioners from Universities, research institutions, government agencies and industries to share or exchange ideas, experiences and recent progress in Industrial Engineering and Management.

We are very convinced that our presenter and delegates will gain many shared ideas and great experiences from this conference. Furthermore, our participants will enjoy additional insights from our plenary sessions' speakers, i.e., Associate Prof. Dr. Montalee Sasananan from Thammasat University, Thailand and Prof. Younghwan Lee, Ph.D from Kumoh National Institute of Technology, South Korea.

Through this seminar, we are committed to promote sustainable innovation in industrial technology, information and management in order to increase industrial competitiveness in facing the global challenges in industrial environment. Once again, it is my great honor to welcome you to the 8<sup>th</sup> International Seminar on Industrial Engineering and Management (ISIEM) 2015 in the great cultural city of Malang, Indonesia.

Best wishes,

Chair of the 8<sup>th</sup> ISIEM 2015  
Dr. Ir. Lamto Widodo, M.T.

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## DESIGNING QUALITY ASSURANCE SYSTEM FOR RAW MATERIAL ACCEPTANCE PROCESS IN BATIK INDUSTRIES USING BUSINESS PROCESS IMPROVEMENT METHOD

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### ABSTRACT

*Quality assurance of raw materials in batik industries needs to be performed in accordance with its critical to quality factors derived from requirements of customer and batik standards such as SNI (Indonesian National Standard) and Batikmark. The existing processes are subject to be improved using Business Process Improvement method, which is conducted in a series of activity analysis and streamlining analysis for every activity in critical processes in order to capture more effective and efficient processes. The improved business processes are then documented in the form of Standard Operating Procedure that is based on requirements ISO 9001:2008 clause 7.4 (Procurement).*

**Keywords:** Business process improvement, material acceptance, ISO 9001:2008.

### 1. INTRODUCTION

Quality of raw materials for batik such as fabric, paraffin wax, and canting affect the critical to quality factors of batik. Reference of quality in raw material is based on definition of a CTQ (Critical to Quality) which is defined as a product or service characteristic that must be fulfill specification or requirement (Kumar, 2006). CTQs are identified for each material acceptance process in order to maintain product and process quality so as to fulfill customer requirements of Batik product with references to SNI for batik and Batikmark. In raw material acceptance process, CTQ targets that fail to be met lead to the occurrence of defects, which are shown in Table 1.

CTQs are created by a set of critical business processes which have direct influence on the quality. The procedure of materials acceptance should ensure that the raw materials be compliance with the quality criteria. In addition, the process flow of raw materials acceptance process should be efficient to reduce cycle time and other resources. BPI (Business Process Improvement) is a method which aids in simplifying and streamlining business processes while ensuring that both internal

and external customers of the organization receive better outputs (Harrington, 1991).

Table 1. Types of Defects Based on Unfulfilled Critical to Quality

| Types of Defects Based on Unfulfilled Critical to Quality Occurred at Batik Companies |
|---|
| 1. Inappropriate fabric width   |
| 2. Inappropriate fabric weight  |
| 3. Bad fabric absorbency  |
| 4. Uneven fabric texture  |
| 5. Inappropriate dyeing colour  |
| 6. Torn fabric  |
| 7. Imperfect wax penetration  |
| 8. Stiff wax  |

Proposed business processes should be standardized so as to reduce possible errors that might occur in each batik product realization process. The quality standards set by SNI and the Batikmark should be complemented with quality assurance such as ISO 9001:2008 that is oriented to business and production processes in order to maintain the product quality consistently. The standard ISO 9001: 2008 clause 7.4 for purchasing process is a referencing to design standard operating procedure (SOP) for material acceptance process (Tricker, 2010).

The purpose of this study is to identify and improve the material acceptance

processes that are critical to the realization of CTQ in batik product. Furthermore, this study produces quality documents consist of SOP (standard Operating Procedure) and work instruction that complies with ISO 9001:2008 clause 7.4 for the implementation of material acceptance quality assurance system.

## 2. THEORETICAL BACKGROUND

Quality assurance is the process of defining and fulfillment of the quality standards consistently and continuously, so that customers and other stakeholders obtain satisfaction and trust the quality of the products offered (Elliot, 1993; Pike, 1996; Cartin (1999:132). In this study, some quality standards used for Batik product are Batikmark, SNI Batik, and ISO 9001:2008 clause 7.4. Batikmark in physically is a sign that shows the identity and characteristics of Indonesian batik made of three types, namely batik tulis, batik cap and batik combination by copyrights No 034100, 5 June 2007.

Approach used in this study to produce quality documents is by the designing and improving of the business processes. Other study used the same approach to design of a process-based Quality Assurance System for batik cap industry based on ISO 9001:2008 clause 7.5.1 (product realization) that compliance to ISO 9001:200 (Damayanti, et. al, 2014).

BPI (Business Process Improvement) provides a system that will assist the process of business process simplification/streamlining, to give an assurance that the internal and external customers of the organization will get a much better output (Harrington, 1991). Phase of business process improvement can be seen Figure 1.

The figure 1 can be explained as follows (Harrington, 1991):

Organizing of improvement is to get a success by building leadership, understanding, and commitment. Activities undertaken are:

- a. Defining critical process
- b. Selection process owner

- c. Defining the boundary - initial boundary refinement
- d. Formation and training of process improvement teams
- e. Develop a change management plan
- f. Set Indicators of success

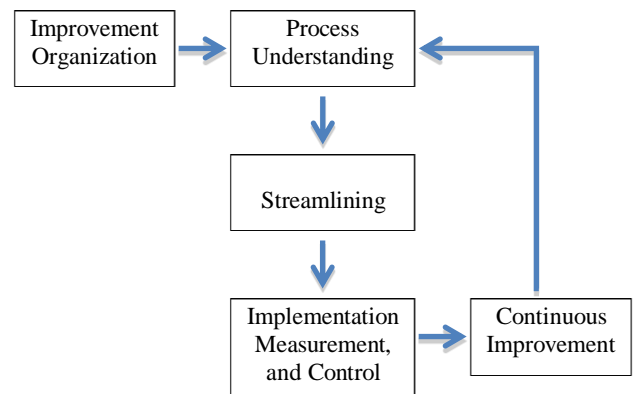


Figure 1. Business Process Improvement Phase (Harrington, 1991)

Process understanding is the entire understanding of the ongoing business process dimensions. Activities undertaken are:

- a. Make a flow chart (Flowchart) business process
- b. Establish a relationship - a relationship with a running process
- c. Perform timing analysis process
- d. Walkthrough process (implementation of rapid improvement)
- e. Resolve differences (fixes problem solving process)
- f. Setting processes and procedures

Streamlining is an attempt at process simplification using 12 different tools wherein process considered to add little to no value can be reduced and main process that still needs improving can be simplified, resulting in a more effective and efficient process. Streamlining brings about greater process effectiveness, efficiency and adaptability.

Measurement and control is an implementation a system to control the course of business processes in order to achieve a desired target. Activities undertaken are:

- a. Develop a process measurement and targets
- b. Provide a feedback system

c. Perform a periodic inspection process

Continuous improvement is an ongoing process of business process improvements which are considered better and is able to improve the efficiency of the process.

### 3. DESIGNING QUALITY ASSURANCE SYSTEM FOR RAW MATERIAL ACCEPTANCE PROCESSES IN BATIK INDUSTRIES

The output of this study are SOP (standard Operating Procedure), work instruction and the mechanism of process performance evaluation that complies with ISO 9001:2008 in material acceptance process. This is achieved by improving its business processes, that is aligned well with their CTQ targets. Figure 2 explains the conceptual model in this study.

Data collected for design of quality assurance in this study are as follows:

- 1) Existing business processes, particularly raw material acceptance process and batik pattern designing process.
- 2) Organizational structure of Batik Komar company.
- 3) ISO 9001:2008 document, clause 7.
- 4) SNI for batik and Batikmark standards.

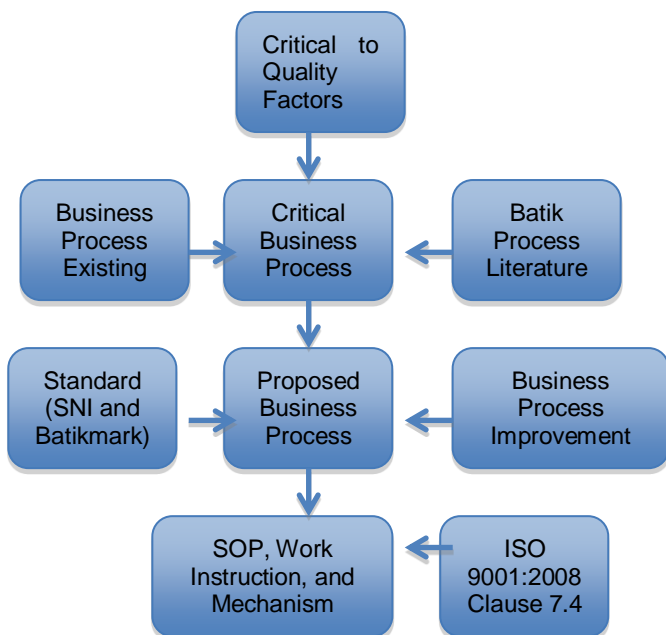


Figure 2. The conceptual model

The processes of designing quality assurance system for material acceptance are as follows:

I. Identification of existing business processes

This research exclusively analyzes raw material acceptance process that strongly affects the quality of finished products. In the existing business processes of two batik companies, material inspection is held in the middle of the production process and testing is not executed. Some critical points of inspection are also missed in the inspection process. This process could lead to longer inspection, rejection or sometimes rework processes happened in the middle or end of the production process. In detail, findings in the existing business process are as follows:

1. The materials inspection is done in the middle of the production process instead of in the receiving process.
2. The standard quality of the raw materials such as Mori and Primisima fabric, gondorukem candle, and raw damar were not specified.
3. Examination of the raw materials are only done physically, resulting in defects caused by raw materials.
4. There is no testing tools are used to ensure the quality of raw materials.
5. Raw materials received and stored data are not documented.

II. Identification of critical factors with direct impact on quality

Factors that affect quality in the production process of batik fabric, particularly in raw material acceptance process are identified through information gained from workers as business processes players and supporting literatures. Critical business processes with high influence on quality are improved with references to SNI for batik and Batikmark standard using BPI method to create proposed business processes that are more effective, efficient and compliant with their Example of CTQ targets in Mori fabric are as follows:

(SNI 08-0281-2004):

- i. Width :105-120 cm
- ii. Weight :90-100 gram
- iii. Construction : plain
- iv. Water Absorption :20 seconds



- v. Kind of fiber : cotton
  - vi. Texture : flat
- Example of CTQ targets in Gondorukem candle are as follows:  
(SNI 7636:2010) :
- i. Colour : bright yellow
  - ii. Packaging: thick zinc coated steel, sealed
  - iii. Labels: clear
  - iv. Softening point: 60-70 ° Celsius

III. Analysis using Business Process Improvement Method

All CTQs become the references for designing critical processes. Inspection and testing processes are improved in proposed business processes. Some improvements set in proposed business process are as follows:

1. The materials inspection is done in the beginning of the receiving process.
2. The standard quality of the raw materials such as Mori and Primisima fabric, gondorukem candle, and raw damar have been set.
3. Inspection of incoming raw materials is done in accordance with the standards of the ISO 9001:2008 clause 7.4, and this ensures that incoming raw material does not interfere the production process and the quality output.
4. There is inspection checksheet contains items and their standards to be met.
5. Inspection of raw materials is done by taking the sample test.
5. Raw materials received and stored data are not documented.

Streamlining brings about greater process effectiveness, efficiency and adaptability. Tabel 2 shows the result of streamlining process of the material acceptance business process.

Table 2. Result of streamlining process

| Existing Business Process |     |     |        | Proposed Business Process |     |     |        |
|---------------------------|-----|-----|--------|---------------------------|-----|-----|--------|
| RVA                       | BVA | NVA | Effic. | RVA                       | BVA | NVA | Effic. |
| 7                         | 5   | -   | 91.43% | 8                         | 2   | -   | 99.82% |

IV. Quality Document Design

The output of this study is quality document that designed by considering improved business process. Quality documents resulted from this study are as follows:

- A. System operating procedure of material acceptance process
- B. Work Instruction of Mori Prima fabric inspection
- C. Checksheet of Mori Prima fabric inspection
- D. Work Instruction of Mori Primisima fabric inspection
- E. Checksheet of Mori Primisima fabric inspection
- F. Work Instruction of Gondorukem inspection
- G. Checksheet of Gondorukem inspection
- H. Work Instruction of Damar inspection
- I. Checksheet of Damar inspection

4. RESULT AND DISCUSSION

The performance of proposed design compare to the existing business processes of material acceptance process is explain as follows:

Effectiveness:

- i. An addition of incoming raw material testing, which is conducted in accordance with standard testing in SNI and Batikmark standard, creates a more effective inspection process in account of the ensured quality of raw material.
- ii. Raw material acceptance becomes more effective with the implementation of criterion-based testing as stated on the checksheet, which acts as a buffer that prevents the incoming of low quality raw material.
- iii. Customer requirements for batik products, produced with quality raw material, can be fulfilled.

Efficiency:

- i. Incoming raw material testing based on criterions stated on checksheet is able to reduce time spent on handling nonconforming products. Estimation results show that approximately 5.833 hours can be deducted from the total cycle time of both production process of stamped batik and hand-drawn batik, thus increasing the former cycle time efficiency by 8.39% and the latter by 6.52%.
- ii. The number of defective raw materials found in production process can be reduced to about 5%.

## 5. CONCLUSION

Several conclusions can be drawn from data processing and analysis using Business Improvement method that have been performed:

1. Proposed business processes in material acceptance process is designed in accordance with critical to quality targets specified by the company using Business Process Improvement method to improve critical proses businesses, resulting in more effective and efficient business processes. batik product. Estimation results show that approximately 5.833 hours can be reduced from the total cycle time of both production process of stamped batik and hand-drawn batik, thus increasing the former cycle time efficiency by 8.39% and the latter by 6.52%.
2. This study produces quality documents consist of SOP (standard Operating Procedure), work instructions and checksheets that complies with ISO 9001:2008 clause 7.4 for the implementation of material acceptance quality assurance system. The documents include system operating procedure of material acceptance process, work Instruction of Mori Prima fabric inspection, checksheet of Mori Prima fabric inspection, work Instruction of Mori Primisima fabric inspection, checksheet of Mori Primisima fabric inspection, work Instruction of Gondorukem inspection, checksheet of Gondorukem inspection, work Instruction of Damar inspection, and checksheet of Damar inspection.
3. Further research can consider to include cost estimation in implentation of the proposed business process.

## 6. REFERENCES

- (a) Cartin, T.J. 1999. Principles and Practices of Organizational Performance Excellence. Milwaukee, Wisconsin:ASQ Quality Press.
- (b) Damayanti, D.D., Widaningrum, S., Andrawina, L., and Pramudya, I. 2014. Design of Quality Management System Based ISO 9001:2008 Clause 7.5.1 for

Traditional Batik Cap Industry. Proceedings of International Seminar on Industrial Engineering and Management, Bali.

- (c) Elliot, J. 1993. Action Research for Educational Change. Philadelphia: Open University Press
- (d) Harrington, dkk., 1997 . Business process improvement Workbook, The McGraw-hillCompanies, Inc
- (e) Kumar, Dharendra. 2006. Six Sigma Best Practices. United State: J. Ross Publishing.
- (f) Pike, Barnes. 1996. TQM In Action, London : Champman dan Hall
- (g) Tricker, R. 2012. ISO 9001: 2008 for Small Businesses. 4th ed. New York: Routledge.

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