Production Efficiency Analysis for Empowerment Strategy of Troso Weaving Craft Micro, Small, and Medium Enterprises (SMES) in Jepara Central Java

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ABSTRACT
This study attempts to analyse the business efficiency level of Troso weaving craft (tenun ikat or woven fabrics) of small and medium enterprises (SME) in Jepara, Central Java. In this research, a Data Envelopment Analysis (DEA) was used to obtain data from productive and unproductive SMEs. It analyses the value of technical efficiency and revenue efficiency of 41 Troso weaving craft SMEs with various business scales in Jepara. Results show that only 14 SMEs or 34% of the businesses were technically efficient. 50% of enterprises fulfilled the revenue efficiency.

Keywords: DEA, production efficiency, SME, Troso weaving craft

INTRODUCTION
Micro, small, and medium enterprise (SME) play a significant role in improving Indonesia’s economy. In 2009, SMEs contributed 32% of the GDP, which increased to 34% in 2014 (data from the Directorate General of Small and Medium Industries, the Ministry of Industries of the Republic of Indonesia). The GDP earns much of its revenue from the fashion industry, such as through natural silk, leather products, batik, and woven items (tenun).

However, Indonesian SMEs still face many obstacles. One of the main constraints is the low quality of human resources (HR) to compete in this free market era. To be able to compete in the Asian Economic Community (AEC), it is necessary to (1) anticipate the dispersion of EAC insights among SME communities;
(2) enhance the production efficiency and business management; (3) increase the good performance of market absorption for local SME products; and (4) create a conducive business climate. Therefore, guidance and empowerment of SMEs are needed to improve the product quality and standards, increase the performance, and produce highly competitive products.

Troso tenun ikat or weaving crafts, besides carving, are one of Jepara’s primary products. Troso weaving crafts used to flourish but is now declining due to production efficiency factors. From 2009 to 2013, the enactment of the Jepara Regency regulation to wear traditional Troso weaving craft fabric as uniforms for all regional government employees, excluding civil servant regional police units (Satpol PP) and transportation sector (Dishub) employees, every Wednesday, Thursday, Friday, and Saturday, resulted in an increase in the number of units, number of employees, amount of production volume, amount of investment value, and amount of production.

In 2009-2010, the production volume increased by 11.6%; it continued to increase by 2% in 2010-2011; rose by 5% in 2011-2012; and reached 59% in 2012-2013. In terms of production value, in 2009-2012 it increased by 11.6%; continued to 0.38% in 2010-2011; rose to 12% in 2011-2012; and topped at 59% in 2012-2013. Marketing strategies, from 2009 to 2013 was focused in local national markets.

A problem that arises in the Troso weaving craft industry is the lack of competitiveness with other textile and fashion industries, such as batik, in the international market. This is due to the lack of human resource quality and low efficiency, while there is a need for a high cost economy. Moreover, the Troso weaving craft quality, quantity, and continuity of the products are still largely not up to par for world trade.

Research on the efficiency of Troso weaving craft production is necessary to improve its competitiveness in the global market. The development of the SME human resources, especially Troso weaving craft plays an important role in the creation of quality, resilient, competitive, and independent workers. SMEs should strive to increase their competitiveness by improving the quality and efficiency of their products. This study aims to analyse and measure the efficiency of Troso weaving craft SMEs in Jepara. The study also expects to provide inputs for small and medium industry on using better production factors to improve product quality.

**LITERATURE REVIEW**

**Production**

Production refers to the transformation of various inputs or resources into output in the form of goods and services (Salvatore, 2003). Production is also the result of an economic process or activity by utilizing some input or input (Tati & Fathorrozi, 2003). In general, there are two notions of production, namely economic production and physical production. Economical production is an activity to increase the
Production Efficiency Analysis of Troso

added value of a good, either through the form of utility, time of utility, or place of utility. Meanwhile, physical production is the relationship between factors of production; it is a relationship between the input and output in the productive process (Sudarsono, 1984).

The technical relationship between inputs and outputs in the form of equations, tables, or graphs is a function of production (Salvatore, 1996). The production function can also be defined as an equation that shows the maximum number of outputs produced with combined input using technology (Hutami & Yusrina, 2016). Soekartawi (2003) claimed that the production function is a physical relationship between the described variable (Y) or output and the variable that explains (X) or the input.

After utilizing every available input, companies strive to obtain maximum results at the highest technological level (Nicholson & Snyder, 2013).

Efficiency

Efficiency is the ratio between input and output (Stoner, Freeman, Gilbert, & Daniel, 2013). The obtained input and the comparative figure depends on the purpose of using the benchmark. Efforts to increase efficiency are generally linked to lower costs in obtaining an outcome and waste suppressed to the minimal.

Meanwhile, Wattanutchariya and Panayotou (1982) argued that the efficiency of input utilization requires usage an input at a level where marginal value is at the same level with price or MVPi = Pi, so that the MVPi/Pi = 1; MVPi is the marginal value product of i value inputs and Pi is the i value. If the marginal value is greater than the price, the gain is increased by escalating the input utilization.

Concept of Economic Efficiency

Miller and Miners (1997) suggest that efficiency is based on the relationship between output and input. Technical efficiency requires a production process that can utilize fewer inputs to produce the same amount of output. Implicitly, in the concept of economic efficiency, the idea being that the least cost is the best. In other words, at each level of output, a company will have an economically efficient production process if it utilizes the cost of resources for each unit of output (whatever its total output) at the cheapest/lowest cost. The resources owned by a company are limited (rare). Therefore, the company must be able to determine the most efficient means of production (Soeratno, 2000).

Soekartawi (2003) categorizes efficiency into three aspects: technical efficiency (TC), economic efficiency (EE), and price efficiency (PE). Technical efficiency is the ratio between actual production and maximum production. Economic efficiency is a quantity that shows the comparison between actual profit and maximum profit.

Economic efficiency is achieved when the following two conditions are met (Doll & Orazem, 1984): (1) technical production efficiency is a required condition that indicates the physical relationship between input and output, where the elasticity of
the production process is between 0 and 1; (2) a sufficient condition is related to the objective, that is, the maximum profit condition is achieved when the value of the marginal product equals the marginal cost.

MATERIALS AND METHODS
This study has four main stages: (1) describe the problem formulation and research objectives, conducting a literature study and field survey, determining the decision making unit (DMU), and identifying the variables; (2) explain the data collection and collect primary data from site visits and observations of 41 Troso weaving craft SME units in Troso, Jepara; (3) explaining input and output variables using the DEA model and conducting an analysis of the efficiency; and (4) analysing the results and drawing a conclusion of the analysis.

There were two types of efficiency values generated by the DEA: radial efficiency values (efficiency values of each DMU) and efficiency values per part (input and output variables). The values of the radial efficiency and efficiency per part was examined. The radial efficiency was expanded into super-efficiency, and the efficiency per part was extended into potential improvement.

Data Envelopment Analysis
A Data Envelopment Analysis (DEA) was used to measure the technical efficiency. The DEA, which is a relatively convenient measurement of profit and non-profit organizations, measures the inefficiency of business units with other efficient business units in existing data sets. Through the DEA analysis some units had 100% efficiency.

The DEA model is specifically designed to measure the relative efficiency of a production unit with a larger number of inputs and many outputs (Alvarez & Crespi, 2003). One of the advantages of using DEA in an efficiency analysis, according to Hadad, Santoso, Ilyas and Mardanugraha (2003), is to detect the source of inefficiency. In this study, an analysis was conducted on the efficiency performance using a multi-stage DEA model, with a constant return to scale (CRS) and variable return to scale (VRS).

Two kinds of data were analysed: input and output. Inputs are the amount of raw material, production costs, and labour in the weaving craft industry, outputs are the final products of the Troso weaving crafts.

RESULTS AND DISCUSSIONS
This research was conducted using Data Envelopment Analysis (DEA) model with a constant return to scale (CRS) and variable return to scale (VRS). In accordance with the characteristics of the nonparametric approach, DEA does not require a special functional form in measuring the relative efficiency as required in the parametric approach.

The results of the technical efficiency analysis on 41 Troso weaving craft SMEs show that 14 SMEs are technically efficient in production with a technical efficiency value reaching 100%. This indicates 14 Troso weaving craft SMEs used the input to produce the output (weaving crafts) at optimum levels. The craftsmen work
efficiently and do not waste the production factors. In employing labour, craftsmen use remuneration based on the amount of work production and through work supervision to minimize the unstandardized production yields.

The remaining 27 SMEs or 66% are not technically efficient, as their technical efficiency values are below 100%.

Revenue efficiency analysis of 41 SME respondents found that 21 respondents have fulfilled the revenue efficiency with 100% scores. This can be interpreted that these SMEs’ usage of input and remuneration (price) is optimal.

A total of 20 SME respondents showed revenue efficiency results of less than 100%, indicates they are inefficient in utilization of input and remuneration.

Troso weaving craft SMEs in Troso, Jepara, are not fully efficient, both in technical efficiency and revenue efficiency. Out of 41 SME respondents, 66% of the respondents did not fulfil the technical efficiency and 50% of the respondents the revenue efficiency.

Inefficient conditions arise if the actual value does not match the target value. For example, there is the use of less professional labour inputs and a lack of training and supervising of the new workforce. The lack of supervision happens due to production activities being done in residences where the workforce is located, making the level of work concentration less controlled.

The excessive use of raw materials and/or auxiliary materials also results in non-optimal output and affects their prices.

SMEs which cannot use inputs efficiently will have high product prices. Integrated and specific empowerment is needed to help overcome the causes of inefficiency in every form for SMEs.

**CONCLUSION**

It can be concluded that SMEs in the Troso weaving sector are in the main not fully efficient in both technical and revenue aspects. Out of 41 respondents from SME 66% do not fulfil technical efficiency and 50% do not fulfil revenue efficiency. These inefficient conditions indicate that the use of both input and output is not optimal with implications on productivity. It is necessary to create integrated empowerment programs, especially those that are concerned with improving production efficiency. The empowerment of *tenun ikat* (weaving craft) businesses should include the cooperation of academics who conduct research on the management of small industry enterprises, the local government which makes policies to support the development of SMEs and commerce businesses, and craftsmanship organizations to facilitate human capital reinvigoration. Such involvement can improve the competitiveness of the Troso weaving craft sector vis a vis local heritage fashion fabrics, such as batik, both nationally and internationally.

**REFERENCES**


