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# Factors affecting the performance of batik small industries Tanjungbumi becoming environment friendly

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**ABSTRACT**

Sustainability and small industries are the two contradictory things in Indonesian economic growth. Small industries have significant role in economic growth which is inverse with environmental management awareness. One of the economy boosters in Indonesia is batik industry majority of them are small industries. This study aimed to identify the factors affecting the performance of small batik industry environment friendly which applies supply chain management approach. The results of the test of homogeneity of variance showed that there are 23 factors describing the performance of supply chain management (P-value = 0.021). Those 5 (five) main affecting factors are 1) the company performs formal evaluation to suppliers to determine the performance of suppliers every year; 2) the company carries out standards evaluation in production facilities and suppliers operational processes; 3) the company makes on-time payments in purchasing raw materials as scheduled agreed; 4) information technology mastery in order to facilitate communication between companies and suppliers for communication; and 5) modifying the production process in order to produce environment friendly products

***Key words :*** *Supply chain management, Batik industry, Small and medium industry, Environmental management*

## Introduction

Batik is one of Indonesian cultural icons. Determining Indonesian batik by The United Nations Educational, Scientific and Cultural Organization (UNESCO) as Cultural Heritage for Oral and Non-material Humanity (Masterpieces of the Oral and Intangible Heritage of Humanity) on October 2, 2009 affected the further development of the batik industry. The development of batik industries led to multiplier effects on Indonesian economy and culture. Almost all regions in Indonesia have typical batik motif. One of regions famous with its batik is Tanjungbumi located in the island of Madura. Most batik produced in this region comes from small industries.

Small industries is a mainstay of the economy in almost all countries in the world, especially in developing countries (Uma, 2013); (Musa and Chinniah, 2016) (Ghazilla *et al.,* 2015). In Indonesia, small industry contributes significantly to the Gross Domestic Product (GDP) at least 60% and provides employment for 97% (Anggadwita and Mustafid, 2014). When monetary crisis hit Indonesia in 1997, small industries had survived and have remained its existence to this present day, due to the less government influence on the small industries. The existence of small industries is an important resource that sup-

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ports economic growth and development flexibility (Robu, 2013). Inversely to its important role in the Indonesian economy growth, small industries have a number of problems along with its development, namely 1) the lack of capital; 2) lack of knowledge and resources skills; and 2) the technology limitations (Rahmadyanti and Witjaksono, 2015).

Those various limitations have caused many small industries lack knowledge on environmental management and on the ability to manage the environment. Generally, those small businesses have no clear ideas of the benefits in managing the environment. This is in line with Moses and Chinniah (2016) who stated that most of small industries have less information on current issues related to sustainable environment. Most small businesses believe that their industries have no significant effects or small effects on the environment. This condition becomes a challenge in developing small industries in order to contribute to the future economic growth. It is because at the same time the development will come along with the decreasing availability of natural resources as well as potential pollution of water, ground and air. This situation becomes the risk for the sustainable development (Mittal and Sangwan, 2014).

Most of previous studies were focused on the management of the environmental effects on big industries rather than small industries. The number of small industries, especially in developing countries which have no waste management gave big and significant environmental effect (Hillary, 2000). Therefore, environmental management should be focused on small industries (Moorthy, 2012). The demands in obtaining higher economic prosperity with minimum environment effect have raised new paradigm of Green Manufacturing (GM). The term 'Green Manufacturing' was created to reflect the new manufacturing paradigm implementing various green strategies (objectives and principles) and engineering (technology and innovation) becoming more efficient (Deif, 2011). Generally, green manufacturing including production processes use inputs with a low environmental impact as well as the productive process depth approaching zero waste and contamination. The example of green manufacturing practices (GMP) is the pollution prevention that involves reducing the use of energy, raw materials and solid waste, reusing products and recycling water. Other efforts include the use of renewable materials and environmentally friendly energy, redesigning the process and products, as well as employee training on the surveillance products practice (Ghazilla *et al.,* 2015).

Green technology and sustainable business practices will enable small industries to build and maintain a competitive position in the market. Collaboration and integration among companies in an industry can provide important benefits, such as an increase in value, efficiency, and customer satisfaction or known as supply chain management (Stock, Boyer and Harmon, 2010; Chow *et al.*, 2008). Uchida and Ferraro (2007) found that companies incorporating in environmental practices and organizations are able to create competitive advantage in order to improve profitability, new markets accesses, and customers relationships strengthen as well as to gain competitive advantage. The integrating environmental components in the supply chain management known as green supply chain management. Green supply chain management aims to minimize waste, including hazardous chemicals, energy and solid waste emissions along with the supply chain (Srivastya, 2007; Rao, 2006). The global trade era makes the manufacturing process becoming more environmentally friendly which stay as part of intensive competition. Therefore, the technology adoption supporting processes and environmentally friendly products for small industry is very important for the competitiveness of small industries in the future and the sustainability of economic growth in Indonesia. This study aimed to identify the factors that affect the performance in the development of batik small industries Tanjungbumi becoming more environmentally friendly.

## Materials and Methods

The questionnaire prepared by admitting a variable of long-term relationships, information sharing, environmental management, and supply chain performance. The questionnaires were developed through survey conducted by the Organization for Economic Co-Operation and Development (OECD). Each variable has 13 questions. Furthermore, those questionnaires were distributed to 30 respondents to conduct the validation test in order to show whether the questionnaire distributed are valid or not. The results of the validation test showed that there were some questions invalid. Those invalid questions are: 1) on the variable of information, sharing there were 4 of 9 questions invalid (question points 1.3, 1.4, 1.5,

1.7); 2) on the variable of long term relationship, there were 7 of 13 the questions invalid, (question points 2.6, 2.7, 2.8, 2.9, 2.11, 2:12, 2:13); 3) on the variable of supply chain management performance, there were 7 of 13 invalid (questions points 3.2, 3.4, 3.6, 3.8, 3:10, 3:11, 3:12); and 4) on the variable of environmental management, there were 7 of 3 of the questions invalid (questions points 4.3, 4.4, 4.5, 4.7, 4.8, 4:10, 4:11). Those invalid questions were subsequently removed from the questionnaire. The valid questionnaires were distributed to 63 small batik industries Tanjungbumi as the representative of 197 batik small industries Tanjungbumi. Data were analyzed using one way Annova to determine the factors that have role in the supply chain management in the batik small industries Tanjungbumi by concerning environmental management aspects.

## Results

The data collection is conducted after the validity of the questionnaire was tested beforehand. Based on the analysis, there were 23 valid questionnaire variables that can be used in data collection. According to the descriptive table, the average and standard deviation of each variable can be determined, as seen in Table 1.

Before proceeding with the test, it was necessarily remembered that one of the ANOVA test has same variance from the table of test of homogeneity of variance. The results showed that the 23rd variant

**Table 1**. Result of *the homogeneity test of variance*

ANOVA

| *Levene Statistics* | df1 | df2 | Sig. |
|---|---|---|---|
| 1.712 | 22 | 1426 | .021 |

of that group was same (P-value = 0.021), meaning the ANOVA test for this relationship was valid. The next stage was carried different test average on 23 variables. The result of one way ANOVA test showed the significance level of 5%. Initial hypothesis (Ho) was stated that there was no different average value. The results showed that Ho was rejected, because the Sig = 0.000 less than 0.05, meaning there was a difference between the average value of each variable studied, or there was a difference among the values of the standard deviation on each variable studied as showed in Table 2.

The results of the questionnaire analysis were obtained according to the Scatter Plot Graphs where most of respondents from the 63 questionnaires agreed, proved by the average value of 3-6 which means that the respondents' answers tend to agree, with the standard deviation value between 1.1341 to 1.7502 as seen in Figure 1.

According to the Scatter Plot Graphs in Figure 1, the table was arranged based on the most dominant variables of respondents' answers in small batik industries Tanjungbumi.

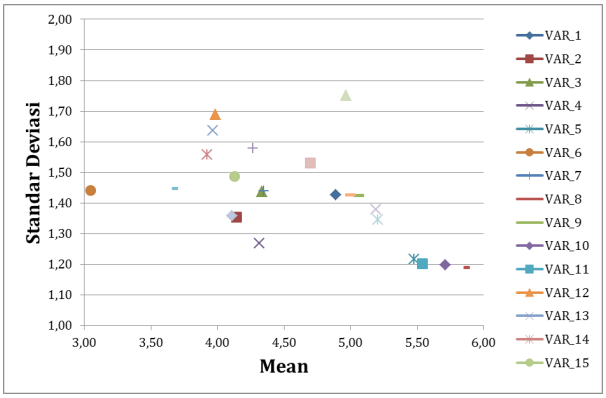


**Fig. 1.** *Scatter Plot Graphs* distrubuting from 23 variables in the questionnaire

The results of this study showed that the most dominant variables affecting the productivity of supply chain of batik small industry Tanjungbumi based on scatter plot graphs are:

## Discussion and Conclusion

The results of this study as shown in Table 4 showed

**Table 2**. Result of ANOVA test

ANOVA

| Sum of Squares | Df | Mean Square | F | Sig | |
|---|---|---|---|---|---|
| Between Groups | 712.410 | 22 | 32.382 | 15.766 | .000 |
| Within Groups | 2928.825 | 1426 | 2.054 | | |
| Total | 3641.235 | 1448 | | | |

that in batik small industries Tanjungbumi has created companies networking in producing and delivering products from producers to direct users. These companies are suppliers, distributors, and retail stores or other supporting companies such logistics service company. One of economic performance measurement is productivities (Zhu and Sarkis, 2004). A sustainable approach is able to lead to internal cost savings, new markets opening, and other uses of waste (Tsoulfas and Pappis, 2006). Sustainable approach will boost the company's image, competitive advantage, and marketing exposure (Rao and Holt, 2005), which leads to increased performance.

Considering to those results, it showed that most of batik small industry performances were described by long-term relationship represented by

**Table 3**. The sequence of dominant variables of *Scatter Plot Graphs*

| No. | Variabel | Means | Stdev |
|---|---|---|---|
| 1 | 8 | 5.857143 | 1.189431 |
| 2 | 10 | 5.714286 | 1.197155 |
| 3 | 11 | 5.539683 | 1.202489 |
| 4 | 5 | 5.476190 | 1.216249 |
| 5 | 23 | 5.206349 | 1.345946 |
| 6 | 22 | 5.190476 | 1.377903 |
| 7 | 9 | 5.063492 | 1.424135 |
| 8 | 18 | 5.000000 | 1.425573 |
| 9 | 21 | 4.968254 | 1.750283 |
| 10 | 1 | 4.888889 | 1.426829 |
| 11 | 20 | 4.698413 | 1.530706 |
| 12 | 7 | 4.349206 | 1.438623 |
| 13 | 3 | 4.333333 | 1.436842 |
| 14 | 4 | 4.317460 | 1.267782 |
| 15 | 16 | 4.269841 | 1.578140 |
| 16 | 2 | 4.142857 | 1.354290 |
| 17 | 15 | 4.126984 | 1.486412 |
| 18 | 19 | 4.111111 | 1.357311 |
| 19 | 12 | 3.984127 | 1.689551 |
| 20 | 13 | 3.968254 | 1.635969 |
| 21 | 14 | 3.920635 | 1.558552 |
| 22 | 17 | 3.666667 | 1.448024 |
| 23 | 6 | 3.047619 | 1.441645 |

three points: 1) company performs formal evaluation to suppliers every year to determine the suppliers performances; 2) company carries out standards evaluation in production facilities and suppliers operational processes; 3) company makes on-time payments in purchasing raw materials as schedule agreed. Those are certainly groundless because the existences of long-term and sustainable development are the company's main objectives (Karagulle, 2012). Most of small industries have close relationship with the environment. Long term relationships built over the years based on trust to suppliers, so supply chain management relationship contributes in securing the long-term existence and development of company.

The performance of small batik industries Tanjungbumi was also illustrated by information sharing variables represented by the information technology mastery that was used by companies and suppliers to facilitate communication. At the level of environmental management, understanding of small industries was limited to modify the production process to produce environmentally friendly products. The efforts performed were by using natural dyes made from plants to gradually reduce the use of synthetic dyes. It was one of green practices in order to reduce environment pollution. Zhu and Sarkis (2004) analyzed data from the manufacturing sector in China and found the positive relationship between green initiatives and environmental performance. This indicates that small industries have limited knowledge related to environmental management. Many of batik small industries Tanjungbumi see sustainability as a threat because it requires high cost which makes them reluctant to change. Lack of information tends to obscure the results of potential activities to be more sustainable. It is consistent to several previous studies, as stated by Mittal and Sangwan (2014) that there were lack of respect and information on environmental management efforts.

Based on the results, this study can be concluded that test of homogeneity of variance as seen on the table showed that the 23rd variant of the group was same (P-value = 0.021), so the ANOVA test was valid to describe the further supply chain management performances. The 5 (five) points in describing the performance of batik small industries Tanjungbumi which environmentally friendly using supply chain approach are 1.) company performs formal evaluation to suppliers every year to determine supplier performances; 2) company carries out standards evaluation in production facilities and suppliers operational processes; 3) company makes on-time payments in purchasing raw materials as scheduled agreed; 4) information technology mastery in order to facilitate communication between companies and suppliers; and 5) company modifies

**Table 4**. The sequence of dominant components variables in ***Scatter Plot Graphs***

| Ranks | Variables | Variable Sequences | Main Variable |
|---|---|---|---|
| 1 | 8 | Company performs formal evaluation to suppliers regularly every years in order to evaluate the suppliers' performances. | *Long term relationship* |
| 2 | 10 | Company carries on standard evaluation on production facilities and suppliers' operational processes. | *Long term relationship* |
| 3 | 11 | Company makes on-time payments on material purchasing as schedule agreed. | *Long term relationship* |
| 4 | 5 | Information technology mastery in order to facilitate communication between company and suppliers. | *Information sharing* |
| 5 | 23 | Undergoing modification in production process in order to produce environmentally friendly products. | *Environmental management* |
| 6 | 22 | Suppliers have offered environmentally friendly packaging to the company. | *Environmental management* |
| 7 | 9 | Company undergoes audit on facilities and suppliers' operational process during business relationships. | *Long term relationship* |
| 8 | 18 | Company states SOP for batik production process in order to reduce waste generated. | *Environmental Management* |
| 9 | 21 | Company has recycled raw materials in order to minimize the waste generated. | *Environmental management* |
| 10 | 1 | Company has to formally apply purchasing guidelines, such as quality of products and delivery time to material purchases from suppliers. | *Information sharing* |
| 11 | 20 | Company has performed employee's training related to handling, distributing, and storing raw materials to minimize raw material overload. | *Environmental management* |
| 12 | 7 | Company has performed material quality training to the suppliers in order to maintain raw material qualities as expected. | *Information sharing* |
| 13 | 3 | Company has to socialize purchasing manual to suppliers. | *Information sharing* |
| 14 | 4 | Determining and charging loss claims due to defecting products or delivery delayed are jointly decided. | *Information sharing* |
| 15 | 16 | There is limited lead time from product production and distribution to consumers | *Long term relationship* |
| 16 | 2 | Company has to socialize purchasing manual to suppliers. | *Long term relationship* |
| 17 | 15 | There is limited lead time from raw material order until delivered to the company (factory). | *Long term relationship* |
| 18 | 19 | Suppliers have offered environmentally friendly raw materials to the company. | *Environmental management* |
| 19 | 12 | Company has maintained loyalty to suppliers by purchasing material as market rate. | *Long term relationship* |
| 20 | 13 | Company has maintained loyalty to suppliers by rewarding program (rewards/gifts/bonus/etc.) to loyal suppliers. | *Long term relationship* |
| 21 | 14 | Suppliers are satisfied in having business with the company compare to others. | *Long term relationship* |
| 22 | 17 | Company has production flexibilities, especially in certain specification. | *Long term relationship* |
| 23 | 6 | Company provides facilities to suppliers directly in order to facilitate production. | *Long term relationship* |

production process in order to produce environmentally friendly products. An overview of these conditions should become the foundation for the government to undertake 1) preparation and dissemination of regulations supporting the production processes and producing environmentally friendly products; 2) campaign on the importance of environmentally friendly products to the public, so people interest in buying environmentally friendly products is increased.

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## References

Chow,W.S., Madu, C. N., Kuei, C. H., Lu, M. H., Lin, C. and Tseng, H. 2008. Supply chain management in the US and Taiwan: an empirical study. *Omega.* 36 (5) : 665-679.

Deif, A.M. 2011. A System Model for Green Manufacturing. *Journal of Cleaner Production.* 19 (14) : 1553-1559.

Erina Rahmadyanti and Andre Dwijanto Witjaksono. 2016. Implementing Cleaner Production as an Environmental Management Efforts in Small Industries of cassava Chips. *Matec Web of Conference.* 58.

Grisna Anggadwita and Qaanita Yuuha Mustafid, 2014. Identification of Factors Influencing the Performance of Small Medium Enterprises (SMEs). *Procedia : Social and Behavioral Sciences.* (115) : 415-423.

Haslinda Musa and Muruga Chinniah, 2016. Malaysian SMEs Development : Future and Challenges on Going Green. *Procedia : Social and Behavioral Sciences* (224) : 254-262.

Hillary, R. 2000. *Small and medium sized enterprises and the environment- Business Imperatives*. United Kingdom: Green Leaf Publishing Ltd.

Karagulle A.O. 2012. Green Business for Sustainable Development and Competitiveness : An Overview of Turkish Logistic Industry. *Procedia-Social and Behavioral Sciences.* 41 : 456-460.

Maximilian Robu, 2013. The Dynamic and Importance of SMEs in Economy. *The USV Annals of Economics and Public Administration.* Vol. 13 Issue 1(17).

Moorthy, M. K. 2012. Green Practices: perception of Malaysian SME owners / managers, *International Journal of Academic Research in Economics and Management Sciences*. 1 (3) : 103–111.

Raja Ariffin Raja Ghazilla, Novita Sakundarini, Salwa Hanim Abdul-Rashid, Nor Syakirah Ayub, Ezutah Udoncy Olugu, S. Nurmaya Musa. 2015. Drivers and Barriers Analysis for Green Manufacturing Practices in Malaysian SMEs : A Preliminary Findings. *Procedia CIRP*. (26): 658-663.

Rao P. 2006. Greening of suppliers/in-bound logistics : In the South East Asian Context. Greening the Supply Chain 189-204.

Rao, P. and Holt, D. 2005. Do green supply chains lead to competitiveness and economic performance? *International Journal Operation Production. Management.* 25: 898-916.

Srivastava, S.K. 2007. Green supply-chain management: a state-of-the-art literature review. *International Journal of Management Reviews.* 9 (1) : 53-80.

Stock, J. R., Boyer, S. L. and Harmon, T. 2010. Research oppor- tunities in supply chain management. *Journal of the Academy of Marketing Science.* 38 : 32-41.

Tsoulfas, G. and Pappis, C. 2006. *Environmental Principles Application Production.* 14 (18) : 1593-1602.

Uchida, T. and Ferraro, P.J. 2007. Voluntary development of environmental management systems: motivations and regulatory implication. *Journal of Regulatory Economics.* 32 (1) : 37-65.

Uma. 2013. Role of SMEs in Economic Development of India. *Asia Pacific Journal of Marketing and Management Review.* 2(6) : 120-126.

Varinder Kumar Mittal and Kuldip Singh Sangwan. 2014. Prioritizing Barriers to Green Manufacturing : Environmental. *Social and Economic Perspectives. Procedia CIRP* (17) : 559-564.

Zhu, Q. and Sarkis, J. 2004. Relationships between operational practices and performance among early adopters of green supplychain management practices in Chinese manufacturing enterprises. *Journal of Operations Management.* 22 : 265-289.