



## Occupational Safety and Health (OSH) Factors Identified in Indonesian Batik Textile Small/Medium Enterprises



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### Abstract

Indonesia is a country with numerous SMEs spread throughout 34 provinces. One of the important problems that need to consent more is labor health and safety. To increase safety, SMEs need to identify factors of occupational health and safety. SMEs need to properly avoid workplace accidents, and the batik industry is no exception. As a first step, it is necessary to identify the OSH factors that can be used in a prevention accident strategy. The population in this study were workers in Indonesia, these batik companies were located in Solo, Yogyakarta, Pekalongan, Cirebon, Minahasa, Bali, Madura, Indramayu, Bengkulu, and Palembang. The questionnaire consisted of latent variables, from the research that has been done, variables that affect work safety are the physical work environment, social work environment, job stress, and work productivity, while the variables that have a significant influence on occupational health are the physical work environment, social work environment, and work stress.

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## 1 Introduction

A small industry plays an important role in the economy of Indonesia. The number of micro-, small-, and medium-sized enterprises (SMEs) amounted to 56.6 million with a growth of 2.41%, which, in the crutch workforce, amounted to 107.6 million (Statistic Indonesia, 2016a). Indonesia is a country with numerous SMEs spread throughout 34 provinces. The Java Island has approximately 67.8% of Indonesian micro- and small businesses, with 28.1% of these in Central Java 28.1%, 22.4% in East Java, 13.1% in West Java, 3.2% in Banten, 1.5% in Yogyakarta, and 1% in Jakarta (Statistic Indonesia, 2016b). According to the International Standard Industry Classification (ISIC) codes for the textile industry, Indonesia has 131,433 different types of micro- and small businesses (Statistic Indonesia, 2016c). Meanwhile, small and medium *batik* industries in Indonesia reached 50,000 units with 100,000 employments (Ministry of Industry, 2016a). The number of workers in the batik industry will certainly be an influence on employment issues (Wisenthige & Guoping, 2016; Bagudu *et al.*, 2016).

The decline of labor problems has been influenced by several factors. One of them is leader commitment, in which the leader has a relationship with the safety of the workplace (Nielsen *et al.*, 2016). Besides, the organization is classified as a factor that has a significant effect on safety climate (Haslam *et al.*, 2016). To increase safety, SMEs need to identify factors related to occupational health and safety (OSH) (Cagno *et al.*, 2011). Safety conditions in SMEs are worse and less acceptable compared to large enterprises (Cagno *et al.*, 2011; Reinhold *et al.*, 2015). SMEs also have a higher risk of occupational hazards, and their ability to control risk is lower than that of large firms (Jørgensen *et al.*, 2010; Micheli & Cagno, 2010; Tait & Walker, 2000).

Based on *Jamsostek* data, 65,474 accidents happened, which caused 1,451 deaths and 5,326 injuries (Kani, 2013). Accidents should be prevented by identifying accident factors. The information obtained in this study relating to labor (employment, health facilities, health education, health and safety management, and safety activities are important to OSH management (Kongtip *et al.*, 2008). Safety management and safety culture is also an important factor in the prevention of occupational accidents (Jørgensen, 2016).

Efforts to improve the performance of SMEs have been conducted worldwide through the study of knowledge management (Floyde *et al.*, 2013; Chen *et al.*, 2012; Chen *et al.*, 2013), Quality Management System (QMS) certifications (Santos *et al.*, 2013; Santos *et al.*, 2011), and regulation (Deros *et al.*, 2014). The assessment is used to determine the influence of management in how successful SMEs are at anticipating occupational accidents and to encourage investment. Studies indicate that efforts to improve performance have been conducted in several countries. In Indonesia, as a country where SMEs contribute to 57.9% of GDP (Ministry of Industry, 2016b), investment flows and exports continue to increase (Media Industry, 2015). Thus, SMEs need to properly avoid workplace accidents, and the batik industry is no exception in this regard. Several studies related to batik have been done. As a first step in reducing the accident rate, it is necessary to identify the OSH factors that can be used in a prevention accident strategy.

## 2 Materials and Methods

### *Population and Sample*

The population in this study were workers in ten batik companies in Indonesia. These batik companies were located in Solo, Yogyakarta, Pekalongan, Cirebon, Minahasa, Bali, Madura, Indramayu, Bengkulu, and Palembang. The selected batik manufacturers were the most popular in the batik industry (Sindo, 2014). The samples consisted of 400 workers taken at random from each location, such that each location provided 40 samples. The number of samples was estimated using structural equation modeling (SEM) observations of 5–10 for each parameter (Ferdinand 2002; Jogiyanto, 2004). There are 53 parameters used in this study, and therefore the recommended minimum sample size is 265–530. The number of respondents (400) meets this minimum requirement. The locations where the questionnaire was distributed are shown in Figure 1.



Figure 1. Location of the questionnaire distribution

### *Questionnaire*

The questionnaire consisted of latent variables, namely occupational safety, occupational health, corporate management, physical work environment, social work environment, work behavior, job stress, and work productivity as a bound variable. The questionnaire used a 5-point Likert scale, with the size of the STD (strongly disagree) score of 1; D (disagree) score of 2; QA (quite agree) score of 3; A (agree) score of 4; SA (strongly agree) score of 5. Details of the variables are as follows:

- a) Occupational safety  
Encompasses OSH training, supervised use of personal protective equipment (PPE), OSH procedures have been implemented, PPE availability, and fire extinguishers.
- b) Occupational health  
Encompasses stress levels, smoking habits, sleep quality, nutrition and balanced nutrition, sufficient rest, workload, and whether workers relaxed before work.
- c) Corporate management  
Encompasses the worker's value to the company, whether dangerous work is stopped, whether OSH training is provided if OSH violations are punished, the standard level of satisfaction, and whether there are safety meetings.
- d) Physical work environment  
Encompasses heat level, air quality, level of noise, available space in work stations, lighting quality, vibration levels, presence or absence of smell, and air humidity.
- e) Social work environment  
Encompasses the involvement of a social worker in decision making, whether there were awards for workers, the contribution of workers in the running production process, availability or lack of training, availability or lack of supervision, whether there was cooperation among workers, and whether workers cast blame on others.
- f) Work behavior  
Encompasses the level of accident reporting, whether fellow workers were warned about the dangers and safety, whether materials and tools were in the appropriate place, whether work was performed according to the procedure, and whether instructions were followed.
- g) Job stress  
Encompasses sleep regularity, appetite, whether a worker could be easily shocked, whether a worker trusted people, whether a worker was easily offended, workers' ability to concentrate, whether workers' were patient in doing all the work and socializing, and quality of social life.
- h) Productivity  
Encompasses whether tasks were completed on time, adherence to company rules, rate of worker absenteeism, whether workers actively provided input, individual potential, attitude, positive work, and producing on target.

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*Research Procedure*

## a) Preparation Step

The research procedure began by preparing questionnaires for discussion with stakeholders, including company management, ergonomic experts, and government authorities. The purpose of discussing questionnaires was to allow some companies to provide input and variables that were not included in the questionnaires. Identify industries and labors target in ten regions that are the biggest batik industry in Indonesia

## b) Research Step

This research was conducted in the ten most popular batik companies in Indonesia. Respondents were provided with guidance on the purposes and objectives of the study and were asked to fill out questionnaires. A questionnaire distribution was conducted with assistance. The questionnaire distribution was conducted for one month in each of the ten regions for a total of ten months.

## c) Analysis of Step

Statistical analysis in this study used Moment Structure Analysis or AMOS version 21. SEM analysis allowed the simultaneous calculation of multiple and interconnected estimated regression equations. The characteristics of this model are as follows: (1) it estimates the relationship of dependent double interlocking, (2) it brings a concept that is not observed in the relationship as well as in determining measurement errors in the estimation process, and (3) it accommodates a set of relationships between the independent variables with the dependent variable and uncovers latent variables (Ghozali, 2008).

### 3 Results and Discussions

Figure 2 shows the result of the confirmatory analysis.

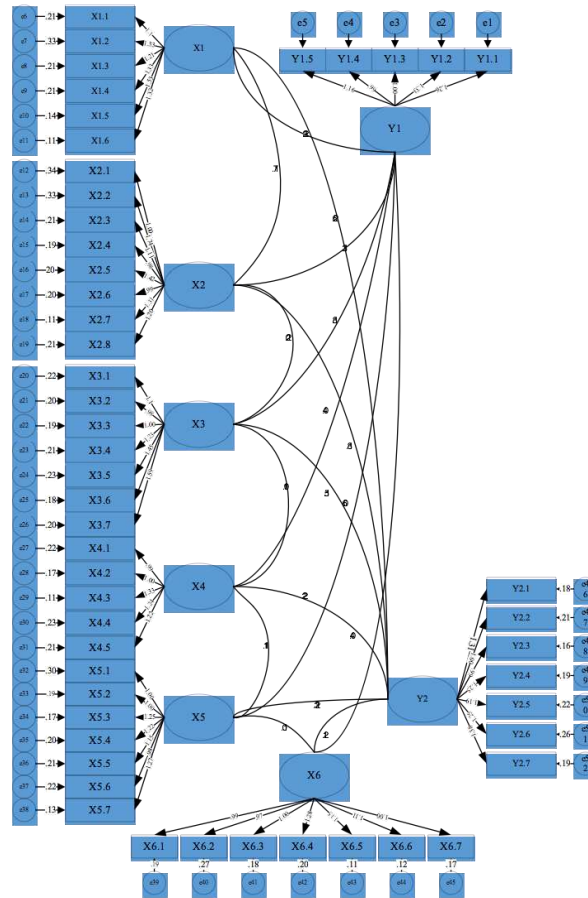


Figure 2. Confirmatory factor analysis

Confirmatory Factor Analysis (CFA) was used to obtain the loading factor estimation, factor weight score, and error variance for each item. The previous figure is the result of CFA in 52 question items from 8 variables, which are as follows: work safety, health, company managerial, physical environment, social environment, work behavior, work stress, and work productivity. The results of the reliability test are shown in Table 1.

Table 1  
Reliability test

Label	Variable	Reliability
Y1	Work Safety	0.66
Y2	Health	0.70
X1	Company Managerial	0.66
X2	Physical Environment	0.68
X3	Social Environment	0.70
X4	Work Behavior	0.73
X5	Work Stress	0.67
X6	Work Productivity	0.71

These results show that the variables have reliability values above 0.5. Work safety had a value of 0.66, health had a value of 0.70, company managerial had a value of 0.66, the physical environment had a value of 0.68, the social environment had a value of 0.70, work behavior had a value of 0.73, work stress had a value of 0.67, and work

*Title of manuscript is short and clear,  
implies research results  
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productivity had a value of 0.71. The next step was model testing, whose results are shown in the following figure 3.

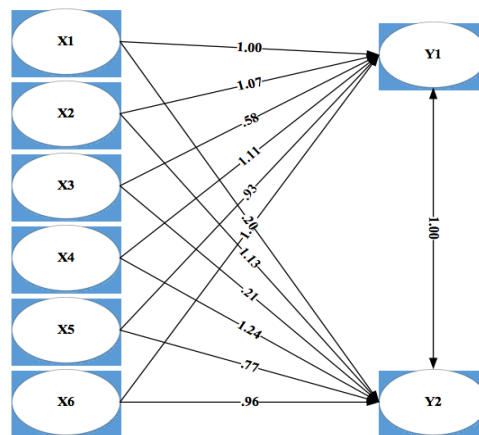


Figure 3. Model testing

An identification test was done to test whether the model could be analyzed further or not. This test used degrees of freedom. SEM could be categorized as:

- Just Identified Model*, which has 0 degrees of freedom and identified, indicating that estimation and model assessment was not necessary.
- Under-Identified Model*, which has <0 (negative) degrees of freedom. The estimation parametric was below variants data and its co-variants, indicating that estimation and model assessment was not necessary.
- Over-Identified Model*, which has >0 (positive) degrees of freedom. The estimation parametric was below variants data and its co-variants, indicating that estimation and model assessment was possible to do.

Table 2  
Goodness-of-fit model

The goodness of Fit Index	Result	Cut Off Value	Criteria
<i>Likelihood Chi-Square</i>	248,734	Expected to be small	
<i>Probability</i>	0.000	$\geq 0.05$	<i>Marginal Fit</i>
CMIN/DF	1.859	$\leq 2.00$	<i>Good Fit</i>
RMSEA	0.077	$\leq 0.08$	<i>Good Fit</i>
GFI	0.936	$> 0.90$	<i>Good Fit</i>
AGFI	0.865	$> 0.90$	<i>Marginal Fit</i>
TLI	0.947	$\geq 0.90$	<i>Good Fit</i>
CFI	0.956	$> 0.90$	<i>Good Fit</i>

From the results of the goodness-of-fit index in the preceding table, most of the goodness-of-fit criteria met the cut-off value, and only the probability values and AGFI that do not meet the cut-off value. This is following the opinion of [Ghozali \(2006\)](#), who states that if there are some goodness-of-fit parameters are not qualified, this can be seen from the other parameters, and if the majority of parameters meet the requirements, it can be stated that the model meets the assumption's goodness of fit. The results of the goodness of fit are the value X2 (Chi-Square) with a significance level of 248,734, whereas the minimum sample discrepancy function (CMIN/DF) is an index that measures the relationship of conformity parsimonious goodness-of-fit models and the number of estimated coefficients that are expected to reach the level of conformity. The result of CMIN/DF is 1.859, which is less than the recommended value  $CMIN/DF < 2$ , thus showing that the model fits well. The root means square error of approximation (RMSEA) is an index which compensates the statistical Chi-Square in huge samples. The RMSEA value indicates the goodness of fit that can be expected when the model is estimated in the population. The recommended value for acceptance is  $\leq 0.08$ , while the test result is 0.077, which shows that the model is good.

Based on an analysis of the goodness of fit (GFI), it reflects the level of an overall fitness model. The

recommended level of acceptance is  $GFI > 0.90$ . The results show that the GFI value is 0.936, indicating that the model fits well. The Tucker Lewis Index (TLI) is an alternative incremental fit index that compares the baseline models tested. The recommended value of a good fit index is  $> 0.90$ . The results showed that the TLI value was 0.947, so it can be stated that the level of conformity is good. The Comparative Fit Index (CFI) is incremental stability that compares tested models with the null model. The recommended CFI value is  $> 0.9$ . The test results shown 0.956, showing that the model is good.

Table 3  
AMOS model estimation result

Variables Relationship	Estimate	S.E.	C.R.	p	Note
Y1 ← X1	0.326	0.101	4.069	0.070	Not significant
Y1 ← X2	0.198	0.082	2.136	0.031	Significant
Y1 ← X3	0.245	0.108	2.753	0.033	Significant
Y1 ← X4	0.222	0.108	2.165	0.044	Significant
Y1 ← X5	0.211	0.100	2.176	0.015	Significant
Y1 ← X6	0.116	0.076	3.563	0.024	Significant
Y2 ← X1	0.163	0.108	3.118	0.198	Not significant
Y2 ← X2	0.185	0.099	2.364	0.018	Significant
Y2 ← X3	0.157	0.100	4.323	0.017	Significant
Y2 ← X4	0.155	0.104	2.145	0.099	Not significant
Y2 ← X5	0.243	0.098	1.454	0.003	Significant
Y2 ← X6	0.154	0.078	3.638	0.067	Not significant

Table 3 shows whether there is a significant relationship between variables or not. This is indicated by a value of significance that is greater than 0.05. Variables that are not significantly related are as follows: X1 to Y1 (company management to work safety); X1 to Y2 (company management to health) in this case a lot less cares evidenced by the company against exercising their OSH program has been done by [Kani et al. \(2013\)](#), which prove that in Indonesia, the company still has not been given sufficient attention and commitment that is appropriate to implement the OSH program; X4 to Y2 (work behavior with occupational health); X6 to Y2 (productivity with occupational health).

The following variables were shown to be significantly related: X2 to Y1 (physical work environment and work safety) with a  $p$ -value of 0.031; X3 to Y1 (social environment and work safety) with a  $p$ -value of 0.033 this result is followed by research held by [Khan et al. \(2014\)](#), where the purpose of health and safety, including in fostering a healthy work environment. X4 to Y1 (work behavior with work safety) with a  $p$ -value of 0.044; X5 to Y1 (work stress and work safety) with a  $p$ -value of 0.015; and X6 to Y1 (work productivity and work safety) with a  $p$ -value of 0.024. Research has been done by [Taderera \(2012\)](#), proving that OSH actions eliminate the hazard or risk and control the hazard at its source by using controls or work processes regularly.

The following variables are related to Y2 (occupational health): X2 to Y2 (physical work environment and occupational health) with a  $p$ -value of 0.018, X3 to Y2 (social work environment with occupational health) with a  $p$ -value of 0.017, and X5 to Y2 (work stress and occupational health) with a  $p$ -value of 0.003. In terms of occupational health and safety, both the physical and social working environment has a significant influence on health and safety. This conclusion is supported by [Grahamingtyas et al. \(2012\)](#), whose research describes how the working environment physically and psychologically affects health and safety. Furthermore, it also mentioned by [ILO \(2010\)](#), that managerial parties have the overall responsibility in protecting the safety and health of workers. Continuity between all aspects of the possible impact on health and safety, into a single unit for the workers to create a healthy and safe work environment. As previously disclosed by [Al-Abdallat et al. \(2015\)](#), factors in health and safety at work can result in injury and death and can be a burden on society, the economy, families, communities, industry, and government.

## 4 Conclusion

From the research that has been done, it can be concluded that the variables that affect work safety are the physical work environment, social work environment, job stress, and work productivity, while the variables that have a significant influence on occupational health are the physical work environment, social work environment, and work stress, with  $p$  values of 0.018, 0.017, and 0.003, respectively. Based on the calculations that have been done, work stress (X5) is the most influential factor on the dependent variables. Job stress has a  $p$ -value of 0.015 against the dependent work safety variable, and a  $p$ -value of 0.003 against the value of occupational health

### *Conflict of interest statement*

The authors declared that they have no competing interests.

### *Statement of authorship*

The authors have a responsibility for the conception and design of the study. The authors have approved the final article.

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