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Hazard Risks for Batik Artisans in Home-Based Industries in Bantul

Agus Warseno[1], Prof. Dr. Muhammad Akhyar, M.Pd[2]., Dr. Sapja Anantanyu., M.Si[3].,*
Dr. Noer Rachma, dr.,Sp. RM[4]
[1,2,3,4]Sebelas Maret University
**Corresponding author: gusmotivation@gmail.com*

ABSTRACT

Background. As the batik industry in Bantul continues to grow, most people use their homes as both living spaces and places of batik production. It is not unlikely that the expansion of the home-based batik industry could lead to health problems for the artisans. Factors that may contribute to these health issues include the physical environmental conditions of the home, the batik production process which uses chemical materials, and the waste generated. Batik is a method of applying patterns onto fabric through a dipping process, using a resist-dyeing technique, with wax as the intermediary medium.
Objective. This study aims to determine the environmental conditions of the batik industry and to identify health complaints related to the batik production process.
Method. The research was conducted through observation and interviews in November 2023 at four home-based batik industries in the Bantul region. Interviews were conducted with one person from management and six batik artisans from each home industry, making a total of 28 respondents. Observations were carried out by visiting the batik production sites using an observation guide that had been prepared in advance.
Result. The observation results revealed that one of the four locations had a cramped workspace, where workers were somewhat inconvenienced by the limited space, needing to move items or tools when using others. In contrast, at other locations, the batik workspace was outdoors with a zinc roof, and the artisans reported that after 11 AM, the heat became intense, causing them to sweat and feel uncomfortable while working. During work, employees involved in cap batik worked while standing, while the batik tulis (handwritten batik) workers performed their tasks while sitting. The workers reported that common health issues included being splashed with wax or malam. Additional data revealed that 17 artisans occasionally experienced shortness of breath while working due to inhaling the fumes from the wax/malam.
Conclusion. The results of this study indicate several health problems experienced by batik artisans, including burns and respiratory issues. Preventive efforts are necessary from both management and the batik artisans themselves to reduce these risks by implementing the five levels of disease prevention.

Keyword: *Batik; Hazard; Health; Wax*

INTRODUCTION

Current technological advances have brought about an era of globalization that presents changes and challenges that must be anticipated early on. The era of globalization also has an impact on industry which is also growing throughout the world. It requires various companies to always be proactive in increasing their production which affects the use of machines, production equipment, and the use of hazardous materials which are growing to support smooth production. With the increase in production, the potential for work accidents and occupational diseases will also increase (Budiono, 2003).

According to global data released by the International Labor Organization (ILO, 2017), the number of cases of Work Accidents (KK) and Occupational Diseases (PAK) in the world reaches 430 million per year consisting of 270 million (62.8%) KK cases and 160 million (37.2%) PAK cases, and causing the death of 2.78 million workers each year. As many as 40% of KK and PAK cases occur in young workers. The estimated economic loss is 3.94% - 4% of a country's Gross Domestic Product (GDP). Another reference states that medical costs related to KK and PAK in the United States are estimated at $67 billion plus indirect costs of almost $183 billion (Ministry of Manpower, 2022).

Sun Life in its survey of around 2,400 small and medium business owners in 7 regions of Asia, namely Hong Kong, India, Indonesia, Malaysia, the Philippines, Singapore, and Vietnam in 2021. It was stated that Micro, Small, and Medium Enterprises (MSMEs) have a positive level of optimism towards

better growth opportunities, but it needs to be balanced with the understanding that they still have several risks. Regarding risk mitigation, only 61% of respondents have personal health and accident insurance; 36% have health and accident insurance for employees; and only 18% have insurance as a key man in the company. Therefore, real action is needed to mitigate the impact of risk into an effort that needs to be made to build stronger resilience in business continuity, as well as provide more security and peace of mind for business owners and employees (Sun Life, 2022).

Informal economic activities in the form of MSMEs concentrate on informal sector workers, namely those who are not registered and whose work contracts are based on mutual trust between workers and employers. These workers are called their own accounts, with low wages, no benefits, social protection, or health. They need to be distinguished from self-employed or autonomous workers whose activities can be regulated and registered such as consultants who may have high salaries even though social protection is absent or limited. In addition to having their businesses, the informal economy also involves individuals who carry out work tasks regularly for companies, namely as wage earners but do not have formal work contracts. (ILO, 2013). One form of informal economy that is widespread in society is the Batik Industry.

The batik industry originated from household crafts, which then increased to batik production in relatively large quantities. Batik was selected as inheritance World Culture Works Representative List of Intangible Cultural Heritage of Humanity by UNESCO on October 2, 2009. This wealth of Indonesia gives sufficient contribution big for the country through income exports. The domestic batik industry has contributed to the country's foreign exchange. The main markets for batik exports include the United States, Japan, and European countries. According to data from the Central Statistics Agency (BPS) in 2022, the value of Indonesian batik exports reached US$ 25.31 million or around Rp. 392.74 billion with a volume of 987.71 thousand kilograms (CNBC Indonesia, 2023). The consequence faced is that the batik industry must make efforts to improve its performance, both in quality, productivity, and creativity. On the one hand, the batik industry has great opportunities in the future, on the other hand, as an informal industry, it is not free from health problems due to work.

The batik industry is currently small and medium, sometimes combined with a home industry. In 2014, the number of small and medium batik industries (IKM) in Bantul was 612 batik production houses and supported by 2,056 batik makers. The increasing development of the home batik industry can cause health problems for its craftsmen (Antaranews, 2014). Factors that can influence these health problems are caused by the physical environmental conditions of the house, the batik production process that uses chemicals, and the waste produced (Puspo et al., 2016).

The batik industry activity does contribute to the welfare of the community, but it is also followed by the emergence of health problems for workers and the environment around the batik industry. This process also exposes batik makers to irritating, toxic, and carcinogenic chemicals and physical hazards, such as less ergonomic work positions and processes, exposure to hot steam and lighting, with high incidences of work-related diseases. Long-term exposure to heavy metals affects the health of organs including the kidneys and liver. In addition, observations show that there is still minimal protection for Occupational Health and Safety (K3) for batik makers, as well as a commitment to maintaining environmental health around the workplace by business owners (FKKMK UGM, 2020).

The growing batik industry in Bantul mostly uses their homes as a place for batik production. The growing home batik industry may cause health problems for its craftsmen. Factors that can influence these health problems are caused by the physical environmental conditions of the house, the batik production process that uses chemicals, and the waste produced. Batik is a method of applying patterns to cloth through a dyeing process, color barriers, with wax as the barrier medium. (FKKMK UGM, 2020).

Batik consists of several processes including preparation, batik, coloring, removing batik wax, and finishing. In these processes, several materials are used, namely paraffin, gondorukem (coophony, rosin), resin, Micromax and animal fat. These materials are processed into one called "batik wax". Pollutants found in the work environment if inhaled by workers are suspected of causing lung function disorders and if this process lasts for a long time can cause occupational diseases. Exposure to the coloring process of making batik in the Laweyan Solo batik industry has a significant impact on the exposed group compared to the unexposed group on clinical lung disorders in the form of respiratory complaints of chronic cough, chronic phlegm, wheezing, and shortness of breath (Puspo et al., 2016).

One of the components of wax used in making batik is paraffin. Paraffin is a hydrocarbon with the general formula CnH2n+2. Pharmaceutical paraffin is used for a variety of purposes. When inhaled,

paraffin is deposited in the alveoli and can cause a variety of reactions, ranging from no pressure to acute respiratory distress syndrome. Common radiographic findings in exogenous lipoid pneumonia are heterogeneous airspace opacities, mostly in both lower lobes, with possible overlapping reticular opacities. Occasionally, local consolidation may be seen (Weinberg & Fridlender, 2010).

Measurements from the Bantul Environmental Health Engineering Center (BBTKL) show that the dominant gas contained in the smoke from melting batik wax is carbon monoxide (CO) which also contains NO2, SO3, HC, H2S, and particles. Batik wax smoke can have a negative impact on workers' health, especially when workers attach wax to the fabric, either when canting or placing a printing tool that has been given batik liquid (stamp). CO gas causes hypoxia because hemoglobin has a greater affinity for binding CO than oxygen, which is 200-250 times greater. H2S triggers cell death and inhibits cell proliferation, which affects the life span of erythrocytes and hematocrit values. NO2, SO2, and formaldehyde gases are pollutants that are irritants and cause respiratory tract sensitization (Fauzia, 2015). The permissible exposure limit value for paraffin/wax smoke exposure according to the Occupational Safety and Health Administration (OSHA) is the average exposure to the contaminant over a certain period of time/ time-weighted averages (TWA) of 8 hours of 2 mg/m3. The agency has determined that the adverse effects associated with excessive exposure to paraffin wax smoke are material health problems. Measurement of the threshold value of paraffin exposure by collecting paraffin smoke, namely by sucking air with a certain volume through a glass fiber filter. Then the sample is desorbed with Carbon Disulfide, and gas chromatography is carried out to analyze the sample using a Flame Ionization Detector. This study aims to determine the environmental conditions of the batik industry and to determine health complaints related to the batik process.

MATERIALS AND METHODS

The study was conducted through observation and interviews in November 2023 in four batik home industries in the Bantul area. Interviews were conducted with one management and 6 batik craftsmen from each home industry so the total respondents were 28 people. Observations were carried out by reviewing the batik location using previously prepared observation guidelines.

RESULTS

The results of this study are the results of interviews and observations. The results of the observation obtained data from one of the four locations showed a narrow workspace, workers were slightly disturbed because the room used was quite narrow so they needed to move some items or tools when they wanted to use other tools. While in other locations, the batik room was in an open place with a zinc roof and the batik makers said that at 11 am and above the atmosphere was very hot to the point of making the batik makers sweat and uncomfortable. The batik arrangement is in the form of a circle around a candle or wax so that it is easy to bump into the batik makers. During the batik process in all locations, workers did not wear masks or gloves. Gloves were only used by workers who colored the batik cloth that had been given a batik pattern. Of the four locations, only one had a first aid kit, but its contents did not meet the provisions of Permenakertrans No. PER.15 / MEN / VIII / 2008 concerning First Aid for Accidents in the Workplace.

Based on the results of interviews with 24 batik craftsmen in each location, data on employee working hours are obtained that are uncertain, depending on how many orders are ordered by customers, sometimes in one day, stamped batik completes 10 pieces of cloth with a size of 2 meters, while working, employees who work in stamped batik do their work standing up, while hand-drawn batik does their work sitting down, health workers or health centers have never come to provide education related to work safety. Employees conveyed the health problems that usually occur, namely being splashed with wax or candles, then if they are splashed with wax or candles, the action taken is to apply kerosene to the splashed area to melt the wax or candle that touches the skin so that it does not stick. The person who provides first aid in the event of a work accident is the business owner or other workers at the scene to be immediately taken to the nearest health service. Other data shows that as many as 17 craftsmen stated that sometimes they complain of shortness of breath when making batik due to inhaling wax/wax vapor. If one of the batik makers is injured or sick, there is no supply of medicine prepared, workers are only given permission not to go to work and check themselves at the nearest

health facility. Workers also do not have social security, either health insurance or work accident insurance.

Based on the results of the study above, we can see several health problems experienced by batik craftsmen, including burns from hot wax splashes and complaints of shortness of breath due to inhaling wax vapor. while problems related to the environment include, narrow workspaces, zinc roofs so that the atmosphere is hot, and working in a sitting position for too long.

DISCUSSION

This study is in line with the results of a study by Fauzia et al. (2015) on batik craftsmen in Semarang where the measurement results showed that the average percentage of Forced vital capacity (FVC), Forced Expiratory Volume (FEV1), and Peak Expiratory Flow (APE) was lower and those who experienced impaired lung function were more in batik craftsmen than in the control group. Of the 32 study subjects, 10 samples (31.3%) had moderate to severe lung function disorders, while 22 samples (68.8%) had normal lung function or mild lung function disorders. Another study by Putri et al (2019) showed that as many as 60% of respondents who worked in the wax attachment section had impaired lung function. This value is greater than that of respondents in the coloring and wax removal section, who had 36.4% and 3.6% lung function disorders. The study also showed that out of 49 batik workers working in 5 industries, 57.1% had abnormal lung vital capacity. Factors related to lung vital capacity in workers were the length of service with an average of 10.63 years and length of service with an average of 7.96 hours/day.

Munthe et al.'s (2014) study showed that there was no significant relationship between exposure to batik candle smoke and decreased lung function (X2=2.03, p=0.154). The exposed group had a 4.67 times greater risk of suffering from impaired lung function compared to the unexposed group (OR=4.67; 95% CI 0.48-45.62). In addition, workers exposed to batik candle smoke experienced a 12 times greater risk of clinical abnormalities compared to the unexposed group, with a statistically significant impact (p=0.009). Occupational asthma was found in 1 person (2.3%) of 44 respondents, with a diagnosis based on anamnesis and lung function examination.

Based on the research results of Hasanah (2011), in the Semarang batik village, batik artisans admitted that they were often exposed to spilled wax liquid (30.76%), sore eyes due to boiling steam (23.07%), stiff neck when walling (30.76%), tight chest when making color recipes (7.69%), and stiff or feeling pain in the back (back) when dyeing and canting (23.07%). This occurs due to the lack of concern of workers in using PPE and incorrect ergonomics so batik artisans often experience problems with their spines and complain of burns on their hands. Not only that, artisans also complain of shortness of breath during the wax boiling process.

Efforts to reduce the number of occupational diseases, occupational diseases, and work accidents require coaching and inspection of workplaces and occupational health. Government Regulation No. 50 of 2012 concerning the Implementation of the Occupational Safety and Health Management System (SMK3) states that Occupational Safety and Health (K3) are all activities to guarantee and protect the safety and health of workers through efforts to prevent work accidents and work-related diseases. The implementation of K3 is intended to protect workers from Work Accidents (KK) and Work-Related Diseases (PAK) as well as other diseases/health disorders in workers and other people in the workplace, including ensuring that the production process can run efficiently and productively.

To prevent occupational diseases in the workplace, it is essential to implement effective occupational health and safety measures. These measures aim to anticipate, recognize, evaluate, and control workplace hazards that may cause injury or health problems among workers (Cavallari et al, 2024). By controlling occupational health hazards, the incidence of work-related diseases and accidents can be reduced, improving overall worker health and morale, which in turn reduces absenteeism and increases worker efficiency (Rao et al, 2022). Integrating occupational safety and health protection with health promotion is a recommended strategy to prevent worker injuries and diseases while promoting health and well-being (Sorensen et al., 2013).

The concept of five levels of disease prevention in occupational diseases, namely (Jeyaratnam, 2009): 1) Health promotion. For example, health and safety counseling (K3) health education, improving good nutrition, personality development, healthy and adequate companies, recreation, adequate work environment, marriage counseling, and sexual education, consultation on heredity, and periodic health

checks. 2) Specific protection. For example: immunization, personal hygiene, environmental sanitation, and protection against hazards and work accidents by using personal protective equipment (PPE) such as helmets, work glasses, masks, ear muffs and ear plugs, heat-resistant clothing, gloves, and so on. 3) Early diagnosis (detection) and immediate treatment and limitation of weak points to prevent complications. 4) Limiting the possibility of disability (disability limitation). For example: examining and treating workers comprehensively, treating workers perfectly, and health education. 5) Health recovery (rehabilitation). For example: rehabilitation and re-employment of workers who suffer from disabilities.

CONCLUSION

The results of this study indicate several health problems experienced by batik craftsmen including burns and respiratory disorders. There needs to be preventive efforts from management and batik craftsmen to reduce the risk by implementing five levels of disease prevention.

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