The Cognitive Intervention for Hazard Prevention to Improve Safety Behavior in Creative Industry (Case Study: Indonesian's Batik SME)

Nachnul Ansori
Industrial Engineering, Universitas Trunojoyo Madura
Indonesia
nachnul@trunojoyo.ac.id, nachnul@gmail.com

Ari Widyanti
Professor of Industrial Engineering,
Institut Teknologi Bandung
Indonesia
widyanti@mail.ti.itb.ac.id

Rifko Rahmat Kurnianto
Industrial Engineering, Institut Teknologi Bandung
Indonesia
rahmat.rifko@gmail.com

Made Ardhia Diva Vikanaswari, Hazza Shafa Ramadhana, And Aulia Fajriningtyas
Undergraduate Students of Industrial Engineering,
Institut Teknologi Bandung
Indonesia

Abstract

SMEs have an important role in the national economy. Ninety-nine percent of Indonesia's business units are SMEs which involved 97% of Indonesia's workforce. One of the important aspects of work safety is safety behavior. Good safety behavior has an impact on reducing the number of work accidents and injuries. The contribution of these programs/activities is educating workers by providing information through intervention (counseling) dealing with hazards and work implementation. Evaluation of intervention assessed 10 workers as participants. Implementation was done in two SMEs, Batik Naraya and Batik Zulpah located in Tanjung Bumi-Madura. The intervention was given for 2 days with a focus on efforts to increase the level of workers' knowledge of physical, chemical, and ergonomic hazards and their hazard management. Intervention activities by short explanations or discussions directly with workers at their workstations (safety briefing). The intervention activity ended by displaying the posters of hazard types and efforts dealing with safety engagement at each workstation. The results showed that there was improved knowledge of workers before and after the intervention regarding the physical hazards, the procedure of physical hazards, the chemical hazards, the procedure of chemical hazards, ergonomic hazards, and the procedure of ergonomic hazards.

Keywords
Intervention, Safety briefing, Behavior, Hazard, SME

1. Introduction

One important aspect of work safety is safety behavior (Geller 2001). Safety behavior is behavior that supports safety practices and activities required by workers according to occupational safety and health (OSH) requirements to avoid accidents (Panuwatwanich et al. 2016). Wallace (2016) states that there is a negative relationship between safety behavior and accidents. Good safety behavior can have an impact on reducing the number of accidents, avoiding injuries, and not losing work time (Seo et al. 2015). Therefore, it is important to pay attention to worker safety behavior when doing work in the workplace.

Small and medium-scale industries (SMEs) have an important role in the national economy (Jaswadi et al. 2015). Based on the latest information, 99% of business units in Indonesia are SMEs that involved 97% of all Indonesian workers. SMEs could contribute up to 61.97% of Indonesia's total GDP in 2020 (https://www8.bkpm.go.id/).

Batik is generally a product of SMEs. The United Nations Educational, Scientific and Cultural Organization (UNESCO) stated batik as Indonesia's non-material cultural heritage on October 2, 2009 (UNESCO, 2009). Indonesian Batik is unique because this handicraft is inherited from generation to generation. Batik motifs/patterns vary which shows local wisdom/character.

The process of producing batik uses conventional technology. The work environment and process of making batik in SMEs generally do not consider OSH aspects. This can be seen in the unhygienic conditions of the work environment, work equipment, and raw materials that are not appropriately arranged. Apart from that, the liquid waste from the coloring and cleaning processes of batik is left scattered. Workers also do not understand procedures for handling chemicals, therefore workers when using these materials carry out their work activities in unsafe conditions (Ansori et al. 2016). As a consequence, workers often experience health complaints such as impaired lung function, decreased visual function, and extremity dermatitis (Latif et al. 2016).

Ansori et al. (2015) stated that workers' safe behavior is influenced by their knowledge. Batik coloring materials are hazardous and toxic materials, so the use of these materials must consider work procedures (Syamwil et al. 2010). The material used in SME batik when in contact with the skin causes a burning sensation and allergies, and if it occurs over a long period will cause disease and chronic effects on the skin.

In other aspects, it is necessary to pay attention to ergonomic risk factors that cause musculoskeletal complaints of batik workers (Prabarukmi and Widajati 2020). Agustina and Maulana (2012) stated that workers' postures are generally uncomfortable, even dangerous. The techniques and workmanship processes have been inherited from generation to generation without any improvements or innovations. The work equipment used is still not following ergonomic standards (Agustin 2012). Specifically, Ansori et al. (2015) stated that facilities such as seats, wickets, and the physical work environment such as lighting and work areas have not taken into account the comfort of workers.

The OSH aspect is an important thing to be considered. Even so, this aspect often gets less attention. Ansori et al. (2021) stated that safety participation in the batik industry is influenced by safety communication. Mohamed (2002) and Subramaniam et al. (2016) mentioned safety communication related to the effectiveness of safety information in the form of reporting, safety policies, goals, and safety targets as well as discussion of safety issues. Because of these conditions, educational efforts are needed in the form of dissemination of practical guidelines on hazard prevention as guidelines for batik workers to communicate OSH principles to workers in all their work activities.

Madura is an area in Indonesia that has been known for its batik. Phalitatyasetri et al. (2020) state that the economic benefits of batik have been contributing to the national economy. Then, efforts to improve the safety and work environment performance of Madura batik SMEs have been induced. Ansori et al. (2016) did a campaign on personal protective equipment (PPE) through direct interaction with workers and use posters related to work procedures or a safe work culture (Ansori et al. 2016). However, the practical guidelines on hazard prevention which cover physical, chemical, and ergonomic hazards as well as guidance for practical handling in an integrated manner in the entire process of making batik have not yet been induced (Ansori et al. 2016). The contribution of these programs/activities is in the form of educating workers by providing information (sharing information) regarding hazards and efforts to deal with them at all stages of the batik process based on practice guidelines, so it will be more effective and efficient.

1.1 Objectives
The purpose of this intervention activity is to increase the knowledge of workers through their cognitive reactions of workers. Cognitive reaction indicators that are measured include three aspects of the reaction, namely physical hazards, chemical hazards, and ergonomic hazards.

2. Literature Review
An important aspect of work safety is safety behavior (Geller 2001). Wallace (2016) states that there is a significant negative relationship between safety behavior and accidents. Good safety behavior can have an impact on reducing the number of accidents, avoiding injuries, and not losing work time (Seo et al. 2015). On the contrary, bad/unsafe safety behavior can lead to work accidents (Seo 2005).

In general, Panuwatwanich et al. (2016) define safety behavior as behavior that supports safety practices and activities required by workers according to occupational safety and health (OSH) requirements to avoid accidents. In general, safety behavior is evaluated based on safety participation and safety compliance (Griffin and Neal 2000; Neal et al. 2000). Safety participation relates to worker participation in helping colleagues and supporting work safety programs, initiatives, and efforts to improve safety in the workplace. Meanwhile, safety compliance is related to the main safety activities in maintaining safety in the workplace (Griffin and Neal 2000; Neal and Griffin 2006).

Safety behavior influences work accidents (Christian et al. 2009). Eighty percent of accidents in the workplace are due to activities that do not support safety and 20% are caused by conditions that do not support safety (Al-Hemoud and Al-Asfoor 2006). Meanwhile, Heinrich (1931) stated that 88% of work accidents were caused by unsafe activities, 10% were caused by unsafe conditions, and the remaining 2% were caused by things that could not be avoided. Furthermore, Khandan et al. (2013) stated that 86% -96% of work accidents in the industry should be prevented, but they still occur due to unsafe behavior. Therefore, intervention is required to improve safety performance.

Oyewole et al. (2010) define safety interventions as efforts made to change behavior in improving safety, both in the form of programs, practices, initiatives, and ideas. Meanwhile, Geller (2001) states that intervention is changing the external conditions of the system to achieve good safety behavior.

Some intervention programs implemented are in the form of behavior-based safety programs (Choudhry 2014). The program is a systematic application of psychological studies that aim to change unsafe behavior into safe behavior (Geller 2001). The behavior change model does not change people but changes a person's perception of work accidents by conditioning the work environment. Therefore, a behavior evaluation is required to show the behavior performance.

The behavior evaluation could be based on the theory of mind model (Theory of Mind/ToM). It shows the cognitive, affective, and conative aspects. The cognitive aspect is the ability to think from beliefs/beliefs, the affective aspect is related to emotion, and the conative aspect is related to intention as research by Dennis et al. (2013). The cognitive level is in the evaluation of the realm of knowledge, affective is more towards the attitude taken, and conative/psychomotor is more towards the worker's actions/behavior. Borges and Quintas (2020) explain that cognitive reactions are the result of thoughts and beliefs from certain situations, affective reactions are related to the emotions that a person feels toward a certain situation, and behavioral reactions are attitudes expressed toward a situation. The research approach is in line with the theory of reasoned action (TRA) by Nazura et al. (2011) that cognitive can take the form of learning strategies.

3. Methods
The safety induction-based practical guidelines on hazard prevention were implemented in the Bangkalan batik industry center - Madura. At the beginning of the intervention activities, an evaluation of the knowledge of workers regarding physical, chemical, and ergonomic hazards is evaluated. The number of workers involved in this OSH intervention is 20 workers, however, an evaluation of the performance is only possible for 10 workers due to work activities and personal activities of workers.

The method for OSH intervention activities is shown in Figure 1. The preparatory stage consists of designing and compiling practical guidelines for preventing hazards in the batik industry. This stage involves several OSH experts and designers. Designer involvement to compile informative and practical guides, in which informational messages are visualized with a combination of pictures and short narratives. The debriefing stage is related to the equalization

of perceptions to the extension team so that it is expected that when the interaction takes place, information can be conveyed effectively and efficiently to the workers. At the implementation stage, the information process stage is done with several activities, including:

- Local presentations or direct discussions with batik workers at workstations. This technique is performed due to workers can directly interact with tutors regarding potential hazards and the implementation by demonstrating or practicing the contents of the guide.
- Placing posters (A3 size) at all workstations according to the topic of the posters. The purpose of this activity is to remind (reminder) regarding potential hazards and the handling.
- Those activities ended with a cognitive evaluation related to workers' understanding of the content of the material presented.

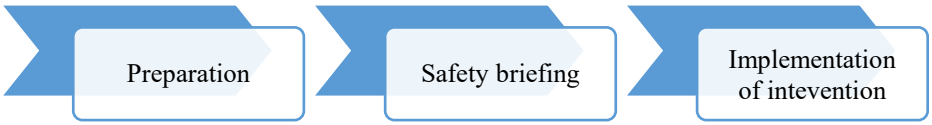

Figure 1. Activity Stages

The safety briefing was given so that the same perception of the content/material will be informed to the batik workers. Apart from doing the safety briefing online (via zoom), coordination is done through a group WhatsApp, namely “Keg. Pengabdian Batik Tanjung Bumi". Figure 2 shows the activity of coordinating intervention activities.

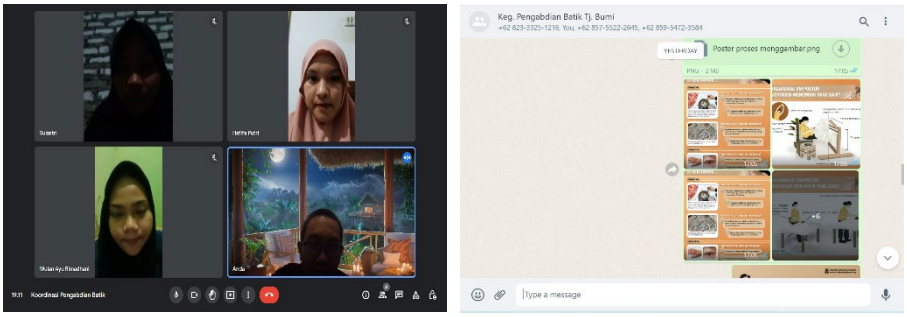

Figure 2. Coordinating activities for the preparation of intervention activities

Practical guide materials for safety briefing can be seen at https://bit.ly/PanduanPraktisBatik. Figure 3 shows an example of a visualization of a practical guide to hazard prevention. The guide content consists of an introduction, a pyramid of handling hazards, practical guides per process, and first aid.

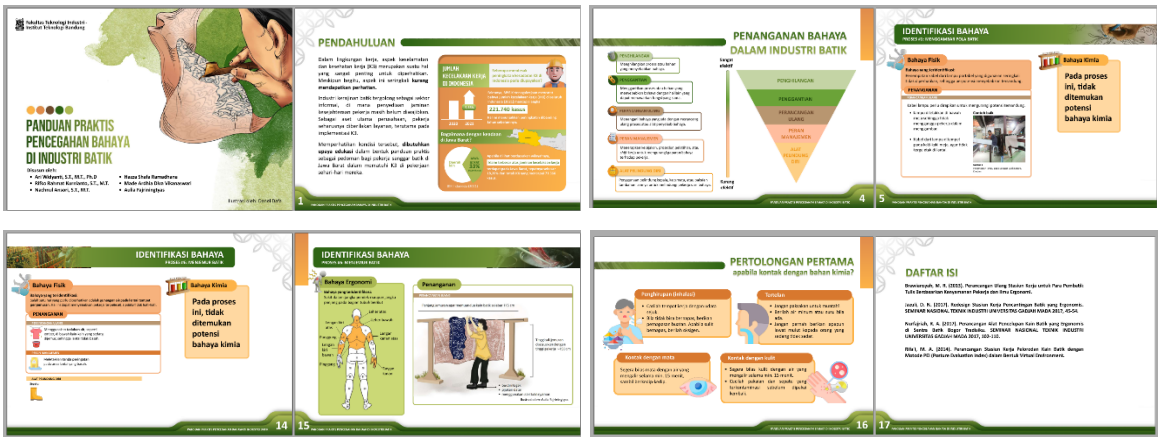

Figure 3. Screenshot of an example of a practical guide to hazard prevention

Evaluation of the effectiveness of the intervention (counseling) is measured based on the performance of cognitive reactions. Cognitive reactions are the result of thoughts and beliefs from certain situations (Borges and Quintas, 2020), meaning that the level of knowledge can be evaluated based on the cognitive aspects of workers. Instrument questions on cognitive reactions as in Table 1.

Table 1. Intervention indicators of cognitive reaction

Code	Indicators
A1	Do you know about the physical hazards in the batik production process?
A2	Do you know how to deal with physical hazards in the batik production process?
B1	Do you know about the chemical hazards in the batik production process?
B2	Do you know how to handle chemical hazards in the batik production process?
C1	Do you know about the dangers of ergonomics in the batik production process?
C2	Do you know how to handle ergonomic hazards in the batik production process

The evaluation scale for the effectiveness of the intervention uses a scale of 1 to 4. In detail: scale 1 (don't know); scale 2 (a little bit): scale 3 (adequate): scale 4 (very know).

4. Data Collection

The intervention by counseling of the guide to workers was done on Sunday and Monday, 30 and 31 October 2022. The counseling location is two SMEs, namely Batik Naraya and Batik Zulpah. The location of the two SMEs is in Paseseh Village, Tanjung Bumi District, Bangkalan, Madura. Mechanisms for counseling the guide by brief presentations and reciprocal discussions by the tutors in workplaces. The counseling activity ended with the installation of posters in the work area.

The counseling hazard prevention guide materials consist of: (1) Hazard prevention in the pattern drawing process, (2) Hazard prevention in the isen (nembok) process, (3) Hazard prevention in the stamping process, (4) Prevention of hazards in the coloring process, (5) Hazard prevention in the cleaning process, and (6) Prevention of hazards in the drying process.

Hazard characteristics that informed cover three types of potential hazards. Figure 4 shows the hazard for physical, chemical, and ergonomic. Physical hazards such as tripping or slipping. The chemical hazards such as skin irritation, eye irritation, inhalation, chemical ingestion, or improper chemical storage/handling. An ergonomic hazard includes awkward postures, repetitive movements, and long-prolonged standing.

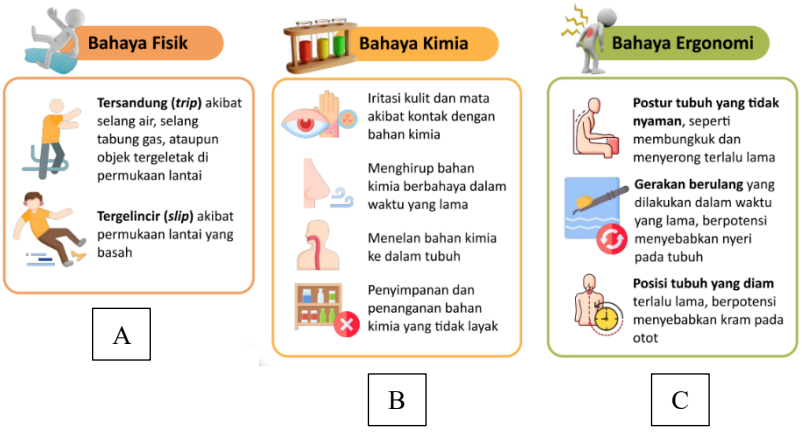

Figure 4. General characteristics of the physical (A), chemical (B), and ergonomic hazards (C) of the batik industry

The counseling activity served each worker for about 10 to 15 minutes. The number of counseling tutors was 2 women, both of them had Bachelor's degrees in the Industrial Engineering study program and had received learning material related to occupational safety and health (OSH). Figure 5 shows the counseling activities of hazard management guidelines in each process.

Figure 5. Worker activities in the process of drawing (A), cleaning (B), coloring (C), drying (D)

After the intervention activities, posters were displayed in a work area by work activities. These posters are installed to be a reminder regarding procedures and hazards that have the potential to harm the health of workers. Figure 6 shows the poster installation process in the work area.

Figure 6. Installation of batik practical guideline posters in the work area

At the end of the safety intervention program, documentation was done. Figure 7 shows a photo activity between tutors and workers/participants. The majority of batik workers are female. An evaluation of counseling effectiveness is done by assessing the workers.

Figure 7. Tutors and participants in intervention activities

Table 2 shows the results of evaluating the level of knowledge of batik workers before and after an intervention. Workers do not know about the types of ergonomic hazards and the efforts to deal with them when compared to the other two types of hazards, namely physical hazards and chemical hazards. There is an increased knowledge before and after personal interventions for all types of hazards.

Table 2. Evaluation of the knowledge of workers before and after intervention

Participants	Before						After					
	A1	A2	B1	B2	C1	C2	A1	A2	B1	B2	C1	C2
Worker-1	2	2	2	1	1	1	3	3	3	3	2	3
Worker-2	2	2	2	1	1	1	3	3	3	3	2	3
Worker-3	2	2	2	1	1	1	3	3	3	3	2	3
Worker-4	2	1	2	2	2	1	3	3	3	3	2	2
Worker-5	2	2	2	1	1	1	3	4	3	3	3	3
Worker-6	2	1	2	2	1	2	3	3	3	3	2	3
Worker-7	1	2	2	1	1	1	3	3	3	3	2	3
Worker-8	2	2	2	1	1	1	3	4	3	3	3	3
Worker-9	1	1	1	1	1	1	3	3	3	3	2	3
Worker-10	2	2	2	1	1	1	3	3	3	3	2	3
Mean	1.8	1.7	1.9	1.2	1.1	1.1	3	3.2	3	3	2.2	2.9

5. Results and Discussion

The performance evaluation approach to the knowledge of this study refers to the theory of mind/Theory of Mind that cognitive aspects are the ability to think from beliefs (Dennis et al., 2013). Intervention through counseling shows that there are changes or differences in the knowledge of workers before and after socialization. Visually, the difference in results can be seen in Figure 8.

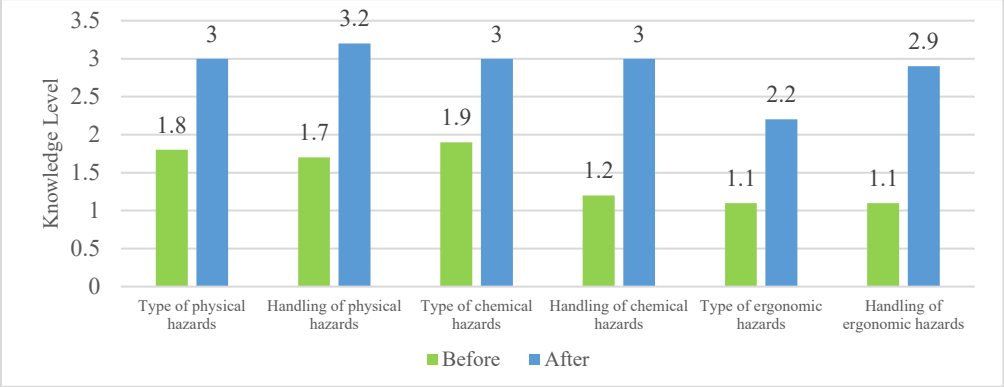

Figure 8. The changes of knowledge performance

The lowest knowledge of workers before counseling related to an understanding of the type of ergonomic hazard and handling of ergonomic hazards. This is because in general workers often assumed that ergonomic hazards and their handling are not an issue regarding the OSH in batik. Because of this, the level of knowledge of workers regarding hazards and their management before counseling is still low. On the other hand, after implementing the intervention by such counseling, the knowledge of workers mostly is good (score ≥ 3) except for the type of ergonomic hazard and handling of ergonomic hazard. This condition is possible because the initial worker's performance knowledge is low (score < 3).

Then, the difference in indicators of the knowledge of workers before and after the intervention indicates a change in the performance of workers' safety knowledge. The changes in knowledge can be evaluated based on the Wilcoxon

test. Consideration of the Wilcoxon test due to the feasibility of parametric statistics is not fulfilled as Hasanah et al. (2011) and research by Cantero-López et al. (2021) that non-parametric statistical tests are used to evaluate the differences in two dependent samples.

Differences in cognitive reactions before and after the intervention program show that there are significant changes in the workers' knowledge of (1) physical hazards and how to handle them, (2) chemical hazards and how to handle them, and (3) ergonomic hazards and its handling. The difference in the level of understanding (cognitive) of workers is shown in Table 3.

Table 3. Differences in cognitive before and after intervention

Code	Statement	Z value	P value	Result
A1	Physical hazard knowledge	-2.972	0.003	There are differences in the knowledge before and after the intervention
A2	Knowledge of how to handle physical hazards	-2.879	0.004	
B1	Chemical hazard knowledge	-3.051	0.002	
B2	Knowledge of how to handle chemical hazards	-2.972	0.003	
C1	Ergonomic hazard knowledge	-2.810	0.005	
C2	Knowledge of how to handle ergonomic hazards	-2.972	0.003	

The cognitive level of hazard identification can be explained in each process. In general, the batik process consists of 6 activities. They are: drawing batik patterns (process 1), painting or nembok (process 2), stamping (process 3), coloring (process 4), nglorod (process 5), and drying (process 6).

In the activity of drawing patterns, there is a potential physical hazard for the portable light cables due to improper installation so they have the potential to trip over. Efforts to handle it can be done by tidying up the cable (fixed installation). Then, ergonomic hazards in the form of short-term or long-term pain or complaints in the neck (upper, lower), shoulders (left, right), back, waist, upper and lower right arms, and right hand. Handling this ergonomic hazard by stretching and using a chair table that is by the worker's anthropometry.

In the nembok and stamping activities, the hazards and their handling are identical to the previous activity. However, physical hazards include placing the stove too close to or low to the worker. This physical hazard can be reduced by using an electric stove or using an electric canting. In addition, a traditional stove can be equipped with a stove protector. Meanwhile, chemical hazards are in the form of skin contact with candles or smoke exposure. In this condition, the wax can be replaced with a gutha tamarind (it doesn't need to be boiled) and the work suggested is done outdoors so that exposure (i.e., carbon dioxide, carbon) can be reduced. In ergonomic hazards, complaints can occur in the shoulders, neck, elbows, forearms (left and right), and buttocks. In this condition, the arrangement of variations of work by sitting and standing can be done.

In coloring activities, physical hazards can be the wet floor and untidy arrangement of water hoses. The solution is placing the work area closer to the water source, adjusting the water hose, or repairing the liquid waste disposal system to make it safer. Meanwhile, for chemical hazards, skin/eye contact can cause irritation or the use of inhaled dye powders. The improvement is using natural dyes, and usage of the stirrer to dissolve synthetic dyes. In addition, a more ergonomic dye bath design can be proposed. Finally, the physical hazard in the nglorod process is identical to the coloring process, as well as the chemical hazards and their handling, the same thing applies to sun-drying activities. The cognitive intervention by counseling the guide of hazard prevention program effectively can be implemented when there is the active participation of workers and interaction with safety officers.

The results of the study are in line with Restuputri et al. (2021) that participatory ergonomics programs can increase worker productivity by up to 11% and reduce workplace accidents. Research case study Restuputri et al. (2021) was conducted on the same object, that is industrial batik center. This shows that an intervention strategy in the form of education can improve cognitive and behavioral aspects of safety compliance (Wang et al. 2018).

6. Conclusion

The implementation of intervention by counseling based on hazard prevention guidelines on the cognitive reactions of batik workers is effective. In detail, there is increasing knowledge regarding physical hazards, chemical hazards, ergonomic hazards, and efforts dealing with them. These results indicate that the guide can be used as a reference in counseling hazard prevention at Batik SME.

References

Agusti, N., *Perancangan Ulang Ruang dan Peralatan Kerja dengan Pendekatan Ergonomi Bagi Pembatik Tulis pada Pengrajin Batik Tulis X*. Tesis, Fakultas Kesehatan Masyarakat Program Magister Keselamatan dan Kesehatan Kerja Universitas Indonesia, Depok, 2012.

Agustina, F. and Maulana, A., Analisis Postur Kerja dengan Tinjauan Ergonomi di Industri Batik Madura*, Jurnal Inovasi dan Kewirausahaan*: *Kajian di Negara-negara Berkembang*, 11, 167-171, 2012.

Al-Hemoud, A.M. and Al-Asfoor, M.M., A behavior based safety approach at a Kuwait research institution, *Journal of Safety Research*, 37, 201–206, 2006.

Ansori, N., Novianti, T. and Agustina, F., Designing Ergonomic Participatory based on Critical Safety Performance Index in Batik Creative Industries. *The 2nd International Conference on Science, Technology and Interdisciplinary Research Approach*. Bandar Lampung, 22-25 August 2016.

Ansori, N., Novianti, T., Agustina, F. and Rakhmawati, N., Safety Performance Index pada Industri Batik Tulis Berdasarkan Kriteria. *Jurnal Teknik Industri,* 17, 105–110, 2015.

Ansori, N., Widyanti, A. and Yassierli., The Role of Safety Silence Motives to Safety Communication and Safety Participation in Different Sectors of Small and Medium Enterprises – Investigation Results on Two Kinds of Industries in Indonesia, *Safety and Health at Work*, 12, 2021.

Borges, R., and Quintas, C.A., Understanding the individual's reactions to the organizational change: a multidimensional approach. *Journal of Organizational Change Management*. 33, 5, 667-681, 2020.

Cantero-López, N., González-Chordá, V.M., Valero-Chillerón, M.J., Mena-Tudela, D., Andreu-Pejó, L., Vila-Candel, R. and Cervera-Gasch, Á., Attitudes of Undergraduate Nursing Students towards Patient Safety: A Quasi-Experimental Study. *Int. J. Environ. Res. Public Health*, 18, 1429, 2021.

Choudhry, R.M., Behavior-based safety on construction sites: A case study, *Accident Analysis and Prevention*, **70**, 14-23, 2014.

Christian, M.S., Bradley, J.C., Wallace, J.C. dan Burke, M.J., Workplace safety: A meta-analysis of the roles of person and situation factors, *Journal of Applied Psychology*, 94, 1103–1127, 2009.

Dennis, M., Simic, N., Bigler, E.D., Abildskov, T., Agostino, A., Taylor, H.G., Rubin, K., Vannatta, K., Gerhardt, C,A., Stancin, T., and Yeates, K.O., Cognitive, affective, and conative theory of mind (ToM) in children with traumatic brain injury. *Developmental Cognitive Neuroscience*, 5, 25– 39, 2013.

Geller, E.S., *Psychology of safety Handbook*, CRC Press LLC, 2001.

Griffin, M.A., dan Neal, A., Perceptions of safety at work: A Framework for linking safety climate to safety performance, knowledge, and motivation, *Occupational Health Psychology*, 5, 347-358, 2000.

Hasanah, M.U., Setyaningsih, Y. and Lestantyo, D., Perilaku Pencegahan Kecelakaan Kerja Sebelum dan Sesudah Penyuluhan K3 Pada Perajin Batik, *Jurnal Promosi Kesehatan Indonesia*, 6, 2, 2011.

Heinrich, H.W., *Industrial Accident Prevention*, McGraw-Hill, Inc., New York. 1931.

Jaswadi, Iqbal, M., and Sumiadji., *SME Governance in Indonesia – A survey and insight from private companies*, International Accounting and Business Conference, Procedia Economics and Finance, 31, 387-398, 2015.

Khandan, M., Maghsoudipour, M., Vosoughi, S., dan Kavousi, A., Safety climate and prediction of ergonomic behavior, *International Journal of Occupational safety and Ergonomic*, 19, 523-530, 2013.

Latif, V.N., Ristiawati, and Istiqomah, N., Profil Potensi Penyakit Akibat Kerja Tahapan Pembatikan. *Unnes Journal of Public Health*. 5, 4, 2016.

Mohamed, S., Safety climate in construction site environments, *Journal of Construction Engineering and Management*, 128, 375-384, 2002.

Nazura, A., Paimin, Hadgraft, R., Prpic, J.K. dan Alias, M., *Factors Affecting Study Performance of Engineering Undergraduates: Case Studies of Malaysia and Australia*. Proceedings of the Research in Engineering Education Symposium. Madrid-Spanyol. 2011.

Neal, A., dan Griffin, M. A., A study of the lagged relationships among safety climate, safety motivation, safety behavior, and accidents at the individual and group levels. *Journal of Applied Psychology,* 91*,* 946–953, 2006.

Neal, A., Griffin, M.A., dan Hart, P.M., The impact of organizational climate on safety climate and individual behavior, *Safety Science*, 34, 99-109, 2000.

Oyewole, S.A., Haight, J.M., Freivalds, A., Cannon, D.J., dan Rothrock, L., Statistical evaluation and analysis of safety intervention in the determination of an effective resources allocation strategy, *Journal of Loss Prevention in The Process Industries,* 23, 585-593, 2010.

Panuwatwanich, K., Al-Haadir, S., and Stewart, R.A., Influence of safety motivation and climate on safety behavior and outcomes: Evidence form the Saudi Arabian Construction Industry, *International Journal of Occupational Safety and Ergonomics*, 23, 60-75, 2016.

Phalitatyasetri, Fahma, F., Wahyudi, S., *The economic benefits of the implementation of batik Indonesian National Standard (SNI) by ISO methodology - Economic benefit standard (EBS) approach*. THE 5TH INTERNATIONAL CONFERENCE ON INDUSTRIAL, MECHANICAL, ELECTRICAL, AND CHEMICAL ENGINEERING 2019 (ICIMECE 2019) - Surakarta, Indonesia, Published by AIP Publishing. 978-0-7354-1971-1/$30.00. 2020.

Prabarukmi. G.S. and Widajati, N., Hubungan Faktor Risiko Ergonomi dengan Keluhan Muskuloskeletal pada Pembatik. *The Indonesian Journal of Occupational Safety and Health*, 9, 269-278, 2020.

Restuputri, D.P., Huda, M.C. and Mubin, A., Work Safety Aspects Using a Participatory Ergonomic Approach, *Spektrum Industri*, 19, 1, 2021.

Seo, H.C., Lee, Y.S., Kim, J.J., and Jee, N.Y., Analyzing safety behavior of temporary construction workers using structural equation modeling, *Safety Science*, 77, 160-168, 2015.

Subramaniam, C., Shamsudin, F.M., Zin, M.L., Ramalu, S.S., and Hassan, Z., The influence of safety management practices on safety behavior: A study among manufacturing SMES in Malaysia, *International Journal Supply Chain Management*, 5, 148-160, 2016.

Syamwil, R., Kusumastuti, A., and Nurrohmah, S., Peningkatan Kinerja Industri Batik Melalui Penerapan Standar Operation Procedure, Lingkungan, Serta Kesehatan dan Keselamatan Kerja, Rekayasa, *Jurnal Penerapan Teknologi dan Pembelajaran,* 8, 30-36, 2010.

UNESCO., Batik Indonesia. Accessed on 3 Nopember 2022 at https://ich.unesco.org/ en/RL/indonesian-batik-00170, 2009.

Wallace, J.C., Creating a safety conscious organization and workforce, *Organizational Dynamics*, 45, 305-312, 2016.

Wang, J., Yue, P., Huang, J., Xie, X., Ling, Y., Jia, L., Xiong, Y., and Sun, F., Nursing Intervention on the Compliance of Hemodialysis Patients with End-Stage Renal Disease: A Meta-Analysis. *Blood Purif*. 45,102–109, 2018.

https://www8.bkpm.go.id/, Accessed on 15 September 2022.

Acknowledgments

This publication is part of the output of the 3T (frontier, outermost, and lagging) community service activities from Institut Teknologi Bandung.

Bibliography

Nachnul Ansori completed his bachelor's degree at the University of Muhammadiyah Gresik (Indonesia) graduated in 2003, the master's program at ITS (Indonesia) graduated in 2006, and the doctoral program at ITB (Indonesia) graduated in 2023. The research area studied is ergonomics, work engineering, and work safety.

Ari Widyanti, is a professor in the area of ergonomics, work engineering, and work safety at the faculty of industrial technology at ITB. She finished her bachelor's degree in 1998 and her master's program in 2001 at ITB (Indonesia). She got into the doctoral program at the University of Groningen (Netherlands) in 2013.

Rifko Rahmat Kurnianto completed his education with a bachelor's degree at ITB (Indonesia) and graduated in 2016, and the master's program at ITB (Indonesia) graduated in 2018. The research area studied is Ergonomics, Work Engineering, and Work Safety.

Made Ardhia Diva Vikanaswari, Hazza Shafa Ramadhana, and Aulia Fajriningtyas. They are a student with bachelor's degrees in Industrial Engineering at ITB.