Workers' Safety in Indonesia, Is It Enough to Protect Them from Facing the Industry 4.0 Era?

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Abstract: Workers in Indonesia, especially carpenters and non-permanent construction workers, lack good safety behaviour, marked by a high incidence of mortality, morbidity, and disability caused by occupational accidents. It involves many sociocultural demographic factors to change workers' behaviour. This study aims to identify factors influencing workers' safety behaviour among carpenters and non-permanent construction workers. A Qualitative study was conducted using in-depth interviews and focus group discussion (FGD) with semi-structured guidelines, conducted in 2 micro, small and medium enterprises (MSME) carpenter industries and one construction site of a national construction company. The FGD involved three layers; workers, supervisors, and management staff. Phenomenology approach was used as a conceptual framework. Adequate safety behaviour perception was found among carpenters due to their long work experience. Carpenter's attitude and behaviour that did not comply with safe behaviour were influenced by lack of motivation, interest, role model, readiness, policy and supervision. Supervisors were not regarded as role models and are weak in supervision. Management already provides standard infrastructure and facilities but is weak in terms of policy, regulation, training, and reward and punishment system. A similar condition was found among construction workers that did not wear personal protective equipment (PPE) regularly, due to limited Knowledge, and misperception of the importance of PPE.

1 INTRODUCTION

The world in general, and Indonesia in particular, is entering a new industrial era marked by the era of digitalization in various sectors of life (Ministry of Industry Republic of Indonesia, 2018). This era is often referred to as the 4.0 era of the industrial revolution, which created a world that is very different from the previous world (*Fourth industrial revolution*, n.d.). Specific conditions in the era that can be felt and seen are the development of automated innovation with the creation of super-computers, robotic artificial intelligence and genetic modification (Marr, 2018).

In the Industry 4.0 era, industry players let computers connect and communicate with each other to make decisions without human involvement finally. The combination of cyber-physical systems, Internet of Things (IoT) and Internet of Systems makes Industry 4.0 possible and creates smart factories. In smart modular structures, cyber-physical systems oversee physical processes, create copies of the physical world virtually, and make decisions that are not centralized. Through the Internet of Things, cyber-physical systems communicate and cooperate and humans simultaneously. Through cloud computing, internal and cross-organization services are provided and utilized by various parties in the value chain.

The logical consequence of Industry 4.0 era is the change and shift type of labour at the present era and the future. A large number of labour in the labour-intensive sector began to be replaced by automation and digitalization of machines. The implications of the industrial revolution are like two sides of the coin. At one side, it has a positive value for the productivity of work and efficiency of the production process. On the other hand, the competitive world of the work that leads to a large number of available labour will become a serious social problem for the pillars of a country's political or economic stability. Everyone who still wants to have an existence in global competition must prepare their minds and skills that have a competitive advantage from others. The only

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way to prepare for this is to have an excellent behavioural attitude, increase self-competence, and have a literacy spirit. Provision of self-preparation can be passed with the education path (long-life education) and self-concept through working across generations or across disciplines (experience is the best teacher).

The problem concerning readiness to shift to industry 4.0 in Indonesia lies in several factors. From human resources and equity perspective, some industrial sectors in Indonesia are still not close to Industry 4.0, for example in the carpentry industry, there are still carpentry industries that still use manual methods, or old tools and machines, or working unsystematically. With the construction industry, new and modern tool and machines have been used in daily practice, but the behavioral attitude towards health and safety is still inadequate. Another problem lies in the large number of Indonesian companies that do not have adequate human resource because it is estimated that the entry of this Industry will cut human labour with low human resource capabilities and possibly increase unemployment (Ministry of Industry Republic of Indonesia, 2018).

There are at least four challenges related to Occupational Safety and Health (OSH) In the 4.0 industrial era, including challenges related to new work organizations, the legislative and regulatory framework was still lagging, the OSH management system that should be reviewed, and work risk management that needs rethinking. Occupational Safety and Health Act of 1970 stated that its primary purpose is "To assure safe and healthful working conditions for working men and women; standards developed under the Act; by assisting and encouraging the States in their efforts to assure safe and healthful working conditions; by providing research, information, education, and training in the field of occupational safety and health ... ".

Occupational Safety and Health is essential because of the impact of accidents and occupational diseases harm not only the employees but also the company. OSH program created by the company is an effort to prevent work-related accidents or diseases by identifying the potential occupational hazard and work-related illnesses, as well as anticipating actions to manage them. Occupational Safety and Health is one of the crucial aspects of the production process. Effective and efficient OSH implementation is critical in increasing productivity and competitiveness in Indonesia.

Work accident in Indonesia is still severe compared to other ASEAN countries. In average, it was reported an average of 414 cases of workplace accidents per day throughout the country (Irfani, 2015). At least ten construction accidents were reported during the development of public and private construction projects in 2017-2018 (*10 Workplace accidents*, 2018). According to the National Health survey 2018, as many as 9.1% of accidents happen at the workplace, being the third most significant number of accidents among the population of Indonesia.

Some causes of workplace accidents are 73% due to unsafe behaviour, 24% due to the environment and or equipment that does not meet the requirements, and the rest is caused by nature and other causes that cannot be avoided (Irfani, 2015). Ministry of Manpower and Transmigration recorded all work accidents with disabilities per 1,000,000 working hours. In mining industries, it was 23.07 per cent, it was 22.32 per cent in timber construction, 19.10 per cent in construction, 0.99 per cent in transportation, and the rest were in other industries (*10 Workplace accidents*, 2018).

OSH has been targeting the use of Personal Protective Equipment (PPE) to minimize the risk of the work accident, especially when technical and administrative control is not possible, or when they are not adequate to reduce exposure at an acceptable limit. PPE should be provided by the company and be used by every worker by correct procedure and continuous supervision (Occupational Safety and Health Administration, n.d.).

Even though strict regulation has been implemented for workers to wear PPE at all time during work, many workers are still reluctant to follow the procedure. The behaviour is thought to be caused by the company's inconsistent policy regarding implementation of the regulation, and from the workers themselves. Some studies regarding the use of PPE found several factors: uncomfortable sensation when wearing PPE, workers thought that wearing PPE is not essential, because they have been working in the field for so many years without having an accident, PPE is not attractive and does not fit their body, and workers do not have precise information when to wear PPE or do not have time to wear it (Fairyo & Wahyuningsih, 2018) (Saputri & Paskarini, 2014) (Astinngsih et. al., 2018) (Tampinongkol et. al., 2016).

This study aims to identify workers' Knowledge, Attitude and Practice (KAP) about work safety and work accident, and worker's perception about the use of PPE at work, and influencing factors to workers' safety behaviour among carpenters in the micro, small and medium enterprises (MSME), and among non-permanent construction workers in the era of industry 4.0

2 METHOD

This study uses qualitative research methods applying the phenomenology approach as a conceptual framework. The study examines a particular case in a context that is limited by time and activity (program, process, organization or social group) and complete information about factors that influence the behaviour of application of work safety behaviour in preventing work injury in carpenter workers and construction workers. The theme of workplace accidents is a case that has become a focus and is often discussed. Exploration is carried out to find out about what is felt related to the experience of applying occupational safety behaviour; both how to work safety behaviour can prevent and or suppress the incidence of workplace accidents, or workplace accidents that occur due to not applying the principles of work safety (Creswell, 2017).

To find out what factors cause workers not to behave safety at work, various factors were examined, following the concept of Green. Enabling factors are factors that precede the occurrence of unsafe behaviour such as Knowledge, perception, and attitude. Predisposing factors are the factors that allow the principles of work safety behaviour not applied, for example, the availability of facilities and pre-facilities such as Personal Protective Equipment, equipment and the environment by the principles of work safety behaviour and company policy. The last factor, reinforcing factors, the factors that strengthen workers to behave not according to the principle of work safety behaviour in work, which is manifested in the form of supervision (Glanz et. al., 2008).

A series of in-depth interviews and Focused Group Discussion (FGD) with semi-structured guidelines, were conducted in two MSME carpenter industries and one construction site of a national construction company. The FGD involved three layers; workers, supervisors, and management staff. Every session was audio-recorded, and field note was taken. The audio recordings of all sessions were transcribed and anonymized. Data collected were then categorized according to the theme and contrasted with existing theory. Triangulation was achieved by reviewing the transcripts of interactions during an in-depth interview and Focused Group Discussion. Thematic content analysis was employed. Emergent themes were identified and a coding framework constructed. Data collection continued until data saturation was reached and no new themes emerged during the process (Creswell, 2017).

3 RESULT AND DISCUSSION

As many as 39 informants joined the in-depth interview and FGD. Informants consisted of workers, supervisors, and management staff. All subject were males, due to the nature of the work itself. Informants from the carpenter industry represented typical Medium and Small Enterprises, i.e. individually owned, less supervision and Standard Operating Procedures (SOP) in the company were not comprehensive. The three types of informants were worker (typically has been employed for several years), supervisor, and Management staff.

On the other hand, Construction industry (national construction company) was chosen because it has been well known as an industry in which comprehensive SOP has been implemented, compliance to the standard is a must, and intense management supervision should be implemented to minimize (or zero accident, if possible) principles have to be implemented. Similar to the carpenter industry, the three types of informants involved in the study were workers (typically non-permanent worker, paid daily), supervisor, and Management (site or project management staff). Informants in this study came from two different types of Industry, with two specific different characteristics. Before the study, the researcher predicted that there would be a significant difference in the way informants from the two industries would behave and practice towards work safety and PPE. This is because informants from the Carpenter SME were predicted to have lower awareness and Knowledge due to the nature of the work. Nevertheless, this study showed that the practice in the SME was not different from the more formal, structured construction company.

Table 1. Characteristics of participants

No.	Variable	Worker	Supervisor	Management Staff
1.	**Age**			
	< 20 years old	2	0	0
	21-30 years old	10	1	2
	31-40 years old	9	1	2
	> 41 years old	6	3	3
2.	**Education**			
	Nine year	16	2	0
	12 year	11	3	5
	Diploma	0	0	0
	Bachelor/Master	0	0	2
3.	**Length of Work**	9	0	3
	< 5 year	5	1	2
	5-10 year	10	2	1
	10-25 year	3	2	1
	> 25 year			

Below is a common description of informant's characteristic:
"……. I'm not smart, not finish my school, initially, I did not know anything about how to work correctly or safely. I learnt by practice….." (carpenter).

Regarding the KAP about work safety and work accident, in general, workers still have poor KAP about work safety. There is a tendency of underestimating the risk of a work accident, although some already have some concerns.

"*yesterday I drowned in the sea when doing the project here. I was okay eventually, cause I was wearing life jacket" (while laughing, along with other FGD participants)…. (construction worker)*
"*I often step on a nail, it's okay, just small wound, I can get to work again" (construction worker)*
"We just work… what's important is that we finish our work and get paid…" (carpenter)
"we can die"… (construction worker)
" it was horrifying to see my friend got cut by a machine" (carpenter)
" well, it is risky when working with a sharp knife, risk of getting cut, especially if we are careless" (carpenter).

The condition is similar to what Fairyo[8] and Saputri[9] described in their studies. They stated that there is a relationship between attitude, education level and years of service. The higher the education and the long years of service, the better the Knowledge and practice regarding PPE use among construction workers.

At the supervisor and management level, Knowledge is already excellent and comprehensive. Regarding the fact that the implementation of work safety does not fully comply with the regulation, they tend to blame workers for not working safely. Other reasons for not implementing work safety is a stringent deadline that forces them to work overtime without having sufficient rest.

"I saw several posters of OSH and Zero Accident. If there is a problem with one of the workers, it must be because of the worker himself or because of the deadline" (carpenter manager)
"the longer they work, the more they know how to work safely which is good for them" (carpenter manager)
"*If we apply OSH, we will be pursued by our customer" (construction supervisor)*

We can see the missing link between workers' KAP and the perspective from the management and supervisor side. This poses a challenge as to what needs to be done so the two sides can have the same perspective. This is similar to the study done by Astiningsih[10] but different from the study by Tampinongkol[11]. In their studies, Astiningsih found that by Lawrence Green Model, professional safety practice is influenced by reinforcing factor of supervision by Management, that health and safety program developed by Management will prevent unsafe Act of not wearing PPE. This fact, however, is not supported by Tampinongkol. They stated that there is no correlation between PPE use and unsafe action. In their study, most of the workers did not wear PPE, merely because they did not feel comfortable wearing PPE. According to the workers, experience, and high skill in doing their job are two critical factors that can prevent an accident.
Perception about the use of PPE at work at the worker's level, Knowledge on the use of PPE is generally fair, although there is still misperception on how to use PPE:
"…to protect us at work, examples are boot shoes, helmet, gloves" (construction worker)"Shoes to protect from sharp items, gloves when working with heavy items such as glass or wood, helmet to protect our head when falling" (construction worker) "If I wear boot I can't swim when I fall/drown" (construction worker) "If my boot is too small, I will ask for a replacement, if not then I cut the front part and make it sandals" (along with laugh from other workers) (construction worker).
The Supervisor and Manager described difficulties in implementing the use of PPE. However, they also stated what is needed, so this becomes a habit:

"safe work is the right of each person, so there is no need for coercion ... the problem is usually if you are forced to do it then just when you are monitored ... If you aren't then you become careless, experience teaches them better" (Carpenter Manager)

"The difference between construction and other business is that in construction business many people are involved, of low education, low economic status, don't care about themselves, and don't care about safety because they think it (work accident) is normal…." (Construction Manager)

Again, there is a gap between KAP of the management/supervisor and workers. There is the willingness to comply with regulation regarding PPE use at the management/ supervisor level, but this is not well understood by the workers, who simply think about being comfortable in doing the job, without a clear understanding of the potential risk and hazard. The answer regarding what factors might constitute

the difference in perception lied in the fact that consistent and robust law enforcement should be implemented from top Management to the bottom line, i.e. workers.

4 CONCLUSION

The study confirms that in the fast-moving world in the era of industry 4.0, there are still many workers who are not well informed of their work safety. There are some discrepancies between what workers know and practice and what Management has done. Therefore, Consistent law enforcement should be implemented to ensure that proper work safety is done consistently. Moreover, peer group and collaborative education are needed to make workers understand the importance of wearing PPE. Use of personal experience as a motivational factor might be an essential factor for workers. And this should be reinforced using the various channel and social media.

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