Factors Affecting Safety Performance: Case Study at PT Pamapersada Nusantara

Muhammad Nabawi[1], A Izzuddin Abdissalam[2], Anita Maharani[3], Lidya Lidya[4]

Bina Nusantara University

Email : muhammadnabawi08254@gmail.com[1] zudin19@gmail.com[2] anita.maharani@binus.edu[3] lidya001@binus.ac.id[4]

ABSTRACT

Purpose: The purpose of this study is to see the impact that safety performance can have on technical competencies, non-technical competencies, technical training and non-technical training

Design/methodology/approach: The research method referred to in this study is quantitative research, and the object of this research is PT. Pamapersada Nusantara, further using 89 respondents as a research sample, refers to the structural equational modelling model.

*Findings***:** The results showed that the respondents considered that technical training had nothing to do with safety performance, while other hypotheses were proven.

Research limitations/implications: Although we found that technical competency and non-technical competency influence safety performance, it still need further exploration in order to explore other factors that influence safety performance; also, there will be a necessity for research to explore within mining companies

Practical implications: The managerial implication of this research is that the company can evaluate the technical training implemented, which is related to the readiness of the instructor, the implementation of classroom learning activities, simulator activities, field practice activities, the content of the material following the training objectives, and the benefits felt by employees who have attended technical training.

Originality/value: This paper originated from exploring within one particular mining company

Paper type: Research Paper

Keyword: Influences, Factor, Mining, Performance, Safety.

I. INTRODUCTION

In recent years, occupational safety-related issues have become an increasingly attractive topic in the professional world. Management issues related to K3LH manage well by the company, such as quality, environment, and human resources in the past decade. In various studies, various countries have implemented occupational safety and health performance indicators Fu, G., Dend, N-J., Zhang, S-L., Xue, Z-J. and Gong, (2010); for example, in China, there have been attempts to support the low number of accidents in the workplace (Yang, 2011).

Safety performance is critical because effective work safety management requires an appropriate and reliable performance measurement tool, namely safety performance. Thus, industries with a high level of risk due to work accidents such as construction, oil and gas, manufacturing and mining certainly make safety performance one of their KPIs. Operations in the mining industry are a significant source of risk for work safety. For example, in China's coal industry, fatal incidents in coal mining activities account for 70% of the total number of fatal incidents globally (Hong Chen, 2011). In Indonesia, fatal incidents account for 16% of total

Page | 373

Factors Affecting Safety Performance:
Case Study at PT Pamapersada Nusantara
Muhammad Nabawi, A Izzuddin Abdissalam, Anita Maharani, Lidya Lidya

work accidents in mining activities based on data from the Director-General of Mineral and Coal of the Ministry of Energy and Mineral Resources from 2018 to 2020.

Performance defines as an act or work carried out. Performance assesses how a person has worked than predetermined targets, be it individual work or within the organization's scope (Cushway, 2002). Within the organization's scope or company, performance appraisal carried out to determine the extent to which an organization's ability to achieve planned targets includes operational or financial aspects. In industries with a high level of risk due to work accidents such as construction, oil and gas, manufacturing, and mining, of course, safety performance is one of the KPIs. In the coal mining industry, safety performance is critical because of the high risk of work accidents in operations. For example, in the coal industry in China, fatal incidents in coal mining activities account for 70% of the total number of fatal incidents globally.

The definition of safety performance use is related to several levels of injuries, work accidents and diseases (Iraj Mohammadfam, 2016). Another opinion is that safety performance defines the quality of work related to safety (Björn Nevhage, 2008). Also, we found literature states that safety performance is the level of safety that determines the incidence of work accidents, injuries and deaths Abdallah Mohammad Ashour, (2018) (Bhattacharjee, 1991)The fundamental cause of the accident rate in the mining industry is unsafe conditions, unsafe actions. Unsafe conditions can arise through preliminary mine design, geological factors, poorly maintained equipment, inadequate supervision, while unsafe actions often arise due to unsafe behaviour (Bhattacharjee, 1991).

If there is a work accident, it will negatively impact the company's performance, both operationally and financially. Work accidents will result in higher costs in mining operations because extra costs will arise, namely through workers' compensation and reducing production levels Bhattacharjee, (1991), and confirms work safety is one of the keys to a company's success because, with good work safety management, the company's economic strength will also increase. The statement corroborates both opinions that good safety performance and high productivity must go hand in hand and should not be separated (Memarian, 2016).

The quality of work or employee performance, of course, is greatly influenced by employee competence. Knowledge, skill, attitude (KSA) is an ideal model for behaviour change, and this shows that employees with good safety attitudes have good safety behaviours (Hui Key Lee, 2017). Emphasizes individual performance and company performance depend on individual competencies so that improving the quality of employee competencies must always be appropriately managed in order to be able to meet the demands of their work.

Companies must continue to strive to improve employee competencies, both technical and non-technical, to achieve performance targets. Competency enhancement allows employees to increase knowledge and share information, and ultimately meet organizational demands. One way to improve competence is through training. States that one of the significant aspects affecting employee competence in HRM practice is training (technical and non-technical). By gaining the appropriate knowledge, skills and attitudes through training, employees can work more effectively and prepare for future jobs (Wright, 2001).

To achieve safety performance excellence, organizations in the mining industry often adopt a safety management system or a behaviour-based systems approach to managing workplace safety. PT Pamapersada Nusantara is one of the coal mining industry players with the largest market share in Indonesia. Total coal production of 85 million tons and coal overburden material production of 780 million cubic meters has 15 work locations spread across Kalimantan and Sumatra. PT Pamapersada Nusantara has made many efforts in implementing a workplace safety management system, one of which is by providing training to all employees, especially at the level of heavy equipment operators who have the highest risk of accidents. The number of heavy equipment operators managed by PT Pamapersada Nusantara is 9400 people, or nearly 42.7% of all employees. Training is an activity directed at acquiring knowledge, skills, and attitudes in a direct application (Aguinis, 1998). The training provided to employees expected to improve employee competence, both technically and non-technically, which will support the achievement of safety performance. However, based on the work accident statistical report data from the SHE Department for 2017 to 2019, the number of work accidents each year exceeds the stated threshold limit. Likewise, in 2020, data on work accident statistics up to October 2020 were 350 work accidents where unsafe actions by heavy equipment operators caused 45% of the incidents.

In general, research on the relationship between training and performance discusses the direct relationship between training as the independent variable and performance as the dependent variable. Much of the literature has revealed a relationship between providing training to employees on employee competencies; even so, the following training must be right on target. In his research, Gayatri Panda, (2018) found an impact of training based on competency-based training needs analysis (TNA). In the literature, identifying training needs is essential to improve employee competence in facing challenges; therefore, training design must bridge the gap between current employee competencies and future needs. Other literature shows that TNA and training effectiveness are positively related to employee performance. Rahamah Mahmood, (2018) However, this study

Factors Affecting Safety Performance:
Case Study at PT Pamapersada Nusantara
Muhammad Nabawi, A Izzuddin Abdissalam, Anita Maharani, Lidya Lidya

shows that competence is only a partial mediator in the relationship between training and employee performance.

There is a relationship between training and competencies that affect individual and organizational performance. However, the previous literature has not specifically explained the relationship between training from technical or non-technical sessions on safety performance in industries with a high risk of work accidents, such as the mining industry. The influence of both technical and non-technical competencies in the relationship between training and safety performance has not explicitly explained in the mining industry. This study will investigate the relationship between technical & non-technical training on safety performance mediated by technical & non-technical competencies. Based on the explanation above, the purpose of this study is to see the relationship between technical and non-tennis training provided to operators, technical and non-technical competencies, to the safety performance of operators at PT. Pamapersada Nusantara.

Technical training is identical to skills training where the aspects provided during the training are technical or how to operate, or how to do it. The significant influence of training and development on employee competencies found from the research results (Otoo, 2018). By applying newly learned skills, knowledge and attitudes in daily work, showing better abilities and competencies in doing their jobs, and this is in line with the inner opinion of Appiah, (2010), which emphasizes that training and development results in benefits related to increased performance for employees and the organization by positively influencing employee performance through the development of knowledge, skills, abilities, competencies and employee behaviour.

This training delivered to experts or employees in an operational scope with specific jobs such as welder, mechanic, heavy equipment operator, and many others. Technical training for Heavy Dump Truck operators at PT Pamapersada Nusantara contains knowledge and skills in carrying equipment. Simamora, (2006) defines technical training, which is often also called skill training, as training often encountered in organizations. the training program is relatively simple. Needs or shortcomings identify through careful assessment—the training effectiveness rating criteria based on the assessment phase's objectives. Technical training interpreted as an effort to improve the ability to use the knowledge, methods, techniques and equipment needed to carry out specific tasks (Blanchart, 1992).Technical training can be assessed reliably by one expert instructor, while non-technical training is asses by two trainers (instructors) who provide appropriate conditions at the time of observation (WYL, 2008). The following from the training indicators, according to Dessler, (2015) are as follows: 1) instructors (adequate qualifications/competencies, motivating participants, needs for feedback), 2) training participants. Training participants must, of course, be selected based on specific requirements and appropriate qualifications (enthusiasm for training, desire to pay attention), 3) methods (method suitability with the type of training, the suitability of the method with the training material), 4) the training material (increasing the ability, the suitability of the material with the training objectives), 5) the training objectives (the skills of the trainees, understanding the work ethics of the trainees).

Technical training will undoubtedly benefit employees or employees in an operational scope with specific jobs so that employees can carry out their duties productively and safely. Mackelprang, (2012)who argue that improving employee capability training plays an essential role in improving overall organizational performance. Zumrah, (2013) states that employees who attend training apply new skills, knowledge and attitudes in their daily work. Training related to safety is vital, primarily to educate employees about safety practices and compliance; this will provide accident prevention and control (Cooper, 2006).

A. Operator technical training has a relationship with operator safety performance.

Non-technical training is something other than the technical aspects of a job. Non-technical training aims to train and teach non-technical aspects or aspects of individual soft skills that are often associated with interpersonal, emotional, and behavioural skills (Rainsbury, 2002). Also, non-technical training can improve interpersonal skills and the behaviours needed to apply technical skills and knowledge in the workplace (Melvin R. Weber, 2009). Non-technical training can provide all levels of employees, and even non-technical training can complement technical training and is a requirement for successful performance in the workplace. In general, non-technical training indicators are not much different from technical training, only with significant differences in training materials. In non-technical training for Heavy Dump Truck operators at PT Pamapersada Nusantara, the material focuses on behavioural attitudes, discipline and communication.

Behavioural factors significantly affect safety performance, and this is following the opinion of which states that unsafe behaviour is said to contribute directly and indirectly to 90% of all workplace accidents and incidents. Therefore, non-technical training will help improve behavioural factors; Seiler, (2010) states that training can change employees' behaviour, attitudes, and values about their work and the organization as a whole. Appiah, (2010)Training and development, including non-technical training, will produce benefits related to increased performance for employees and organizations by positively influencing employee performance through the development of knowledge, skills, abilities, competencies, and employee behaviour.

Factors Affecting Safety Performance:
Case Study at PT Pamapersada Nusantara
Muhammad Nabawi, A Izzuddin Abdissalam, Anita Maharani, Lidya Lidya

Page | 375

B. Non-technical operator training has a relationship with operator safety performance.

Competence as a fundamental character of a person that causes him to show effective or superior performance in a job Spencer, (1993) . Mulder, (2007) defines competence as a generic professional ability that consists of an integrated set of knowledge, skills, and attitudes. Boyatzis, (2018) states that competence is the existing capacity of someone who can make that person able to fulfil what is required by work in an organization to achieve the expected results.

Employee competencies have a significant influence on organizational performance (Otoo, 2018). emphasizes that employee competence is a combination of knowledge, behaviour and skills that secretly gives a person the potential to carry out their duties effectively. Thus his research, Otoo, (2018) states that several other authors argue that increasing employee competence is very important for organizational performance.

Competence consists of five indicators: motives, traits, self-image, knowledge, and skills (Spencer, 1993). Boyatzis, (2018) expresses competence as a characteristic that underlies a person, such as motives, traits, skills, self-image, social roles, or knowledge. Some authors define competence as a concept that describes the prerequisites for job performance and organizational results, as indicated by indicators of skills, character, quality, abilities, capacities and capabilities (Worley, 2009).

Hutapea, (2008) defines technical or functional competencies (technical/functional/complex competencies / hard skills), which is a description of what a person must know or do to carry out his job correctly. Hard (technical) competency is a skill related to specific technical knowledge and is task-oriented . Technical competence is mainly cognitive, which is likely to be influenced by an individual's intellectual intelligence (IQ) (Rainsbury, 2002). Technical competency refers to the technical category skills in doing work (Melvin R. Weber, 2009).

Employee competence can be improved through training programs and can further improve employee performance as a whole. Increasing employee competence and organizational development is one of the primary forms of training and development Otoo, (2018), and also supported by research conducted, which reveals that employee competence has a mediating effect between the management function and human resource development and service quality for workers in the hospitality industry in Malaysia.

C. Operator technical competence mediates the relationship between operator technical training and operator safety performance.

Non-technical competence is closely related to behaviour and is often called behavioural competency (soft competency / soft skills). Soft competency is interpersonal skills or behaviours needed to apply technical skills and knowledge in the workplace (Melvin R. Weber, 2009). Non-technical competence is primarily affective and behavioural and is likely to be influenced by emotional intelligence (EQ) (Rainsbury, 2002). Also, non-technical competence is how a person expected to behave in order to do his job well (Hutapea, 2008).

Non-technical competency indicators are non-technical things tied to individuals, such as creativity, collaboration, and complexity which consider necessary for employees to succeed. Meanwhile, individual soft competency is often associated with interpersonal, emotional, and behavioural skills Rainsbury, (2002).Technical competence is after employees get technical knowledge obtained from schools, universities, or training centres that usually focus on technical expertise in their fields. Knowledge will assist an individual in contributing to the achievement of the organization's business objectives.

In previous research, soft competency is considered necessary for work performance Spencer, (1993),and this is also true in the mining industry where research results J. Maiti, (2004) found that 'risk taker' behaviour significantly causes workers to be prone to accidents. Employees' non-technical competencies can be improved through effective non-technical training programs and further improve overall employee performance. By acquiring the appropriate knowledge, skills and attitudes through training, they can perform their current jobs more effectively and prepare for future jobs (Wright, 2001). Found that employee competence is a partial mediator between the training function and employee performance and states that competence is the primary mediator between training interventions and job performance.

Factors Affecting Safety Performance:
Case Study at PT Pamapersada Nusantara
Muhammad Nabawi, A Izzuddin Abdissalam, Anita Maharani, Lidya Lidya

Page | 376

D. Operator non-technical competence mediates the relationship between operator non-technical training and operator safety performance.
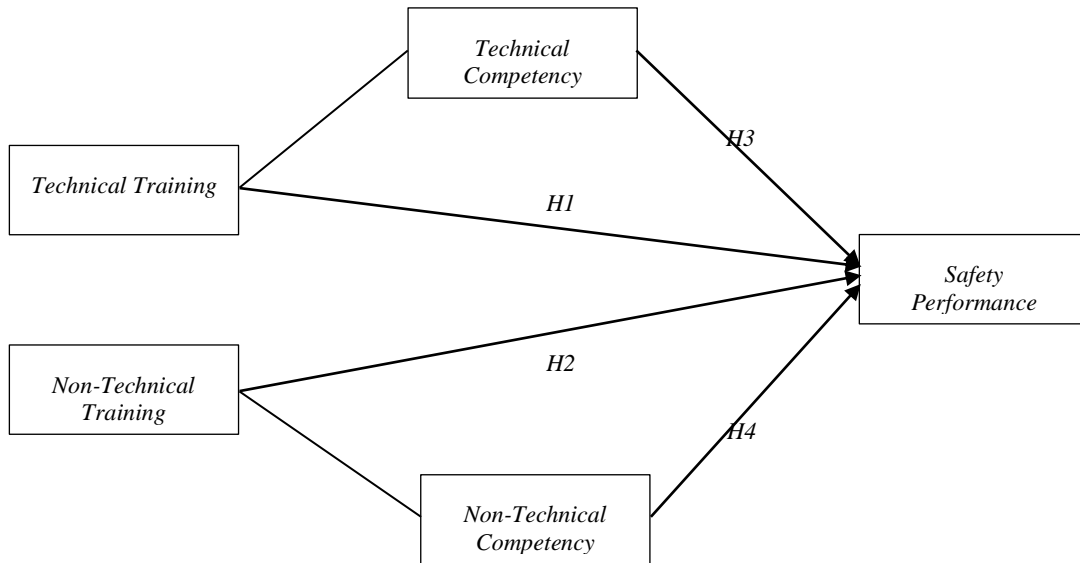

Figure 1. Research Model

II. METHODOLOGY

Our research is research with quantitative methods. Our research design is a non-contrived setting. In this study, researchers chose an individual unit of analysis because we wanted to see the data collected from each individual regarding the relationship of training that HD heavy equipment operators have received with their performance, especially in terms of safety. Our study was included in a cross-sectional study based on the data collection time because researchers only collected data once in a few weeks or months.

In this study, the population was all 785 Heavy Dumptruck Operators in 5 Districts representing the characteristics and types of work areas in PT Pamapersada Nusantara, ADRO, ARIA, ASMI, INDO, KIDE, KPCS districts. Based on data from the company's Human Capital Department, there are currently 850 HD 785 operators working in the district. We made a sample frame from a population of 850 HD operators according to our research frame, namely the HD 785 operator who had attended technical and non-technical training.

Sampling uses a proportional random sampling method based on the number of HD 785 Operators in one district to the total number of HD 785 Operators in the target population. This method of research results is base on the distribution of districts. With this method, the number of samples to be studied is 89 people.

The data we need in this study are primary. The method we will use is to obtain primary data is a questionnaire because our research strategy is a survey where the questionnaire will be compiled with the help of Google Form software so that it is easy to process and sent to the respondent's email address according to the criteria for our sample frame research. We will explain this questionnaire to the respondents via email, and we will also include it in the cover letter of the questionnaire (attached).

In this study, we used a survey strategy to describe, compare, or explain their knowledge, attitudes, and behaviour (Fink, 2003). This survey includes cross-sectional studies, questionnaires or structured interviews for data collection and generalizing the sample to the population.

Furthermore, the validity and reliability conducted to ensure the questionnaire measuring tool are valid and usable—regression analysis used as a measure for the study . A statistical test will carry out using the Structural Equation Modeling (SEM) method using the SmartPLS software in testing the data. There are two analyzes, namely the Measurement Model, to measure validity and reliability. Meanwhile, the Structural Model (Multiple Regression) is used to test the hypothesis.

Factors Affecting Safety Performance:
Case Study at PT Pamapersada Nusantara
Muhammad Nabawi, A Izzuddin Abdissalam, Anita Maharani, Lidya Lidya

III. RESULTS AND DISCUSSION

This study succeeded in obtaining 100% of the survey filling as previously targeted. The process carried out by researchers in order to encourage respondent participation is by providing a cover letter at the beginning of the online questionnaire page as a form of introduction to the researcher and conveying the aims and objectives of the research. Furthermore, we identified the profile of our research respondents, all of whom were male, held the position of HD 278 operator, and had passed technical and non-technical training, then the majority of respondents had a service period of more than five years.

Next, the researcher checks the statement items used to measure the proposed research variables. Researchers take a method by processing all statement items using SmartPLS. The result obtained from the initial procedure is Convergent Validity, which will consider as significant if it has a value> 0.5. As the opinion of states that the loading factor> 0.5 is significant. Also, the rule of thumb in SEM states that the minimum value for loading factor is> 0.7, so the researchers decided to exclude items with a value of <0.7, among others, are PT04 and KT04 (information: for the attached loading factor table).

After removing items that do not meet the criteria, the next researcher looks at the Composite Reliability and Average Variance Extracted results.

Table 1. Reliability Test

	Cronbachs Alpha	Rho_A	Composite Reliability	Average Variance Extracted
Technical training	0,913	0,916	0,933	0,698
Non technical competency	0,907	0,910	0,931	0,729
Technical competency	0,954	0,956	0,961	0,757
Non technical training	0,903	0,904	0,929	0,723
Safety Performance	0,870	0,879	0,901	0,603

Based on the test results in Table 1., all items (except PT04 and KT04) can be continued for the next test, namely, the validity test. To test the validity, researchers refer to the results in discriminant validity analysis. In the discriminant validity table, the researcher compared the AVE roots to each construct's AVE roots, preferably higher than the correlation between the constructs based on.

Table 2. Discriminant Validity

	Technical Training	Non-Technical Competency	Technical Competency	Non Technical Training	Safety Performance
Technical training	0,835				
Non-technical competency	0,773	0,854			
Technical competency	0,776	0,860	0,870		
Non-technical training	0,700	0,707	0,623	0,850	
Safety Performance	0,709	0,818	0,795	0,706	0,777

Based on the results of the validity test and reliability test, the model is declared valid. The researcher sees the magnitude of technical training, non-technical competence, technical competence, and non-technical training on safety performance before taking hypothesis testing as follows.

:: IJEBD ::
(International Journal of Entrepreneurship and Business Development)
Volume 04 Number 03 May 2021
This work is licensed under a Creative Commons Attribution- ShareAlike 4.0 International License.

ISSN : 2597-4785 (ONLINE)
ISSN : 2597-4750 (PRINTED)

Table 3a. R Square

	R Square	Adjusted R Square
Safety Performance	0,731	0,718

Table 3a. The above illustrates the effect of the independent variable on safety performance; from the results above, safety performance is influenced by 73.1% a combination of technical competence, non-technical competence, technical training and non-technical training. This study proposes a model that also involves non-technical competence and technical competence as the dependent variable, which shows the following results.

Tabel 3b. R Square

	R Square	Adjusted R Square
Technical competency	0,603	0,598
Non technical competency	0,500	0,494

Based on Table 3b., Referring to Figure 1., above Non-Technical Competence will be influenced by Non-Technical Training by 50%, while Technical Training will influence technical Competence by 60.3%. Furthermore, temporarily that there are dynamics between variables, which of course, will be interesting to know further from hypothesis testing. The final step in testing the research data is hypothesis testing using PLS-SEM. In testing this hypothesis, bootstrapping is an attempt to provide consistent data for estimated factor numbers. The bootstrap provides information on the stability of the estimated coefficients, in which, in this process, a large number of subsamples from the original sample with replacement. The bootstrap analysis results, the SmartPLS tool displays the T-statistics and P-values for the estimated structural model derived from the bootstrap procedure. The t-statistic value shows the magnitude of the effect of the independent variable on the dependent variable. The t value greater than 1.96 (p <0.005) indicates that the relationship is significant at the 95% confidence level ($\alpha = 0.05$).

Table 4. Hypothesis Testing

Hypothesis	t-Statistic	P Value	Decision(s)
H1	0,045	0,964	Not supported
H2	2,983	0,003	Supported
H3	2,323	0,020	Supported
H4	2,824	0,005	Supported

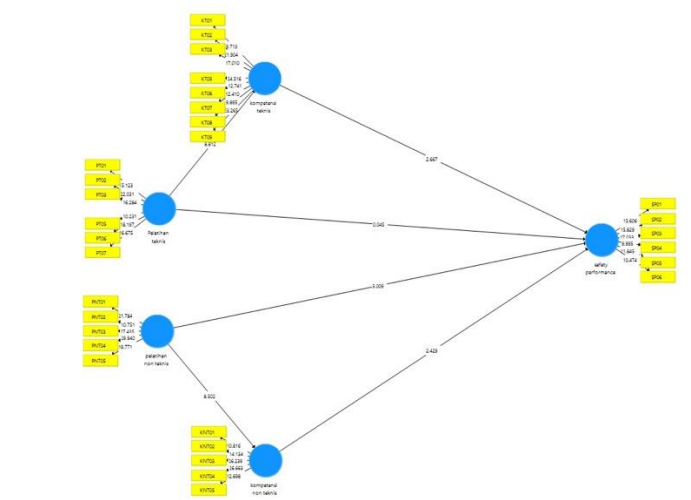The following is a structural model of this study.

Figure 2. Structural Model

Based on table 4, the researcher can find out that the operator's technical training is not proven to have a relationship with the operator's safety performance, while the other three hypotheses are accepted, and the discussion for the results of this test discussed in the following paragraph.

In testing, the first hypothesis, which is not supported, shows a fascinating phenomenon. The company, which is the object of this research, stipulates the obligation to carry out technical training for its employees. In concept, technical training interpreted as an effort to improve the ability to use the knowledge, methods, techniques and equipment needed to carry out specific tasks, as expressed by (Blanchart, 1992).The results of this study certainly contradict Harrison, (2000) view; and Appiah, (2010),which emphasizes that training and development produce benefits related to increased performance for employees and for the organization by positively influencing employee performance through developing knowledge, skills, abilities, competencies and employee behaviour.

In the second hypothesis test, accepted and means that non-technical training significantly affects safety performance; this is in line with the fact that non-technical operator training has a significant relationship with operator safety performance. Appiah, (2010) states that training and development, including non-technical training, will produce benefits related to improved performance for employees and organizations by positively influencing employee performance by developing knowledge, skills, abilities, competencies and employee behaviour.

The third hypothesis test is accepted, meaning that technical competence significantly mediates the relationship between technical training and safety performance. The results of this study confirm Hutapea, (2008), which defines technical or functional competencies (technical/functional/complex competencies / hard skills), which is a description of what a person must know or do in order to carry out his job well. Hard (technical) competency is a skill related to specific technical knowledge and is task-oriented. Technical abilities are primarily cognitive, likely to be influenced by an individual's intellectual intelligence (IQ) (Rainsbury, 2002). Technical competence refers to the technical category skills in doing work .

The fourth hypothesis test is supported, meaning that non-technical competence significantly mediates the relationship between non-technical training and safety performance and is in line with the opinion that the quality of work or employee performance is influence by employee competence. Knowledge, skill, attitude (KSA) is an ideal model for behaviour change, and this shows that employees with good safety attitudes have good safety behaviours (Hui Key Lee, 2017). Thus, individual performance and company performance depend on individual competence, so that the improvement of the quality of employee competencies must always manage adequately in order to be able to meet the demands of their work.

CONCLUSION

Based on the research results, some things need special attention from the company, namely technical training concerning safety performance. This study indicates that respondents' perceptions of technical training have no relationship with safety performance. In reality, in companies, technical training is an essential part of ensuring safety performance. Next, this study shows the respondent's perception that non-technical training has a relationship with safety performance, and this also applies to non-technical and technical competencies when viewed about operator safety performance. The managerial implication of this research is that the company can evaluate the technical training implemented, which is related to the readiness of the instructor, the implementation of classroom learning activities, simulator activities, field practice activities, the content of the material following the training objectives, and the benefits felt by employees who have attended technical training.

REFERENCES

Abdallah Mohammad Ashour, Z. H. (2018) 'A CONCEPTUAL FRAMEWORK FOR UPGRADING SAFETY PERFORMANCE BY INFLUENCE SAFETY TRAINING, MANAGEMENT COMMITMENT TO SAFETY AND WORK ENVIRONMENT: JORDANIAN HOSPITALS.', International Journal of Business dan Social Research, 11.

Aguinis, W. C. (1998) Applied Psychology in Human Resource Management.

Appiah, C. (2010) Human Resource Strategies for International Growth. Routledge, London.

Bhattacharjee, A. (1991) 'Mine safety management: an application of risk analysis, forecasting techniques, and Markov process to injury experience data', Pennsylvania: The Pennsylvania State University.

Factors Affecting Safety Performance:
Case Study at PT Pamapersada Nusantara
Muhammad Nabawi, A Izzuddin Abdissalam, Anita Maharani, Lidya Lidya

Page | 380