The Relationship between Personal Factors and Behavior of Using Personal Protective Equipment on Workers

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ABSTRACT

Introduction: PT. Kerta Rajasa Raya is an industrial manufacturing company in the manufacturing of Woven Bags and Jumbo Bags. From 2012 to 2017, the total incidence of work accidents reached 844 cases. One of the divisions at PT. Kerta Rajasa Raya which often experiences work accidents is the extruder division. The most frequent accidents experienced by workers in the extruder division are being hit by a cutter and pinched by a roll on the machine. One of the causes of accidents is workers' non-compliance with the use of PPE. This study aims to analyze relationship between personal factors and non-compliance behavior in using PPE by workers. **Methods:** This study used a quantitative approach with an observational analytical method and a cross-sectional design. The population of this study was workers in the extruder division of PT. Kerta Rajasa Raya with sample of 79 workers, who were chosen through a random sampling technique. The data collection was conducted by the means of observation sheets and questionnaires using Kendall test analysis. **Results:** The results of the study showed that education level (r = 0.220), years of service (r = 0.216), attitude (r = -0.244) and knowledge (r = -0.210) had a weak relationship with the behavior of using PPE. **Conclusion:** There was an effect in the relationship between education level, years of servicee, attitude, and knowledge of workers in using personal protective equipement.

Keywords: behavior, personal factors, personal protective equipment

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INTRODUCTION

Indonesia is a developing country which has various business fields, one of which is industry (Prihartini, 2010). Industrial companies in carrying out the production process definitely need human resources and production equipment to increase their productivity. Worker activities and work equipment used, however, can be a potential source of work accidents if handling and control are not carried out as well as possible (Heriyadi, 2017).

Accidents are unwanted and unexpected events that can cause casualties and / or property (Regulation of the Minister of Manpower of the Republic of Indonesia Number 03 of 1998). The number of work accidents in Indonesia is still in the high category. Based on the International Labor Organization's data, it is shown that every 15 seconds a worker dies worldwide due to work accidents and occupational diseases (Ministry of Health, 2020). Based on data from Social Security Administering Agency for Employment /BPJS Ketenagakerjaan Indonesia (2019), since 2013 the number accidents in Indonesia due to accidents and illnesses at work has kept increasing. In 2017 the number of work accidents that occurred was 123,041 cases, and then it increased into 173,105 cases in 2018. Meanwhile, according to the Department of Manpower and Transmigration in East Java, the number of work accidents in East Java attained 21,631 cases during 2017 (Social Security Administering Agency for Employment/ BPJS Ketenagakerjaan, 2019). This number increased by 200 cases compared to that in 2016, which was around 21,431 cases. Unsafe behavior is one of the most dominant causes of work accidents (Sakinah, 2017).

In addition to unsafe behavior factors in the workplace, there are also physical, biological, chemical, ergonomic and psychological hazards that can cause occupational accidents and diseases. The control hierarchy is an effort to control the occurrence of accidents and occupational diseases,

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which consists of elimination, substitution, engineering, administrative control, and Personal Protective Equipment (PPE) (Suyono and Nawawinetu, 2010; Nizar, Tuna and Sumaningrum, 2016; Amir and May, 2018; Julaikah, 2019).

PT. Kerta Rajasa Raya is an industrial manufacturing company in the manufacturing of Woven Bags and Jumbo Bags with the largest production capacity in Southeast Asia. In this company there is some fluctuation in the number of work accidents. From 2012 to 2017, the total work accidents reached 844 cases. One of the divisions at PT. Kerta Rajasa Raya which often experiences work accidents is in the extruder division. The most frequent accidents experienced by workers in the extruder division are being hit by a cutter and pinched by a roll on the machine. These accidents are due to the non-compliance of workers with the use of PPE as well as procedural errors. According to, workers in the field are often found to be disobedient in using PPE.

The implementation of Occupational Safety and Health is aiming to create a work place that can decrease work accidents and , occupational diseases, which in the end can improve work efficiency and productivity (Liswanti, 2017; Musdalifah, 2017). The use of PPE is an implementation of the occupational safety and health management system. Personal protective equipment abbreviated as PPE, according to the Regulation of the Minister of Manpower and Transmigration Number 08 of 2010 concerning Personal Protective Equipment, is a tool that is usually used to protect someone or a worker from potential hazards in the workplace area. A protective head gear, as one type of PPE, serves to protect the head from possible collisions, stumbles, hits or falls of sharp objects or hard objects floating in the air, as well as from exposure to heat radiation, fire, chemical sparks, microorganisms (micro organisms) and extreme temperatures. An example of this protective head gears is safety helmets. Meanwhile, respiratory protective equipment serves to protect the respiratory organs by distributing clean and healthy air or by filtering chemical contaminants, microorganisms, and particles in the form of dust, mist, vapor, smoke, gas or fume, and so on. An example of this respiratory protective equipment is masks. Moreover, ear protection devices, such as ear plugs or ear plugs and earmuffs or ear muffs, protect the hearing organs from noise and pressure types. Furthermore, hand protective equipment serves to protect the fingers and hands from exposure to fire, hot or cold temperatures, electromagnetic radiation, ionizing radiation, electric currents, chemicals, collisions, blows, scratches, infection with viral or bacterial pathogens and microorganisms. Lastly, Foot protective equipment serves to protect the feet from being hit by heavy objects; punctured by sharp objects; and exposed to hot or cold liquids, hot steam, extreme temperatures, dangerous chemicals, microorganisms, and the potential for slipping. An example of this foot protective equipment is in the form of safety shoes that are tailored to the workplace (Katili and Kartikasari, 2016).

PT Kerta Rajasa Raya implements a policy regarding workers who are required to wear five types of PPE when carrying out work including safety helmets or work hats, masks, ear plugs, gloves, and safety shoes. However, not all workers in the work environment have the behavior to use PPE in accordance with the standards set by the company (Cimera, 2019).

Based on the results of the research, not all workers are aware that there is a policy regarding PPE in the workplace, and the supervision related to this policy has not been strictly implemented. For workers who do not use PPE according to the rules, they will only be given a sanction in the form of a warning (Andriyanto, 2017). In addition, problems related to the use of Personal Protective Equipment (PPE) are problems experienced by almost all workplaces and various types of industries (Putri, 2019). The behavior of using inappropriate PPE can lead to an increased risk of worker severity when an accident occurs.

According to the theory of Geller (2011),to form a culture of safety there are three components that are interconnected with one another, namely people, behavior, and the environment, called the safety triad. These three factors influence one another in achieving safety in the company. Then, Geller integrated that the human safety culture is influenced by two factors, namely personal or internal factors such as education level, knowledge, attitude, and years of service and external factors such as training, introduction, communication, among many others.

According to Rakhmawati (2017), behavior has basic principles that can be learned and can be changed by identifying and manipulating stimuli that precede and follow a behavior. Behavior is a person's response to stimuli that come from within or outside. Previous research conducted by Putri (2019) shows that personal factors in the form of age, years of service, education, and knowledge were related to

the PPE act substandard. Moreover, Liswanti (2017) explained that attitude had a significant relationship with the behavior of using PPE. Therefore, the aim of this study is to analyze the relationship between personal factors which include education, years of service, attitude, and knowledge of the behavior of using PPE in the extruder division of PT Kerta Rajasa Raya.

METHODS

The study used an observational research design because the researchers only made observations without giving treatment to the subject of research. Based on the approach, this study used a cross-sectional design inasmuch as the measurement of variable observations was in the same period of time (Notoatmodjo, 2002). This research was conducted at PT Kerta Rajasa Raya in January 2019, with the aim to analyze the relationship between personal factors, such as education, years of service, attitude, and knowledge of the behavior of using PPE in the extruder division.

The population in this study was all workers in the extruder division of PT Kerta Rajasa Raya Sidoarjo as many as 98 people with the sample of 79 respondents. The method to determine the sample was a simple random sampling technique for a population less than 10,000, using the Slovin formula.

The personal factor variables in this study were the level of education, years of service, attitude, and knowledge regarding PPE among the workers in the extruder division. The knowledge variable was expressed by 10 questions in the questionnaire with a score of 10 for each question. Thus, if the respondents could answer the question correctly, the total score obtained was the number of correct answers multiplied by 10. Then, the categorization of the score was divided into three, which were good (71-100), moderate (36-70) and poor (0-35). Then, the measurement of the attitude variables ware expressed in 9 statements in the questionnaire, and the respondents were asked to indicate the level of agreement or disagreement with the statement (Fauzi, 2018; Cimera, 2019; Putri, 2020). Each statement had an answer priority scale with the criteria, namely strongly agree with a score of 4, agree with a score of 3, disagree with a score 2 and strongly disagree with a score 1. The scores obtained were summed up and then divided by the maximum score of 36 and then multiplied by 100. Following this, the attitude score categorization was divided into three, namely good (76% -100%), moderate (51 % -75%) and poor (25% -50%) (Sukmawati and Maharani, 2004).

Table 1. The Category of Strength of Kendall's tau-b Correlation Test Score

Correlation Coefficient Value	The Strength of Relationships
- / + (0.001-0.249)	Weak
- / + (0.250-0.499)	Moderate
- / + (0.500-0.749)	Strong
- / + (0.750-0.999)	Very strong

The variable of PPE usage behavior was measured using an observation checklist that contained 5 items of PPE required by the company (safety helmets or work hats, masks, ear plugs, gloves, and safety shoes). Afterwards, it was calculated using the formula below:

$$SBI = \frac{SO}{SO + UO} \times 100\%$$

where:
SBI = Safe Behavior Index
SO = Safe Observed
UO = Unsafe Observed

The assessment category was good = 60%, fairly good = 40% - 60%, and poor = <40%. The data obtained were analyzed using software with the Kendall analysis test to analyze the relationship and strong relationship between the variables. The strong relationship between the research variables can be seen from the correlation coefficient (r). The correlation coefficient values ranged between 1 and -1. The negative correlation coefficient shows the opposite relationship where while there is an increase in the variable x, there is a decrease in the variable y and vice versa. Prior to the analysis using data processing software, the data from the questionnaire were processed first. The results of the analysis would then be linked to existing theories and observations through in-depth interviews. The research protocol of this research has been ethically

tested, and it has received the ethics number 16/EA/KEPK/2019.

RESULTS

Personal Factors of the Respondents

The behavior factors of compliance with the use of PPE are influenced by internal factors and external factors. The internal factors are personal factors that include years of service, education level, attitude, and knowledge of respondents related to personal protective equipment in the extruder division of PT Kerta Rajasa Raya. The number of workers in the extruder division of PT Kerta Rajasa Raya were 79 people.

Based on Table 2, the majority of workers' years of service was approximately seven years (43.0%), followed more than eighteen years (32.9%) in the second position. Furthermore, the majority of respondents had high school education (68.45%), followed by college education (19%), and junior high school (12.7%) respectively.

The knowledge of the majority of workers in the extruder division about PPE was classified as having a good knowledge of 82.3%. The knowledge of PPE among respondents was measured using a questionnaire regarding the definition and main benefits of using PPE, the disadvantages of not using PPE, the types of PPE that workers must use according to the policies established by the company and the appropriateness of using PPE. The majority of workers answered questions well. Furthermore, the attitude of workers regarding PPE in the extruder division was classified as having a good attitude of 57.0%.

Behavior of the Use of PPE in the Extruder Division of PT. Kerta Rajasa Raya

The types of PPE that must be used by workers in the extruder devision are safety helms, masks, gloves, ear plugs, and safety shoes. The assessment of the use of PPE on workers was carried out directly while the respondents were doing their job without giving certain treatment.

Based on Table 3, the behavior of using PPE was categorized into three categories, namely good, good enough, and not good. Of the total respondents, which numbered 79 workers in the extruder division, most of them had bad behavior in using PPE, accounting for 32 people (40.5%), while 25 people (31.6%) behaved quite well, and 22 people (27.8%) behaved well.

The Relationship between Education and the Behavior of Using PPE

Table 4 shows the results of the Kendall's tau-b correlation test between education and the behavior of using PPE, which had a p value (0.033) $<\alpha$ (0.05) with a correlation coefficient of 0.220. This means that there was a weak relationship between education and the behavior of using PPE. Meanwhile, the direction of the relationship was positive, which means that the higher the level of education of the respondents, the better the behavior of using PPE.

Table 2. Distribution of Workers' Years of Service, Education Level, Knowledge, and Attitude in the Extruder Division of PT Kerta Rajasa Raya Sidoarjo in 2019

Variabel	Category	Frequency	Percentage (%)
Years of service	≤ 7 years	34	43.0
	7 <x ≤ 18 years	19	24.1
	> 18 years	26	32.9
Education Level	Junior High	10	12.7
	High school	54	68.4
	College	15	19.0
Knowlegde	Less	6	7.6
	Enough	8	10.1
	Good	65	82.3
Attitude	Enough	45	57.0
	Good	34	43.0
Total		79	100

The Relationship between Years of service and the Behavior of Using PPE

Based on Table 4, the results show that the correlation test between years of service and the behavior of using PPE obtained p value (0.033) <α (0.05) with a correlation coefficient of 0.216. This means that there was a weak relationship between years of service and the behavior of using PPE. Meanwhile, the direction of the relationship was positive, which means that the longer the respondents' years of service, the better the behavior of using PPE.

The Relationship between Attitudeand the Behavior of Using PPE

Based on Table 4, The correlation test shows that relationship between attitude and behavior of using PPE obtained p value (0.023) <α (0.05) with a correlation coefficient of -0.244. This means that there was a weak relationship between the attitude variable and the behavior of using PPE. Meanwhile, the direction of the relationship was negative, which means that the better the respondents' attitude towards using PPE, the higher the tendency of the respondents to behave less well in using PPE.

The Relationship between Knowledge and the Behavior of Using PPE

Based on Table 4, the correlation test between knowledge and the behavior of using PPE obtained p value (0.045) <α (0.05) with a correlation coefficient of -0.244. This means that there was a weak relationship between the knowledge about PPE and the behavior of using PPE. Meanwhile, the direction of the relationship was negative. The direction of the negative relationship in the study means that the better the respondents' knowledge of the use of PPE, the higher the tendency to behave less well in using PPE.

Table 3. Distribution of Respondents' Behaviour on the Use of PPE in the Extruder Division of PT. Kerta Rajasa Raya in 2019

Variable	Category	Frequency	Percentage (%)
PPE usage behavior	Good	22	27.8
	Good enough	25	31.6
	Not good	32	40.5
Total		79	100

Table 4. Statistical test of the relationship between personal factors and the behavior of using PPE on workers in the Extruder Division of PT. Kerta Rajasa Raya in 2019

Variable	P value	The value of r	Strong Relationship
Education level	(0.033) <α (0.05)	0.220	Weak
Years of service	(0.033) <α (0.05)	0.216	Weak
Attitude	(0.023) <α (0.05)	-0.244	Weak
Knowledge	(0.045) <α (0.05)	-0.210	Weak

DISCUSSION

Analysis of the Relationship between Education and the Behavior of Using PPE

The level of education is the last formal education that employees took (Cimera, 2019). The level of education is one part of internal factors that can influence a person's mindset and behavior. According to Andriyanto (2017), someone's education affects the way of thinking in dealing with work. In general, the higher a person's education level, the better his behavior. The level of education referred to in this research is the last level of education attained by workers at the time this research was conducted. Table 4 shows that there was a relationship between the level of education and the behavior of using PPE, but it was classified weak with a positive direction, which means that the higher the level of education of workers, the better the behavior of using PPE.

The results of this research is in line with research conducted by Sakinah (2017) which explained that there was a relationship between education level and compliance with the use of PPE. Putri further (2019) stated that there was a weak relationship between the education level of workers and the substandard act of Personal Protective Equipment (PPE). The level of education can influence a person's mindset and actions in carrying out his job. The weak relationship between education and the behavior of using PPE occurs

because education does not directly affect the use of PPE but only affects the mindset of workers.

Analysis of the Relationship between Years of Service and the Behavior of Using PPE

The period of service is the time a person has worked in an agency. According to Rakhmawati (2017), the work period can see the maturity of workers in facing their work; the longer they work, the more experience they get and the more skills they have in doing their jobs. The years of service referred to in this research is the length of work calculated from the first year working at PT. Kerta Rajasa Raya until the time this research was conducted. Table 4 shows that there was a relationship between years of service and the behavior of using PPE, but it belonged to a weak category with a positive relationship. This means that the longer the worker works at the company, the better the behavior in using PPE he has.

Years of service can be related to the workers' experience. The longer the years of service a worker has, the more experience he gets. The experience gained can be in the form of a better introduction to the environment in the workplace as well as experience regarding work accidents so that workers will be more careful in maintaining their safety if they understand firsthand the risks in the workplace compared to workers who have just entered the company and do not understand for sure the details of the type of work, especially the safety in the workplace (Krajnak, 2018).

The research results are also in line with research of Nizar, Tuna, dan Sumaningrum (2016) which conducted a study on clinical laboratory staff and found thatthere was a positive correlation between the length of service and compliance with the use of PPE. The longer the years of service , the lower the non-compliance of respondents in using PPE.

Analysis of the Relationship between Attitudes and the Behavior of Using PPE

Attitude is an individual's closed reaction to certain stimuli or objects that involves opinion and emotional factors. Attitude is not in the form of actions but predispositions to actions (Notoatmodjo, 2014; Amir and May, 2018). The attitude referred to in this study is the attitude of workers in using PPE, obtained from the answers to the questionnaire with a scale varied from strongly agree to strongly disagree. Table 4 shows that there was a relationship between the attitude of workers and the behavior of using PPE with a weak and negative relationship category, which means the better the attitude of workers in using PPE, the higher the tendency to behave less well in using PPE.

Attitudes are grouped according to the level of intent, namely accepting, responding, respecting, and being responsible (Cimera, 2019). This research shows that the attitude of workers was good towards the use of PPE but their actions were not good or negative. This can be due to the attitude of workers which has not yet reached the level of appreciation, in which the individual gives positive values to the object or stimulus of using PPE in the workplace. The attitude of a good workforce towards the use of PPE is still a perception that exists in the minds of workers and has not been manifested in the form of open reactions or direct actions.

Feelings of discomfort also play a role in the use PPE among workers, so even though workers understand the importance of using PPE, workers prefer not to use PPE according to the company's rules. Personal protective equipment often causes workers to feel uncomfortable (Geller, 2001; Aguwa, Arinze-Onyia and Ndu, 2016; Julaikah, 2019). This also happens to workers in the extruder division where workers feel uncomfortable and feel that using PPE even make it difficult for them to work. According to the results of interviews with workers in the extruder division, the gloves used during the yarn harvesting process often caused workers to feel slower and less thorough in checking the thread layers.

Another part of the work process also experience the same discomfort with the use of PPE, namely the process of cutting irregular threads on roll 3 of the extruder machine. When irregular threads are found, the workers must immediately cut the thread so that the threads in the production system do not experience problems. The thread cutting activity must be done quickly, and workers used the cutter lying near roll 3. Workers often used cutters that were not equipped with guards because they felt they did not have enough time if they had to take protective cutters. In addition, it is known that most workers still did not know the main benefits of using PPE, so that workers did not feel the benefits of using PPE itself, and the behavior of using PPE has not been properly established (Beard and Griffin, 2016; Putri, 2019; Rachmadiyawati, 2019).

According to Act Number 1 Year 1970 regarding Occupational Safety, the PPE that is provided must meet the requirements of the manufacturing process, testing, and certification appropriateness. In addition, there are several other things that must be considered in determining the use of PPE, namely the comfort of wearing, no disturbance to the calm atmosphere and no limitation to the movement of workers, effective protection against various types of potential hazards, aesthetic requirements, attention to the side effects of using PPE, easy maintenance., appropriate size, easy provision and affordable prices.

In this study, there was an inconsistency between attitude and the behavior of using PPE because workers considered PPE to be uncomfortable, workers' perceptions of safety during work were still lacking, and there was still the need for supervision so that workers could realize the need to use PPE. Thus, even though the attitude of workers towards the use of PPE is good, it is not certain that the use of PPE by workers is also good. This study is in line with research conducted by Liswanti (2017) which explained that although the results of measuring attitude were in the good category, the behavior of using PPE was opposite to that attitude. This is because the respondents have not fully accepted and been responsible for using PPE recommended by agencies or companies. Based on the results of interviews with workers, PT. Kerta Rajasa Sidoarjo has never held training or socialization related to PPE for workers in the extruder division.

Analysis of the Relationship between Knowledge and the Behavior of Using PPE

Knowledge is one of the stimuli that influence human behavior. Knowledge is the result of every human's sensing process for an object. The knowledge referred to in this research is knowledge about the meaning, types, functions and benefits of Personal Protective Equipment (PPE) and who wears PPE at work.

The data shown in Table 4 explains that there was a weak relationship between knowledge and the behavior of using PPE among workers in the extruder division of PT. Kerta Rajasa Raya with a negative relationship direction. This research illustrates that although the majority of workers' knowledge is classified as good, the behavior of using PPE is not balanced by the policies that have been set by the company. Workers who have high knowledge will tend to have poor behavior in using PPE. Good knowledge does not necessarily guarantee good behavior. Many of the workers already know about the importance of using PPE but decide not to use PPE according to the regulations.

The results of this study are supported by previous research by Munir (2018) and Putri (2019) which stated that there was a weak relationship between the level of knowledge and the behavior of using PPE with a negative relationship, in which the better the respondent's knowledge, the lower the behavior of using personal protective equipment. work. Liswanti (2017) also supports the results of this study by explaining that a high level of knowledge about PPE is not a guarantee that respondents have the ability according to their level of knowledge. Moreover, Pertiwi, Novrikasari, and Lestari (2016) in their research also explained that good knowledge does not affect compliance with good PPE use as workers only wear some types of PPE which are not in accordance with the established rules. Workers are of the opinion that maintaining occupational safety and health is the responsibility of the leadership and those appointed only, and their work does not have a high risk of accidents so that the use of complete PPE is not needed.

According to Rachmadiyawati and Ardyanto (2019), behavior is not always influenced by positive knowledge. This shows that behavior with its uniqueness is influenced by various variables. Knowledge is a stimulus from outside that will not immediately cause a response from the person concerned (Notoatmodjo, 2014). Thus, it can be interpreted that good knowledge does not always result in good behavior, especially in the use of good and complete PPE. This can be caused by workers' knowledge which is not yet at the application level. Knowledge is broadly divided into six levels of knowledge, namely knowing, understanding, application, analysis, synthesis and evaluation. Application is when someone applies the principles that have been observed and understood.

Attitude and knowledge are two of the many factors that influence a person’s behavior (Glanz, Rimer and Viswanath, 2008). Hence, if attitudes and knowledge do not have a positive impact on the behavior of using PPE, there could be other factors that are more dominant that influence the behavior of using good PPE such as enabling factors, which are factors that support a behavior to manifest. Enabling factors manifest in the form of physical environment andavailability of facilities. Meanwhile, reinforcing factors are factors that reinforce the manifestation of

behavior. These reinforcing factors are manifested in supervision, leadership style and policies.

CONCLUSION

The behavior of the majority of workers in using PPE was still not good because the workers did not use 6 types of PPE in accordance with the company standard. The personal factors studied included the level of education, years of service, knowledge, and attitude, all of which had a significant but weak relationship to the behavior of workers in the extruder division of PT Kerta Rajasa Raya Sidoarjo in using PPE. Education level and years of service had a positive relationship direction where the higher the level of education and the longer the years of service, the better the behavior of using PPE. Meanwhile, attitude and knowledge with the behavior of using PPE had a negative direction, which means that the better the knowledge and attitude of workers, the poorer the behavior of using PPE.

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