

## Improving Occupational Safety through Worker's Personality Approach

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**Abstract:** The growth of manufacturing industry in Indonesia is quite high but unfortunately it is followed by the higher number of accidents. Therefore, Occupational Safety and Health Management System (OSHMS) including behavior based safety approach needs to be implemented to reduce the accident rate. The purpose of this study is to identify one aspect of behavior based safety approach that is the personality types that affect workplace accidents. The 56 workers in forging department and casting department PT. X is involved voluntarily in this study. Personality is assessed using HEXACO Model which divide personality into 6 dimensions honesty-humility (H), Emotionality (E), extraversion (X), Agreeableness (A), Conscientiousness (C) and Openness to experience (O). Data of occupational accidents is obtained from self-reports. Discriminant analysis was used to explore the contribution of personality type to accident. The study shows that the dimensions of personality that affect workplace accidents are honesty-humility (H), Emotionality (E) and Openness to experience (O) with negative effects and Conscientiousness (C) with positive effect on accident.

**Key words:** Workplace, accident, personality, OSHMS, HEXACO

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### INTRODUCTION

The number of manufacturing industries in Indonesia continues to increase. Unfortunately, this increasing number was followed by the high accident rate. In 2013, there were 35.917 cases of occupational accidents and 97.144 cases of occupational diseases. As a result of the many cases of both accidents and occupational diseases, manufacturing industry had to expend Rp. 366. 9 billion in 2013.

Basically, the cause of accidents in the industry can be classified into two types which are unsafe behavior and unsafe conditions. It is mentioned that in 75,000 reports of industrial accidents, 88% of the causes of workplace accidents in the industry is unsafe behavior, 10% of unsafe conditions, the remaining 2% is the inevitable crash.

One of the factors that most influence on safety behavior is the individual factors. Individual factors has several attributes such as attitudes and perceptions, age and experience, undesirable behavior, the desired behavior, skills and competencies, psychological conditions and personality (Khosravi *et al.*, 2014). Personality is the character of individuals that form a pattern of thoughts, emotions, behavior along with the psychological mechanism behind this pattern (Funder, 2013). The definition indicates that the pattern of thinking related to perception and behavior both of which

are attributes of individual factors causing unsafe behavior, related to personality. Therefore it can be indicated that personality is related to unsafe behavior. This indication can be strengthened with accident proneness theory that also associate individual personality as one of the attributes the causes of accidents (Visser *et al.*, 2007).

Several studies have tried to prove a relationship between personality and accident rate. Most recently research is by Nurhayati who used big 5 factor personality instruments that divides personality into five dimensions that are extraversion, agreeableness, conscientiousness, neuroticism and openness. She concludes that only openness dimension have relation to the safety behavior of workers. Different results shown in the study by Beus *et al.* (2015) which concludes that agreeableness and conscientiousness are the most influence dimension on safety in the workplace.

Research in personality measures, accident in the workplace as well as relation between both have been growing. Recent update on personality measures is the use of HEXACO tools (Ashton and Lee, 2007; Ion *et al.*, 2017). HEXACO Model divides personality into 6 dimensions that are honesty-humility (H), Emotionality (E), extraversion (X), Agreeableness (A), Conscientiousness (C) and Openness to Experience (O) was introduced to complement the earlier big 5 theory. The description of each dimension is provided by Ashton and Lee (2007). Honesty-humility relates to characteristic

of person to manipulate others for personal gain, feel little temptation to break rules are uninterested in lavish wealth and luxuries and feel no special entitlement to elevated social status. Emotionality refers to experience fear of physical dangers, experience anxiety in response to life's stresses, feel a need for emotional support from others and feel empathy and sentimental attachments with others. Extraversion refers to positively feel about themselves, feel confident when leading or addressing groups of people, enjoy social gatherings and interactions and experience positive feelings of enthusiasm and energy. Agreeableness refers to willingness to forgive the wrongs that they suffered are lenient in judging others are willing to compromise and cooperate with others and can easily control their temper. Conscientiousness refers to capability to organize their time and their physical surroundings work in a disciplined way toward their goals, strive for accuracy and perfection in their tasks and deliberate carefully when making decisions. Openness to experience refers to ability to absorb the beauty of art and nature are inquisitive about various domains of knowledge use their imagination freely in everyday life and take an interest in unusual ideas or people (Ashton and Lee, 2007).

**MATERIALS AND METHODS**

**Participants:** Fifty six workers of PT. X in the Forging Department and Casting Department (mean age = 39.2, SD = 7.8; work experience 15.9 years, all males) were participating voluntarily in this study by filling out questionnaires. These two departments direct responsibility for the production activities and are having high risk activities.

**Questionnaire:** The questionnaire begins with preliminary part to explain the purpose of the questionnaire. The core part of questionnaire is divided into three parts. The first part is the demography of respondent including age, gender, work experience, the unit of employment and last education. Second part is HEXACO-PI-R 100 questions in Indonesian. The Indonesian HEXACO-PI-R100 has been translated and validated following back translation procedure (Johnson and Widyanti, 2011; Widyanti *et al.*, 2013a, b) for a review). The third part is a part of workplace accidents with eight questions that is generated by the classification of the accident by the ILO (1996) with a binary answer yes or no.

**RESULTS**

**Accident data:** Of the 56 respondents, 30 of respondents are in accident category and 26 respondents are in the non-accident category.

Table 1: Personality type of workers in PT. X

Variables	Mean	SD	Min.	Max.
Honesty-humility (H)	62.54	9.07	41	78
Emotionality (E)	54.54	7.01	41	77
eXtraversion (X)	54.91	4.93	63	44
Agreeableness (A)	51.05	6.70	63	36
Conscientiousness (C)	52.29	5.56	63	39
Openness to experience (O)	54.04	6.04	69	43

**Personality data:** Personality data based on HEXACO questionnaire can be seen in Table 1.

**Correlation between demographic and accident data:**

Correlation analysis between occupational accidents and demographic was conducted using  $\chi^2$  analysis. None of the demographic factors (i.e., age, education level work experience or work unit) relates with occupational accidents. No significant correlation between age and accidents is because the average age of workers fell at the age of 39 years old with a standard deviation of 8 years. Workers at that age tend to be more familiar with his work and more aware of the action taken. The absent of significant correlation between education level and occupational accident may due to the educational level of workers is concentrated in high school and junior high school by percentage of 87.5% as compared to the Bachelor and Diploma which is only 12.5%. With a small sample size and the large frequency differences, chi-square analysis is considered less sensitive enabling the bias against the results of the analysis. No significant correlation between work experience and occupational accident is because the majority of workers (83%) has been working for >5 years. By enough of work experience, accidents are not considered as a factor that influenced by work experience but are influenced by other factors.

**Discriminant analysis:** Discriminant analysis shows that Honesty-humility (H), Emotionality (E), Conscientiousness (C) and Openness to Experience (O), effect accident. The order of magnitude and direction of the effect can be seen from the resulting discriminant function as follows:

$$Y = -8.935 + 0.132H + 0.086E - 0.117C + 0.091O$$

Based on the model, 85% of the variance of the dependent variable can be explained by the model. The accuracy of the discriminant function is 96.4%.

**DISCUSSION**

HEXACO Model is relatively new when compared with the model of personality that has been commonly used, the big 5 theory. The main difference is the addition

of new dimension, Honesty-humility (H). HEXACO Model comes as a complement of the big 5 theory, not to replace them. HEXACO Model is more consistent when replicated in other languages (Italian, Hungarian, Greek) while some of the big 5 theory factors are not consistent when replicated in other languages. Honesty-humility variables also provide a complete picture of the self-importance which is related to feel himself above other people, do not obey the rules and want to feel overlooked as indicated would affect the safe behavior of workers.

Individual with high score of honesty-humility tends to avoid harming others for personal gain and low desire to break the rules (Ashton and Lee, 2009). Low desire in breaking the rules is one component of safety behavior by Bird *et al.* (2007). Neal and Griffin (2006) report a positive relationship between safety behavior and occupational accidents. This explanation reinforces that dimension honesty-humility has an influence on workplace accidents. Another study conducted by Weller and Tikir (2011) states that the honesty-humility has an association with the safety and risk-taking. In line with these studies honesty-humility is also said to have a fairly high correlation with the attitude that tends to sensation seeking. Sensation-seeking attitude is measured by a scale that describes the attitude is not afraid like something unconventional, creative, honesty and prudence. Individuals who have a low fear tends not to be careful in acting course this can lead to accidents. Individuals who like something unconventional keen to carry out work outside the established procedure. Surely this also can stimulate the occurrence of accidents (Bird *et al.*, 2007). Lee *et al.* (2015) stated that the dimensions of honesty-humility has relationship with human performance tools. Aspects of human performance tools associated with honesty-humility is self-examination. This self-examination is an important aspect in safety behavior to ensure optimal condition of himself to do the job so it can minimize the risk of accidents (Bird *et al.*, 2007).

Individual with low emotionality values tend to have no fear of physical danger. Individuals who are not afraid of physical danger feel physical danger does not restrict movement. This makes individuals who are not afraid of physical danger tend to be wary. Unawareness deliver the individual to the accident. One aspect of emotionality is fears. This aspect is also mentioned that individuals with low of fearness has also low emotionality score and he tends not to be sensitive to physical pain and accidents (Widyanti *et al.*, 2013a, b). In line with this the fearness is also related to the attitude of sensation seekers (De Vries *et al.*, 2009). Sensation seekers have an interest to do work in different ways with others and often

it is at risk of an accident. Emotionality related to human performance tools in aspects of questioning every action and stop when you're not sure (Lee *et al.*, 2015). Individuals with high emotionality score tends to question the actions to be carried out in accordance with which he does right, whether existing regulatory or personal subjectivity. Individuals with high emotionality score tend not to act when he's not sure of their actions. This shows that individuals with high emotionality score tend to be reckless and cautious in acting so as to minimize the risk of accidents. In research among HEXACO dimension to the risk, emotionality dimension shows the strongest and most consistent correlation with risk. Individuals with high emotionality score tend to behave defiantly worth the risk compared with individuals with lower emotionality score. In terms of health and safety, the relationship between risk taking by emotionality dimension mediated by perception of risk (Weller and Tikir, 2011).

Extraversion associated with attitudes toward self, confidence in leadership, social interaction and energy and feeling. By definition, these attitudes are not associated with workplace accidents. Several other studies did not find a significant association between extraversion with accidents. Research by Clarke and Robertson (2005) only found a correlation of extraversion with traffic accidents but not on occupational accidents. The study, using the big 5 personality model of this theory found a significant link between all the dimensions of personality with the accident except for the dimensions of extraversion. Extraversion in the model of the big 5 theory has an association with the same dimensions on HEXACO. The same results were mentioned by Lajunen (2001) which states that extraversion is not related to occupational accidents but with traffic accidents. The results of these studies indicate that there is a positive relationship between the number of traffic accidents with a score of extraversion. Countries with high extraversion scoree has the greater number of traffic accidents. In research relating to risk, extraversion also did not show a significant correlation (Weller and Tikir, 2011).

Agreeableness dimensions did not correlate significantly to occupational accidents. Agreeableness relates to forgiveness, judgment of others, cooperation with others and control anger. Definitely properties included in agreeableness have no correlation with the accident. The same is shown by research linking personality with human performance tool (Lee *et al.*, 2015). Human performance tool is a set of procedures to prevent, anticipate and reduce errors in the work (Wachter and Yorio, 2013). Many studies suggest that

90% of accidents related to human error (Hughes and Ferret, 2009). The implication, agreeableness unrelated to human performance tool is not related to human error caused the accident. In a related study of risk, agreeableness also did not show a significant correlation (Weller and Tikir, 2011).

There are differences between previous studies using model of the big 5 personality theory and recent research using personality models HEXACO. Some studies with a model of the big 5 personality theory found a correlation between accidents and risks with agreeableness dimension. As in the study (Weller and Tikir, 2011) which states that individuals with low agreeableness score are predictors of an accident while in the study. De Vries *et al.* (2009) states that all HEXACO personality dimension correlated with sensation-seekers and risk-taking except agreeableness dimension. This difference was due to some aspects of agreeableness in big 5 theory enter into aspects of honesty-humility in HEXACO. Dimensions agreeableness and emotionality in HEXACO is a factor that represents the alternate rotation of dimensions Neuroticism and agreeableness in big 5 theory and dimensions honesty-humility in HEXACO has an association not only with dimensions agreeableness in big 5 theory (Ashton *et al.*, 2014).

This study has limitation in the context of number of participant. However, 56 participants in this study is considered adequate. The discriminant analysis suggested there were 20 samples for each independent variable with a minimal amount of sample is 5 per independent variable. The number of samples also depends on the number of categories that a minimum of 20 per category (Hair *et al.*, 2014).

In this study, based on the number of independent variables which are six variables, it takes a minimum of 30 samples and while based on the number of categories with two categories of samples required number of 40.

This study gives significant contribution on the behavior based safety in particular relates to personality approach in reducing accident rate in industry as previous study reveals the success of behavior approach in many fields in Indonesia (Widyanti *et al.*, 2014).

## CONCLUSION

This present study observe relation between personality-one aspect of behaviour based safety approach and accident rate in industry. The results of discriminant analysis states that the personality dimensions Honesty-humility (H), Emotionality (E) and Openness to Experience (O), negatively affect the occupational accident, the personality dimension

Conscientiousness (C), positively effect on occupational accidents while the personality dimensions of extraversion (X) and Agreeableness (A) has no significant effect on occupational accidents.

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