A Causal Model of Safety Working Behavior in the Rubber Wood Industry

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Abstract

This survey research aimed to develop causal models of work safety behavior in the Rubber Wood Industry. The sample groups of this research were 440 manufacturing workers from 89 factories. The research instrument consisted of questionnaires with the rating scale and analysis of the data using descriptive statistic include frequency, percentage, mean, standard deviation, variables distribution and correlation, the relationship between factors and measurement Model, Confirmatory Factor Analysis: CFA and Structural Equation Model using AMOS v.21 program.

The study found that the developed causal models' compliance with empirical data at the acceptance criteria of Goodness of Fit Index with the index value of χ^2/df equal to 1.189, CFI equal to 0.996, GFI equal to 0. 965, AGFI equal to 0.935, RMSEA equal to 0.022. In addition, the results found that (1) safety climate has direct influence on safety knowledge. (2) safety knowledge has direct influence on safety behavior (3) safety climate has direct influence on safety motivation (4) safety motivation has a direct influence on safety behavior. (5) safety climate has direct influence on safety attitude (6) safety attitudes have a direct influence on safety behavior (7) personality has direct influence on safety behavior (8) personality has direct influence on safety attitudes (9) safety knowledge has direct influence on safety motivation. (10) safety motivation has a direct influence on safety attitudes. The suggestions from the research are to study work safety behavior of the other sample groups or in other industrial areas with the same variables. The government and organizations may use the findings as a guideline for safety protection and help in resolving problems concerned with safe working behavior.

Introduction

The promotion and development of national industrial sectors is the driving force of Thailand's economy. Health promotion is also a main priority supported by Thailand's government. One of the most important qualities of labor quality development is the promotion of work safety. Every year around the world, labors are injured, lost of lives and property incur from work. Each year, there are more than 317 million labor injuries from work while 160 million labors had work

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related illness. There were 2.34 million labors around the world that have lost their life from work. There were 3.21 hundred thousand workers injured from work accidents every 15 seconds and there were 151 workers injured from work accidents (International Labour Organizatio, 2013). Thailand's statistics for work accidents or illnesses of the insurers during 2004-2013 found that there was a slight decrease of 15.12 percent. Meanwhile, 3,036 workers experienced dismemberment which increased in proportion of 26.94 percent. There were 28 workers with total permanent disability which also increased from the previous year to 32.14 percent (Workmen's Compensation Foundation, 2014).

Accidents that occur in the workplace cause damage on raw material, organizations and the government agencies need to pay large amounts of compensation but also worker's family suffer because if the worker is permanently disable they are not able to work and become a burden to the family to take care (National Institute of Development Administration, Research Center, 2010; Osuansri, 2011)

Thailand's industry has continued to grow especially the rubber wood export industry due to demand from foreign countries (Pornchaisuree, 2012). Southern Thailand is the region with the most rubber wood processing industry. There are 593 legally registered rubber wood processing plants with 64.50 percent located in the South of Thailand (Department of Industrial works, 2013). In 2013, Agricultural Statistics showed that Southern Andaman provinces have a high potential in rubber productions which is close to the average of the whole country (National Statistical Office Thailand, 2014). The rubber wood industry requires the labor force to work with large and small machinery. (Department of Health, 2010) which means the labors have a high risk of injury during their work. Fritz & Sonnentag (2009) mentioned that in taking proactive safety precautions will increase organizations' effectiveness.

Rubber wood processing manufacturing workers are related to all production process which the product's quality depends on them. If the organization can create a safety system in the workplace, the employee will feel more secure and produce quality and effective work to reach the goal. (Manion, 2003). The use of human labor with large machines and sharp equipment may increase the risk of accident from work. Although the Thai government has introduced measures on this matter that relates to laws to prevent risk and injury from work; still

the injury rate tends to increase. Moreover, the study on factors affecting work safety has not been studied in the rubber wood processing industry.

Therefore, this research is conducted to develop the causal models for work safety behavior in the rubber wood industry to be the guidelines for the organizations to manage effective work safety, reduce injury and loss in the organizations and develop productive organizations with high work safety systems for the employees.

Objectives

To develop safety behavior, safety climate, safety knowledge, safety motivation, safety attitude and personality for causal models of work safety behavior in the rubber wood industry.

Conceptual Framework

From the literature review of the mentioned variables, the researchers used as the guidelines for integrate and develop the model related to influence variables on safety behavior include 5 latent variables are (1) Safety Climate which divided into 4 observable variables include Management Values Security Communications Safety Training Safety Laws (2) Conscientiousness divided into 6 observable variable include Competence Order Dutifulness Achievement Striving Self-Discipline Deliberation (3) Safety Knowledge divided into 4 observed variables include Equipment Knowledge Working Environment Knowledge Working area Knowledge Safety Mechanism (4) Safety Motivation divided into 2 observable variables include Intrinsic Regulation External Regulation (5) Safety Attitudes divided into 4 observable variables include Hardware Software Live ware Risks Behavior. It summarized into research conceptual framework as the following Figure 1.

Research Methodology

1. Population and Sample

Population used in this research were manufacturing workers in Southern Andaman rubber wood industry (Ranong, Phang-nga, Phuket, Krabi and Trang) which was authorized in 2014. The sample size used to analyze the causal models was at least 20 samples per 1 variable (Hair, Black, Babin & Anderson, 2010). There were 22 variables used in this research with the sample group of 440 manufacturing workers. The random sampling used were multi-stage sampling.
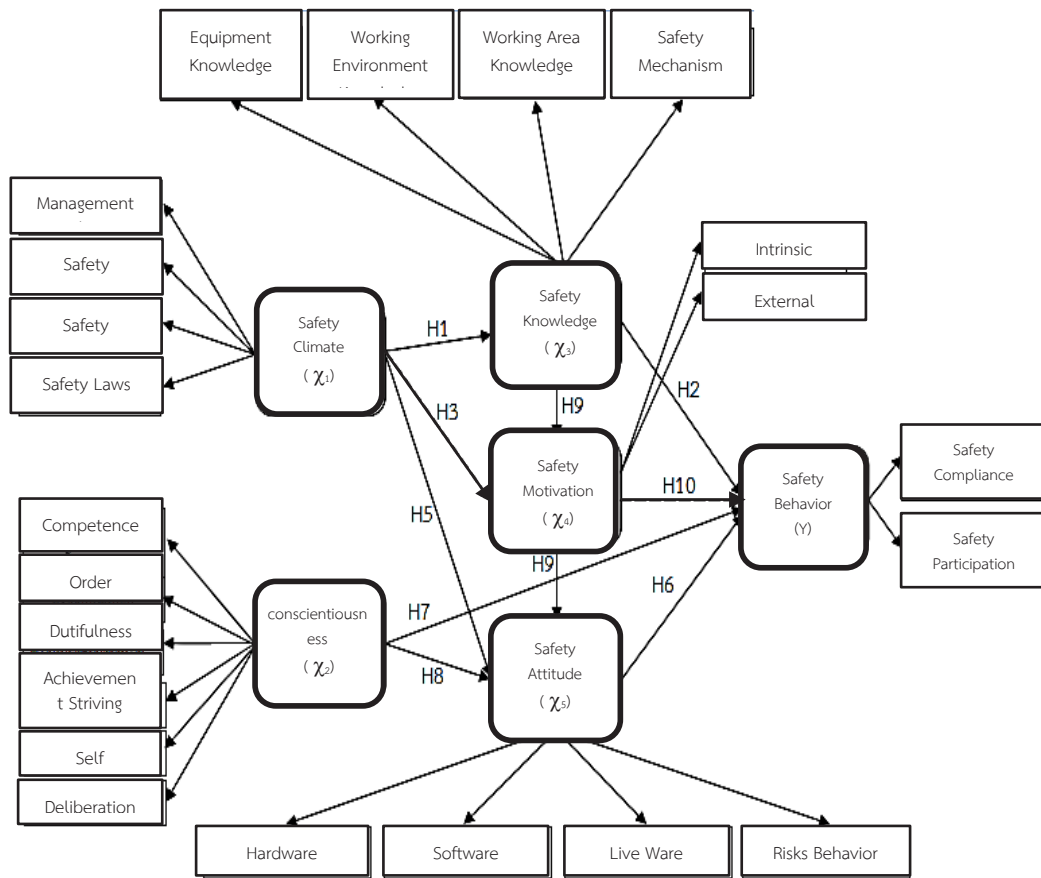
Figure 1 Conceptual Framework

2. Research instruments

The research instrument used for this research was a 5 level rating scale questionnaires consisting of very high, high, moderate, low and very low. The questionnaire was developed by relevant literature reviews and then examined through the content validity and analyzed with the Index of Congruence (IOC) by 5 professional experts. The Index of Congruence were 0.20-1.00. The researchers revised the contents of the questionnaire according to professional expert's advice and distributed to 30 non-sample group manufacturing workers in order to analyze the reliability of the questionnaire by liker rating scales which the α Coefficient equal 0.84 indicating excellent reliability (Kline, 2011). Therefore, the questionnaire was qualified to use.

3. Data Collection

The researchers coordination with human resource department to collect the data from manufacturing workers from 89 rubber wood industries. There were 440 questionnaires with 8 weeks for data collection with 100 percent of questionnaire returned.

4. Data Analysis

Data analysis used for this research were frequency, percentage, mean and standard deviation. The variables distribution, analyze the relationship between factors, measurement model, Confirmatory Factor Analysis: CFA and Structural Equation Model were also used to analyze the data.

Results

1. The samples used in this study were mostly male aged between 30 – 39 and held a High Vocational certificate. They were mostly married and lived together. Their work experiences are lower than 5 years in production supervisor. The sample group were mostly from Trang province.

2. The Confirmatory Factor Analysis (CFA) analysis found that the models are consistent with empirical data that the Goodness-of-fit-index (GFI) were at the acceptance criteria of $\chi^2/df = 1.189$, CFI = 0.996, GFI = 0.965, AGFI = 0.935, RMSEA = 0.022 which the

value of the index were at the good fit of the criteria as shown in Table 1.

Table 1 The Goodness-of-fit-index (GFI) analysis of Casual Model

Goodness-of-fit-index (GFI)	Criteria	Index value	Result
χ^2/df	<2.00	1.189	pass
CFI	≥0.95	0.996	pass
GFI	≥0.95	0.965	pass
AGFI	≥0.90	0.935	pass
RMSEA	<0.05	0.022	pass

3. The researchers analyzed the result by using 2 statistic testing which are Kaiser-Mayer-Olkin Measure of Sampling Adequacy (KMO) and Bartlett's test of sphericity to specify observable variables in identity Matrix (Ungsuchot, Vijitwanna & Pinyophanuwat, 2011. Therefore, if the KMO value is greater than 0.5 and P-Value of Bartlett's test of sphericity is less than 0.05 representing that the data of the variables are related and appropriate to be used in structural equation analysis.

4. The result of the causal relationship test found that safety climate has a direct positive influence on safety knowledge (ß = 0.56, p<.01). Safety climate has a direct positive influence on safety motivation (ß = 0.06, p<.01). Safety climate has no direct influence on safety behavior (ß =-03, p<.16) conscientiousness has direct positive influence on safety behavior (ß = 0.53, p<.01) conscientiousness has direct positive influence on safety attitude (ß = 0.29, p<.01) safety knowledge has a direct negative influence on safety behavior (ß = -0.21, p<.04) safety knowledge has a direct positive influence on safety motivation (ß = 0.82, p<.01) safety motivation have no direct influence on safety behavior (ß = -0.82, p<.1) safety motivation has direct positive influence on safety attitude (ß = 0.54, p<.01) safety attitude has direct positive influence on safety behavior. (ß = 0.34, p<.01) shown in Figure 1
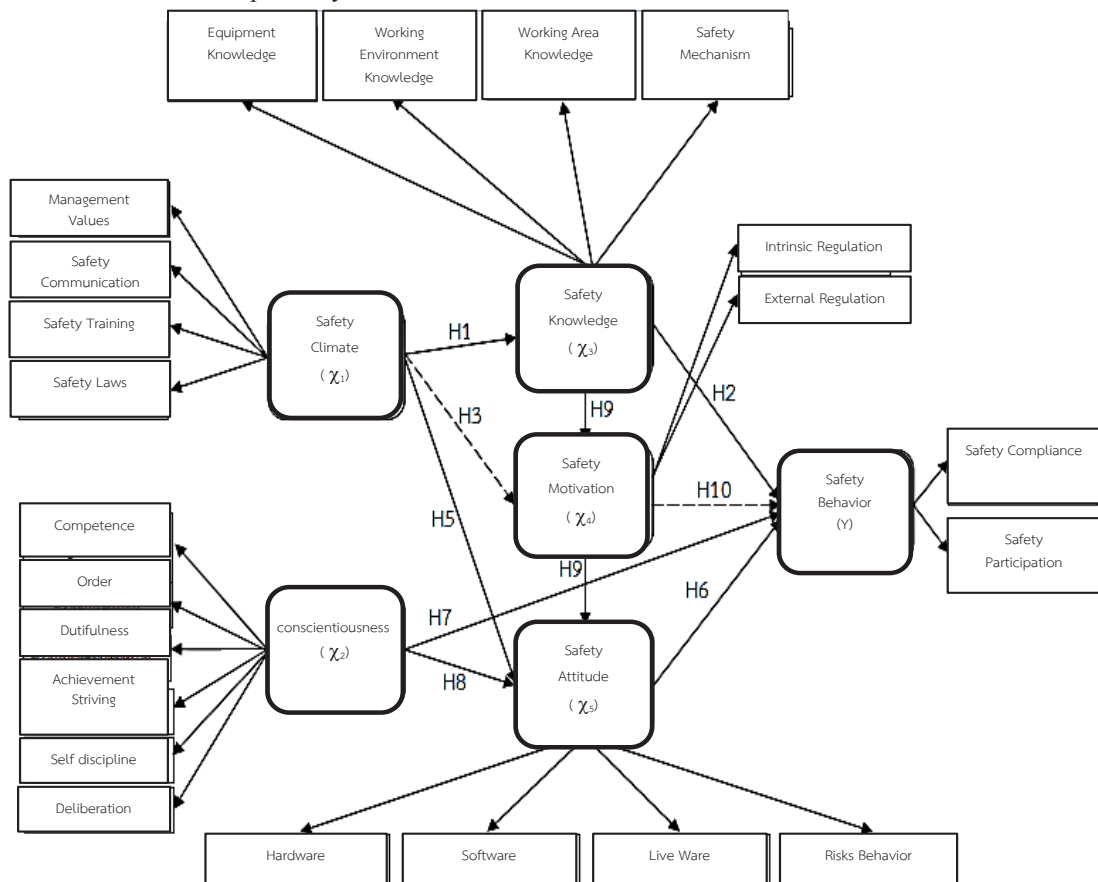
Figure 2 The Goodness-of-fit-index (GFI) analysis result of Casual Model of work safety behavior in rubber wood processing industry.

Remark: * = P < 0.05
The relationship between variables is significantly correlated. ⟶
The relationship between the variables was not significantly correlated ----▸

Discussion

The result found that the conscientious personality have an influence on safety behavior. In addition, the hypothesis testing results found that variables which influence safety behavior were safety climate has positive direct influence on safety knowledge. It is consistent with Hedlund, Ateg, Andersson & Rosen (2010) who indicated that the safety climate focuses the workers on their work safety such as the manager with clear safety standpoint and educate the workers about work safety. It is also consistent with the study of Hughes (2008) stating that the safety climate has an influence on work safety and workers'th behavior. Therefore, if the manager values work safety, it will promote a work safety climate and work safety behavior.

Work safety behavior has a direct influence on safety motivation in the rubber wood industry consistent with the study of Neal & Griffin (2006) found that work safety climate has a direct influence on safety motivation. In addition, it is also consistent with Hedlund et al. (2010) who indicated that work safety climate is a psychological factor that drives positive motivation. The continuous training for the workers will benefit them in long-term which gives workers self-esteem and lead to work safety motivation. Therefore, work safety climate that is properly arranged will bring positive work safety motivation.

Personality has positive direct influence on work safety behavior in the rubber wood industry which is consistent with the study of Siu,Phillips & Leung (2004) found that personality of workers contributes significantly to work safety behavior. Therefore, it is also consistent with Nickell & Hinsz (2011) stating that personality has both direct and indirect influence on work safety behavior as well as work safety attitude. Therefore, the workers with proper personality will be determined for work safety attitude.

Work safety knowledge has a direct influence on work safety behavior in the rubber wood industry which is consistent with the study of Probst & Brubaker (2001) that found that in order to know that work is risky will have a negative influence on work safety behavior. The work safety knowledge has a direct influence on work safety motivation which is consistent with the study of Chockalingam & Sornakumar (2011) findings that work safety knowledge has an influence on work safety motivation. The more safety knowledge workers have, the more effective work safety motivation.

Work safety motivation has a direct influence on work safety attitude in the rubber wood industry which is consistent with the study of Deci & Ryan (2008) that intrinsic motives and extrinsic motives have an influence on personal mindset. Jeffries (2011) also explained that intrinsic motives and extrinsic motives supported by the organization such as work safety performance prizes, work pride will influence worker's positive safety attitude.

Work safety attitude has a positive direct influence on work safety behavior in the rubber wood industry consistent with the study of Henning, Stufft, Payne, Bergman, Mannan & Karen (2009) that found work safety attitude has different effects on behavior as well as the study of Phoo-ngernkham, (2009) who found the relevant result that attitude is the system of thought that reflects their behavior. Personal behavior or performances resulted from their attitude. If they have work safety attitude, they will have work safety behavior.

Therefore, safety behavior, safety climate, safety knowledge, safety motivation, safety attitude and personality have an influence on work safety behaviors of rubber's wood processing manufacturing worker's which Fritz & Sonnentag (2009) mentioned that in taking proactive measures in work safety will increase an organizations' effectiveness.

Suggestions

1. Government agencies should set up training plans to educate the safety, consult, follow up and advise industries on work safety in order to promote work safety behavior.

2. The organization should define the policy and safety goal along with systematic management on work safety plans as well as follow up the result continuously which will help to minimize accidents occurring at work.

3. There should be work safety behavior study of different sample groups or in different industry area with the same variables in order to develop the preventive plan and to resolve safety behavior issues at work.

Suggestions for the future research

The researchers have suggestions for the future research as follows:

3.1 There should be additional qualitative studies by using different tools such as group discussion, observation or in-depth interview and action study in order to have in-depth information to benefit in various areas that can be applied in designing safe workplaces

for the workers.

        3.2 There should be research on the effect or the correlation of intervening variables that might influence the safety behavior and give more details in the conceptual framework.

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