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Study on Disaster Prevention Plan for an Electronic Industry in Thailand

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***Abstract*—**In this article, a study of employee's opinion to the factors that affect to the flood preventive and the corrective action plan in an electronic industry at the Sharp Manufacturing (Thailand) Co., Ltd. has been investigated. The surveys data of 175 workers and supervisors have, however, been selected for data analysis. The results is shown that the employees emphasize about the needs in a subsidy at the time of disaster at high levels of 77.8%, as the plan focusing on flood prevention of the rehabilitation equipment is valued at the intermediate level, which is 79.8%. Demonstration of the hypothesis has found that the different education levels has thus been affected to the needs factor at the flood disaster time. Moreover, most respondents give priority to flood disaster risk management factor. Consequently, we found that the flood prevention plan is valued at high level, especially on information monitoring, which is 93.4% for the supervisor item. The respondents largely assume that the flood will have impacts on the industry, up to 80%, thus to focus on flood management plans is enormous.

***Keywords*—**Flood prevention plan, flood event, electronic industrial plant, disaster, risk management.

I. Introduction

ELECTRONIC industry is vital to the economic system, and is expanding rapidly and continuously. It also plays an important role in the certification of workers in the industrial sector, because there are a lot of employment, and potential in conjunction with the manufacturing factors. In late 2011, Thailand was experienced massive flood in many years, result in the industry sector to be severely affected as well [1]. Therefore, the disaster in electronic industrial plant is, especially, important to have planning and resolve of such problem that is important to the country economy.

By this article, the researcher requires studying the flood preventive and corrective action plan, in order to convey the information received to use as guide for developing the flood preventive and corrective action plan of an electronic industrial plant in Thailand to be more effective. Moreover, it will be able to prevent the electronic industrial plant from losses, or minimize losses.

II. Related Theory

The Disaster Risk Management (DRM) is a strategic approach to deal with disasters of all types. The promotion of disaster risk management is often a keyword, commonly used in field operations and technical. The scope of operation covers mitigation, impact reduction or prevention, preparedness to cope with relief and reconstruction, etc. [2]. The impact of flood in the industry can thus be divided into four main areas: employee, production, machine, and economy [3] - [5].

The only way to remedy the flood that the company can do for the employees is to announce that there will be no layoffs, which no layoffs is the means that the company can also rehabilitate quickly, because the employees are an important production factor. Using the Maslow's hierarchy of needs [6] - [7], it is believed that most of the human behaviors can be explained by the tendency of people searching for the goal that will make every human life get the desired things that are meaningful to themselves. The Need-Hierarchy Conception of Human Motivation, sequencing the basic human needs to the next step is shown in Fig. 1.

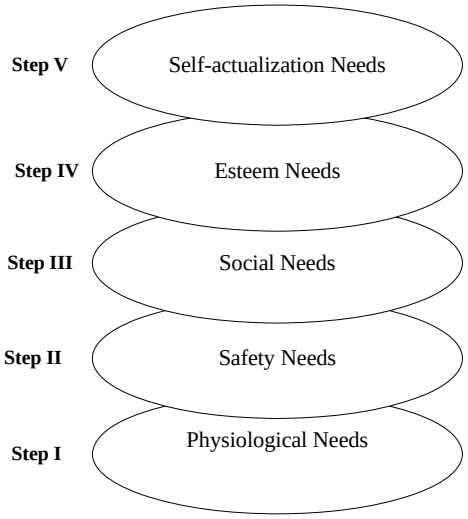

Fig. 1 Human Hierarchy of needs

The statistics that used in this research are the survey of employees to the factors. It's caused to the flood prevention plan effectively. It can thus be detailed as followed below:

- Samples Specification

It's caused to there are so many populations, therefore it is unable to collect them all, then sample size is used with the equation of *Krejcie* & *Morgan* [8], as shown in the equation below:

$$n = \frac{x^2 Np(1-p)}{e^2(N-1) + x^2 p(1-p)} \quad (1)$$

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where n = sample size
N = population size
e = level of acceptable sampling error
x^2 = Chi-square at degree of freedom equal to 1, and the confidence level 95% ($x^2 = 3.841$).
p = proportion of the population of interest ($p = 0.5$ in general case)

- Statistical Demonstration

When the questionnaires, using as tool for data collection is completed, it might be submitted to expert(s) for determination prior to trial by checking for the Item Objective Congruence index (*IOC*), using the equation of "*Rovinelli* and *Hambleton*" [9].

$$IOC = \sum \frac{R}{N} \tag{2}$$

where IOC = index value between questions and purposes
ΣR = sum of scores from experts
N = number of experts

In addition, the demonstration of the non-population samples to find the reliability of the questionnaire, using a numerical coefficient alpha [10], can be expressed by:

$$\alpha = \frac{k}{k-1}\left[1 - \frac{\sum s_i^2}{s_t^2}\right] \tag{3}$$

where α = the confidence
k = number of items
s_i^2 = variance of the scores of each question.
s_t^2 = variance of the whole set of questions

- Data analysis

Materials received from the questionnaires are an important raw data. The data have thus been analyzed by using the quantitative statistical techniques such as percentage, average, or standard deviation [11], hypothesis testing Chi-square distribution, average population of a single demonstration, one-way analysis of variance, [12]. An example of the calculation equation used to analyze the surveys data can, however, be expressed by:

- *Equation to find the Chi-square*, which is a metaphor for the relationship testing between independent variables and the dependent variables, is shown in (4)

$$x^2 = \sum_{i=1}^{r}\sum_{i=1}^{c} \frac{(O_{ij} - E_{ij})^2}{E_{ij}} \tag{4}$$

where O_{ij} = frequency from observation (authentic data), in row i, and column j
E_{ij} = expected frequency. (hypothesis data), in row i and column j
r_i = total frequency (authentic data), in row i
c_i = total frequency (authentic data), in column j

- *Equation for One-way ANOVA (F-test)* is a demonstration method of the difference between the means of the independent variables with 2 sub-values and over, by analyzing with the dependent variables having the variable measurement level as interval scale

$$F = \frac{Ms_B}{Ms_W} \tag{5}$$

Ms_B is corresponds to the total average power of 2 between groups, and Ms_W is the total average power within the groups respectively.

III. Research Operational Methods

Tools used to gather data is questionnaires that are divided into two sets, workers and supervisors respectively. The first set is for workers which are divided into three important parts as shown its structure in Fig. 2 (a).

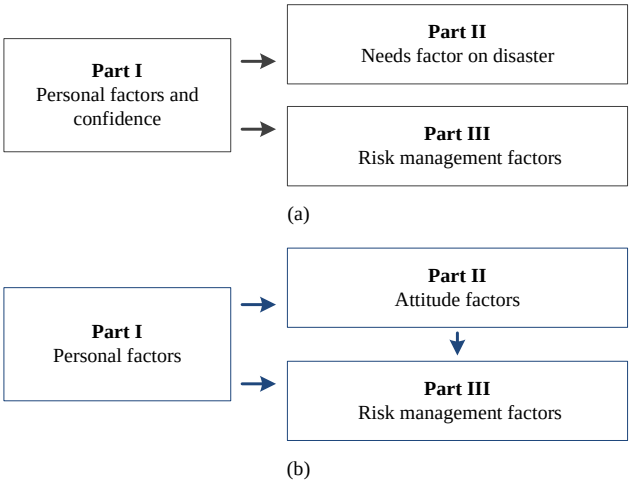

Fig. 2 Concept of questionnaire (a) component of workers (b) components of the supervisors

For the second set, the questionnaire is divided into 3 parts as shown in Fig. 2 (b). On the questions concerning needs factor on disaster and risk management factors, 5 levels of answers can be selected in each question. The time for survey is one month period, after that the data is calculated using the computer program (Statistics Package for the Social Science: SPSS), and the results are analyzed using the descriptive statistics, percentage, mean value and standard deviation respectively. The statistics used is divided into two parts as follows: Descriptive Statistics is the first part that used to describe personal factor and attitude factor of the supervisors. Inferential statistics is the former part that used to demonstrate the hypotheses as followed by: 1st hypothesis, personal data of workers affects the needs factor on disaster, 2nd hypothesis, personal factor affects disaster risk management factor, 3rd

hypothesis, personal factor of supervisors affects the attitude factor, 4th hypothesis, personal factor of supervisors affects risk management, 5th hypothesis, the attitude factor of supervisors affects disaster risk management respectively.

IV. Results and Discussion

Data collection of workers found that, 55.4% of respondents are female with the age between 26 to 35 years and 48 % get married with 54.3% graduated on bachelor's degree. Consequently 41.1% of the respondents have an average income of 15,001 to 20,000 Baht / Month, and also 38.3% of them are employment period between 5 to 10 years. In addition, 32.0% of respondents are in the intermediate confidence level.

However, most respondents give importance to provide the financial support, with the average of 3.89, followed by the announcement of no-layoffs, average of 3.62, the distribution of consumer products and the arrangement on shelter for victims, average of 3.53 and 3.50 respectively, These results are shown in Fig. 3.

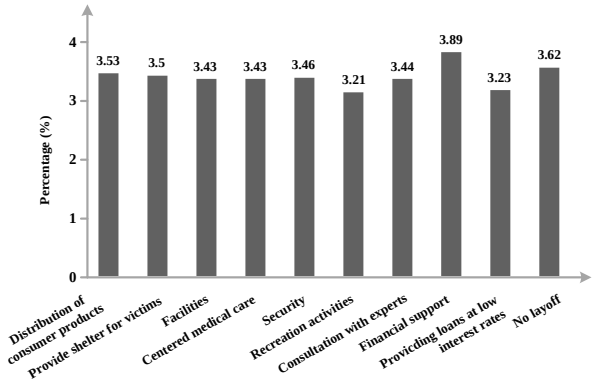

Fig. 3 Survey resulted of needs in items of disaster time

Majority of the respondents mostly value are represented in terms of the rehabilitation of areas affected, reviving manufacturing machinery and facilitating of workers with the average of 3.99 and 3.81 are reported respectively, Moreover, the preparedness of setting up is next represented of the immigration center and making up dyke, with a means of 3.65 and 3.63 respectively. The results are illustrated in Fig. 4.

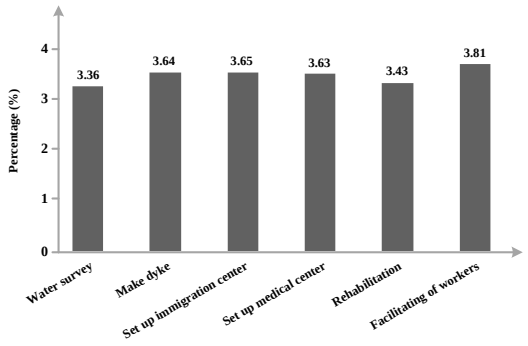

Fig. 4 Resulted of needs in items of disaster risk management

For the questionnaire of supervisors, the results are shown that most respondents are male, 86.7% with the aged between 36-50 years. Consequently, approximately 60.0% of the respondents have been married and 53.3% of the education level is bachelor degree. Moreover, 93.3% of the respondents have the monthly income of 30,001 to 40,000 Baht, and 53.3% of the employment period is 5 to 10 years etc. Comment on the flood that will have huge impact on the industry up to 80.0%. In addition, the flood prevention plans are an important factor for the industry with the percentage of 86.7%. Consequently, there are 60.0% have no idea whether the flood plan is practical and efficient.

In addition, most respondent values are concerned to the flood preventive and corrective action plan. Consequently, the supervisors give important to the information from news, and dredging canals, with the average of 4.67 and 4.47, respectively. On the opposite way, the workers are concerned about the subsidy and the regeneration plant, with an average of 4.53 and 4.47 respectively. On mitigating impacts in terms of improved drainage and water surveys, average of 4.47 and 4.27 respectively. These results are summarized in Fig. 5

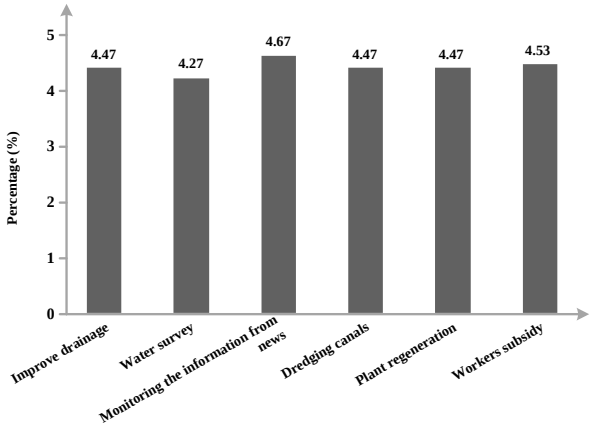

Fig. 5 Resulted of needs in items of disaster risk management (continued)

From the first hypothesis, we found that the effect of personal factors has been needed when disaster strikes, with a significance level of 0.05, especially in the different educational levels. This imply that the person with the high level of education might have more news channels that will be able to systematically plan the needs, compared to those with less education could perception be limited, thus no more plan to deal with disasters. Therefore, the need is to deal with the immediate problem. On the second hypothesis, we found that the personal factor affects to the disaster risk management, especially with regard to the flood prevention plans exercise, which respondents give most value. The data indicates that the company has to perform the flood prevention plans exercise, because when the real problem occurs, the workers will be able to operate and deal with the floods. For the third hypothesis, we also found that the personal factor does not affect to the factor of different attitudes. Consequently, the personal factor

does not affect to the disaster risk management in the fourth hypothesis. It's caused to the flood prevention plan has been made from viewing of the current situation and the location of industry. In fifth hypothesis, we found that thought on the important of flood prevention plan to the industry affects the disaster risk management. From all information, we might conclude that the flood prevention plan is an important factor to the industry. Moreover, those factors most needed to support on consumer goods. This implies that the factors in support on consumer goods are important due to it is fundamentally important to the livelihood of the employee's living.

V. Conclusions

By collecting questionnaires of the survey from 175 workers, we found that the individual employee has different needs on the factors of the disaster time, no matter on the physical of the body, safety, social, psychological, finance and work security. Moreover, they also need different risk management factor in all aspects as, in terms of mitigation, preparedness, coping with disaster and rehabilitation of the disaster areas, due to these factors are important to their way of living when disaster occur. Consequently, the employees then require the company to be in availability and acquire various support factors to build confidence and security to the employee according to different needs. For the supervisors part, we found that the attitude factor and risk management factor is no different, because supervisors are those with high responsibility, and has way of thinking that cover all aspects of plant prevention plan to secure the plant in all the events that will occur. In the supervisor's attitude toward risk management, we also found that individual supervisors values on each of different sequences, allowing a person to cope with. In conclusion, the focus on flood disaster prevention plan is extremely important, because such events are unable to be predicted on occurring at any moment. Therefore the plan has to be effective, and can be used on real events.

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