

Factors Affecting High Accident Rate of Labors in Manufacturing Sector, Central Province, Sri Lanka

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Abstract- An unfortunate incident which is unexpected and unintentional tropically resulting in damage or injury can simply define as an accident. Most of organizations are aiming at reducing the workplace accidents in order to create a healthy working setting which is very safe. In any organization, there can be various factors affected to the workplace accidents. This study focuses on exploring the factors affecting high accident rate amongst laborer category in manufacturing sector, Central Province, Sri Lanka. One of main objective is to find & reveal the relationship and impact between safety training, working condition, job stress and rate of workplace accidents among operational level employees at manufacturing sector in Central Province, Sri Lanka. The study was conducted in coverage of 136 sample which was made using simple random sampling technique out of 210 population of operational level employees in selected manufacturing firms. Rate of workplace accidents of operational level employees was identified as a dependent variable while the safety training, working condition and job stress were identified as interdependent variables. Analysis of collected quantitative data was done using SPSS Data Analyzing Package. As Findings of the study, Safety trainings and working conditions provided to employees would not correlated with the rate of accidents happened in the organization in a sufficient way while job stress had made a considerable correlation as well as an impact on the rate of accidents of employees. Finally, researchers have explored that job stress would be the most affective factor, out of selected factors, which lead to workplace accidents for this study and there may be several other factors which would lead to work place accidents.

Index Terms- Accident rates, Safety training, Working conditions, Job stress, Manufacturing Sector

I. INTRODUCTION

The success of an organization depends on the standard performance of its labor force. Undoubtedly the labor force must be healthy, strong and above all free of accidents. This ensures the smooth performance of the organization. An unfortunate incident which is unexpected and unintentional tropically resulting in damage or injury can simply defined as an accident. All the organizations are aiming at reducing the workplace accidents and to create a healthy work setting which is safe. There is a main cause which can be affected to the workplace accidents. That is an immediate cause or basic cause; the immediate cause is directly making the accident and it composed with unsafe acts such as inappropriate act or behavior of a worker and on the other side, unsafe conditions within an organization such as dangerous equipment, facilities machines and tools that are workers having risk when they are dealing with (González et al, 2016). The statistics of the worldwide labor organization shows that (2020) in its report of the day of worldwide occupational safety and health, “Approximately 4% of the worldwide Gross National Product (GNP) is lost due to the costs of losses, deaths and illnesses, resulting in work absences, treatments and payments due to disability or death” (González et al, 2016).

This study focuses on exploring the factors affecting high accident rate amongst laborer category in manufacturing organizations, Central Province, Sri Lanka. The main objective of this study is to find & reveal the relationship and impact between safety training, working condition, job stress and rate of workplace accidents among operational level employees at manufacturing organizations in Central Province, Sri Lanka. The research questions of this study as follows;

- I. What is the relationship between safety training and workplace accidents of operational level employees in manufacturing sector, Central Province, Sri Lanka?
- II. What is the relationship between job related stress and workplace accidents of operational level employees in manufacturing sector, Central Province, Sri Lanka?
- III. What is the relationship between working conditions and workplace accidents of operational level employees in manufacturing sector, Central Province, Sri Lanka?
- IV. What is the impact of safety training, job stress, working conditions on workplace accidents of operational level employees in manufacturing sector, Central Province, Sri Lanka?

Most of Sri Lankan manufacturing level organizations suffer from various losses due to workplace accidents. Continuous accidents of operational employees are a cost and a risk to the organization. The study findings will be presented to be expected manufacturing

sector to identify the major causes for the workplace accidents of operational level employees and they can be conversant with the best safety strategies to manage high workplace accident rates.

II. LITERATURE REVIEW

The Domino Theory

This theory was introduced by W.H. Heinrich in 1931. According to him, the accident is a result of a series of predisposed events, which subsequently lead to dangerous acts and processes and a dangerous work environment and ultimately creates any injury. He further illustrated that accidents can be a combination of unsafe acts and work environment. The “five-factor accidents equence” was proposed by him in order to show how each factor would activate the subsequently step to cause an accident. According to him, those five factors are Social Environment and Ancestry, Worker fault, unsafe act together with mechanical and physical hazard, Accident and Damage or injury.

Multiple Causation Theory

Multiple causation theory is a further development of the domino theory. As per this theory, several contributory factors can cause workplace accidents and, in most cases, a combination of certain contributory factors can result in an accident. This theory categorizes the major contributory factors into two major groups as; Behavioral factors and Environmental factors.

Safety Training

Workers safety participation, on the other hand is defined as behaviours “Frequently voluntary”(Griffin & Neal, 2000). In other words, According to Griffin & Neal (2000) those are actions that may not pay straight attention to occupational safety, but that helps to create an working environment which safety conditions are being measured (Mashi et al, 2016). Safety training can be identified as an important representative for the victory of an entire business (Zohar, 1980). As a very important risk prevention and control strategy can be named as safety training which is providing a guarantee of the safety of every employee in an organization (Cohen, 1998).

Job stress

Stress can be occurred when there is collaboration between individual and his/her environment that yields emotional strain which can affects to one person’s physical and mental condition (Bowin and Harvey, 2001). Stressors are the factors which creates uncomfortable state of mind within an individual. Stress is a phenomenon that can make individuals capability to continue important variables (psychological, societal, religious or organic) upset within some limits (Blumenthal, 2003). Stress is a fact that nature is intangible and cannot be touched and it is a complicated occurrence. When the job is not connected or matched with the worker’s skills, resources and needs, emotional breakdowns as well as physical injuries can be taken place and it can be defined as ‘work stress’ (Park, 2017). According to the International Labour Organization (2020), it was identified as a mental and physical challenge a person and even for an organization.

Rate of Workplace Accidents

According to the International Labour Organization (2020), a workplace injury is defined as any personal harm or hurt, disease or death which is occurred as a result of an accident in the workplace. Therefore, an occupational injury is different from an occupational disease. Because a disease constricted as a result of an exposure to various risk factors over a long time period which are arising from work activity (ILO, 2020). Recently, physical arrangement in the workplace is playing major role in order to establish the work performance to meet the required standards (Price, 2002). According to the information of the Worldwide Labour Organization (2020) in its report, “Approximately 4% of the worldwide Gross National Product (GNP) is lost due to the costs of losses, deaths and illnesses, resulting in work absences, treatments and payments due to disability or death” (González et al, 2016).

Safety training and Work Place Accidents

It is very important to secure employee’s right during an injuries and accidents. Occupational safety can be begin with well trained workforce (National Safety Council, 2019). Conventionally, occupational accident research has attentive on identifying personal or individual attributes. Many researchers have focused on personality traits or attitudes associated with individuals (Gyekye, 2005; Hansen, 1989; Shaw and Sichel, 1971; Sutherland and Cooper, 1991). As very important safety practice, many countries were enacting the occupational safety legislations in the late 90s. Overtime, the focus is directed to the organizational context gradually. In the middle of the 20th century, the efforts were expanded from individual worker to giving effective safety training to all workers within an organization. Then latter years of 20th century it has be more and more expanded to the organizational context rather than considering to one individual worker’s safety. (Hofmann, 2017).

Working Conditions and Work Place Accidents

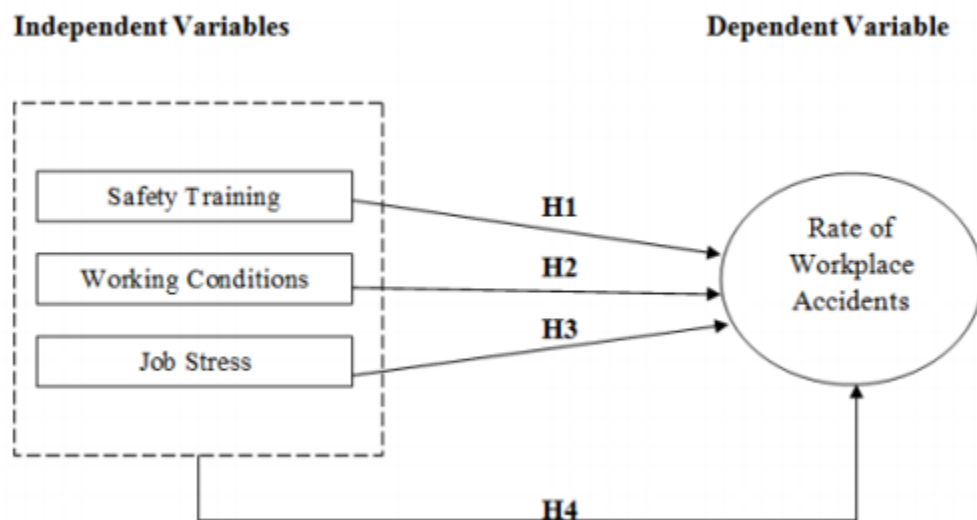
The variance in payment and working conditions provide for the employees have resulted in the continues movement of laborers from enterprises paying low and having poor working conditions to enterprises paying high and having higher working conditions

(Galhena, 2012). In Asia, Latin America and Africa their business owners of small scale businesses has intentional actions to improve the working conditions and ended up with high productivity. If an organization tries to improve working conditions, it will positively affects to the employees that they get the feeling of caring by the organization. It is frequently surprising how small improvements are appreciated far beyond the time and money invested. (Hamid et al, 2008). Work performance will be affected by many factors such as personality, the difficulty of the task, availability of resources and working conditions. in order to achieve high work performances, as managers organizational management should consider about employees' ability, motivation and the resources to meet the organizational goals (Liu et al, 2014).

Job stress and Work Place Accidents

When there is project going on, the particular manager should identify the diversity of workers functions and stress related to it and restrained the factors which lead to high stress levels (Keller, 2001). The phenomenon called job stress always involves in more complex interactions between the individual and the environment. When workers deal with machines, current and other high tech equipment there should be a high attention to those items. For that workers need to clear with their mental stability. Now a days, competition within the industrial environment has grown very fast. On the other hand, after some consideration, that time plays an important role (Beehr et al, 2010).

Conceptual Framework of the Study



Source: Authors Developed

III. METHODOLOGY

Study Design

Quantitative research design was used to conduct this study. This study examines the relationship between safety training, job stress, working conditions and rate of workplace accidents of operational level employees in manufacturing sector. According to Sekaran & bougie (2010), using the same natural environment which is workers normally function can be used to conducted studies in order to make the cause and effect relationships. Therefore, this is a co-relational field study. Because no any factors were controlled or manipulated in this study, non-contrived settings were used to conduct this study where events were naturally occurred with minimum researcher interference.

Data Collection Method

The targeted population for this study was 210 working operative level employees and according to the Morgan table, 136 operative level employees were selected as the sample through simple random sampling method. All operative level employees have almost

similar job descriptions and job specifications to perform their jobs. Therefore, the sample was homogeneous and directly could be used to examine the whole population of this study. The questionnaire is the main method for this research which is primary data obtained. The researchers distributed questionnaires to operative level employees who were working in manufacturing sector organizations and collected them by the researchers. Even the sample is 136, the researchers were able to collect only 130 questionnaires. The questionnaire was designed with 46 questions with three sections: first sections was to gather respondent demographic details whereas second section was to measure safety training, job stress and working conditions based on Likert Scale method.

Data Analysis Method

IBM® SPSS® Statistics 22 statistical software program has been used to data analysis procedure. After completing the data collection procedure, the data was entered into the software and generate the outcomes by using it. All variables in the conceptualization model and demographic variables of the sample were analyzed using Descriptive Statistical Method: frequency distributions which were presented using Pie charts for categorical variables, histograms for ordinal variables and frequency distribution tables for ratio variables (safety training, working conditions, job stress and rate of workplace accidents) which were interpreted using central tendency, data distribution and dispersion of data.

The compute of central tendency was calculated for each and every variable in the study conceptual model. These variables were measured by using interval scale which are 5 points and 7 points likert scale. Therefore the value was taken as the central tendency measure for this study analysis. And, the dispersion of data was analyzed by interpreting Standard Deviation and Variance.

The Correlation analysis was the method which used to measure the relationship between independent variable and dependent variable of this study. This was developed to calculate the degree and the path of the relationship between independent variables (safety training, working conditions and job stress) and dependent variable (rate of workplace accidents) of operative level employees in manufacturing sector. Reliability of the measurement scales was tested by using Cronbach's alpha (α). As suggested by Bryman and Bell (2011), values of $\alpha > 0.8$ are typically engaged as a rule of thumb for satisfactory inner reliability, although most of the researchers believe somewhat 95 lower figures.

IV. RESULTS AND DISCUSSION

The composition of the sample was analysed in respect to demographic Variables: Age, Gender, Marital Status, Working Experience and Working Hours of respondents. Exploratory Data analysis of this study was done by using SPSS software and it was focused to examine normality of the data, correlation analysis to find out the relationship between independent variables (Safety training, Working Conditions and Job Stress) and the dependent variable (Rate of Accidents) and multiple regression analysis to explore the impact of independent variables on the dependent variable of this study. Mean, median and mode values of safety training, working conditions, job stress and rate of accidents are closer to 3; meant central tendency was indicated in the data set which could be explained that data has been distributed symmetrically. When considering skewness of safety training, working conditions, job stress and rate of accidents, values were 0.098, 0.050, 0.080 and -0.027 respectively thereby it could be concluded that all values of skewness were closer to zero (0) which denoted a normal data distribution. Since kurtosis values of safety training, working conditions, job stress and rate of accidents were 1.010, -.691, .804 and -.552 which explained a heavy tailed data distribution for safety training and job stress while a flat tailed data distribution for working conditions and rate of accidents.

Correlation Analysis

The relationship between study variables was measured by correlation analysis in SPSS software and it was done in three times to explore the relationship between safety training and arte of accidents, working conditions and rate of accidents and job stress and rate of accidents accordingly.

Table 1 Correlation analysis

Independent Variable	Dependent Variable	Sig. (2 tailed)	Pearson Correlation	N
Safety Training	Accident Rate	0.002	-0.184	130
Working Conditions	Accident Rate	0.003	-0.254	130
Job stress	Accident Rate	0.000	0.694	130

** . Correlation is significant at the 0.01 level (2-tailed).

Multiple Regression Analysis

Table 2 Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.230 ^a	.53	.050	.22574

a. Predictors: (Constant), JS, WC, ST

According to the above table, R square is 0.53 which indicates 53% of the dependent variable: Rate of Accidents is explained by independent variables: Job Stress (JS), Working Conditions (WC) and Safety Training (ST). In contrast, 47% of the rate of accidents is not explained by Job Stress (JS), Working Conditions (WC) and Safety Training (ST) in this study and there may be some other factors which affect to the rate of accidents in agricultural sector in Sri Lanka.

Table 3 ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	3.347	3	1.116	21.892	.000 ^b
	Residual	59.976	130	.461		
	Total	63.323	130			

a. Dependent Variable: Accident Rate

b. Predictors: (Constant), JS, WC, ST

As per the above table, overall model fit of the study can be explained by considering the F value which is 21.892 along with the significant value of 0.000 which is less than 0.05 or significant at 5% confidence level.

Table 4 Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5.065	.088		57.641	.000
	ST	-.020	.030	-.024	-.662	.008
	WC	-.170	.026	-.238	-6.445	.000
	JS	.025	.022	.033	1.131	.001

a. Dependent Variable: Accident Rate

According to the coefficient table above, regression equation can be derived as follows where ST stands for Safety Training, WC stands for Working Conditions and JS stands for Jos Stress with the dependent variable of Rate of Accidents.

$$Y = a + bx$$

Rate of Accidents = 5.065 – 0.020 ST – 0.170 WC + 0.025 JS
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According to the equation built above, it can be explained the extent to which rate of accidents can be changed in respect to change of one unit of Safety Training, Working Conditions and Jos Stress. When one unit of Safety Training, Working Conditions and Jos Stress change, the rate of accidents will be decreased by 0.020 or 2%, 0.170 or 17% and will be increased by 0.025 or 2% respectively.

Summary of Accepted Hypothesizes

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Table 5 Summary of accepted hypothesizes

Alternative Hypothesis	Status
H1: Safety training has a relationship with the workplace accidents In Manufacturing sector, Central Province, Sri Lanka.	Accepted
H2: Working conditions have a relationship with the workplace accidents In Manufacturing sector, Central Province, Sri Lanka.	Accepted
H3: Job stress has a relationship with the workplace accidents In Manufacturing sector, Central Province, Sri Lanka.	Accepted
H4: Safety Training, Working conditions and Job stress have an impact on the workplace accidents In Manufacturing sector, Central Province, Sri Lanka.	Accepted

V. Recommendations based on research findings

According to the data analysis, findings of this study are supported with the literature. As per the findings of the study, following recommendations can be developed to reduce workplace accidents in Manufacturing sector, Central Province, Sri Lanka.

According to the table 1, it was proved that there was a slightly negative relationship (Pearson Correlation = -0.184 with Sig. value of 0.002) between Safety training and the workplace accidents in Manufacturing sector, Central Province, Sri Lanka. Based on the above discussion, it can be recommended that Manufacturing sector, Central Province, Sri Lanka needs to concentrate current safety training practices, procedures and policies whether they are efficiently and effectively being used within the organization. Unless, proper policies for safety related training programmes should be developed with the mutual agreement and collaboration of employees and managers. According to the table 1, Rate of accidents would be behaved according to the safety training provided by Manufacturing sector, Central Province, Sri Lanka in a negative manner to some extent thereby it can be concluded that safety training has no very strong correlation with rate of accidents of employees who are working in Manufacturing sector, Central Province, Sri Lanka. Current safety training programmes may not be directly linked to reduce workplace hazards since it has no impact on increasing or decreasing workplace injuries of employees, but, according to the literature mentioned at the beginning of the research, it was proved that safety training would do a considerable impact on reducing workplace hazards and injuries.

As per the table 1, it could be recorded that there was a negative relationship (Pearson Correlation = -0.254 with Sig. value of 0.003) between Working conditions and workplace accidents In Manufacturing sector, Central Province, Sri Lanka. Further, it indicated that rate of accidents could be varied due to working conditions moderately, in a negative way. When working conditions would be better or enhance, the rate of accidents would decrease moderately. Based on above discussion, recommendations can be built on enhancing workplace working conditions in order to make a considerable relationship and impact from working conditions to reduction of workplace accidents. According to demographic variables analysis, manufacturing sector, Central Province, Sri Lanka has majority of male employees who are working within the organization and they may not seek for better working conditions as female employees. That may be the reason to get a lowest correlation between working conditions and accident rate. However, Literature supports that working conditions make a considerable impact on workplace accident reduction and manufacturing sector, Central Province, Sri Lanka needs to pay attention on enhancing, enriching and strengthening workplace working conditions based on employee comfort ability and productivity.

As per the table 1, findings denoted that there was a positive relationship (Pearson Correlation = 0.694 with Sig. value of 0.000) between Job stress and the workplace accidents in Manufacturing sector, Central Province, Sri Lanka. Compared to other independent factors: Safety training and Working conditions, Job stress has correlated with the rate of accidents considerably. Therefore, it can be concluded that male employees are suffering from a huge working stress and that would lead to arise and increase accidents in the workplace. Manufacturing sector, Central Province, Sri Lanka needs to concentrate human side of the employees and reduce the workload and offering a bearable workload. According to the table 2, it could be proved that moderate impact ($R^2 = 0.53$) was done by Safety Training, Working conditions and Job stress on the workplace accidents In Manufacturing sector, Central Province, Sri Lanka.

It means, 53% of the rate of Accidents could be explained by Job Stress, Working Conditions and Safety Training while 47% of the rate of accidents was not explained by them in Manufacturing sector, Central Province, Sri Lanka.

VI. Conclusion

As per the study conducted within the manufacturing sector, Central Province, Sri Lanka mainly three accident causation factors were identified and evaluated the relationship between those factors and rate of accidents. Those factors can be recognized as Safety training, Working conditions and job stress. According to demographic variables analysis, the selected organizations in the manufacturing sector has majority of male employees who are working within the organizations and they may not seek for better working conditions as female employees. That may be the reason to get a lowest correlation between working conditions and accident rate. According to the table 1, it was proved that there was a slightly negative relationship (Pearson Correlation = -0.184 with Sig. value of 0.002) between Safety training and the workplace accidents. According to the same table, Rate of accidents would be behaved according to the safety training provided the organization in a negative manner to some extent thereby it can be concluded that safety training has no very strong correlation with rate of accidents of employees who are working in the Company. As per the table 1, it could be recorded that there was a negative relationship (Pearson Correlation = -0.254 with Sig. value of 0.003) between Working conditions and workplace accidents. Further, it indicated that rate of accidents could be varied due to working conditions moderately, in a negative way. When working conditions would be better or enhance, the rate of accidents would decrease moderately. As per the table 1, findings denoted that there was a positive relationship (Pearson Correlation = 0.694 with Sig. value of 0.000) between Job stress and the workplace accidents. Compared to other independent factors: Safety training and Working conditions, Job stress has correlated with the rate of accidents considerably. Therefore, it can be concluded that male employees are suffering from a huge working stress and that would lead to arise and increase accidents in the workplace. On the other hand, according to the table 10, it could be proved that moderate impact ($R^2 = 0.53$) was done by Safety Training, Working conditions and Job stress on the workplace accidents in the organization. It means, 53% of the rate of Accidents could be explained by Job Stress, Working Conditions and Safety Training while 47% of the rate of accidents was not explained by them. Safety trainings and working conditions provided to employees would not correlated with the rate of accidents happened in the organization in a sufficient way while job stress had made a considerable correlation as well as an impact on the rate of accidents of employees. Therefore, it can be concluded that job stress would be the most affective factor, out of selected factors, which lead to workplace accidents for this study and there may be several other factors which would lead to work place accidents.

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