

### 5.0 Conclusions and Recommendations

#### 5.1 Summary of Study

Employees' safety has become one of the major concerns with the rapid phase of development now taking place in the industry. In this context, the identification of the most significant accidents and diseases in terms of their severity and frequency helps to mitigate these accidents and ensure that a workplace is safer for carrying out industrial operations. However in industrial operations, the risks of injuries and diseases are unavoidable. Mitigating these accidents and diseases has become a challenge. The victims need to be compensated by satisfying the minimum conditions stated in the Workmen's Compensation Act. Workmen's Compensation Insurance (WCI) is one of the common methods that are available to cover workplace related injuries/accidents and diseases. This study was formulated to gather accurate secondary data from an insurer on accidents and diseases that occurred during a period of four years and which were covered under its WCI Scheme. The data has been used for the first time in a study like this. The basic information included was the date of injury/accident, type of injury/accident, and the respective compensation cost. A quantitative method was used for the data analysis.

#### 5.2 Key Findings

Both the frequency and the severity of accidents need to be considered in the decision making process. Accidental injury was found to be the most significant type of accident among the 25 accident types. The ratio severity/ frequency (cost per accident) could be used to benchmark workplaces, and monitor their progress over time. There was no evidence of any employee being compensated for suffering from an occupational disease. Statistical analysis shows the trends, severity and frequency of different types of accidents, and groups of accidents.

### 5.3 Conclusions

The following conclusions can be made based on the analysis of Workmen's Compensation Insurance (WCI) data that were extracted from the claims received by an insurance company made under the Workmen's Compensation Act, during a period of four years (from 2010 – 2013).

**5.3.1** Frequency and time have shown a “positive linear relationship” with each other whereas severity has shown a “negative linear relationship” with time during the same period (Figure 4.2 & Figure 4.3). Cost per accident (severity/ frequency) has a “negative linear relationship”(Figure 4.4) with time. This indicates that although the number of accidents have a positive trend, the cost of accidents have a negative trend. With the rapid industrialization of the country, this is an area that needs to be addressed early to keep up with the phase of development. In order to make the workplace safer this rate need to be reduced. Therefore this rate is one of the important parameters that could be used to monitor the level of safety in a workplace.

The ratio (cost/accident) also could be used to benchmark workplaces.



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**Other Findings**

**5.3.2** It is significant to note that severity (cost) of non-fatal accidents was 81% of the total cost whereas that of fatal accidents was only 19%. The frequency (number of accidents) of non-fatal accidents during the period was 98% and that of fatal accidents was only 2%. This shows that even though the frequency of accidents is low, their severity was significantly high. Therefore, both severity and frequency of accidents need to be considered in decision making.

**5.3.3** The accidents that were significant were those that recorded 67% (severity) of losses whereas their frequency for the same period was 95%. The second highest loss was paid for death while on duty which was 17% of the total losses. All other types of accidents represent only 16% (severity) of losses which is a relatively low figure.

**5.3.4** This study found no evidence of any employee suffering from an occupational diseases being compensated.

**5.3.5** As far as workplace accidents are concerned, the second major group of accidents came from the commuting group (this includes all accidents that occurred due to travelling and while travelling to and from work). This recorded 29% (severity) of losses whereas frequency for the same period was only 2%. This emphasises the importance of identifying accidents which do not directly arise from the core operations of a workplace but from workplace supportive operations which however are covered under the Workmen's Compensation Act.

**5.3.6** The commuting group (this includes all accidents due to travelling and occurring while travelling to and from work) recorded 44 % (severity) of losses due to deaths whereas its frequency for the same period was 24%. The severity and frequency of losses due to death, thus the risk of death, were high in the commuting group when compared with any of the other groups. This is an important area that relevant authorities have to make a note of.



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#### **5.4 Recommendations**

The following recommendations are made based on the conclusions:

**5.4.1** There should be a way of benchmarking the number of accidents occurring in a country (from a regional perspective in Asian countries first. Hence there should be accurate databases to compare the figures of different countries in a region. This is one of the areas that need to be addressed in order to promote, motivate, and achieve our goals, i.e., minimizing the number of accidents which should be possible to achieve through a strong legal framework. As far as regional perspectives are concerned, there should be a common understanding and a legal framework among the countries of the region to address these matters. This can be achieved by having a common legal framework through the ILO.

**5.4.2** The cost of accidents per annum can be taken as a measure to plan safety activities (accident prevention strategies). Therefore, the assessment of economic loss due to an accident is important to understand the gravity of the problem and to take adequate precautions. Practically, no organization will allocate funds for safety improvements above its breakeven point. Therefore, the assessment of economic loss will motivate them to make necessary steps as it will be easier for the top management/decision makers of the organizations concerned to understand figures. Accidents in a workplace can occur due to unsafe acts and unsafe machinery. One of the causes of unsafe acts is negligence. Wilful negligence could be controlled by taking disciplinary action against the persons concerned within a given legal framework whereas negligence can be minimized by getting them to follow awareness/training programmes.

**5.4.3** In certain industries, for example, in the paint industry, hazardous vapour/fumes exist and the prolong exposure of workmen to such a hazardous environment can cause many diseases in them. Fatal accidents and minor accidents are relatively low while diseases due to long exposure are high. This is however difficult to prove once an employee gets affected by a disease like cancer. Therefore, it is recommended that a screening test be done for possible diseases before people are recruited and to monitor their health thereafter by carrying out periodical tests while being in employment. The enforcement of legal provisions in this regard is important.

**5.4.4** The compensation cannot be paid for the first three days of a disablement. Therefore, it is very clear that some of the minor accidents and near misses have not been recorded in most of the instances. In accident prevention, near misses is one of the critical areas that need to be incorporated.

**5.4.5** The amount of compensation paid under the Workmen's Compensation Act needs to be reviewed as the minimum salary (monthly wages of the workmen) can exceed the maximum possible compensation in most instances. An increase in the

maximum amount of compensation payable is necessary to mitigate disparities and ensure respect to different categories of workmen.

**5.4.6** There is a list of occupational diseases mentioned in the Workmen's Compensation Act (covered by the WCI). Not a single employee was found during the study to have been compensated for an occupational disease listed in the Act. This fact needs to be addressed. Furthermore, it was revealed that there had been many patients suffering from occupational diseases but who were unable to prove that their diseases have been caused by working in hazardous environments. The relevant authorities should critically analyse this situation and incorporate necessary amendments to the Workmen's Compensation Act.

## **5.5 Other Recommendations**

**5.5.1** In the case of fatal accidents and permanent disablement, no legal action was possible (e.g. falls, electrocution) due to lack of necessary regulations in the country. In order to overcome this situation, regulations pertaining to a variety of industries such as the construction industry have to be introduced. This situation will be rectified considerably when electrical regulations and construction regulations come into force.

**5.5.2** Individual factors such as age, marital status, number of dependents etc., need to be considered appropriately in mitigating risks of accidents caused by unsafe acts and unsafe behaviour. For example, most of these factors can be considered at the time of recruitment of an employee, and they need to be provided with training on stress management / attitude and behaviour since positive attitudes will have a definite impact on reducing accidents. The accidents caused by other factors can be effectively addressed by making use of effective engineering controls and administrative strategies.

**5.5.3** The essential factors to be considered at national level in minimising accidents in workplaces will be the experts' involvement and training, and physical

infrastructure such as equipment and other facilities. Once these are in place, it would be much easier and practical to think of legal provisions.

**5.5.4** Workplace environments are constantly changing due to the rapid phase of development taking place in the country. New hazards are coming into workplaces due to this rapid industrialisation. Therefore, it is important to make necessary amendments to the current Act in order to make it more effective.

## **5.6 Limitations of Study**

### **5.6.1 Period**

This study was designed to gather from one insurance company, the accurate secondary data that was available with the company on accidents and diseases that occurred during a period of four years from January 2010 to September 2013.

### **5.6.2 Data Source Characteristics**

Those who were insured with the insurance company concerned under the Workmen's Compensation Insurance Scheme were considered in this study. According to Workmen's Compensation Ordinance, an occupational disease also has to be treated as an accident that has occurred in the course of the employment of a worker. The disease must be directly or reasonably attributable to the work in which the worker was engaged. Although "Travelling to and from work" is not expressly covered under the Act, the insurer has included it in his policy.

Only one insurance company was selected for this study. Conclusions were made after a statistical analysis of data available with that company by using information such as the date of injury/accident, type of injury/accident, and the frequency and severity of accidents/diseases. Insurance claim data that was available with the insurer in respect of its Workmen's Compensation Insurance (WCI) Scheme was used for this analysis.

This study was expected to gather accurate secondary data on accidents and diseases that had occurred during a period of four years. The basic information included were the date of injury/accident, type of injury/accident, and the respective compensation cost. It is for the first time that this data has been used in a study like this.

The accidents and diseases which did not come under the purview of the insurance company concerned were excluded as it was not feasible to gather information about them due to the non-availability of relevant records.

## **5.7 Further Research**

**5.7.1** A study could be carried out by using data of at least fifteen years so that the trends could be analysed comprehensively.

**5.7.2** The secondary data set which was used contained redundant data. This data has to be removed. The data set can consist only of details such as the cause of loss, amount claimed, amount allowed, location, type of industry, date of accident and a brief description of the accident.



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**5.7.3** The consequences that can arise from industrial accidents and which will have an effect on the employee's family and society have not been considered in this study. This can be one of the areas on which research can be focused in the future to make people think of and understand the gravity of the issue, and enhance the safety culture.

## List of References

- (2014, September 3). Retrieved from <http://www.ilo.org/public/English/region/asro/Bangkok/asiaosh/country/Thailand/progact/index.htm>.
- Ahamed M.S.S., Nafeel A.F.M., Rishath A.A.M., Dissanayake P.B.G. (2011). [www.civil.mrt.ac.lk](http://www.civil.mrt.ac.lk). Retrieved from: <http://www.civil.mrt.ac.lk/conference/ICSECM2011/sEC-11-76.pdf>
- Al-Hemound A.M., A.-A. M. (2006). A behaviour based safety approach at a kuwaitresearch institution. *Journal of Safety Research* , 201-206.
- Amarasinghe, N. (2009). Importance of reporting accidents and illness. *National safety conference 2009 on "Safe workpromotes healthy life"*. Colombo.
- Bomel Limited, Glasgow Calendonian University, Institute for Employment Research. (2006). *An analysis of the significant causes of fatal and majour injuries in construction in Scotland Factors influencing Scottish Construction Accidents- FSCA*. Suffolk: WSE Books. [www.wsebooks.com](http://www.wsebooks.com)
- Carpenter W.S., Lee B.C., Gunderson P.D., Stueland D.T.,. (2002). Assessment of personnel protective equipment use among midwestern farmers. *American journal of industrial medicine* , 236-247.
- Chan D.W.M., Choi T.N.Y. (2014). Establishing an intergrated model for measuring the site safety performance of construction projects. *Literature review and future research agenda, the 3rd world constracton Symposium*, (pp. 231-238). Colombo.
- Choudhry R.M., Fang D. (2008). Why operatives engage in unsafe workbehaviour. In F. D. Choudhry R.M., *Invstigating factors on construction site safety, Science* (pp. 566-584).



Commerce, O. O. (2004). *Achieving Excellence in Construction Procurement Guide 10*.

commerce, O. O. (2004). *Achieving excellence in construction procurement guide 10: Health and Safety*. London: Office of Government Commerce.

Corso P., Finkelstein E., Miller T., Fiebelkorn I., Zaloshnja E., (2006). *Incidence and life time costs of injuries in the United States*.

Courtney, D. (1996). *Health, Environment, Loss prevention and Safety manual*.

Cox S., James B., Walker D., Wenham D., Hunting C., (1998). *Tolley's office health and safety handbook*. Surrey (UK.): Tolley Publishing Company.

De Silva N., Nawarathna R.A.G. (2014). Reporting Procedure of construction accidents in Sri Lanka. *Sustainability and Development in Built Environment*, (pp. 461-470). Colombo.



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Electronic Theses & Dissertations

[www.lib.mrt.ac.lk](http://www.lib.mrt.ac.lk)

Fang D.P., Chen Y., Louisa W: (2006). Safety climate in construction industry: a case study in Hong Kong. *Construction Engineering and management* , 573-574.

Fellows R., Liu A. (2003). *Research methods for Construction*. UK: Blackwell Science Ltd.

Hamdad, M. (2003). *Valuing Households' unpaid work: comparison between 1992 and 1998*. Canada: Income and expenditure accounts division.

Haslam R.A., Hide S.A., Gibb A.G.F., Gyi D.E., Pavitt T., Atkinson S., Duff A.R. (2005). Applied ergonomics. In *Applied ergonomics* (pp. 401-415).

Hifsa M., N. A. (2009). Investigation of heavy metals in commercial spices brands. *N Y Sci J*.

Hinze, J. (1997). *Construction Safety*. New Jersey: Prentice -Hall.

Hyung Yi K., Hak Cho H., Kim J., (2011). *An Empherical analysis on labour Unions and occupational Safety and Health committeess activity and their relation to the changes in occupational injury and illness rate*. Korea: Occupational safety and health research institute, Korea occupational safety and health agency, Incheon department of nursing, Kyungwon University.

Idirimanna I.A.S.D., Jayawardena L.N.A.C. (2011). Factors affecting the Health and Safety behaviours factory workers. *11th Global conference on business and economics*.

M.K., M. (1981). *The physical environment*. London (UK.): Butterworths.

Manda N. Mohammed, Katerere J. (2004). *Chemicals, Our environment, our health, Africa Environment Outlook*.

Manu P., Anikrah N., Proverbs D., Suresh S., (2010). An Approach for determining the extent of contribution of construction project features to accident causation. In *Safety Science* (pp. 687-692).



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Electronic Theses & Dissertations  
www.lib.mrt.ac.lk

Masood R., Choudhry R.M. (2012). Investigation of demographic factors relationship with safety climate. *ASC Annual international conference proceedings*.

Mnjula N.H.C., De Silva N. (20 – 22 June 2014). Factors influencing safety behaviours of construction workers. *3rd World construction symposium 2014: Sustainability and development in built environment*, (pp. 256-264). Colombo.

Mohamed, S. (2003). Scorecard approach to benchmarking organizational safety culture in construction. *Construction Engineering and Management*, 80-88.

Olufunsho A., Temidayo D.P.,BAwo S.O., Akins A., Herbert A.B.C., Alade A. (2014). *Occupational Hazards and Safety Measures Amongst the paint factory workers in lagos*. Nigeria.

Organization, I. L. (n.d.). Recording and notification of occupational accidents and diseases. Geneva: International labour office.

Parker D., Brosseau L.,Samant Y., Pan W., Xi M., Haugan D.,. (2007). A comparison of the perception beliefs of workers and owners with regard to workplace safety in small metal fabrication business. *american journal of Industrial medicine* , 999-1009.

Pidgeon N., O' Leary M.,. (2000). Man made Disasters: why technology and organizations.

Piper, R. (1965). The hazards of painting and varnishing. Br J Lnd Med.

Quebec, I. (2009)  University of Moratuwa, Sri Lanka.  
Electronic Theses & Dissertations  
[www.lib.mrt.ac.lk](http://www.lib.mrt.ac.lk)

Rameezdeen R., Pathirage C., Weerasooriya S.,. (2003). Study of construction accidents in Sri Lanka. In Built environment Sri Lanka.

Rice D.P., Mackenzie E.I. (1989). Cost of injury in the united states. San Fransisco.

Rowlinson, S. (2003). Hong Kong Construction Safety management and the Law. Hong Kong: Sweet and Maxwell Asia.

Sawacha E., Naoum S. Fong D.,. (1999). Factors affecting safety performance of consstruction sites. International Journal of project management, 309-315.

Sawacha E., Naoum S., Fong D.,. (1999). Factors affecting ssafety performance on construction. Internationaljournal of project management, 309-315.

Seixas N.S., Blecker H., Camp J., Neitzel R., (2008). Occupational health and safety experience labourers in seattle. *American journal of industrialmedicine*, 399-406.

Shad AK., Lajbar K., Iqbal H., Khan BM., Naveed A., (2008). Profile of heavy metals in selected medical plants.

Siu O.L.,Phipps D.R., Leung T.W. (2004). *Safety Climate and Safety performance among construction workers in Hong Kong*.

Suraji A., Duff,A.R., Peckitt S.J. (2001). Development of a casual model of construction accident causation. *Construction Engineering and management* , 337-344.

Tan, W. (2002). *Practical research method*. Singapore.

Workmen's Compensation Ordinance (1934)



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