

## **Analyzing Explicit and Implicit accidents workplace costs**

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### **Abstract:**

Accidents are one of most important phenomena in the production industries and treat the health of the factory workers. Work accidents are a burden for many parties in many ways. Accidents and incidents lead to costs for companies, individual workers and society. The economic effects of accidents and injuries are not only as financial expenditures, damages or loss of resources, but also there are adverse effects (such as grief ,Loss of major body organs ,...) that are difficult to express in terms of money. Work-related accidents are a major safety and health topic. Every year, workers are faced to accidents in their workplace. This is a huge cost for businesses and a huge cost in terms of human suffering for the victims and their families. Workplace accidents can mean pain and disability and can affect the worker's life, both in and out of work. According to the contents, it is very important to review and evaluate accidents and their costs. Some researchers have divided costs into, direct and indirect categories. In this study, costs have classified and described as: Explicit and Implicit costs, next has introduced regression model , analyzed and calculated workshop accident.

**Key words:** Occupational Health, Indirect cost, Explicit cost, Implicit cost, Safety Investment

### **Introduction:**

Accident is an unfortunate incident that happens unexpectedly and unintentionally, typically resulting in damage or injury[1]. Accidents cause huge financial costs in industries [2]. The most important part of these costs is the human cost, and deaths caused by occupational accidents result in the loss of life and years of work [3]. Ignoring Health and Safety can be expensive. Resulting effects such as occupational accidents cost money for the companies in which they happen, they lead to financial losses for the employees to whom they happen and they cost society money in e.g. health care and loss of working capacity [4].

Every year, numerous accidents occur in any work environment and society, and these work events will have a negative impact on the body of the economy and productivity. Identifying and controlling risk factors in the occurrence of accidents can significantly prevent and reduce accidents, by creating a safe working environment, reduce the cost of the event and increase profitability and optimal production. In order to establish the relationship between costs and benefits, it is necessary to constantly and systematically examine the costs of accidents [5].

Work-related accidents and their associated costs have been a serious concern for management, especially as statistics show that there is no clear relationship between the frequency of injuries and the costs of accidents. Besides the personal and economic loss for workers, employers and the government, the trend under-scores the difficulty to predict the full extent of the costs associated with occupational injuries. While workers' compensation provides coverage for the cost of most injuries, it does not account for administrative and operational losses associated with workplace incidences [6].

Fullarton (et.al) indicated that work place injury remains a significant job related concern. While worker injury has been increasingly addressed through safety training and survey, worker injury continues to present major expenses both emotionally and financially[7].

Leigh estimated that the cost of work injuries and diseases in the United States is about US \$250 billion [8]. Therefore, estimating the cost of events is very important. In this regard, cost consider as explicit and implicit .Explicit means that people usually see the appearance of accidents such as injury, treatment ,hospital ;in other words they can identify these accidents costs without to have a lot of experience in accounting analysis . But in Implicit: specialist (Management Accounting-H.S.E officer) pay attention and evaluating the severity, influence on product, the amount of stress on the environment , family and ...



Figure 1: Visual description of Explicit& Implicit Cost

### **Significance of the study:**

The human cost of these daily adversities is enormous and the economic burden of OSH practices is estimated at 4% of global gross domestic product each year. Most of these deaths and injuries occur particularly in developing countries where a large population is engaged in hazardous activities (ILO, 2012).Improving health and safety practices at work is a key to the success of a contented workforce with more innovative, efficient, and effective in every area of the business [9]. Estimates of the economic burden of work injuries and diseases can help policymakers prioritize occupational health and safety policies and interventions in order to best allocate scarce resources. Several attempts have been made to estimate these economic burdens at the national level, but most have not included a comprehensive list of cost components, and none have attempted to implement a standard approach across several countries[10]. "Workplace health promotion and protection" broadly refers to an integrated approach to workplace health and safety initiatives. There are substantial benefits to adopting such an approach, including the potential for: improvements to individual employees' health and well-being; increased productivity; and reduced safety risks and expenses [11]. So, cost estimates are essential part of health and safety activity and financial manager.

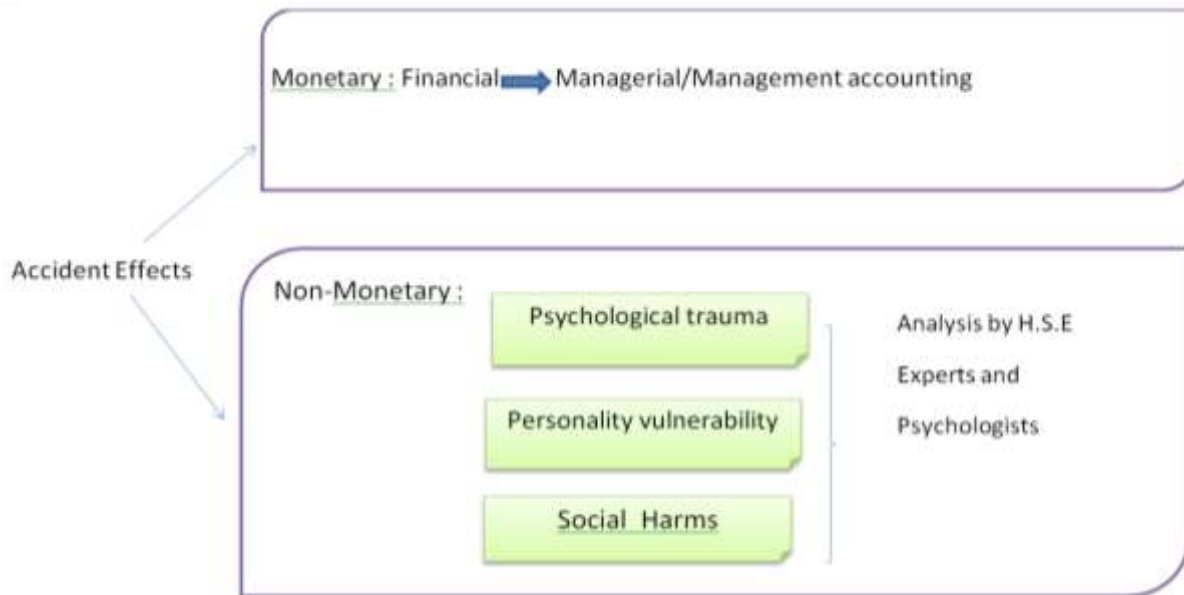


Figure2: Monetary and Non- Monetary influences of accident

### Literature Review:

In The Conceptual Framework for the International Classification for Patient Safety [12], selected definitions of accident are as following:

1. An event that involves damage to a defined system that disrupts the ongoing or future output of the system. [13,14]
2. An unintentional and/or unexpected event or occurrence that may result in injury or death. [15]
3. An unplanned, unexpected, and undesired event, usually with an adverse consequence. [16]
4. An event that involves damage to a defined system that disrupts the ongoing or future output of system. [13]
5. An adverse outcome that was NOT caused by chance or fate. [17]

### General definition and classification of cost:

Cost is generally defined as the total amount spent for goods or services. This includes money, time and labour [18]. The system of classifying costs depends upon the purpose of carrying out the study. The International Labour Organisation has come out with a number of classification systems [19]. Rikhardsson(2005) stated that " the costs of occupational accidents are classified into six overall categories"[4]:

1. Costs due to the absence of the injured employee: Includes e.g. payment of sick pay and payment of supplementary sick pay.
2. Communication costs: Includes e.g. formal communication to employees, staff, and general management as well as informal communication between employees.
3. Administration costs: Includes payroll administration, administration regarding health and safety regulations and reporting requirements, follow-up activities and meetings.
4. Costs of prevention initiatives: Includes e.g. purchase of machine components and training initiatives.
5. Operation disturbance costs: Includes e.g. training of replacements, revenue loss, coworkers overtime, and production reductions.
6. Other costs: Includes costs such as e.g. fines and gifts to injured employee.

### Accident's Effect:

Workplace accidents have adverse effects on the morale of the employees, the productive employee hours and planned production schedules. Employees who sustain injury through workplace accidents are usually

very difficult to replace and the affected companies are often handicapped for months before a replacement is obtained. When property is damaged or destroyed by an accident, it takes a long time to either repair or replace the equipment, investigate and report the underlying causes. Other consequences include delays in getting work done, longer working hours and possible shortage of critical materials [20].

**Background:**

Information on the economic burden of work injuries and diseases is vital for policymakers attempting to allocate scarce resources to priority areas in the occupational health and safety policy arena[10]. Heinrich (1959) pioneered research in accident costs during the 1920s, as he gathered data from more than 75000 cases. He concluded that indirect costs account for as much as four times the direct costs of workplace accidents (Heinrich 1959, Head and Harcourt 1997). Because of its simplicity, the ratio (4 : 1) between direct and indirect costs has become widely used in safety management[21].

A more graphic representation of the hidden costs is the Accident Cost Iceberg [22]. The iceberg shows that the proportion of hidden costs could be much larger than the cost directly related to the accident [6,23]. While the direct cost can be estimated based on the nature of the accident, the indirect proportion is the biggest obstacle for a reliable predictor of the total cost of accidents. Bird and Germain (1966) proposed to estimate the costs of accidents based on ledger costs. Ledger costs of accidents account for workers’ compensation (i.e. medical, legal and wages costs related to the accident), equipment repair and product damage[6,23]. For accounting purposes, however, the composition of indirect costs is complex, as it does not fit specific account ledgers. Elements such as the investigation of the accident, the training of a replacement employee or the impact on productivity cannot be found in a particular ledger column and are included as part of other administrative and operational expenses that are not explicitly measured [6].

Dorman (2000a) defines economic costs as costs that can be expressed in monetary units. They include the costs paid - or expected to be paid - by individuals and organizations acting within the economy, as well as the monetary values implicit in activities undertaken and foregone[19]. The followings are as related studies:

findings	Year of pub	Researchrs	R
They develop an incidence cost framework using a bottom-up approach to estimate the societal burden of work injuries and diseases and implement it for five European Union countries. Three broad categories of costs are considered—direct healthcare, indirect productivity and intangible health-related quality of life costs. Results: Indirect costs are the largest part of the economic burden, then direct costs and intangible costs. As a percentage of GDP, the highest overall costs are for Poland (10.4%), then Italy (6.7%), The Netherlands (3.6%),Germany (3.3%) and Finland (2.7%). The Netherlands has the highest per case costs (€75,342), then Italy (€58,411), Germany (€44,919), Finland (€43,069) and Poland (€38,918). Costs per working-age population are highest for Italy (€4956), then The Netherlands (€2930), Poland (€2793), Germany (€2527) and Finland (€2331).	2021	<sup>10</sup> Emile Tompa , Amirabbas Mofidi , Swenneke van den Heuvel , Thijmen van Bree , Frithjof Michaelsen , Young Jung1 , Lukas Porsch and Martijn van Emmerik	1
The purpose was to enumerate the annual morbidity and mortality incidence and estimate the direct and indirect costs associated with occupational injuries and illnesses in Bangkok in 2008. Results: A total of 52,074 nonfatal cases of occupational injury were reported, with an overall incidence rate of 16.9 per 1,000. The incidence rate for male workers was four times higher than that for female workers. Out of a total direct cost of \$13.87 million, \$9.88 million were for medical services and related expenses and \$3.98 million for compensable reimbursement. The estimated amount of noncompensated lost earnings was an additional \$2.66 million. Conclusion: Occupational injuries and	2014	<sup>24</sup> Phayong Thepaksorn, Sathirakorn Pongpanich	2

illnesses contributed to the total cost; it has been estimated that workers' compensation covers less than one-half to one-tenth of this cost.			
In this study four major categories of uninsured (indirect) cost items and 18 sub-categories of uninsured (indirect) cost items were identified. To determine and validate the importance and necessity of the results of a literature review an expert or professional surveyed had been analyses using the SPSS 18.0, where in the participants whose expertize is in the field of compensation and safety. Based on the results of survey all participants all uninsured (indirect) cost items classified was important and necessary when accidents occurred. Despite recognition of expert on the classification of uninsured (indirect) cost items, it is quite difficult to make generalization for all kind of costs in occupational accident case due to different nature of business for each industry.	2017	<sup>21</sup> Cecil Jung and Jong-Bae Baek	3
An average of twenty-four numbers of minor accidents and one major accident were discovered in Nigeria annually. Negligence of the workers was found a significant cause of accident (P< 0.001). It was also found significant that accidents were rarely (less frequent than yearly) investigated (P< 0.001). There was a significant relationship between causes of accidents and frequency of accident investigation (P< 0.001). About one hundred and twenty-five thousand naira (N125, 000.00) was expended on the treatment of injured employees while about one thousand, two hundred and forty-five (1,245) man-hours of production were lost. Annually, Accident Severity Rate (ASR) was 0.1 and Accident Frequent Rate (AFR) was 0.01, both per millions man-hours lost. Injury to personnel was the most common effect of accidents found with a Case Fatality Rate (CFR) of 58.3 percent.	2015	<sup>25</sup> T.A Yusuf, S.O Ismaila, S.I Kuye, O.D Samuel	4
The field study, carried out in a large Italian company, illustrates technical and organizational aspects associated with the implementation of an accident costs analysis tool. The results indicate that the implementation (and the use) of the tool requires a considerable commitment by the company, that accident costs analysis should serve to reinforce the importance of health and safety prevention and that the economic dimension of accidents is substantial. The study also suggests practical ways to facilitate the implementation and the moral acceptance of the accounting technology.	2014	<sup>26</sup> Massimo BATTAGLIA, Marco FREY and Emilio PASSETTI	5

## 2. Materials and Methods

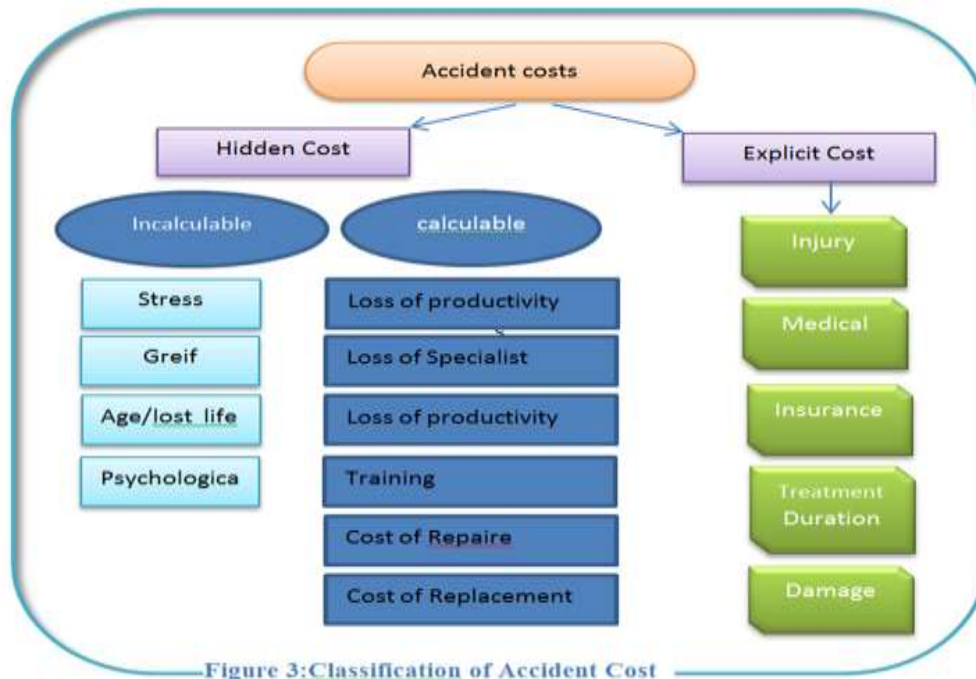
The Following regression model suggest to calculate the cost of accidents

$$T\text{Accident Cost}_i = \hat{\alpha}_0 + \hat{\alpha}_1(\text{Explicit Cost}_{t,i}) + \hat{\alpha}_2(\text{Implicit Cost}_{t,c,i}) + \varepsilon_t$$

Total Accident cost in the period of i : T Accident Cost<sub>i</sub>

Total Explicit Cost in the period of i : Explicit Cost<sub>t,i</sub>

Total Calculable Implicit Cost in the period of i : Implicit Cost<sub>t,c,i</sub>



As shown in the table, in hidden costs some items can not be calculated and the exact financial value.

For a better understanding, a workshop accident in Isfahan is discussed below.

Type of accident	Gender of the injured person	Activity	Date	Place	R
Major	Woman	industrial workshop	2015	Iran/Isfahan	1

Place: Iran ,Isfahan

The cost of artificial hands	Hospital Cost	Reason	Shift work	Type of accident
150,000,000 R	71,000,000 R	No device protection	Night	Maim (hand)

At first glance, people see the apparent costs of treating and amputating a female worker's wrist.

But this year, the base salary of a simple worker has been 6089000 R. In other words, if we look more closely at other matters from a safety and economic point of view, then: should be studied as following:

**A: Workshop manager costs:**

1- Initial costs (Hospital& artificial hands ): are exceeded the wages of 36 workers

$$\begin{array}{r}
 71000000 \\
 + \\
 150000000 \\
 \div \\
 \hline
 6089000 \\
 36.3
 \end{array}$$

2-Insurance Office fines: 2,200,000,000 that is exceeded the wages of 361 workers

$$\begin{array}{r}
 2200000000 \\
 \div \\
 \hline
 6089000 \\
 361.3
 \end{array}$$

Initial cost+ Insurance Office fines  $\approx$  397 workers salary !That is a significant economic point.

3- Court costs

4- Stress of the accident Consequences

5-Negative effect on production

Unaccountable (Incalculable)

B:Worker

1-Lost her job

2- Lost her wrest

3- Negative influences on family

4- Depression

5- Worried about the future

Unaccountable (Incalculable)

Accidents at work and occupational injuries represent a considerable economic burden to employers, employees and to society as a whole. Some of these costs, like lost workdays or lost income, are clearly visible and can readily be expressed in monetary value. For a large part however, economic consequences of accidents are somewhat hidden or cannot be priced. Administrative activities following an accident for example may be forgotten, damage to the company image is hard to quantify and pricing human suffering and health damage is subject to discussion[27].

**Discussion:**

workplace accidents are costly. Increasing accidents cause to decrease productivity ; therefor preventing of accidents in the workplace is important . Undoubtedly, in case of non-observance of safety issues and lack of proper investment in the field of safety in a workplace, heavy costs will be imposed on the relevant organization. For reduction in employee injury rates and improve safety, the effective factors in the occurrence of accidents should be identified and then removed from the chain of work and activity [5].

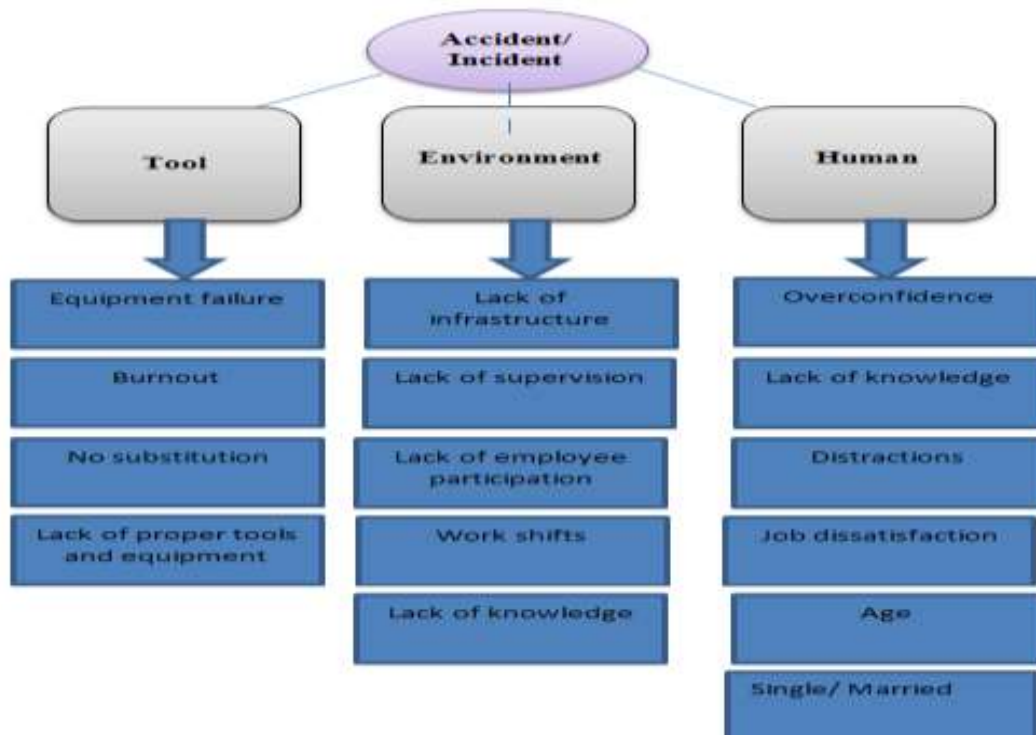
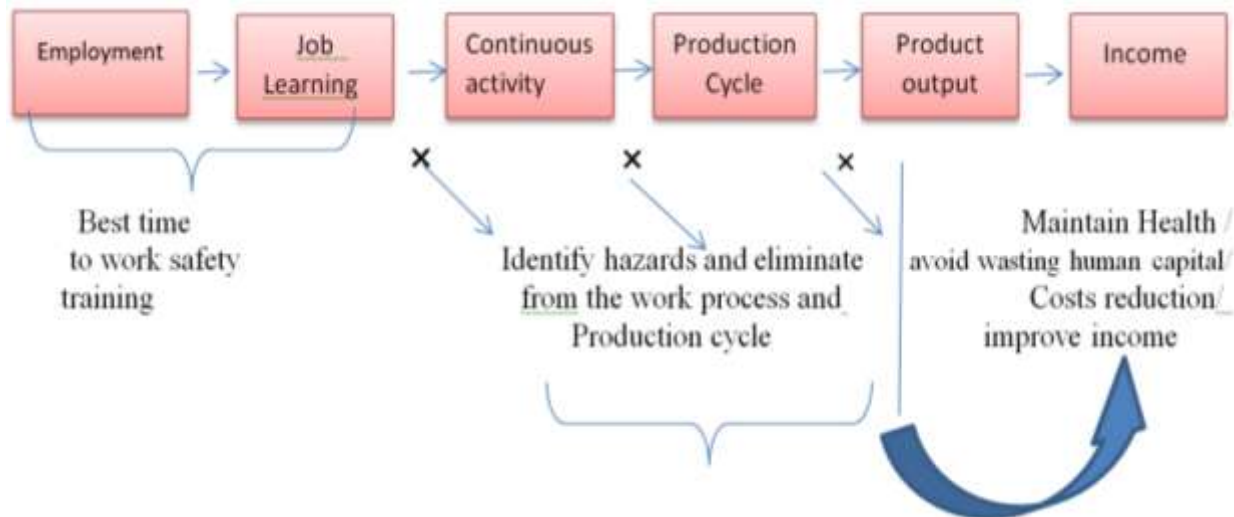


Figure 4 :Factors affecting the occurrence of the event

So, identifying, investigating and eliminating risk factors in the workplace and in the production chain, will have a positive impact on the production body and improve the economy[5].



Figure#5: The benefits of a safe workforce and the elimination of risk factors

Focus on methods of measuring safety cost and designing cost patterns and using information, if manager pay attention to allocate H.S.E cost , the results are as figure 6 [28] :



This shape indicates there is a correlation between Management Accounting and Safety Management.

**For future study:**

- Analyzing relationship between the working conditions and accidents.
- How improvements in safety and health at work can bring economic benefits and decrease costs.

**Conclusion:**

Based on the results of the research and discussion described , it can be concluded several things as follows:



- 1-Accident costs are different.
- 2-Accidents has many influences on production , income and worker's mental health.
- 3-H.S.E units, are responsible to evaluate the roots of accidents.
- 4-Working community should be familiar with influences of accidents and event , specially their costs.
- 5- Cost is not an easy concept to define and evaluate only as the term of money.

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