THE ECONOMIC AND SOCIAL IMPACTS OF SITE ACCIDENTS ON THE SOUTH AFRICAN SOCIETY

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ABSTRACT

Purpose of this paper - This paper aims to identify and quantify the economic and social impacts of site accidents on the South African society.

Methodology/Scope – Literature review is used to identify the different types and causes of site accidents as well as their economic and social impacts. Survey Questionnaire, is used to confirm the identified impacts, add new ones that reflect the South African context and quantify the social and economical impacts of site accidents on the construction company. Interviews carried out with affected families to identify the social and economical impacts of site accidents on their life and activities.

Findings - 40% of the causes of site accidents are resulted from falling of people due to their negligence or not adhering to health and safety regulations. The decrease in standard of living and the loss of productivity represent the highest economic impacts on the affected families and construction companies respectively. The loss/injury of the family provider and the depression of employees and work fellows represent the highest social impacts on the families and construction companies respectively.

Practical implications - The government should enforce the current H&S procedures and take active actions to ensure the applications of H&S procedures on site. Construction firms have to follow the H&S procedures, train all their employees, be stricter to individuals who violate H&S rules, appoint safety representatives to make safety a major priority in the construction site. Employees have to adhere and respect all H&S rules placed on site, practice safe construction measures, wear required personal protective equipment, be aware of their surroundings and report any unsafe activities to management.

Value - Although the area of H&S is well researched, little attention has been paid to study the economic and social impacts of site accidents on the South African Society. It provides a real contribution to the original body of knowledge through filling the gap in this area of research. The research presents a set of recommendations for the government, construction companies and employees as an approach to improve the image of H&S in the South African construction industry.

Keywords: economic and social impacts, site accidents, South African society, health and safety procedures.

1 INTRODUCTION

The construction industry is an important player in the economy of South Africa. It contributes 35% of the total gross domestic fixed investment and employs approximately 240,000 employees. The South African government is the single biggest construction client, making up between 40-50 % of the entire construction expenditure (Department of Public Works, 2000). Despite its pivotal role in social and

economic development, the construction industry is considered a risky business and poses more dangers than any other industry (Brace and Gibb, 2005). While Health and Safety (H&S) are the responsibility of every one at work (Davies and Tomasin, 1990), construction companies have to be aware that they are responsible for managing and improving issues related to H&S on construction sites. This is because construction, to a large extent, is a labour intensive industry and depends on the availability and wellbeing of workers to complete current and future projects (Haupt, 2003, Massyn et al., 2005). Literature review showed that the topic of H&S has been covered from different perspectives. For instance, Hubbard (1986) focused on the relevance of construction safety professions in the construction industry and what these professionals can do to reduce site accidents. In addition, Abdelhamid and Everett (1998), Everret and Pathan (1998) and Hinze, et al., (1998) identified the root causes of construction accidents and injuries. Furthermore, Bowen and Hindle (1999) investigated the problem of site accidents and its causes as well as how these accidents can best be controlled. Haupt, Smallwood and others studied many aspects of construction workers' health and safety including: the influence of design on health and safety during construction (Smallwood, 2004), performance approach to safety management (Haupt, 2003), workers' compensation premium fraud, safety and health interventions, impacts of diseases such as tuberculosis and HIV/AIDS on construction workers (Haupt and Smallwood, 2003 a & b), the plight of aging construction workers (Smallwood and Haupt, 2003) as well as the occupational health and appropriate health interventions such as medical surveillance (Geminiani et al., 2005). In spite of the valuable contribution of these studies, the topic of the economic and social impacts of site accidents on the South African society has received little attention in construction literature. In an endeavour to overcome the limitation of research in this important area and to provide valuable input to the original body of knowledge, this paper aims to identify and quantify the economic and social impacts of site accidents on the South African society.

2 RESEARCH METHODOLOGY AND SAMPLING

A research methodology, consisted of literature review, interviews and questionnaires, is designed to achieve the abovementioned aim. Firstly, literature review is used to identify the different types and causes of site accidents as well as their economic and social impacts. Secondly, in order to investigate the perspective of construction companies, survey questionnaires were developed and sent to directors of construction companies to confirm the identified impacts, add new ones that reflect the South African context and quantify the social and economical impact of site accidents on the construction companies. Finally, as the most concerned part, interviews were conducted with families of the affected worker to identify the social and economical impacts of site accidents on their life and activities. The aim of sampling was get a representative and non-biased sample to increase the validity and reliability of collected data. The South African online yellow pages (SA Yellow Pages, 2007) were accessed to get a list of Durban based construction companies. The result was a list of 50 companies ranging from small, medium to large enterprises. This helped get a clear and well represented sample. Out of 50 questionnaires sent to construction companies, 20 were completed and returned. Because of the sensitivity and nature of this research as certain sectors of the society (i.e. affected employees and their families) have to be interviewed, the companies that replied to the questionnaires, were contacted to get information about the affected workers or his/her family. This information was collected from the records of site accidents kept in construction companies. Out of 87 affected families contacted, 20 families agreed to be interviewed.

3 DATA ANALYSIS

A two-stage approach was adopted for data analysis. The first stage was simply to measure the central tendency of the interviews and questionnaires responses. The measure of central tendency was used to

get an overview of the typical value for each variable by calculating the mean, median and mode (Bernard, 2000). Analysis of the collected data showed close values of these measures which confirmed the quality and the homogeneity of the collected data. Secondly, since not all site accidents have the same impact on families and construction companies, a relative importance index was used to differentiate between impacts of site accidents using the formula of: RII = ∑W / AN, Where W=weighting given to each driver by the respondents and range from 1 to 5, A= highest weight (5 in our case); and N= total number of sample (Kometa and Olomolaiye, 1997; Olomolaiye et al., 1987; Shash, 1993). The data was analysed with the aid of Microsoft Excel spreadsheet. Since there were no quantification without qualification and no statistical analysis without interpretation (Bauer and Gaskell, 2000) during the course of this research both approaches of quantitative and qualitative data analysis were employed

4 TYPES OF SITE ACCIDENTS

4.1 Minor accidents

These are accidents, which yield less severe injuries. The absence from work due to this type of injury would usually be 3 days or less. Most accidents fall into this category includes stepping or striking against small objects, tools, sprains or strains.

4.2 Major accidents

These are injuries which result in amputations or fractures. Usually injured person who falls under this category would be absent from work for about 30 days. Major accidents include slips, trips, falling from heights, machinery and transport accidents and / or electricity accidents (Nichols, 1997).

4.3 Fatalities

These are deaths resulting from work injuries on site (Wikipedia, 2007).

5 CAUSES OF SITE ACCIDENTS IN CONSTRUCTION

In order to investigate the economic and social impacts of site accidents on the society it is essential to identify the causes of site accidents in construction sites. The main causes of accidents are:

5.1 Falls from above

Falls from above can occur from scaffolds, walkways or stairs and into shafts (from the edge of the shafts) excavations, or floor openings. This type of accident occurs because stairs were not provided with railings or scaffolds were not provided with guard rails.

5.2 Falls on the same level

A fall on the same level can be caused by slipping because of poor traction of footgear on the floor. Adhesive friction is a positive grip due to the penetration of one surface into the other- usually the smaller is the sole surface, the greater is the risk of slipping.

5.3 Struck against objects

Being stuck against can occur from stationary or moving objects and from falling or flying objects. The force of impact is a key factor in this type of accident as the greater the impact, there is also a greater pain felt by the person. Also most of these injuries are totally unexpected and employees have no chance to defend themselves.

5.4 Lifting and carrying (over-exertion)

Over-exertion can result from lifting objects that are too heavy to handle without machine assistance or awkward enough to cause loss of balance. The resulting damage is most often a back injury. Over-exertion can also happen from pulling, carrying or pushing objects that are too heavy (Gloss & Wardle, 1984)

5.5 Machinery

Machinery accidents can occur if the equipment fails, for instance other portions of the equipment could fail such that the person becomes electrocuted. Some other machinery accidents occur where the person operating the equipment failed to follow the necessary procedures of operation.

5.6 Electricity

Contact with electric current is a serious and frequent cause of workplace accidents. This could involve a broken or energized power line falling. The employee unknowingly grasps something connected to it or becomes the path to the ground and thus be electrocuted. Similarly faults in electrical equipment, especially portable tools can cause the housing to be energized. The appliance may have broken the connective or internal wiring which touches the tool. When the device is turned on, the user receives a shock, thus later resulting in an electric accident (Hammer, 1976).

5.7 Transport

Non collusion accidents can occur on construction sites which could result in an accident which could be affecting the employees that were around the scene at the time. These involve vehicle overturns or if the vehicle goes out of control or if the vehicle starts or stops abruptly. Transport accidents on construction sites are often minimal as usually the speeds are often too low, for speeding to occur, which could cause an accident.

5.8 Fires and explosions

There are three types of fires and explosions that could probably occur on construction sites. These are small fires, large fires and blowouts. The probability is that small fires are least dangerous and blowouts being the most severe (Gloss & Wardle, 1984). By far the largest category is falls, which include people falling or objects and material falling (this includes structure or part of a structure collapsing). Each year about 70-80% of all fatalities and 35-40% of all injuries may be attributable to falls due to negligence or not obeying health and safety rules. About 25% of all accidents that result in workers being unable to carry out their normal duties for at least 3 days are due to the incorrect manual lifting and carrying, generally of too heavy loads, which results in strain and sprain injuries. A further 10% are due to stepping on or striking against objects (i.e. stepping on protruding nails) (Davies & Tomasin, 1990).

6 IDENTIFICATION AND QUANTIFICATION OF THE ECONOMIC IMPACTS OF SITE ACCIDENTS

The official statistics of site accidents do not only represent terrible human tragedies but also substantial social and economic impacts on society. The social impact of site accidents could be defined as the effect that touches the human side of the society, where the economic impact could be defined as the effect that relates to the financial aspects of the society. All society members such as employees, families, employers, economy and resources will be affected somehow by the occurrence of a site accident.

6.1 Economic impacts of site accidents on the affected family

Interviews with affected families resulted in identifying the following economic impacts: (1) decrease in family income, (2) decrease in the standard of living, (3) education and schooling expenses affected, (4) increase in debts and (5) difficulty to pay bills/policies bond. Analysis of interviews showed that decrease in standard of living is ranked the highest economic impact of site accidents with (mean of 4.6, median of 4.5 and mode of 4.8 out 5 and RII of 0.85). This could be attributed the sever situation which the family faces when the provider of the family get affected. In such cases, families have to give up some of the facilities or goods they used to consume in order to cope with these situations. Decrease in family income is ranked the second economic impact with (mean of 4, median of 3.8, mode 3.9 of out of 5 and RII of 0.71) as the affected person either has to leave the job or be transferred to another place in the organisation which is normally less paid. The increase in debt was ranked the third economic impact with (mean of 3.6, median of 3.5 and mode 3.4 out of 5 and RII of 0.69). Affected families mentioned that they have to borrow money from banks in order to cover the life expenses which result in increasing debts. The other economic impacts of site accidents on families are difficulty to pay bills/policies bond and education and schooling expenses affected were ranked fourth and fifth with (mean of 3.2, median of 3 and mode of 3.1 out 5 and RII of 0.60) and (mean of 2.6, median of 2.5 and mode of 2.7 out 5 and RII of 0.57) respectively. Some of the families mentioned that they were forced to move their children to cheaper schools, where the level of education and offered facilities are less, as a way to reduce their expenditure to cope with the situation of site accidents of their breadwinner, see figure (1).

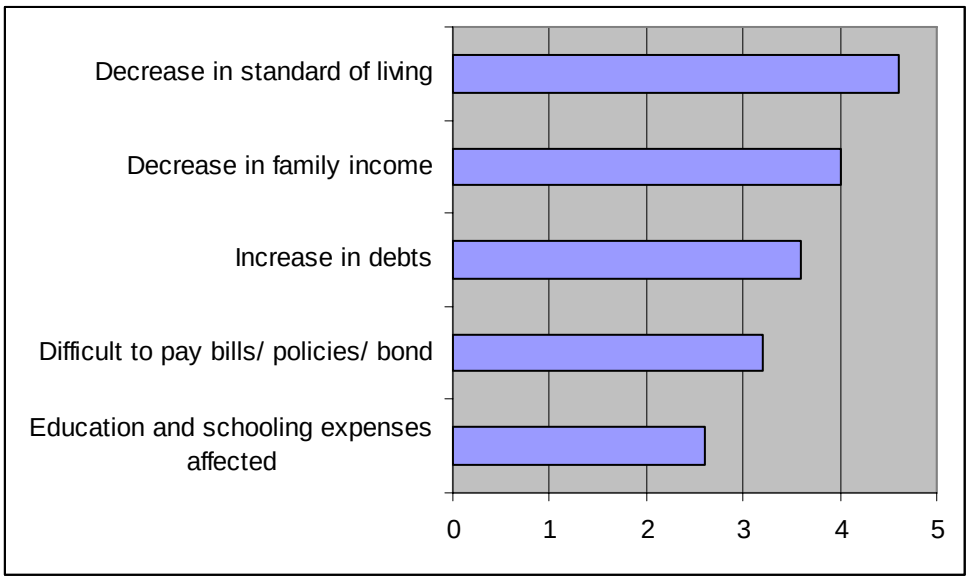

Figure (1) economic impacts on affected families

6.2 Economic impacts of site accidents on the construction company

At the start of the 21st century, unsafe and unhealthy working conditions still take a heavy economic toll. From a business standpoint, accidents affect the bottom line or profitability of a project. Economic impacts of site accidents could have direct and indirect costs. A direct cost is defined as those costs covered by the workers compensation insurance. These may include medical costs, premiums for workers, compensation insurance, liability and property losses (Kapp et al., 2003). Indirect costs are those costs attributed to loss of productivity of the injured worker and the crew, transportation costs to the nearest medical treatment facilities and time expanded to complete various forms related to the injury (Hinze & Appelgate, 1991). Literature review and interviews identified the economic impacts of site accidents on the construction company as follows: (1) damages to plant, equipment and completed

work, (2) payments for settlements of injury or death claims, (3) Legal fees for defense against claims, (4) costs of rescue operations and equipment, (5) expenditures on emergency equipment, (6) loss of function and operations income, (7) slowdowns in operations while accident causes are determined and corrective action taken, (8) corrective actions to prevent re-occurrence of accident, (9) degradation of efficiency of operations because of loss of experienced and trained personnel, (10) training costs for replacements, (11) increased insurance costs, (12) loss of productivity, (13) disruptions while investigations are being carried out by the company safety department and insurers (Hammer, 1976; Davies & Tomasin, 1990), (14) medical payments (Hammer, 1976), (15) insurance premiums (Nichols, 1997; Gloss & Wardle, 1984) and (16) costs of workman's compensation insurance (Kapp et al., 2003; Gloss & Wardle, 1984; Rauner et al., 2005). Analysis of the questionnaires showed that out of all the economic impacts of site accidents on the construction company, the loss of productivity was ranked as the highest economic impact with (mean of 4.5, median of 4.4 and mode of 4.6 out 5 and RII of 0.82). 90% of the companies consider the accident as a hindrance to the performance of its employees, thus resulting in a decrease in productivity. The disruption of current work was ranked the second economic impact of site accident on constriction companies with (mean of 4.3, median of 4.2 and mode of 4.4 out 5 and RII of 0.79). The least ranked economic impact was increasing insurance costs with (mean of 2.2, median of 2.4 and mode of 2.3 out 5 and RII of 0.42). Complete list of the economic impacts is shown in table (1) and figure (2).

Economic site accident Impact on construction companies	Mean	Median	Mode	RII
Loss of productivity	4.5	4.4	4.6	.85
Disruption of current work	4.3	4.2	4.5	.79
Training costs for replacements	4	4	4.1	.77
Damages to plant, equipment, completed work	3.9	4	4	.76
Corrective actions to prevent re-occurrence of accident	3.9	4	4	.76
Degradation of efficiency	3.9	3.8	3.8	.75
Expenditures on emergency equipment	3.7	3.6	3.7	.72
Slowdowns in operations while accident causes are determined	3.7	3.6	3.7	.70
Costs of workman's compensation insurance	3.7	3.6	3.7	.65
Medical payments	3.5	3.5	3.6	.60
Insurance premiums	3.5	3.5	3.6	.55
Costs of rescue operations and equipment	3.2	3.3	3.5	.53
Loss of function and operations income	3	3.1	3.2	.49
Payments for settlements of injury or death claims	2.6	2.7	2.8	.46
Legal fees for defense against claims	2.4	2.5	2.5	.44
Increased insurance costs	2.2	2.4	2.3	.42

Table (1) The central tendency measures and RII for the economic impact of site accidents on the construction companies

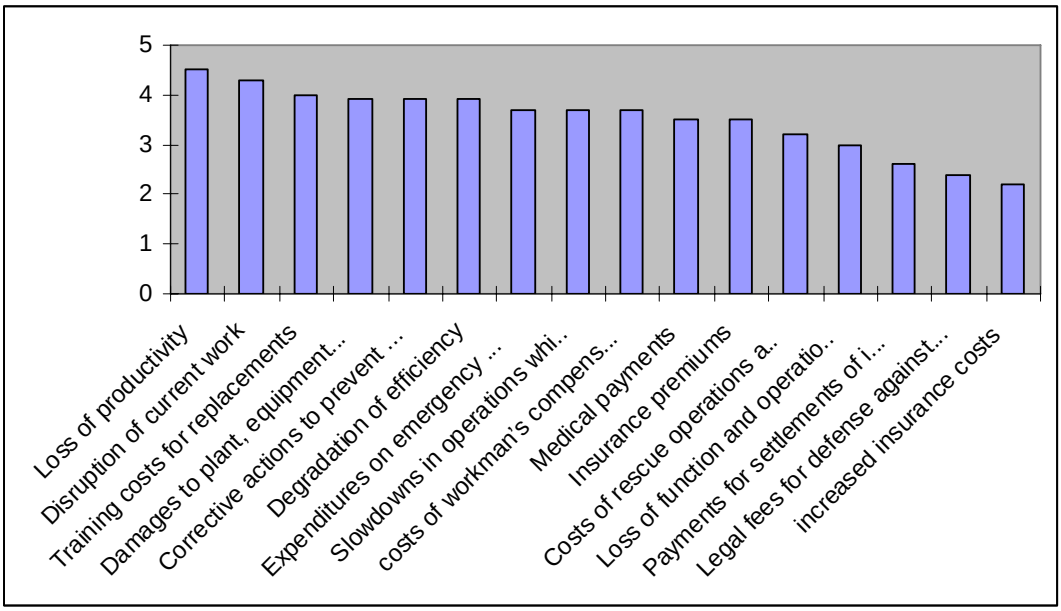

Figure (2) economic impacts on construction companies

7 IDENTIFICATION AND QUANTIFICATION OF THE SOCIAL IMPACTS OF SITE ACCIDENTS

Site accidents have social impacts on the worker, his/her family, employer and community as a whole. Serious accident has the potential to induce a crisis within an organization since it will initiate investigations accompanied by the possibility of criminal proceedings and ultimately project closures. The employees go through a state of shock, people feeling overwhelmed with emotions of sympathy, loss and regret and in some instances guilt, and in essence the whole organisation is thrown into chaos socially due to this accident (Nichols, 1997). During this period, psychological stress and tension grow and there is a danger organisation managers that the organisation will become consumed with accusation and blame and that the energies may be diverted away from the construction tasks at hand. There is also a danger that the organization is thrown back into the defensive retreat phase. It is here that costs arise and social impacts which are intangible in the form of damaged interpersonal relations (Loosemore, 1999). When accidents in the construction industry occur, many of the hardworking laboures can feel betrayed, frustrated and often at times overwhelmed by the lack of legal options they are presented with (Withers, 1988).

7.1 Social Impacts of site accidents on the affected family

Interviews carried out with affected families identified the following social impacts of site accidents:: (1) loss/injury of family provider, (2) family depression, (3) loss of social welfare, (4) loss of worker to the community, (5) loss of the quality of life for individual workers and families. Analysis of responses showed that the loss/injury of the family provider was ranked the highest impact with (mean of 4.8, median of 4.7 and mode 4.8 out 5 and RII 0.80), where the loss of worker to the community was ranked the least social impact on the family with (mean of 1.8, median of 1.6 and mode 1.7 of out of 5 and RII of .6), see figure (3) and table (2).

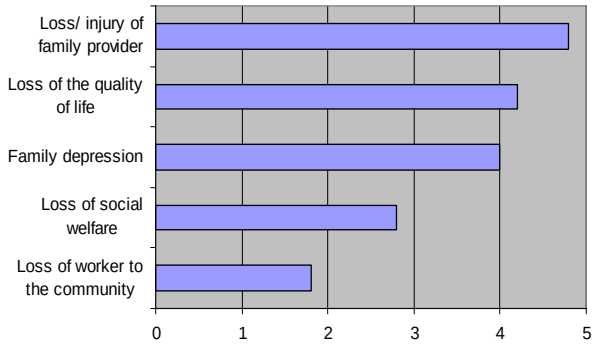

Figure (3) social impacts on affected families

Social Impacts on affected family	Mean	Median	Mode	RII
loss/injury of family provider	4.8	4.7	4.8	.80
Family depression	4.2	4.3	4.4	.75
loss of social welfares	3.6	3.5	3.4	.68
loss of the quality of life for individual workers and families	2.4	2.2	2.3	.63
loss of worker to the community	1.8	1.6	1.7	.60

Table (2) the central tendency measures and RII for the social impacts of site accidents on the families

7.2 Social Impacts on the construction company

Analysis of survey questionnaire showed that the social impacts on the construction company are: (1) depression of employees and work fellows, (2) loss of public confidence, (3) loss of company image, (4) loss of customer satisfaction and (5) degradation of morale. The depression of employees and work fellows was ranked the highest social impact with (mean of 4.6, median of 4.4, mode of 4.5 out of 5 and RII of 0.78). Degradation of morals was ranked the lease social impact with (mean of 2.5, median of 2.3, mode of 2.4 out of 5 and RII of 0.46).

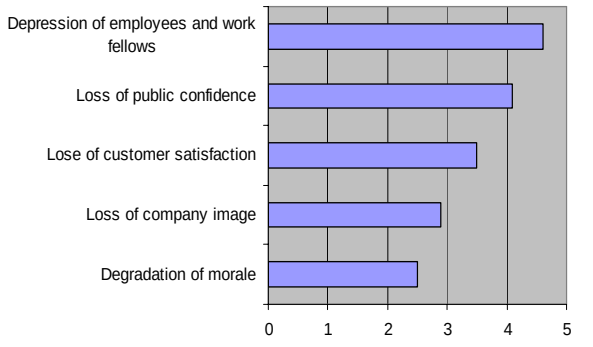

Figure (4) social impacts on construction companies

Social Impacts on Construction Company	Mean	Median	Mode	RII
depression of employees and work fellows	4.6	4.4	4.5	.78
loss of public confidence	4.1	1.3	4.2	.69
Lose of customer satisfaction	3.5	3.4	3.6	.61
loss of company image	2.9	2.7	2.8	.55
degradation of morale	2.5	2.3	2.4	.46

Table (3) the central tendency measures and RII for the social impacts of site accidents on construction companies

8 CONCLUSIONS AND RECOMMENDATIONS

Having reviewed the different types and causes of site accidents, the economic and social impacts of site accidents on the affected families and construction companies, the research may reach the following conclusions and recommendations to government, employers and employees:

- The construction industry has one of the highest accident rates if compared with other industries.
- Although there are many causes of site accidents, about 40% of the causes of site accidents are caused by falls, either by falling of people from above or falling of people from the same level. The main cause to people falling being either it is through their negligence or due to the fact

that they do not obey the correct health and safety rules like wearing the appropriate personal protective equipment at all times when working on heights.

- Site accidents have influential impacts on affected families and construction companies. The decrease in standard of living and the loss of productivity represent the highest ranked economic impact on the affected families and construction companies respectively.
- The loss/injury of the family provider and the depression of employees and work fellows represent the highest social impact on the families and construction companies respectively.
- The government should enforce the current health and safety procedures legislated and take active plans to ensure that all construction companies follow the health and safety procedures properly.
- Construction companies have to adhere to the health and safety procedures as well as train and educate their employees about health and safety procedures on site. Employers have to be much stricter to individuals who violate safety rules. Construction firms have to appoint health and safety officers to make safety a major priority in the construction site. Sub-contactors who do not have good record of health and safety should not be considered during the process of selecting sub-contractors.
- Employees have to adhere and respect all safety rules placed on site. All employees have to practice safe construction measures, wear required personal protective equipment on site and be aware of their surroundings. In addition, they have to report any unsafe activities to management.

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