Occupational Accidents Profile of the Construction Industry in Sweden

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Abstract

In Sweden, accident statistics reveal little, if any, evidence of improvement in health and safety on construction sites. Accident statistics, which adopt a reactive approach, must not be looked upon as merely numbers and figures. They must be able to reveal the underlying factors contributing to the accidents. This paper aims to examine construction safety performance based on accidents data from 2000-10. Additionally, the impact of rules and regulations implemented prior to 2010 on accident trends are discussed. The findings indicate that while accident frequency seems to be declining, the fatalities recorded remain high with an average of 10 fatalities per year, instilling fear among workers for their safety at work. Analysis of the causes of accidents reveals a high level of repetitions of the same or similar accidents, especially with regard to 'loss of control'. Changes need to be made to the reporting of accidents. What is required is to determine the appropriate mitigation strategies, by using analysis of accident reports, to prevent future accidents. Since every accident is a reflection of the quality of management, it is important for companies to recognise that there is no single reliable measure of health and safety performance but rather a combination of both reactive and proactive measures.

Keywords

Fatalities, incidence rate, causes of accidents, absence from work, construction, reactive data.

BACKGROUND

In Sweden, the increase of fatalities in construction since 2000 is worrying. A black month for the industry was in May 2011 when seven major accidents, including three deaths from falls, were reported (Nohrstedt, 2011). In the previous year, the rate of accidents in the construction industry had risen to 11.3 accidents per 1000 workers from 10.2 accidents per 1000 workers a year earlier (Samuelsson, 2011). These reactive data are post-accident measures looking at injury and ill-health. Reactive measures tend to be limited to factual data about the victim such as age, gender, occupation and thus lack other vital information such as environmental conditions, task factors and behavioural factors. The annual occupational accident report produced by the Swedish Work Environment Authority (SWEA) covers activities that were directly and immediately involved in the accident. The absence of information that might help in understanding the factors that lie behind these accidents limits the report's usefulness. Reactive data rely on the reporting of accidents and the efficiency of reporting and so tend to exclude information that might provide useful insights to preventing accidents. Historically, there has been a low level of reporting of accidents by employers, which compounds the problem of getting at the facts behind the statistics. In Sweden, just 77 percent of

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accidents are reported (ESAW, 2011). Reactive data also rely on effective reporting, for without proper training a report may be insufficient due to the absence of important data, difficulty in gathering data and the lack of consistency of data reporting. Additionally, there is the issue of the difference in the definition of reporting. To overcome this issue, some changes to the way of reporting have been made so that the reporting of accident statistics across the member countries of the European Union (EU) is now harmonised or, at least, is far more consistent (Klevestedt, 2011).

Companies measure their health and safety performance through injury statistics (HSE 2001). Internal health and safety performance might differ from one organization to another because successful performance is measured by the absence of incidences (injuries or ill-health). As such, a low injury or ill-health rate, even over a period of years, is no guarantee that risks are being controlled and will not lead to injuries or ill-health in the future. This is particularly true of companies where there is a low probability of accidents, but where major hazards are present (Waldram, 1991). Here, the historical record can be a misleading indicator of safety performance. As companies recognise the importance of managing health and safety, they become aware of the problems inherent in using injury and ill-health statistics alone as the sole measure of health and safety performance. In other words, reactive data must complement proactive measures. Companies can use a reactive data analysis to plan proactive health and safety measures.

This paper examines the safety performance of Sweden's construction sector based on statistical injury data from 2000-2010. The intention is to appraise the occupational accidents trend over the past ten years in terms of accident trends, type of accidents, causes and consequences of accidents. From the trend it will reveal if the annual reporting of occupational accidents to the industry has been effective in improving safety performance and reducing the recurrence of the same or similar accidents.

CHARACTERISTICS OF SWEDISH CONSTRUCTION ACTIVITIES

CONSTRUCTION SCENARIO

Today, Swedish construction industry is well developed and, in international terms, highly industrialised, employing nearly 265,700 people (SCBa, 2012). The industry makes substantial use of prefabricated construction elements and project management skills are advanced. The construction workforce, both blue-collar and white-collar, is generally well educated and highly trained. A few very large companies dominate construction of commercial space and housing, and especially civil construction. However, more than 94 percent of construction contractor firms are classified as micro companies, having between 0-10 employees (SCBb; 2012). Even though these companies are subject to the same regulations on health and safety, alarmingly, more than 50 percent lack sufficient knowledge of health and safety matters (Hedström, 2010).

Construction workers made up 85 percent of all persons employed within the industry (SCBb, 2011). In common with other EU countries, the industry has absorbed foreign workers from within and outside the EU. It is difficult to state the actual number of foreign workers working in Sweden as many of these workers are either employed through foreign manpower companies or foreign construction companies. According to the Swedish Construction Federation (SBI), in 2008 there were 40 foreign construction companies, mostly from Germany and Poland, registered (equivalent to 1.3 percent of all registered members) in Sweden. Changes to the law concerning labour migration at the end of 2008 made it easier to obtain permission to employ workers from countries outside the EU (Berggren, 2012). Applications for work permits in the construction

industry have grown from 25 applications in 2008 to 1,137 applications in 2012 (Berggren, 2012). The increment of these foreign workers has seen more and more companies breaking the law and regulations regarding health and safety (Bergström, 2012).

REGULATIONS AND LEGISLATIONS GOVERNING HEALTH AND SAFETY

The Work Environment Act (AML) (1977:1160) is designed to prevent accidents and reduce occupational ill-health in the course of employment and, ultimately, to achieve a satisfactory work environment. In prior years, AML shifted its focus from work diseases as a consequence of dangerous substances such as asbestos and silicosis towards psychosocial work environment (Augustsson and Skoglund, 2006). Together, clients, consultants, employers, employees, assemblers and suppliers share a common responsibility for maintaining a safe working environment. Figure 1 demonstrates the evolution of the regulations and legislations governing health and safety in construction.

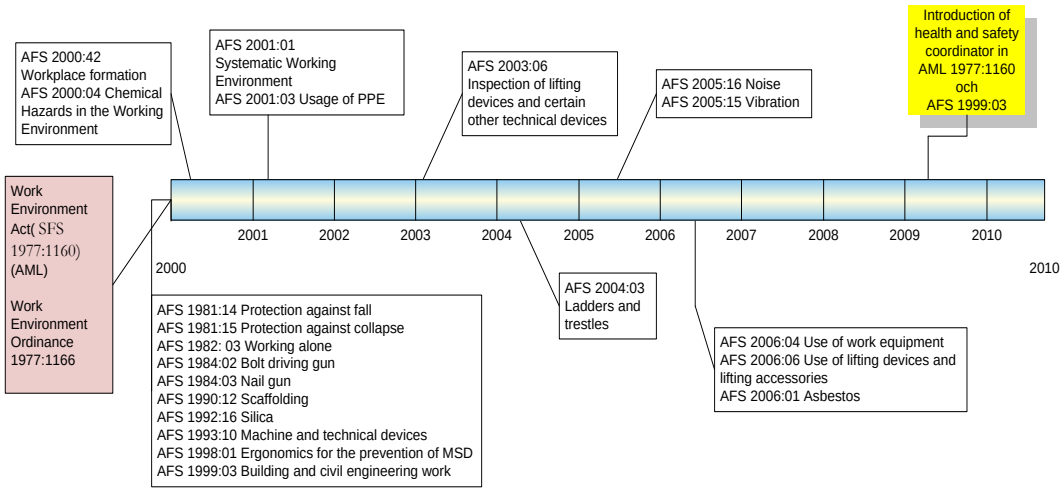

Figure 1. Regulations and legislations governing health and safety in construction

Before 2000, the frequency of accidents was much higher reaching more than 15 incidences per 1000 workers. The accident frequency for 1994 was 19.9 incidences per 1000 workers (Samuelsson, 2010). To improve the situation, the Building and Engineering Works Provisions (AFS 1999:03) were introduced specifically for the construction and civil engineering work. This Provision includes the regulations regarding construction and civil engineering work and importantly the design of Health and Safety Plan (identifying risks). The synergy between AFS 1999:03 and other AFSs such as scaffolding (AFS 1990:12), protection against falls (AFS 1981:14), and protection against collapse (AFS 1981:15) is to improve the manner in which construction activities are performed.

Regulations for organising Systematic Work Environment Management (SAM) came into force in 2001 (AFS 2001:01). These are based on the EU Occupational Safety and Health (OSH) Framework directive 89/391 and contain a new strategy for strengthening the management of safety and health at work. SAM regulates safety at work for all companies, large or small. Companies are obliged to: supply suitable work environment provisions; construct a work environment policy; regularly investigate working conditions; devise plans for dealing with the risks identified; hold personnel meetings; allocate work environment tasks; provide training in the work environment for the manager, safety representative and staff; maintain contact with occupational health service; and, set up routines for reporting injuries and incidents. This Provision has a significant role in increasing productivity while minimising accidents and reducing absence from work.

Following that, the provision for ladders and trestles (AFS 2004:03) was introduced to minimise accidents involving ladders and trestles. Provisions were also introduced to help when working with vibration and noise, using of lifting devices (such as cranes) (AFS 2006:06) and work equipment (AFS 2006:04) and asbestos (AFS 2006:01).

Lastly, a major change worth mentioning is the implementation of Article 3-6 of the Construction Sites directive (CSD 92/57/EEC) which introduced the concept of safety and health coordination based on a new chain of responsibilities (including the owner and the designer), new safety and health documents (the prior notice, the safety and health plan, and the safety and health file) and new safety and health stakeholders (the safety and health coordinators for the design phase and for the construction phase) (Hughes and Ferrett, 2007; Alves, 2004). This is similar to the UK Construction Design and Management (CDM) 2007. These requirements must be taken into account as early as possible during the project namely the planning and design phase. In 2009, the SWEA transposed the directive into the current existing AML 1977:1160 and the Building and Civil Engineering Works Provisions AFS 1999:03. The changes became effective from January 2011.

SOURCE OF DATA ON INJURIES

The official source of information collected on occupational injuries and diseases is derived from the Information System on Occupational Accidents and Work-related Diseases (ISA). The system is based on social insurance legislation, which requires employers to report occupational accidents and diseases to the Social Insurance Agency (SIA). The variables collected from the report includes personal particulars of the injured individual, employer's particulars, type of injury, how it happened, what caused it, extent of injury, measures of preventing repetition of injury and signature. Despite the written regulations, 23 percent of accidents go unreported (ESAW, 2011). Until 2010, the level of reporting of occupational accidents dropped from 7 to 2 injuries per 1000 workers (Klevestedt, 2011). In other words, despite the increase in labour force, the accident reporting is declining. One of the reasons for this downtrend is due to foreign employers or employees that are not obliged to report any accidents since they are not covered by the SIA. Additionally, the quality of recorded data depends on the register's degree of coverage, i.e. on how large a part of the "true" occurrence of work injuries it includes, and on the quality of the individual data (SWEA, 2005). The degree of coverage hinges both on formal limitations and on under-reporting of work injuries.

Accident statistics in Sweden vary over time. Before 2002, the reporting of accidents would also include occupational accidents that did not involve absence from work (which accounts for one tenth of reported accidents). This means that workers with minor injuries such as an acute tooth problem or trauma caused by an incident continued to work even if they were unwell (Samuelsson, 2010). However, a significant change occurred in 2002 when only occupational illnesses and occupational accidents involving absence from work of at least one day are recorded. These data also include accidents occurring to and from work. Administrative work has been reduced, even minimised. Furthermore, the new definitions and variables introduced allow data to harmonise with the EU accidents statistics classification making comparisons easier. This change was applied in 2003. However, due to the limitations in the dataset and the changing practices of reporting, a statistical analysis of the data would not result in any interpretable results. Nevertheless it can still be of interest to discuss the dataset using perspectives drawn from the literature, keeping the limitations in mind.

ANALYSIS OF TRENDS IN ACCIDENTS AND INCIDENTS FROM 2000-2010

The data discussed in this paper are based on construction activity under the F-classification of construction of NACE, refers to the *Statistical Classification of Economic Activities* in the European Community: construction of buildings, civil engineering and specialised construction activity. Due to poor reporting from certain member countries, the EU statistics after 2008 are unavailable.

FATALITIES

Prior to 2000, the national fatality rate in construction has been declining (Figure 2). The increase from 2001 was due to more active economic activity in construction leading to an annual increase of employed workers of more than 4 percent annually (Samuelsson, 2010). The highest number of fatalities was in 2008 with 14 cases when the construction activity was at its peak. When compared with performance across the EU, Sweden together with Denmark, Germany, the Netherlands, Finland, France and the United Kingdom have the lowest incidence rates with less than 0.02 fatal accidents at work per 1000 workers in 2008 (Eurostat, 2012). Romania tops the list with an average of 0.08 fatal work accidents per 1000 workers. The main causes of death over the past 10 years are loss of control (of objects, machines, vehicles and equipment) (25 cases), simple falls (slips, trips or stumbles) or falls from a height (20 cases), crushing (13 cases), electrocution (7 cases) and drowning (4 cases). Most of the victims were general workers (17 cases), carpenters and concreters (10 cases each).

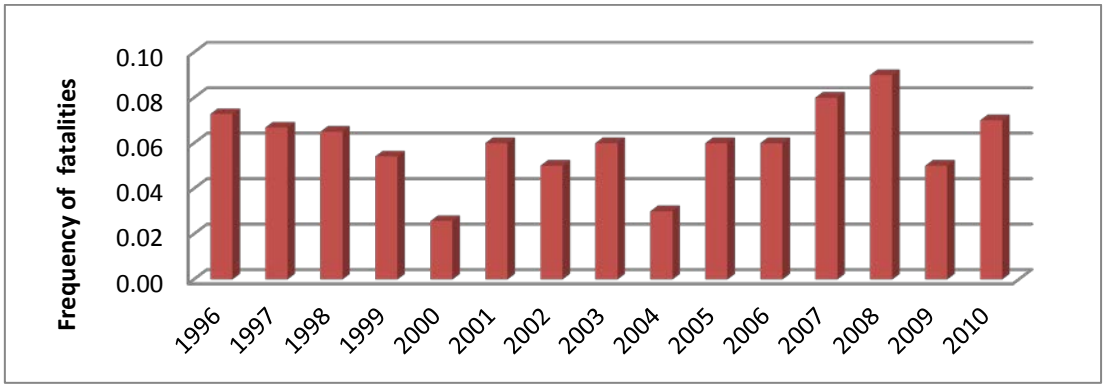

Figure 2. 15 year trend in construction industry incidence fatality per 1000 workers.

ACCIDENTS AND INCIDENTS

Figure 3 demonstrates the top four economic activities with more than 10 accidents cases per 1000 workers. While it can be observed that there is a declining trend in the accidents cases in all four industries, mining remains to be most exposed to physical risks.

Interestingly, countries like Sweden, Ireland and the United Kingdom have the lowest incidence rate for construction with an average of 18 cases per 1000 workers. Until 2007, the majority of member countries in the EU had an average of more than 55 accidents per 1000 workers (Eurostat, 2012). On a positive note, the accidents and incidences in the national construction industry continue to show a downward trend of 15 cases per 1000 workers in 2000 to 10 cases per 1000 workers in 2010. The lowest accident rate was in 2009 with 10.2 cases per 1000 workers (Samuelsson, 2010). According to BI, this lower figure is due to the domino effect of the world financial crisis (2008-2009) leading to a slowdown in the construction activity by 6 percent. By 2010, construction industry activity has return to its former levels which has seen an increase in the number of accidents by almost 10 percent. Surprisingly most accidents occur during

the months of October and November. There is no explanation as to why the statistics are higher over this period.

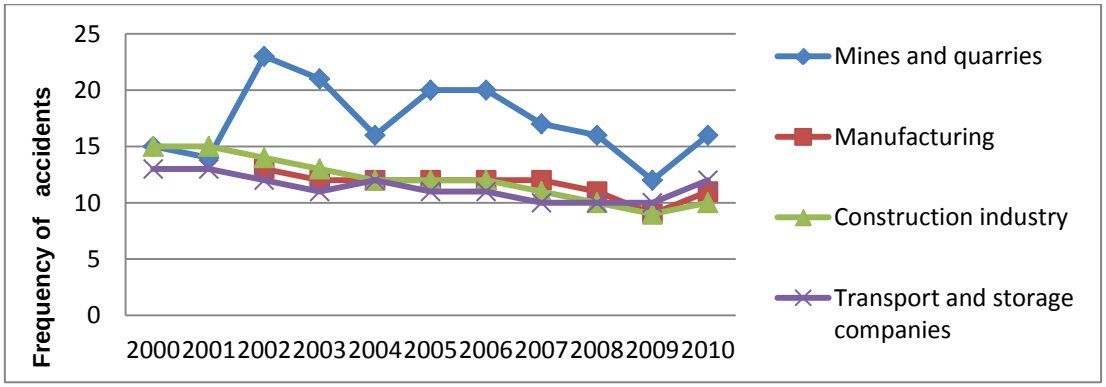

Figure 3. Industries with incidence rate of accidents of ≥10 cases per 1000 workers

ACCIDENT FREQUENCY BY OCCUPATION AND AGE

Overall, the age group under 25 years old is the one most exposed to accidents. The frequency seems to reduce as workers become older. This observation is in agreement with the study performed by Choudhry and Fang (2008), where they observed that less experienced workers are more prone to accidents than older workers. The authors claimed that workers gained more experience and are more aware of safety requirements which should mean fewer or no accidents. However, as in Figure 4, the older age group (over 60 years old) still engages in unsafe acts. Here, experience can be the culprit. Working over a long period of time means workers follow rigid routines which breeds complacency and reduces due care and attention while it increases confidence in one's ability to deal with any eventuality (Choudhry and Fang, 2008).

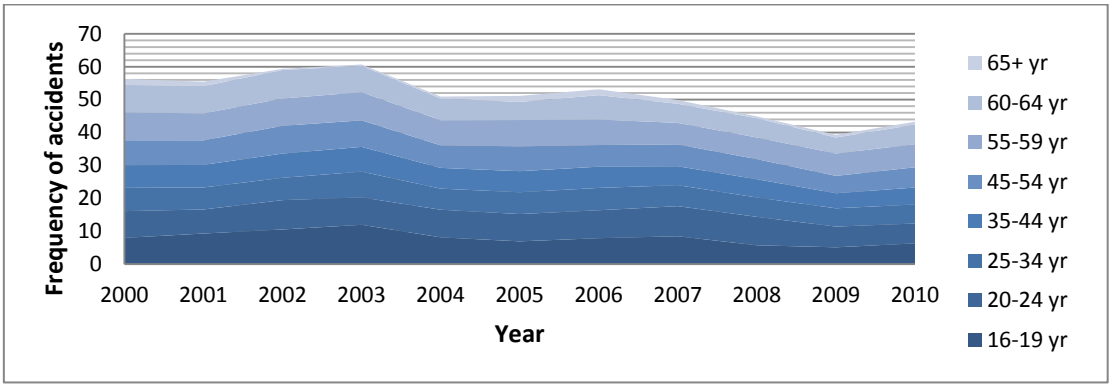

Figure 4. Incidence rate of accidents per 1000 workers by age group.

ACCIDENT CAUSES

Over the past 10 years, the most common events leading to non-fatal accidents were 'loss of control of machine, vehicle, equipment, object and others' (40 percent of cases), 'falls of persons' (25 percent) and 'body movement under or with physical stress' (19 percent) (Figure 5).

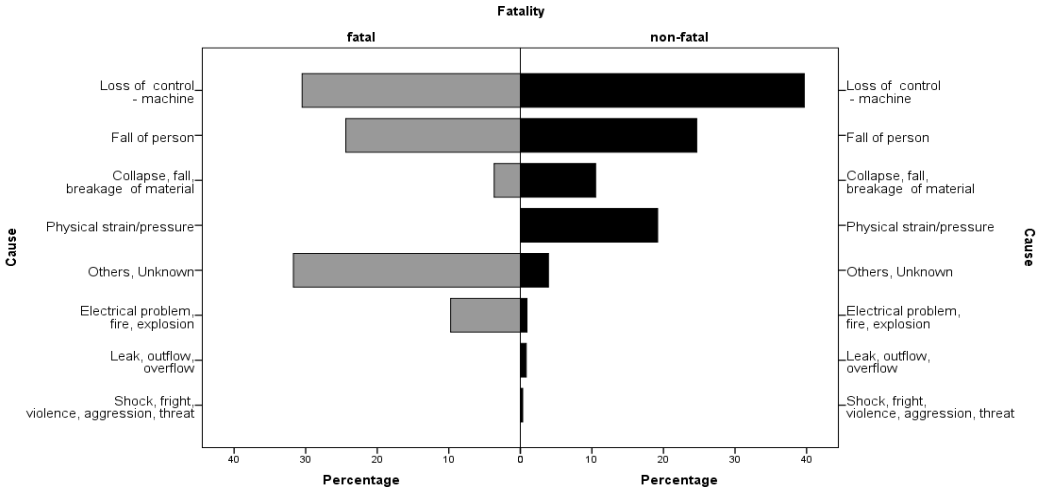

Figure 5. Percentage of accidents causes for fatal and non-fatal accidents.

For fatal accidents, the most common cause was ‘loss of control’ with 25 cases over the last 10 years. The less frequent causes included ‘electrical problems, explosion and fire’. However, these accidents were more often fatal than others, as they accounted for 10 percent of fatal cases and only 0.9 percent of non-fatal accidents. Unlike Sweden, in the EU, slips, trips and falls are the largest cause of accidents at work, accounting for 70 percent of causes of accidents (Eurostat, 2010). Sweden has managed to lower the number of accidents by fall to almost 23 percent compared with those in 2000. This is due to better attention and prevention being given to activities that attract risks of falling (including simple falls and falls from a height). However, accidents caused by ‘loss of control’ and ‘body movement under or with physical stress’ seem to have increased by 17 percent and 65 percent respectively in comparison with those in 2000. The ‘others’ category includes drowning and shearing of body parts. In 2010, carpenters were the trade group most involved in accidents caused by ‘loss of control’ (48 percent) and ‘fall of person’ (47 percent). The reason for this high statistics could be due to carpenters being the most highly employed trade in the construction industry (24 percent of all trade employed in construction in 2010, SCBb, 2011).

CONSEQUENCE OF ACCIDENTS AT WORK

As a direct consequence of accidents at work, the number of days when the victim is unfit for work provides an indication of the severity of the injury. Figure 6 demonstrates the total number of accident cases leading to absence from work per 1000 workers. In 2010, accidents leading to absence from work have increased up to 11 percent in comparison to 2009. Based on the 2010 accident statistics, workers in the age group between 35 and 54 years of age and in general, carpenters seem to be in the majority in this category. For non-fatal accidents at work resulting in more than three days of absence, the average cumulative duration of absence was 712 days in 2010, against 825 days in 2002. However, there seems to be an increase in absence from work between 1-3 days from 203 days in 2002 to 291 days in 2010.

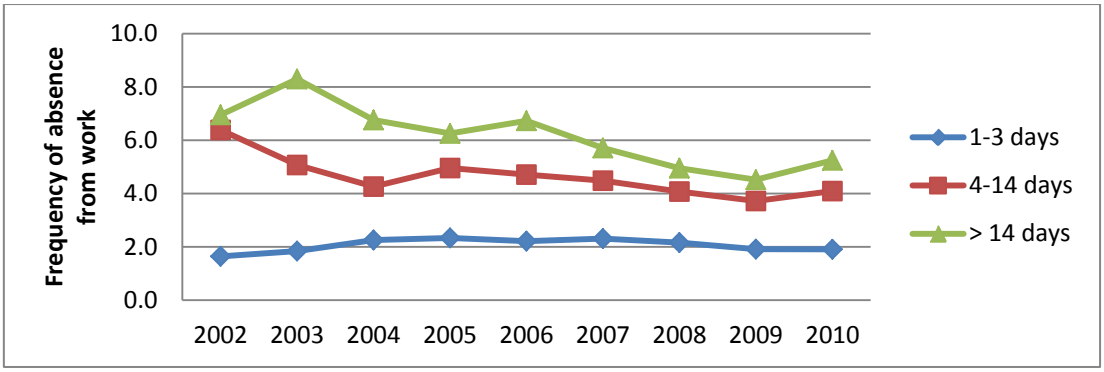

Figure 6. Incidence rate for absence from work per 1000 workers by category.
(*Data from 2000-2001 are excluded due to different classification system)*

Accidents/injuries result in substantial costs to society and injured workers may require long term medical attention or help. For example, absence from work for more than 14 days can either be temporary meaning the victim may need rehabilitation and re-training to return to work or permanent meaning the victim receives a sick allowance. The society has to bear all the costs including sick allowance, rehabilitation allowance, funds for occupational rehabilitation services, funds for company health and rehabilitation guarantee, activity and sickness compensation and disability benefits and compensation for labour and personal injury. In 2008 alone, the total sum paid out to support injured workers reached SEK108 billion (Edwards and Greasley, 2010).

DISCUSSIONS

The accidents profile discussed above does not suggest much, if any, ways to reduce or eliminate accidents. While accident frequency seems to be declining, the fatality record remains high with an average of 10 fatalities per year, instilling fear for workers' safety on construction sites. First and foremost, the level of reporting must improve. Since the data eliminates foreign companies, it does not portray the true situation of the working environment. Fatalities and injuries involving foreign companies or contractors go unreported. Additionally, the data do not include accidents with slight injury without absence from work (also known as zero accidents) as employers are not obliged to do so. The data also exclude cases where employers do not report for an injured worker who is absent from work for less than 14 days as the company pays 80 percent of the victim's salary the first 14 days. After 14 days, the social insurance manages the victim's welfare.

From the discussions on the causes of accidents, there seems to be a high repetition of the types of accidents cases. For example, shearing of body parts has been the cause of 22 fatalities for the past 10 years. The category 'loss of control' has the highest figure. Accidents involving 'lost control of equipment' and 'lost control of vehicle' exhibit a high level of repetition and seem to be increasing. According to Bird's accident triangle (Kunju Ahmad, 2000), for every fatality there are 600 near misses. Taking this analogy, the number of near misses waiting to happen with 11 deaths in 2010 could lead to 6,600 near misses! Measures such as the implementation of SAM (AFS 2001:01) have improved the ways construction companies manage health and safety at work. Currently, all companies are required by law to systematically manage health and safety at work through planning, implementation, improvement and control. By law, a Health and Safety Plan must be established identifying risks as early as possible, that is during the planning and design stage. The plan must also define how risks are to be managed and identify the person responsible to manage the risks. Safety coordinators, a new requirement introduced in both AML 1977:1160 and the Building and Civil Engineering Works

Provisions AFS 1999:03 are to have an active role during the design and construction phases. The appointed safety coordinator is also responsible for establishing the Health and Safety Plan. Since this requirement only took effect in 2011, there is no evidence yet of its effectiveness in reducing accidents at work.

Attention needs to concentrate on improving accidents caused by the 'loss of control' and 'body movement under or with physical stress'. These types of accidents are increasing over the years. The Health and Safety Plan must define actions to eliminate or minimize the causes. In terms of occupation, carpenters and concreters seem to be the most exposed to these types of accidents. To minimise exposure to hazards, improvement measures need to focus on these trades. Accidents and injuries are costly to both the society and the company. Aside from the direct monetary costs, the indirect 'costs' such as reduced morale of the worker and co-workers, impact on family relationships, diminished ability to perform family and social roles also needs attention (Seo, 2005). To reduce this cost to society and minimise human sufferings, it is important to examine the data to understand the root causes of occupational accidents. Accident trends need to convey more than merely numbers and figures. Accident statistics should be seen as a means to an end and not an end in itself (Abdelhamid and Everett, 2000).

CONCLUSIONS

The accidents profile or post-accident study measure the frequency of undesirable events and the severity of the events. Preventions of repetitious accidents are being managed, as derived by the investigation analysis. The annual accidents reports which only include activities which were directly and immediately involved in the accident (the 'what' and the 'how') and fail to look towards understanding the underlying factors (the 'why') limits its suitability. Even with a low reported accident rate, over a period of time, there is no guarantee that a site will be free of hazards. Hence, the statistics presented can be an unreliable and deceptive indicator of safety performance and such approaches do not evaluate project level safety performance effectively. Indeed they contribute little towards suggesting steps to prevent recurrence, and any learning from an accident becomes an expensive experience (physical and psychological damage) (Kunju Ahmad, 2000). Reactive measures rely on both the reporting of accidents and the efficiency of reporting. Employers both locals and foreign must be committed to report all accidents. Furthermore, it is hoped that the implementation of the EU CSD 92/57/EEC will help to improve health and safety on site. The introduction of the role of safety coordinators for the design and construction phases, if taken seriously, will help to coordinate, plan and monitor health and safety on site for all. Finally, since every accident is a reflection of the quality of management, it is important for companies to recognise that there is no single reliable measure of health and safety performance but rather a combination of both reactive and proactive measures.

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