

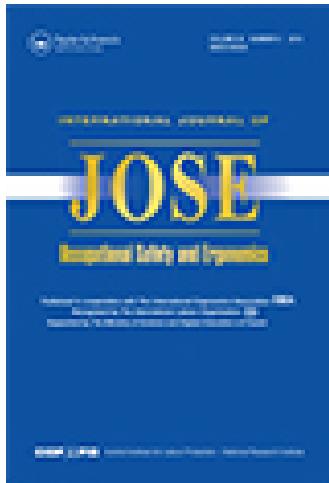
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# **Accidents in Malaysian Construction Industry: Statistical Data and Court Cases**

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*Safety and health issues remain critical to the construction industry due to its working environment and the complexity of working practises. This research attempts to adopt 2 research approaches using statistical data and court cases to address and identify the causes and behavior underlying construction safety and health issues in Malaysia. Factual data on the period of 2000–2009 were retrieved to identify the causes and agents that contributed to health issues. Moreover, court cases were tabulated and analyzed to identify legal patterns of parties involved in construction site accidents. Approaches of this research produced consistent results and highlighted a significant reduction in the rate of accidents per construction project in Malaysia.*

accidents    causes    statistical data    court cases    construction industry    Malaysia

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## **1. INTRODUCTION**

The construction industry has been identified as one of the most hazardous industries in many parts of the world, as measured by work-related mortality, workers' compensation, injury and fatality rates [1, 2, 3, 4]. Safety at work is a complex phenomenon and a subjective area of study. This is because industrial safety has undergone significant changes over the past decade [5]. However, the construction sector is notable as it continues to register a high rate of accident-related casualties. Construction workers who work within the construction industry face a greater risk of fatality than workers in other industries [6, 7].

To prevent accidents, one must know the causes of accidents in the working environment such as inherently hazardous construction projects [4], personal and project factors [8], and mechanisms or equipment that lead to accidents [9, 10]. Statistical data are necessary to identify the causes and agents of accidents in the Malaysian construction industry. The results would be more reliable than the

results of a common questionnaire survey in this area of research. Therefore, recorded data were retrieved for the years 2000–2009. The data were collected from the responsible local government agency, the Social Security Organization (SOCSO). This supports the first objective of this research, which is to identify the causes and agents of accidents in the Malaysian construction industry.

The construction industry is a complex practise by nature due to fragmented working processes, which involve many stakeholders. The responsibilities and obligations of each party tend to overlap during the course of accidents due to unclear provisions or regulations in construction contracts [11]. Legal liabilities need to be investigated and identified through court cases related to safety and health issues in the construction industry. This could suggest certain prevention techniques regarding causation patterns identified from the cases and descriptions of the accidents [12]. Thus, for the second objective, a different research approach is adopted to identify the legal patterns of

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construction safety and health through investigation of court cases. The results arising from the law are of utmost importance to all parties involved in construction projects.

Effective safety approaches and remedial actions may be taken to prevent and minimize reoccurrences in the future with help of factual statistical data. Moreover, participants in the construction industry have to learn and understand applicable legal rules. This research can provide sources for them to explore and understand legal issues regarding safety and health, and their legal liabilities and obligations. The combined results demonstrate the behavior and patterns of safety and health issues in construction sites. Ultimately, this may strengthen awareness and moral obligations on safety and health issues in the Malaysian construction industry.

## 2. HAZARDS

The inherent hazards and the nature of the job performed by workers contribute to occupational injuries [13]. There are three types of hazard which need to be recognized and controlled in all industries, especially the construction industry: chemical, physical and biological [14]. Physical hazards can cause direct injury or internal bleeding to a worker on a site [15]. Negative attitudes and behavior discourage many workers from putting on their personal protective equipment while working on site [16]. Inconvenience is another reason for not putting on protective equipment. Nowadays, contractors, who rely on insurance, tend to pass on most of the responsibility for damages and liability to an insurance company [17]. Secondly, poor communication and coordination between management and employees are causes of accidents [18, 19, 20]. Workers often come from various countries. Some do not speak or understand the local language. As a result, safety committees face difficulties in communicating hazard areas and potential accidents that may occur at the site [21].

Moreover, workers' tasks are repetitive in the construction industry. The construction industry also involves extensive movement of site workers within a workplace. The more movement there is

within the site, the greater the possibility that accidents will arise [4]. The situation becomes worse for a more complex design of a building [22]. More complexity in a design tends to involve a greater likelihood of accidents in a workplace, such as falls [23]. Besides, a construction project involves structural, architectural, bricklaying and plumbing work, and monitoring and evaluation. Each kind of work is performed by a specialized group of workers. Workers are trained in a specialized construction; other types of equipment that are available might not be familiar to them. Moreover, workers tend to apply the same knowledge and techniques even when the nature of the project is different [24]. Hence, there are many potential causes of injury to workers in a workplace [4]. The construction site consists of a lot of sophisticated tools and equipment. Qualified personnel only can operate this equipment. Many nonqualified operators suffer injuries caused by improper handling of equipment. This is because an unqualified practitioner is not able to analyze a situation and respond accordingly [21].

## 3. LEGAL LIABILITIES

Every worker involved in a construction process must understand their rights and liabilities. The law facilitates the management of safety and health in a workplace [5]. If an individual breaks the law, they will be the one personally liable for the consequences of their actions. The main distinction in terms of liability here is between civil and criminal liability. Civil liability gives a person rights to obtain redress from another person, e.g., the ability to sue for damages for personal injury [25]. For there to be an award of damages, the injured party has to suffer an actual loss, be it personal injury, property damage or financial loss arising from tort or contract law. Criminal liability is a more serious offence that involves imprisonment and more serious punishment. With construction-related safety and health issues, criminal liability mainly falls into areas of gross negligence and recklessness such as harm to an individual or society [26]. This area of criminal liability is not a major concern of this

research, the scope of which concentrates on civil liability as the normal scenario in Malaysia. Moreover, civil courts are better at appraising appropriate financial sanctions compared to criminal systems [27].

#### 4. RESEARCH APPROACHES

This research adopted two research approaches from quantitative and qualitative analysis. Factual statistical data and court cases were separated into groups for analysis. Qualitative data of court cases were converted into quantitative data to make the analysis easier and more comprehensible in the form of bar charts, rather than in a descriptive form.

#### 5. STATISTICAL DATA

In 2000–2009, SOCSO reported 656 555 accidents in all industries (6.5% of all accidents in industries) and 42 775 accidents in the Malaysian construction industry. The data were retrieved from the hardcopy of annual reports for the years 2000–2009 in SOSCO's head office. Yet, the online version was available and uploaded in the website from 2009 onwards [28]. Figure 1 shows the total number of accidents by gender. The mean number of accidents for male was 3894 and for female was 384. Out of the total number of accidents, 890 were fatalities cases and 5985 were permanent disablement. Figures 2–3 show the number of death and permanent disablement cases by gender. The number of accidents and the

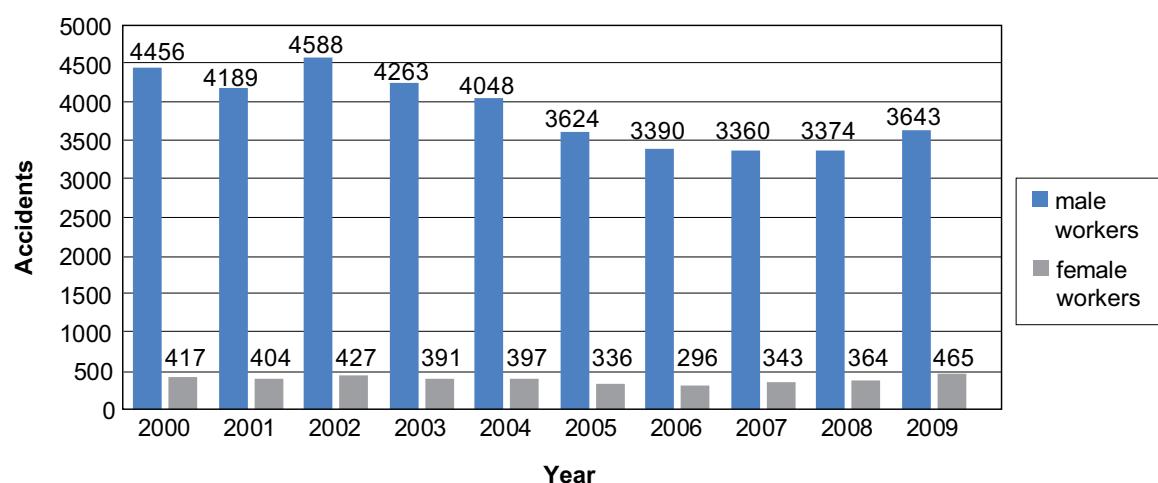


Figure 1. Accidents by gender (2000–2009).

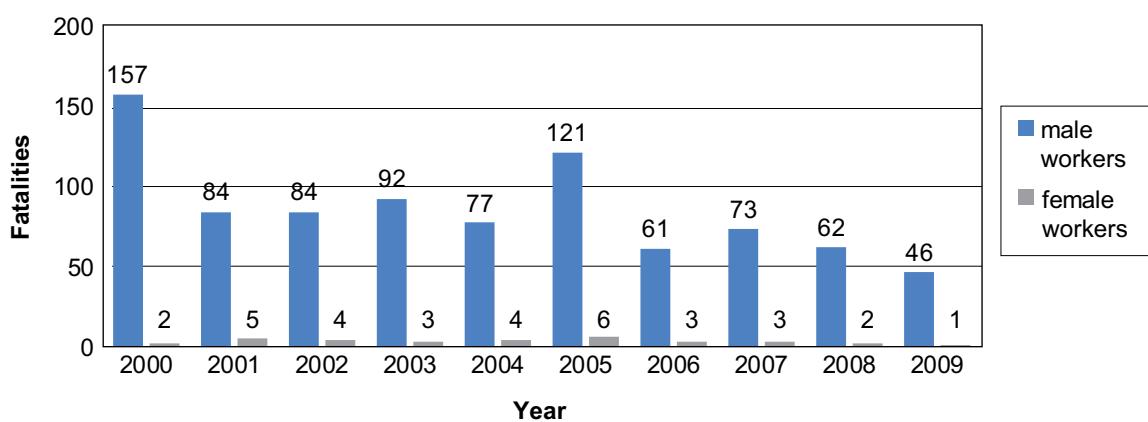
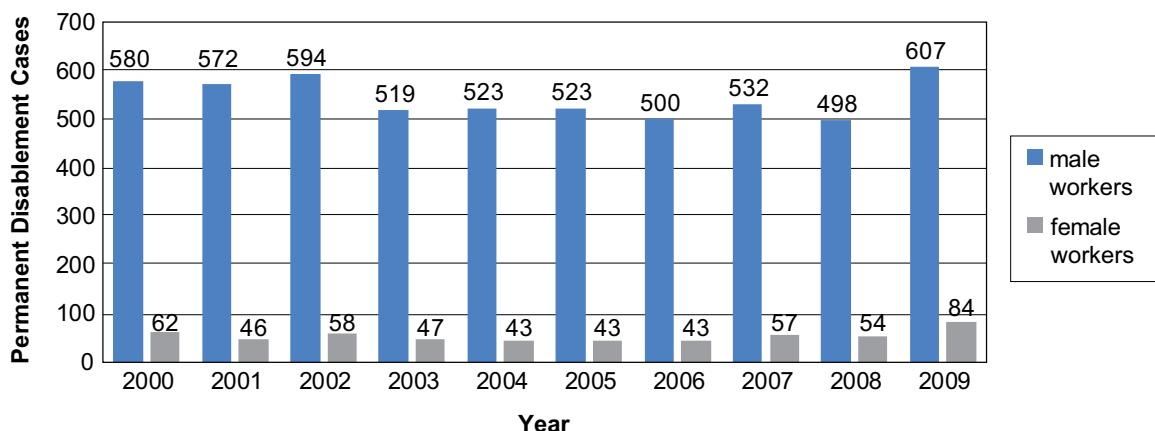


Figure 2. Death cases by gender (2000–2009).

**Figure 3. Permanent disablement cases by gender (2000–2009).**

permanent disablement cases have a similar ratio by gender, where there were less cases for female workers than for male workers. The number of death cases decreased overall and involved fewer female workers only compared to male workers.

Most reported cases involved male workers because of the relatively low number of female workers on construction sites. Table 1 shows the number of construction workers in 2000–2009. Only 9% of the total number of construction workers were female workers; according to the classification of the Department of Statistics Malaysia of female (95 000 in 2010 and 103 300 in 2011) and male workers (987 700 in 2010 and 1 030 300 in 2011) in the construction industry [28].

**TABLE 1. Construction Workers (2000–2009)**

Year	No. of workers
2000	759.900
2001	829.800
2002	905.100
2003	942.500
2004	890.800
2005	904.400
2006	908.900
2007	922.500
2008	998.000
2009	1015.900

### 5.1. Agents of Accidents

Table 2 shows agents of accidents in the Malaysian construction industry. Agents such as floor and wall openings, stairs and confined spaces in the working environment category caused most

accidents (17 106). U.S. Washington State's Department of Labor and Industries defines a floor opening as a ~31 cm or more opening in a floor, roof or platform, while a wall opening is a ~76-cm-high and ~46-cm-wide opening in a wall or partition through which persons may fall, e.g., a window [29].

Accidents with trucks are extremely critical (11 622 reported cases). Trucks are commonly used for transporting loose material such as sand, dirt or gravel for the construction industry [30]. They also deliver materials from suppliers to job sites, including reinforcement bars, bricks, tiles, timber and others. A recent study found that the number of fatal accidents of heavy vehicle drivers aged 21–24 was higher than that of drivers aged 60 and over [31]. The older the driver is, the

**TABLE 2. Agents of Accidents (2000–2009)**

Agent	Reported Cases
Working environment	17 106
floor and wall opening	6774
stairs	6036
confined space	4296
Transport and lifting equipment	12 570
truck	11 622
tower crane	653
lift	295
Other equipment	4205
ladder and mobile ramp	3386
scaffolding	819
Machines	682
earth moving machines, excavating and scraping machines	682

lower the fatality rate. Driver fatigue is also a leading contributor to roadway crashes. In general, fatigue affects driving performance and attention, and the driver may fall asleep while driving. Drivers may have an inadequate amount of sleep because of prolonged working hours, which cause fatigue [32]. Most cases of struck-by accidents happened when a truck or dump truck was reversing [33]. Most fatalities were caused by vehicles without a reversing alarm.

## 5.2. Causes of Accidents

Factual statistical data on causes of accidents were investigated after examining the backgrounds and agents of accidents. Table 3 shows causes of accidents for 2005–2009 according to SOSCO data. Figure 4 summarizes data on accidents caused by various causes. The data provided certain references and knowledge on the causes of accidents as data for the past 5 years could not be compared to the 10 years' data on the agents of accidents.

**TABLE 3. Causes of Accidents (2005–2009)**

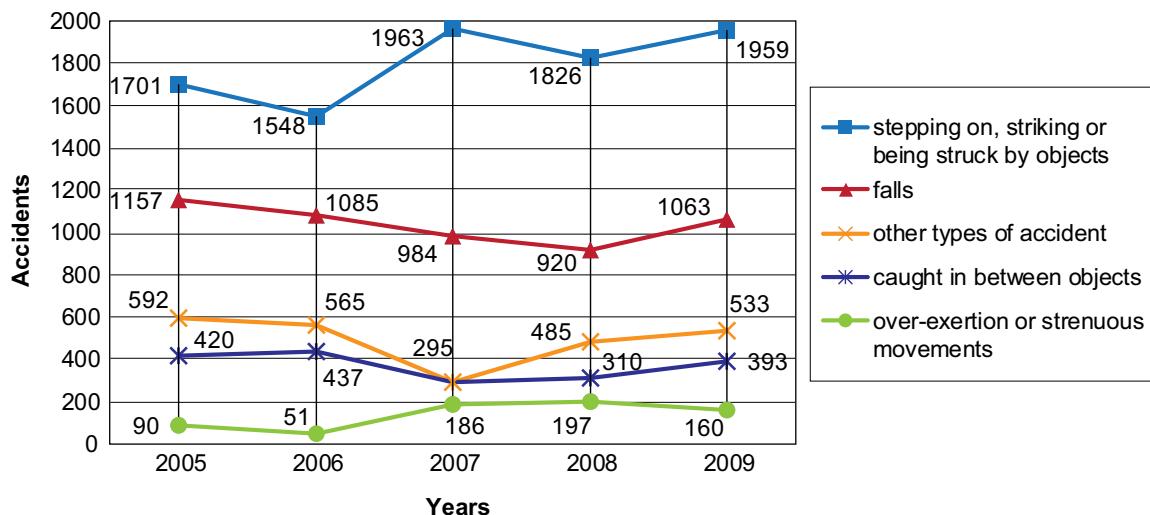
Causes	Reported Cases
Stepping on, striking against or struck by object	8997
Falls	5209
Other types of accidents	2450
Caught in between objects	1855
Overexertion or strenuous movements	684

The most common type of accident is stepping on, striking against or being struck by objects, which happens when moving construction equipment strikes or runs over workers. In 2005–2009, there were 8997 accidents. Figure 4 shows a continuous increase in the number of accidents. According to the results, trucks are a top agent in the Malaysian construction industry.

Falls are a critical cause of accidents with an annual average of 1042 cases in Malaysia. Previous studies also pointed out that falls were the most common type of accident in the construction industry [34]. According to the Occupational Injury and Illness Classification Manual, falls can be grouped into 11 categories [35]:

- falls from stairs or steps;
- falls through existing floor openings;
- falls from ladders;
- falls through roof surfaces;
- falls from roof edges;
- falls from scaffolding or staging;
- falls from building girders or other structural steel;
- falls while jumping to a lower level;
- falls through existing openings;
- falls from floors, docks or ground level;
- other nonclassified falls to lower levels.

The third highest group of accidents is the group including other nonclassified types of accidents such as structure collapse, electrocution, fire, drowning, explosion and toxification. This



**Figure 4. Causes of accidents (2000–2009).**

group has an average of 490 reported cases per year.

Accidents involving being in between objects were reported 371 times per year (1855 in total for 2005–2009). These accidents were usually caused by being buried inside a hole or trench. In most situations, the soil collapsed and trapped workers. This kind of accident attracts attention of the public.

Overexertion or strenuous movements are another type of accidents in industry. A compressed work program and delays in a project schedule are the reasons of accidents. Figure 4 shows that the number of accidents caused by overexertion or strenuous movements increases (137 cases on average each year).

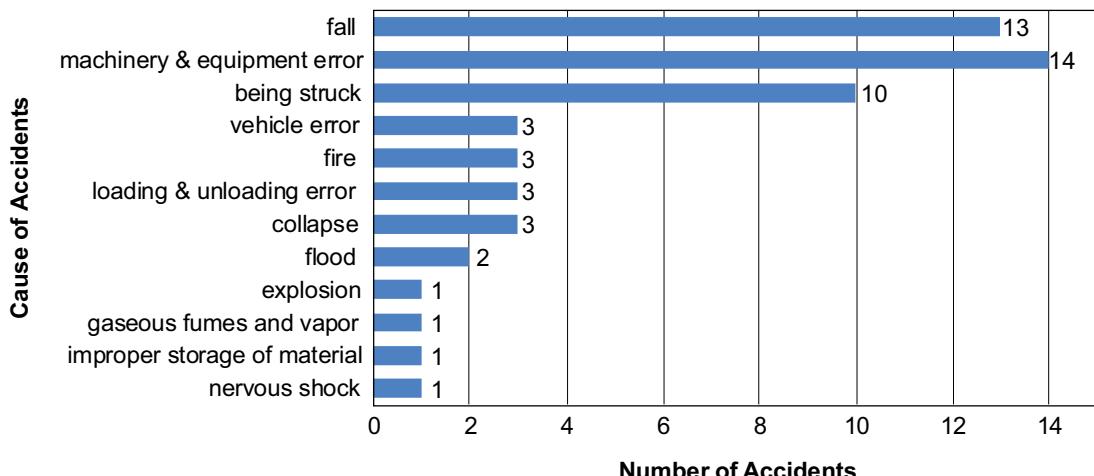
## 6. COURT CASES

Data on 30 court cases were retrieved from the Malayan Law Journal and related reports in Lexis-Nexis. Selected court cases were related to Malaysian construction safety and health issues in 1961–2011. Most court cases were civil suits (12 cases). Cases which were brought to the Court of Appeal and Supreme Court were the least numerous (two cases in each court). Cases brought to the Federal Court and the High Court of Malaysia were nine and five, respectively. There were 14 claims involving an employee (plaintiff) and an employer (defendant). There were seven cases in which the employer claimed

or appealed against the employee. There was one case from other allegations between the parties such as the subcontractor and contractor, licensee and occupier, occupier and employee, etc. These cases could be categorized into four levels of injuries, i.e., minor injury, major injury, disablement and death. The cases with different levels of injuries are broadly similar. There were seven cases of minor injury, seven cases of disablement, seven cases of death and nine cases of major injury. Within 30 cases, the proportions of both plaintiffs and defendants winning their cases were almost even with 12 and 11 cases, respectively. Seven cases were upheld by the courts as contributory negligence. Contributory negligence is a partial defence to a claim brought against a construction professional. The professional may have been in breach of duty but may also be able to argue that the claimant was partially the author of misfortune by failing to take reasonable care to protect themselves [36]. Therefore, both a plaintiff and a defendant have to bear the responsibility of the consequences but with a different proportion of responsibilities, depending on the circumstances and evidence.

### 6.1 Causes of Accidents

Figure 5 shows causes of accidents at the construction site. Nine causes were categorized and analyzed. Accidents caused by incorrect use or poor maintenance of material and equipment were the most common (14 cases), followed by



**Figure 5. Causes of accidents in Malaysia.**

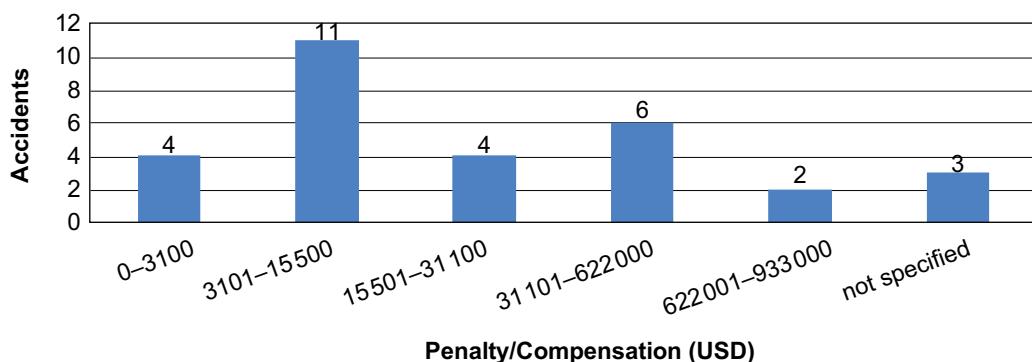
falls (13 cases), being struck (10 cases) and accidents caused by collapse of building structures (3 cases). The results are similar to the statistical data obtained from SOSCO, which confirmed and strengthened the analysis of causes of accidents in the Malaysian construction industry [28].

## 6.2. Penalties and Compensation

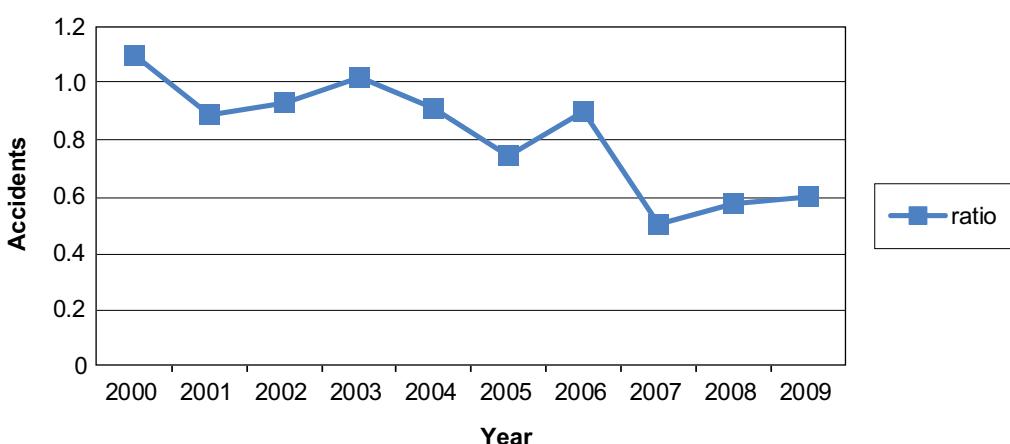
Figure 6 illustrates the range of penalties and compensation which was calculated and determined in the various judgements by courts of Malaysia. The party that was held liable would have to pay the amount to the other party. The penalties tend to be monetary compensation. The most common amount of compensation ranged from 3101 to 15 500 USD and was charged in 11 out of 30 cases. In two case only compensation ranged from 622 001 to 933 000 USD. Penalties were not specified in three cases.

## 7. DISCUSSION

The factual statistical data retrieved from the Department of Occupational Safety and Health (DOSH) cannot indicate the actual and absolute construction safety and health scenario in Malaysia. The number of reported accidents needs to be compared with the total number of construction projects in an individual year. This could demonstrate trends and an accurate ratio of accidents in the Malaysian construction industry. The database on construction projects was retrieved from the Construction Industry Development Board (CIDB), which registers all construction projects in Malaysia. The construction projects are categorized as residential projects, nonresidential projects, mixed developments, social amenities, infrastructure and others. Figure 7 shows the ratio of the total number of accidents recorded by DOSH compared to the total number of projects registered in Malaysia by CIDB in 2000–2009.



**Figure 6. Penalties and compensation charged in Malaysian cases.**



**Figure 7. Accidents compared to total number of projects.**

The number of accidents increased within 10 years and amounted to 0.82 accident per project. The highest accident rate in construction projects was in 2000 with 1.10 cases per project. Then, the accident rate began to decrease until the lowest point in 2007 with 0.5 accident per project; the possibility of an accident was 50%. The accident incident rate (total number of accidents  $\times$  200000/h worked by all employees) decreased from 0.64 to 0.40 in 2000–2009. Meanwhile, fatal accident rate (number of fatalities  $\times$  10<sup>8</sup>/total h worked by all employees) also significantly decreased from 10.5 to 2.31 over 10 years of 2000–2009. The number of permanent disablement cases remained high (642 cases in 2000, 691 cases in 2009) and was further investigated. This was the limitation of this research. The trend in construction safety and health is improving and heading in a positive direction according to the overall analysis of 2000–2009. There is an improvement in safety effectiveness in the Malaysian construction industry, which is the result of the growth and establishment of enacted laws and regulations, professional practises, safety policies, and defined management plans and strategies.

The second approach of this research was based on analysis of court cases under the statute law and included common law jurisprudence. All employers are obliged to protect their employees under common law. This extends into all employment contracts and employers' responsibility to take care of their employees' safety and health. Employers will be liable for their negligence, vicarious liability and contributory negligence. An employer is obliged to provide a safe place of work, to provide and maintain a safe system of

work, provide adequate equipment, and recruit competent and safety-conscious staff. If an employer fails to take reasonable care in any of these areas, an employee has certain legal claims and may be able to resign and claim constructive unfair dismissal and personal injury. Meanwhile, an employer, as the occupier of the premises, has both physical possession and control over the area where workers are working at the time of the accident and if it is proved that an employer had breached statutory duty, his employer may be liable for contributory negligence.

The approaches of this research influence the behavior and trends of construction safety and health issues in Malaysia. Most causes of accidents belong to two categories: striking against or being struck by objects. These two categories require further discussion and examination.

A cross-examination with other countries was also carried to have a clear reference point or to see a trend for Malaysian construction safety and health. The comparison was based on the cases reported in DOSH against the results from the existing literature. Table 4 shows a comparison of the total number of cases of striking against or being struck by objects, and falls. The number of reported accidents was high in various countries in categories striking against or being struck by objects, and falls. The findings show that striking against or being struck by objects ranked higher than falls in Taiwan, Spain, New York and Malaysia, but not in Korea and China. Nevertheless, these two causes are the most dangerous hazards in construction accidents in all countries. This shows that over 50% of all accidents in industry were related to these two categories,

**TABLE 4. Comparison of Accident Categories: Striking Against or Struck by Objects and Falls**

Study	Country	Year	Striking Against or Struck by Objects (%)	Falls (%)	Total Accidents or Cases Investigated
Tam, Zeng & Deng [37]	China	1999	24.2	48.4	2319
Mohan & Zech [38]	USA <sup>1</sup>	1990–2001	43.3	18.7	2161
Lopez, Fontanada & Alcantara [39]	Spain	1990–2000	40.4	20.9	630 452
Im, Kwon, Kim, et al. [40]	Korea	1997–2004	16.8	54.1	4333
Cheng, Lin & Leu [3]	Taiwan	2000–2007	73.0*	59.0*	1347
No study	Malaysia	2005–2009	46.9	27.1	19 195

Notes. \*overlapping areas; 1 = data for New York, NY.

even though the statistical results varied in terms of data collection and years. The results confirm that the causes of accidents in the Malaysian construction industry are similar to the causes of accidents in other construction industries. Thus, a continuing search for innovative and effective safety management plans or precaution methods is necessary for the whole construction industry, particularly for these two categories of accidents.

## 8. CONCLUSIONS

The analysis of statistical data and court cases contributes to safety and health in the Malaysian construction industry. The research outcomes of the approach complement each other. The causes of construction accidents are mainly striking against or being struck by objects, and falls but the judgments of court cases are even for plaintiffs and defendants, and involve critical injuries and death issues.

Certain limitations and recommendations need to be highlighted. The limited number of court cases provides a better perspective of safety and health issues. It does not represent the whole litigation behavior. Statistical data should be investigated because of changes in technologies and practises in the construction industry. Therefore, the actual situation of construction safety and health issues could be identified. This is a limitation of this research. Nevertheless, the combined results meet the research objectives by identifying the factual root causes of site accidents and the legal patterns of the parties involved in the Malaysian construction industry.

The findings could help to raise safety awareness and provide useful references for further effective safety precautions and management plans (root causes of construction accidents, construction related legislation). The results can help to improve the working environment and productivity in Malaysia construction industry.

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