

A34	1	4	4	
A19	1	4	4	
A16	1	4	4	
A37	1	3	3	
A30	1	3	3	
A44	1	1	1	
A43	1	1	1	
Average			12.2	

CONCLUSION

Although the Korean construction industry has been carrying out a variety of prevention activities in regards to construction accidents, it still accounted for about 30% of the total number of industrial accidents. There has been no significant improvement when compared to the 1990s. The current number of accidents show the limitations of the existing methods used for prevention of construction accidents. Therefore, it is necessary to take a new approach to prevention methods for construction accidents [11].

This study built a risk assessment model and evaluated the degree of risk of accidents during construction to enhance the effectiveness of construction management safety.

The main results of the study are as follows.

(1) This study analyzed 49 causes of accidents occurring on construction sites in Korea from 2006 to 2015 and classified them under the 4M categories: Man, Machine, Media and Management (Table 6). There were 10 accidents that fell under the category Man. These accidents were caused by unsafe behavior of the workers. There were 6 accidents that fell under the category Machine, which contains physical risks that cause unsafe conditions. There were 7 accidents that fell under the category Media which contains accidents related to the work environment such as noise, dust and toxic substances. Lastly there were 26 accidents that fell under the category Management, which consists of accidents caused by administrative errors. Out of the 49 accidents 53.1% were caused by Management so it was determined that protective safety management plans need to be more strictly enforced.

(2) When looking at degree of risk according to the cause of the accident, it was determined that the following 8 risk factors were responsible for highest number of accidents: 'Inappropriate maintenance of temporary structure (A33)', 'Inappropriate control of working system (A35)', 'Unsafe behavior by workers (A38)', 'Inadequate conditions above ground and underground(A40)', 'Unfavorable climate conditions(A41)', 'Improper judgement of tasks, underestimation or overvaluation (A45)', 'Lack of experience designing projects (A48)' and 'Inappropriate recognition and assessment of on-site risk factors (A49)'.

(3) Looking at the risk composition rate of the 49 accidents, the degree of risk '16' accounted for the largest rate with 30.6%. Next, the degree of risk 20 accounted for (16.3%), the degree of risk 4 (14.3%), the degrees of risk 8 and 12 (12.2%), the degree of risk 3 (8.2%) and degree of risk 1 (6.1%) in that order. Out of the 49 causes of the accidents, the accidents with risk factors requiring priority management (anything with a degree of risk over '9') were 28 and they accounted for 59.1% of the total (Figure 3).

(4) Among the 4M categories the category containing the most risk factors requiring priority management was Management. 17 out of 26 accidents were caused by risk factors requiring priority management. Looking at accidents falling under the category Man, 8 out of 10 were caused by risk factors requiring priority management. In the case of the category Machine, 2 out of the 6 accidents were caused by risk factors requiring priority management and for the categoryMedia, 2 out of the 7 accidents were caused by risk factors requiring priority management.

(5) The results of the study show that in order to prevent construction accidents it is necessary to improve management techniques. This might include deploying additional workers for safety management, strengthening safety education of management etc. In addition, it is necessary to control the timing, frequency and level of supervision according to the degree of risk. It is possible to maximize the efficiency of construction safety management techniques by requiring intensive management of high risk work.

ACKNOWLEDGEMENT

This study was supported by research fund from Songwon University.

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