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SHORT COMMUNICATION

Accidental Risk Analysis of Highway Construction Sites and its Safety Management Strategies

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Abstract

This study presents the quantification of accidental risk of highway construction and the expected model provides a suitable, dependable and well-organized tool that helps in classifying, scrutinizing and supervision of accidental risks in a highway construction project. The study model enables to know the strategies that suggest accident deterrence, accident reposition and future suggestion. Collection of data is based on survey of five highways construction projects namely Afcon Infrastructure Ltd., Mumbai, Apco Infratech Ltd., Purnia (Bihar), Punj Lloyd Ltd., Udaipur, L&T, Faridabad, NCC Ltd., Agra. This study investigated and evaluated the accidental risk and develops safety management guidelines to the company which can be adopted at the highway projects for better and accident free construction work.

Keywords: Accidental risk, highway construction, survey methods, safety management guidelines.

Introduction

As the highway system ages, the Indian and State government agencies have been fluctuating their capital emphasis to preservation, reintegration and advancement of the prevailing highway systems. More and more highway work zones have established a predictable commotion on consistent traffic flows, which has caused in unadorned traffic safety problems. The safety in work zones although keeping maximum application of highways has become one of the irresistible challenges that traffic engineers and scholars have to challenge. Nationally, great efforts have been devoted to improve the safety and mobility of work zone traffic (FHWA, 1998). Many State departments of transportation have subsidized numerous projects to progress work zone safety in their states. Other worried organizations or research groups have also contributed in this operation and dedicated their assistances by directing expressive researches on numerous work zone safety issues. Irrespective of these exertions, there is little suggestion of noteworthy enhancements in work zone safety countrywide. Annual work zone fatalities rose from 740 in 1999 to 988 in 2003 (Adeli and Ghosh-Dastidar, 2004). The upsetting numbers designate an essential for refining every work zone-safety connected field, counting traffic regulator and evidence, project management, public education. Highway work zone fatal qualifies investigators to classify exclusive work zone safety problems. Therefore, operative guidelines could be settled to save lives of both construction workers and highway users (Fisher and Rajan, 1996). With this motivation, in this study, features of the accidental risk of the highway projects were investigated. Results of the study could be established to develop safety guidelines in near future.

Materials and methods

Collection of data: Collection of data is based on survey of five highways construction projects (a) Afcon Infrastructure Ltd., Mumbai, (b) Apco Infratech Ltd., Purnia (Bihar), (c) Punj Lloyd Ltd., Udaipur (Rajasthan), (d) L&T, Faridabad, and (e) NCC Ltd., Agra.

Questionnaire: The companies were provided with a set of questionnaire factors that includes number of person injured or fatality during three years of project duration. The factors includes accident occurs due to workers who operates construction vehicles, equipment accident injury due to overturn, vehicles collision, being caught in running equipment, highway accident occur from the movement of construction vehicles and equipment in the highway work zones, auto accident caused by passing motorist, Flaggers and other workers on foot are exposed to even higher risk of being struck by an auto or construction equipment if they are not visible to motorist or equipment or equipment operators, Highway accidents happen because workers work in condition of low lighting, low visibility and inclement weather, Highway construction work in congested area and Highway projects with exposure to high automobile traffic and speeds.

Questionnaire sample for three years of highway projects:

1. Number of person injured due to vehicles collision?
2. Number of person being caught in running equipment?

Table 1. Accidental risk factors-Afcon Infrastructure Ltd., Mumbai.

S. No.	Factors	1st year	2nd year	3rd year	Mean value
1.	No. of person injured due to vehicles collision?	3	3	1	2.3
2.	No. of person being caught in running equipment?	2	3	2	2.3
3.	No. of person injured due to workers who operates construction vehicles?	1	0	0	0.3
4.	No. of person injured due to the movement of construction vehicles and equipment in the highway work zones?	0	0	0	0
5.	No. of person injured due to low lighting?	1	0	1	0.6
6.	No. of person injured due to low visibility?	0	0	1	0.3
7.	No. of person injured due to construction work in congested area?	4	2	1	2.3
8.	No. of person injured due to exposure to high automobile traffic and speeds?	6	4	3	4.3

Table 2. Accidental risk factors-Apco Infratech Ltd., Purnia, Bihar.

S. No.	Factors	1st year	2nd year	3rd year	Mean value
1.	No. of person injured due to vehicles collision?	4	2	1	2.3
2.	No. of person being caught in running equipment?	1	1	3	1.6
3.	No. of person injured due to workers who operates construction vehicles?	0	0	2	0.6
4.	No. of person injured due to the movement of construction vehicles and equipment in the highway work zones?	0	1	0	0.3
5.	No. of person injured due to low lighting?	2	1	0	1
6.	No. of person injured due to low visibility?	1	1	0	0.6
7.	No. of person injured due to construction work in congested area?	3	3	2	2.6
8.	No. of person injured due to exposure to high automobile traffic and speeds?	4	4	3	3.6

3. Number of person injured due to workers who operate construction vehicles?
4. Number of person injured due to the movement of construction vehicles and equipment in the highway work zones?
5. Number of person injured due to low lighting?
6. Number of person injured due to low visibility?
7. Number of person injured due to construction work in congested area?
8. Number of person injured due to exposure to high automobile traffic and speeds?

Statistical analysis: The data was collected from all the five companies for the questionnaire and the mean value was tabulated.

Results and discussion

Table 1 to 5 shows the representation of the mean value of the accident occurs on highway projects among the studied companies. The Tables clearly indicate that the accident occurs due to the exposure to high automobile traffic during construction, construction work in congested area, vehicles collision and accidents caught in running equipment are higher as compare to other factors. Therefore, there is an urgent need to look after the factors which causes more accident on the highway construction projects. The factor which have low accident rate should not be taken lightly but it should also be treated as same as the factors having high accident rate. The main reason behind the high rate of accident for the above factors is obvious and low level of awareness and education.

This study enables to create high level safety and awareness program so as to minimize the accident rate as far as possible (Burnette and Moon, 1999).

Conclusion

From the above study it is found that if proper attention and safety management strategies are not applied at the highway construction projects there will be higher accident rate and loss of life, property etc. (FHWA, 2003). The study also concludes that safety management is essential for highway construction activities in curtailing losses and improving efficiency. The supplementary commendations can be provided as safety management strategies founded on this study and from other sources:

1. Including safety management as an important part of every highway construction projects.
2. Developing code of practices, manual on safety, poster presentation and public workshop for every highway construction projects (DPW, 1965).
3. Improved traffic control is the most direct method to reduce highway work zone fatalities.
4. The fact that most accidents were caused by human errors also specifies the insistence of emerging actual education programs to educate the general public who have to travel through the work zones.
5. Effective speed control devices and speed limit enforcement, traffic control enforcement and avoiding confusing traffic control signs/signals and effective speed control devices and speed limit enforcement (Fisher and Rajan, 1996).

Table 3. Accidental risk factors-Punj Lloyd Ltd., Udaipur (Rajasthan).

S. No.	Factors	1st year	2nd year	3rd year	Mean value
1.	No. of person injured due to vehicles collision?	6	2	1	3
2.	No. of person being caught in running equipment?	2	1	1	1.3
3.	No. of person injured due to workers who operates construction vehicles?	0	1	1	0.6
4.	No. of person injured due to the movement of construction vehicles and equipment in the highway work zones?	1	1	1	1
5.	No. of person injured due to low lighting?	0	1	1	0.6
6.	No. of person injured due to low visibility?	1	1	0	0.6
7.	No. of person injured due to construction work in congested area?	3	3	2	2.6
8.	No. of person injured due to exposure to high automobile traffic and speeds?	8	5	2	5

Table 4. Accidental risk factors-L&T, Faridabad.

S. No.	Factors	1st year	2nd year	3rd year	Mean value
1.	No. of person injured due to vehicles collision?	2	1	3	2
2.	No. of person being caught in running equipment?	3	2	2	2.3
3.	No. of person injured due to workers who operates construction vehicles?	1	1	1	1
4.	No. of person injured due to the movement of construction vehicles and equipment in the highway work zones?	1	0	2	1
5.	No. of person injured due to low lighting?	2	1	1	1.3
6.	No. of person injured due to low visibility?	1	1	1	1
7.	No. of person injured due to construction work in congested area?	3	3	2	2.6
8.	No. of person injured due to exposure to high automobile traffic and speeds?	4	4	5	4.3

Table 5. Accidental risk factors-NCC Ltd., Agra.

S. No.	Factors	1st year	2nd year	3rd year	Mean value
1.	No. of person injured due to vehicles collision?	2	4	2	2.6
2.	No. of person being caught in running equipment?	3	3	2	2.6
3.	No. of person injured due to workers who operates construction vehicles?	1	1	1	1
4.	No. of person injured due to the movement of construction vehicles and equipment in the highway work zones?	1	0	1	0.6
5.	No. of person injured due to low lighting?	1	1	2	1.3
6.	No. of person injured due to low visibility?	1	2	1	1.3
7.	No. of person injured due to construction work in congested area?	3	3	4	3.3
8.	No. of person injured due to exposure to high automobile traffic and speeds?	7	3	5	5

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