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HEALTH AND SAFETY IN THE CONSTRUCTION INDUSTRY

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ABSTRACT: ***The Indian society have suffered human losses as a result of the poor safety record in the construction industry. The purpose of this study is to examine safety management in the construction industry. The study involves data collection from general contractors and study specifically investigates the safety perceptions, attitudes and behavior of the construction workers towards management safety practices. A questionnaire was develop to collect data from two different construction sites. This study shows that 74.8% of workers are aware about the health and safety. The study will therefore raise awareness towards health and safety measures and will also assist project manager, engineers and other workers at the construction site in carrying out their work with minimum risk.***

KEY WORDS: ***Safety, Management, Analysis, Construction, Industry.***

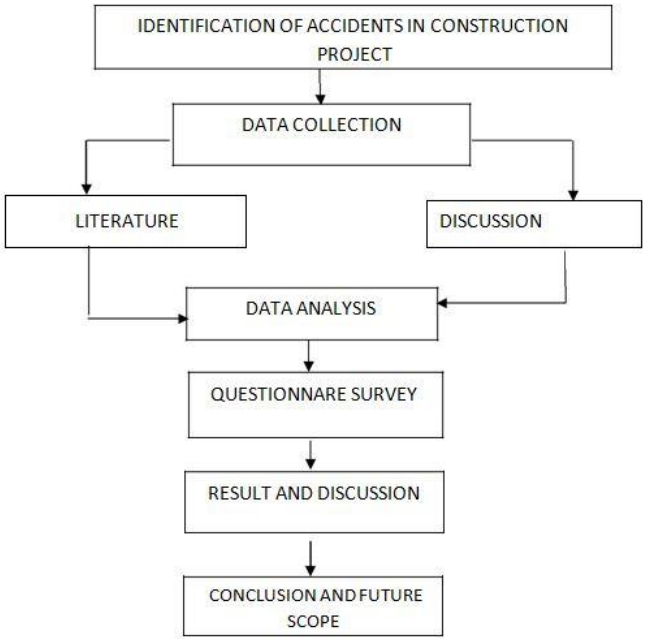
I. INTRODUCTION

Health and safety is very important to all areas in the building and construction industry. It has always been considered very important as it is considered to be greatly exposed sector when it comes to occupational accidents. Although tremendous improvements have been made in health and safety performance in some countries, the construction industry continues to lag behind most other industries. This has been the experience within most countries. The reality is that the construction industry continually has injury and fatality statistics that make it one of the most dangerous industries in which to work predominantly in developing countries. As a result of the increasing number of accidents, the development and publication of standards and good engineering practices based on experience and codes started. We plan to achieve the following objectives:

Survey / information acquiring of health and safety in the construction industry. Questionnaire development and graphical analysis. Analysis of health and safety data acquired at two different construction sites.

II. METHODOLOGY

In achieving the desired results for the study a personal interview was conducted based on the questionnaire and data assimilation was done to project the health and safety at our construction sites. The study is to discuss to achieve the objective of this dissertation work. Methodology is a way in which all the techniques, methods and procedures adopted to collect data, to analyze data and to carry out research is done. Literature study and analytical research are my major learning methods, which play an important role in this report. Step by step procedure of methodology shown in Fig.



III. DATA COLLECTION

Data collection is the process of gathering information on targeted sites, which then enables one to answer relevant questions and evaluate outcomes.

Data was collected from two sites:

Anupam Bricks & Concrete Industries Infrastructure Pvt Ltd. (ABCI)

Ramkay Infrastructure Pvt Ltd.

ABCI Infrastructure Pvt. Ltd.

ZONE 1

Location: Village Tanihal, Banihal J&K

Site: Construction of Railway Tunnel

Site Specification:

01	Length	3km
02	Height	7m
03	Diameter	6m
04	Area located for the site	12500m^2

Safety Measures Adopted

All employees must be provided with appropriate personal protective equipment Like gloves, goggles, safety helmets, shoes etc.

Provision of safety trainings.

Ventilation is required to remove polluted air, gases and smoke produced. Adequate supply of pure and hygienic air to be maintained.

Head light on each end and a whistle or horn with a tone of sufficient volume shall be provided.

Drilling equipment has to be kept in good condition.
Shelter places for workmen shall be provided at suitable intervals in long tunnels. Periodic medical camps for monitoring health and well-being of the workers.
Provide first aid and its best practice to provide one first aid officer per 25 workers.

ZONE 2
Location: Village Tabella Banihal J&K
Site: Construction approach road from NH to Construction of Railway Tunnel
Site Specifications:

01	Length	2km
02	Width	5m
03	Area located for the site	10000m^2

Safety Measure Adopted
All employees must be provided with appropriate personal protective equipments like gloves, goggles, safety helmets, shoes, masks etc…
Keeping and maintained well signs. Proper safety training to the workers.
Proper clothing to the workers especially working in night shift. Wear rubber boots when placing and handling concrete.
Protect your eyes from cement dust.
Wear long sleeves and full length trousers to protect your arms and legs.
All workers must hold a current white card before they commence work on site.
Ramkay Infrastructure Pvt. Ltd.

ZONE 3
Location: Village Awantipora
Site: Construction of Bridge
Site Specifications:

01	Span of Bridge	360m
02	Width of Bridge	10.5m
03	Area site	4000m^2
04	No.of Abutment in one Lane	2
05	No. of Piles in one Abutment	11
06	No. of Piers in one Lane	3
07	No. of Piles in one Pier	6
08	Total Piles in one Lane	40

Safety Measures Adopted
All employees must be provided with appropriate personal equipments like gloves, goggles, safety helmets, shoes, safety jackets etc.
Safety nets should be used for fall protection.
Broken & defective tools should not be used. They should be reported and turned. in for replacement
Inspecting wire ropes on suspension scaffolds before and every shift.
Employees should receive instructions regarding electrical equipments they are authorised to use.
Supervisory person shall ensure that all machinery and equipments are inspected prior to each use to verify that it is in a safe operating condition.
To assess high and low places, a variety of equipments may be used such as ladders, suspended platform, aerial lifts, stairways etc. the use of these access system should be done carefully.
Firefighting equipment must be inspected monthly and maintained in operating condition.
Employees should not be required to perform work under unsanitary conditions. Adequate supplies of portable water shall be provided at jobsite.
Only qualified welders should be authorised to do welding, heating or cutting.

ZONE 4
Location: Village Barsoo to Awantipora
Site: construction of road
Site Specifications:

01	Length	4.6km
02	Width	7m
03	Area located for the site	3220m^2
04	No. of Culverts	2
05	Height of Culvert	2m
06	Width of Shoulder	1.5m
07	Divider	0.5-4m

Safety Measures Adopted
All employees must be provided with appropriate personal protective equipments like gloves, goggles, safety helmets, shoes etc.
Keeping and maintained well signs. Proper safety training to the workers.
Proper clothing to the workers especially working in night shift. Wear rubber boots when placing and handling concrete.

Protect your eyes from cement dust.
Wear long sleeves and full length trousers to protect your arms and legs.
All workers must hold a current white card before they commence work on site.

OBSERVATIONS RECORDED FROM TWO SITES BASED ON QUESTIONNAIRE
The statements and answers of questionnaire from 100 labourers and workers present at two different sites construction sites, viz. 25 labourers/workers from zone 1 and 25 labourers/workers from zone 2 of ABCI Infrastructure

Pvt. Ltd. Similarly 25 labourers/workers from zone 1 and 25 labourers/workers from zone 2 of Ramkay Infrastructure Pvt. Ltd.
The following details related to the two sites have been presented in the following table.

SITE A ZONE 1:

Question No.	Workers Agreeing	Workers Disagreeing	% Agree	% Disagree
Q1	18	7	72	28
Q2	20	5	80	20
Q3	22	3	88	12
Q4	23	2	92	8
Q5	22	3	88	12
Q6	20	5	80	20
Q7	16	9	64	36
Q8	19	6	76	24
Q9	20	5	80	20
Q10	22	3	88	12
Q11	20	5	80	20
Q12	18	7	72	28
Q13	18	7	72	28
Q14	20	5	80	20
Q15	19	6	76	24
Q16	20	5	80	20
Q17	22	3	88	12
Q18	19	6	76	24
Q19	20	5	80	20
Q20	17	8	68	32

TABLE 1: Compliance & noncompliance with respect to questionnaire for site A zone 1

ZONE 2:

Question No.	Workers Agreeing	Workers Disagreeing	% Agree	% Disagree
Q1	15	10	60	40
Q2	19	6	76	24
Q3	21	4	84	16
Q4	21	4	84	16
Q5	18	7	72	28
Q6	23	2	92	8
Q7	17	8	68	32
Q8	16	9	64	36
Q9	22	3	88	12
Q10	24	1	96	4
Q11	13	12	52	48
Q12	16	9	64	36
Q13	22	3	88	12
Q14	15	10	60	40
Q15	16	9	64	36
Q16	18	7	72	28
Q17	18	7	72	28
Q18	16	9	64	36
Q19	20	5	80	20
Q20	13	12	52	48

TABLE 2: Compliance & noncompliance with respect to questionnaire for site A zone 2

SITE B
ZONE 3:

Question No.	Workers Agreeing	Workers Disagreeing	% Agree	% Disagree
Q1	20	5	80	20
Q2	16	9	64	36
Q3	19	6	76	24
Q4	22	3	88	12
Q5	19	6	76	24
Q6	18	7	72	28
Q7	15	10	60	40
Q8	19	6	76	24
Q9	20	5	80	20
Q10	19	6	76	24
Q11	21	4	84	16
Q12	22	3	88	12
Q13	16	9	64	36
Q14	15	10	60	40

Q15	22	3	88	12
Q16	20	5	80	20
Q17	17	8	68	32
Q18	20	5	80	20
Q19	18	7	72	28
Q20	19	6	76	24

TABLE 3: Compliance & noncompliance with respect to questionnaire for site B zone 1

ZONE 4:

Question No.	Workers Agreeing	Workers Disagreeing	% Agree	% Disagree
Q1	17	8	68	32
Q2	21	4	84	16
Q3	20	5	80	20
Q4	24	1	96	4
Q5	21	4	84	16
Q6	18	7	72	28
Q7	19	6	76	24
Q8	20	5	80	20
Q9	19	6	76	24
Q10	20	5	80	20
Q11	14	11	56	44
Q12	13	12	52	42
Q13	21	4	84	16
Q14	13	12	52	48
Q15	17	8	68	32
Q16	21	4	84	16
Q17	19	6	76	24
Q18	15	10	60	40
Q19	16	9	64	36
Q20	13	12	52	48

TABLE 4: Compliance & noncompliance with respect to questionnaire for site B zone 2

IV. RESULT AND CONCLUSION

In order to reach the objectives of the study, a simple graphical representation was made through questionnaire and the response were collected from the employees of four sites.

RESULT

From graphical representation it is clear that Anupam Brick & Concrete Industries Infrastructure Pvt. Ltd. (Zone 1: site: Construction of Railway Tunnel: 79%) are more aware of the health and safety in the construction industry. It can be considered as a good representation of the health and safety norms being implemented at the site.

On the basis of the achieved percentage value i,e 79% for site A(Anupam Brick & Concrete Industries Infrastructure Pvt. Ltd. Site: Construction of Railway Tunnel) zone 1, we can conclude that the workers and the officers at the site are more aware of the health and safety measures at the site. Similarly on the basis of the achieved percentage i,e 72.6% for site A(Anupam Brick & Concrete Industries Infrastructure Pvt. Ltd. Site: Construction of Road from NH to Railway Tunnel) zone 2, we conclude that the workers and the officers at the site are less aware of the health and safety measures at the site.

On the basis of the achieved percentage value i,e 75.4% for site B(Ramkay Infrastructure Pvt. Ltd. Site: Construction of bridge) zone 3, we can conclude that the workers and the officers at the site are more aware of the health and safety measures at the site. Similarly on the basis of the achieved percentage i,e 72.2% for site B(Ramkay Infrastructure Pvt. Ltd. Site: Construction of Road) zone 4, we conclude that the workers and the officers at the site are less aware of the health and safety measures at the site.

The average awareness about health and safety at the above construction sites was found to be 74.8% as per above observations.

On the basis of the achieved percentage value i,e 79% & 73% for site A(Anupam Brick & Concrete Industries Infrastructure Pvt. Ltd) zone 1 & 2, we can conclude that the workers and the officers at the site are aware about the facilities provided to them at construction site.

Similarly On the basis of the achieved percentage value i,e 71% & 69% for site B (Ramkay Infrastructure Pvt. Ltd) zone 3 & 4, we can conclude that the workers and the officers at the site are aware about the facilities provided to them .

On the basis of the achieved percentage value i,e 75% & 65% for site A & B(Anupam Brick & Concrete Industries Infrastructure Pvt. Ltd) zone 1&2, we can conclude that the workers and the officers at the site are aware about the health and safety benefits provided to them. Similarly On the basis of the achieved percentage value i,e 71% & 66% for site B (Ramkay Infrastructure Pvt. Ltd) zone 3 & 4, we can conclude that the workers and the officers at the site are aware about the health and safety benefits provided to them .

Site A

Anupam Bricks & Concrete Industries Infrastructure Pvt. Ltd.

Zone 1

Construction of Railway Tunnel

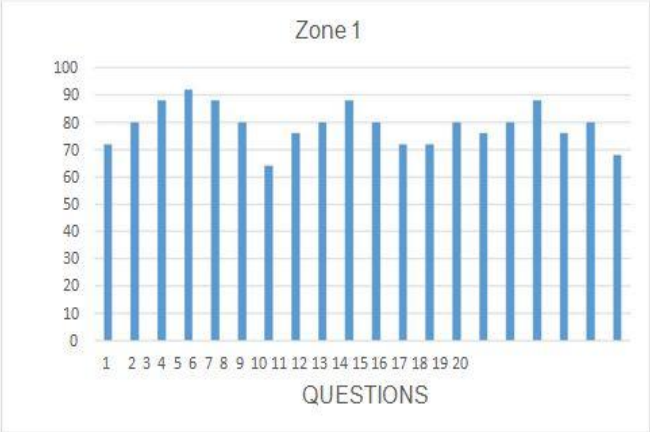


Fig 1: Bar Chart representing the agreeing %age at site A zone 1

Zone 2

Construction of Approach road From NH to Construction of Railway Tunnel

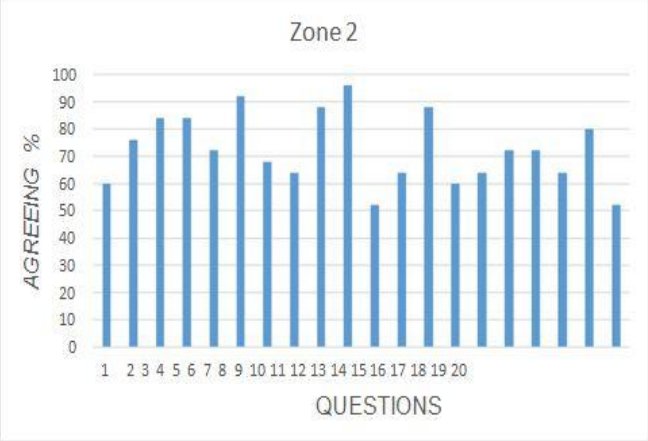


Fig 2: Bar Chart representing the agreeing %age at site A zone 2

Site B

Ramkay Infrastructure Pvt. Ltd.

Zone 3

Construction of Bridge

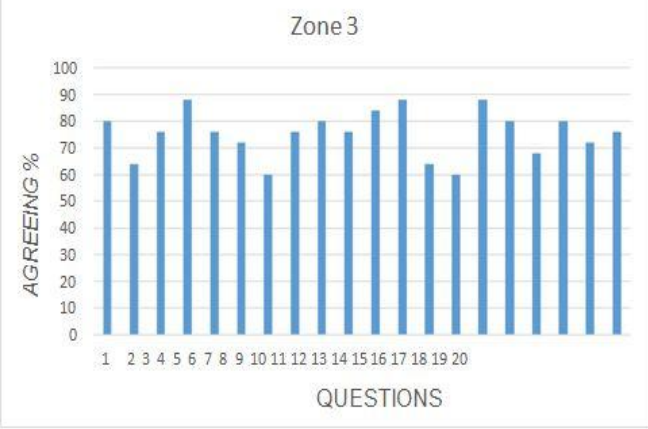


Fig 3: Bar Chart representing the agreeing %age at site B zone 3

Zone 4

Construction of Road

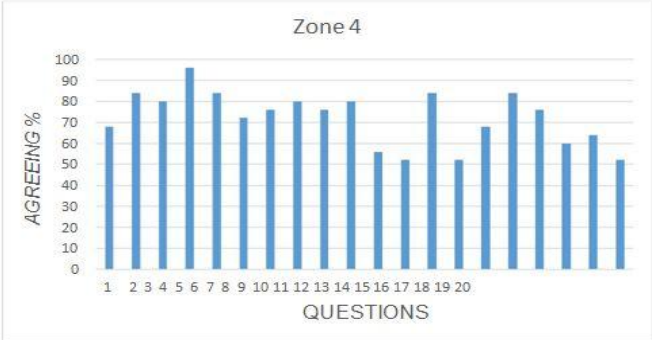


Fig 4: Bar Chart representing the agreeing %age at site B zone 4 Average Percentage of 4 Zones

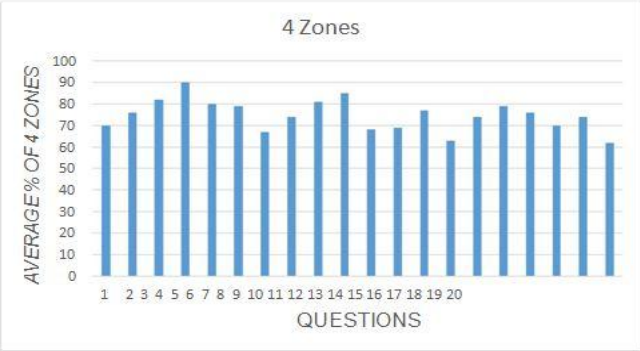


Fig 5: Bar Chart representing the average %age of 4 zones

Mean Percentage of all Zones

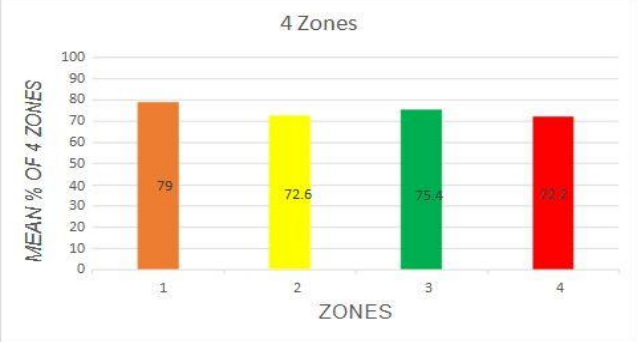


Fig 6: Bar Chart representing the mean %age of 4 zones

Cumulative Percentage of workers knowing about the facilities

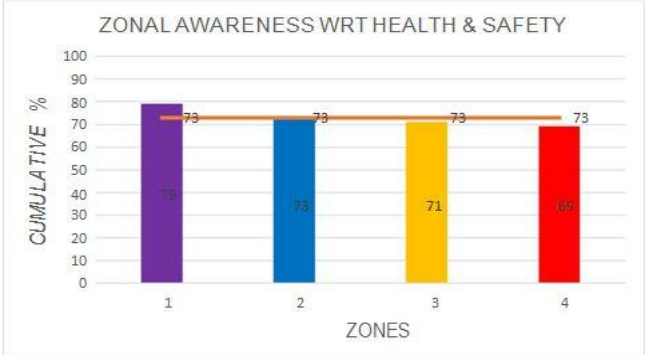


Fig 7: Bar Chart representing the cumulative % awareness in regard to health and safety facilities at the zone 1-4

Cumulative Percentage of workers knowing about the health and safety Benefits

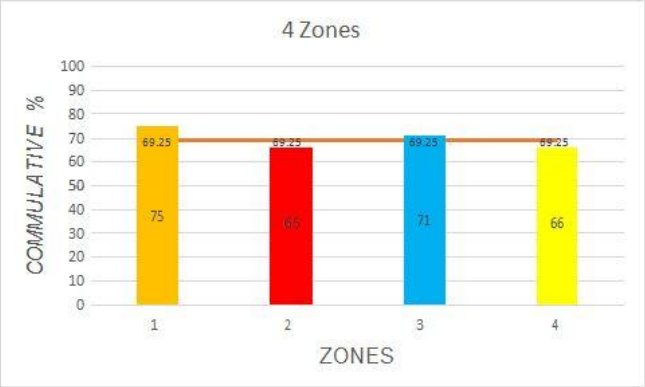


Fig 8: Bar Chart representing the commulative %age knowing the health and safety benefits

V. DISCUSSION ON RESULTS

Fig. 1 display observations recorded at zone 1 on site A which clearly shows that more number of labourers/workers are aware about Q 4, i.e. 92% as compared to other questions. Similarly, less number of labourers/workers are aware about Q 7, i.e. 64 % as compared to other questions.

Fig. 2 display observations recorded at zone 2 on site A which clearly shows that more number of labourers/workers are aware about Q 10, i.e. 96% as compared to other questions. Similarly, less number of labourers/workers are aware about Q 11 & Q 20, i.e. 52 % as comparison to the above mention site.

Fig. 3 display observations recorded at zone 3 on site B which clearly shows that more number of labourers/workers are aware about Q 4, Q 12 & Q 15, i.e. 88% as compared to other questions. Similarly, less number of labourers/workers are aware about Q 7 & Q 14, i.e. 60 % as comparison to the above mention site.

Fig. 4 display observations recorded at zone 4 on site B which clearly shows that more number of labourers/workers are aware about Q 4, i.e. 96% as compared to other questions.
Similarly, less number of labourers/workers are aware about Q 12, Q 14 & Q 20 i.e. 52 % as comparison to the above mention site.

Fig. 5 display average of four zones and it clearly shows that more number of labourers/workers are aware about Q 4 as compared to other questions i.e. 90 %. Similarly less number of labourers /workers are aware about Q 20 i.e. 62 % as comparison to the above mention site

Fig. 6 display mean %age of all zones and it is clearly evident from the graph that 74.8% labourers/workers are aware about the health and safety at construction sites.

Fig. 7 display labourers/workers at zone 1, zone 2 and zone 3, zone 4 of site A and B are aware about 79 %, 73 % & 71 %, 69 % respectively of the facilities provided at construction sites. Therefore, the average %age of labourers/workers at all zones knowing about the facilities provided at the construction site A & B is 73 % collectively.

Fig. 8 display labourers/workers at zone 1, zone 2 and zone 3, zone 4 of site A and B are aware about 76 %, 65 % & 71 %, 65 % respectively of the accident benefits provided to them in construction industry. Therefore, the average %age of labourers/workers at all zones knowing about the health and safety benefits provided to them in construction industry is 69.25% collectively.

VI. CONCLUSION

Four number of sites at Jammu and Kashmir were evaluated on the basis of health and safety measures adopted. A detailed assessment of the health and safety procedures being implemented at every site has been discussed in this study. A questionnaire was developed and with the help of which personal interviews of selected site workers was taken. The main objective of the study was to understand the health and safety management within the construction industries and to develop a framework of recommendations for improving health and safety performance at the construction site. In pursing, a multi strategy was adopted, within which health and safety management take place is considered. With regards to the proposed changes to the health and safety plans of sites to make them more effective, it was found that there was a need to develop a protocol for testing competency, experience, education and people skills. The implementation of a successful health and safety plan will be essentially up to the management of the construction industry. If upper management lead by example and show their employees that they are serious about achieving high standards with regards to health and safety, then this attitude will filter through the industry and will ultimately bring the desired effect. Changing the attitudes of employers and employees of any industry must not be underestimated because this would represent the first level of change in the attempt to achieve a zero accident rating.

REFERENCES

[1] Ms R Suriya et al., (2015- Assistant professor) “A study on industrial health and safety measures in H & R Johnson India”.
[2] Sebastian Joseph et al., (2015-Department of civil engineering, Karpagam University India) “A study on labour safety at construction sites”.
[3] Tomei G et al., (2007) “A study on mental health and life style changes in young workers”.
[4] T. Subramani et al., (2014) “A study on safety management analysis in construction industry”.
[5] Howell E et al., (1990) “A study on trauma in the workplace”.
[6] Igarashi Y et al., (2015) “A study on health effects on workers in disasters”.
[7] Kuroki N et al., (2009) “A study on qualitative evaluation of employer requirements associated with occupational health and safety as good practice

in small industries".
[8] D Tindiwensi et al., "A study on an investigation into the causes of accidents in the construction industry".
[9] Charlex Mbohwa et al., "A study on improving health and safety in the construction industry through cultural transformation".
[10] Alex Albert et al., "A study on emerging strategies for construction safety and health hazard recognition".

