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Detecting dangers and evaluation of movement and establishment of metallic frame in high floor building by Hazid Fuzzy method

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Abstract

Building has been recognized as one of the most flourishing activities and dangerous. Every year, the occurrence of incident in building industry causes many financial, health and environmental losses. Concerning to risk evaluation and detecting of danger focus could strikingly decrease the probability of occurring incidents in which resulted from building activities and operations. In this study, was attempt to detect by obtained results in 3- level dangers by detecting dangers which are resulted from relocation and establishment of metallic frame in high floor building by using Hasid Strategy, which could be used in decision taking to present controlling approach. In the following, in order to change derived oral words to quantitative number was used of phase logical method. In the evaluation of primary dangers, 5% of danger is placed in low danger range, 48% in medium danger range and 49% in high danger range and in the secondary evaluation of danger, 66% of dangers are placed in low danger range, and 66% in medium danger range.

1. Introduction

In the world, high floor building is a phenomenon that had registered in the last of 19 century and beginning of 20 century and had taken the first steps in building of skyscraper from 1818 to 1900 in Chicago. This phenomenon could answer many of urban issues such as ground lacks, dwelling lack and other related cases, but on the other hand, it causes other problems and inadequacy. In western countries, was attempt to use the benefits of high floor building and to control issues and problems which are resulted from it to act based on practical laws and regulations, and control the phenomenon [1]. Beginning of movement of high floor building in Iran is from 1328 hegira and helical. By occurrence of Islamic revolution, high floor building nearly stopped over 10 years. During these years, building of high floor building had limited to complementation of unfinished dwelling projects. In recent years, trend of high floor building has striking growth [2]. Today, due to population growth and increasing needs among society, building has been known to one of the most flourishing activities and dangerous. So that sometimes those people threat outside of the building workshops. For years the occurrence of incidents in building industry has been caused financial, healthy, and environmental losses. In addition of direct and obvious losses, other expenses and consequences such as protector of families, spiritual and mental issues, family expenses and nursing of incident received person and other similar cases could be thought and investigated. Also, in Iran building industry is considered as one of occupation creating industries. Hence, considering related issue to workplace immune and personnel health should have degree of importance. Risks and focus of danger in building workshops are varied and elaborated and lack of precise and expert attention to this issue could have irrecoverable effects and consequences for different working groups. Dangerous nature of building works and high risk of building activities in different phases of administration, low level of workers knowledge and the lack of sufficient monitoring on immune regulation observation could be the reasons of high statics of building incidents. These incidents could include, falling of height, falling of objects, collapsing of debris, falling of suspended objects (work by crane), electric shock and other similar cases. So, concerning to the risk evaluation issue and detecting of danger focuses could strikingly decrease the probability of occurrence of incidents which are resulted from building operation and activities. In this study,

was attempt to detect incident prone focuses in this dangerous operation by detecting dangers which resulted from movement and establishment of metallic buildings in high floor buildings in the building phases, take step to representation. On the basis of national and international level, have been extended studies are conducted, so far that in the following we will points to some of them: Muhlbauer author of evaluation of pipeline risk, expresses that risk management process contains to basic phase; first phase, is the phase of risk estimation (detecting, analysis, and giving priority); and second phase, is the risk controlling (stages of planning and risk management, planning of observing on risk and reformation actions). Boser claims that for risk management in relation to probable risks one should take steps towards detecting and considering a determined and compiled pattern. In the Hazid book, an appropriate and efficient approach for detecting of pipeline risk was introduced [3]. Han and Weng, in the article which is named "model of risk evaluation and its application in urban gas pipeline" reminders that affective factors that causes urbane gas pipeline are various, in which some of them have determined probable number and some of them do not have determined number, that and introduced risk matrix and phase logic to remove break probability [4].

Zhou and Cheng in the article " analysis of breaking risk of refinery and petrochemical equipment based on theoretical phase", at first had pay to the evaluation of quantitative risk by break probability and its consequence based on recorded data and physical models that show the exhibition of incidents sequence and transporting of dangerous materials, and then based on Fuzzy logic had estimated break risk (probability of break and intensity of break consequence) [5]. Kipyoung in the article "detecting of dangers in direction of innovation in the technologies of converting gassing by HAZID method" concluded that dangers which are resulted from innovation in process industry imperil the whole system that should be studied and considered in design stage. in their study, thy reconsidered detecting strategies of dangers by Hazid method and designed a model with the name of dynamic detecting scenarios of dangers [6]. Babazadeh and Zakariyaee in the article "risk detecting and evaluation risk in Biching Plant device in building workshops" represented that increasing progress of knowledge and science and needs towards evolution in industry, and entrance of new devices equipment to achieve this need, had brought new risks and dangerous which threats the workers [7]. Ardashir et al in the article "evaluation of immune risks in proliferating projects by combination of FMEA Fuzzy, FTA Fuzzy methods and integration of AHP and DEA technique" expressed that building industry is known one of dangerous industries in considering losses associated with work, the rate of determent and indemnification to workers [8]. Mohajery and Ardashiri in the article "analysis of immune risk of building projects by using AHP-DEA integrative method" uttered that building industry is known one of in considering losses associated with work, the rate of determent and indemnification to workers [9]. Shams and Rajabi in the article" evaluation of immune risk aspects in building stage of improvement projects expressed that development plans and operation of fundamental building projects such as urbane channelization, highways, railroad and other cases beside establishment projects of dwelling and building units, though are considered as countries' significant and occupation creating, but in regard to elaborateness and variation in building stages, are the origin of many dangers particularly personnel [10]. Abdollahzadeh and Rastgoo in article "evaluation of risks in bridge building by analysis of phase error tree", at first based on obtained results of Dolfi method, the structure of error tree is formed and then by implementing error tree based on phase logic the probability of risk occurrence is calculated and the basic reasons of break is determined. Our main aim in conducting this project is to detect dangers and evaluate risks which are resulted from movement and metallic frame establishment of high floor building by Hzid- Fuzzy method [11].

Material and methodology

In this study, attempt to analysis dangers which are resulted from building activities on movement and metallic building establishment by Hazid technique in order to find fundamental roots of occurrence of dangers and fulfill management planning to remove them. In order to conduct detecting technique of dangers by Hazid method, at first the extent of study or so- called studies' nodes should be determined. In the following detects all activities, operations and equipment in different stages of project for human, environment and equipment and all in all on organization reputation brings loss and damage. Then all Hazid worksheets are designed and to complete Hazid worksheets in sections mental gale meeting and related categorization to them are deducted from Hazid worksheet that by using determined guidance words in that checklist, dangers, threats and consequences of each are determined and scoring to occurrence and intensity of consequences which is resulted from occurrence of incidents is conducted and at last the risk grade for each of guidance words was obtained. Also, in those conducted meetings, existing controlling approaches are detected and are discussed. And the obtained outcomes are inserted in related column of each Hazid worksheets. After this stage, the risk grade with possibility of occurrence and new intensity are computed. In the following, to alter deducted oral words to quantitative numbers, the Fuzzy logic method is used.

Results

The results of conducting studies of Hazid technique process

Dangers after detecting in mental gale meetings had been analyzed and the results of conducted studies are provided in the frame of Hazid worksheet.

Work activity at height (establisher).

At first the study span are detected by danger detecting team and in this study span, the activities, equipment and operations are determined then each of them are inserted in separated worksheet and started to detect dangers and determining grades of obtained risk of dangers. Resulted consequences of falling of height could include wounding to death. Additionally, falling of tools from height could be dangerous for both personnel and equipment. So, dangers which are resulted from work activity in height and falling of work tools and objects should be detected and related risk to them should be computed. In evaluation of primary risk, 3 dangers with high grade risk, 3 dangers with medium risk grade and 0 grades with low risk are observed. Then, after determining and implementation of monitoring approaches the number of these dangers are changed to zero, the danger number with high risk, one the number of danger with medium risk grade and five danger number with low risk.

Rigeri activity

One of activities and operations in metallic building establishment is load- carrying operation. To do this operation one should be considered as load- carrying operator. This person that has the responsibility of fastening and leading load is called Riger. The Reger takes the responsibility of fastening appropriate load by appropriate slings, so after fastening load he/she must lead the crane operator to put properly load in pre-determined place. This operation is categorized to operations that imperil personnel, equipment, and installations. Resulted consequences from dangers of load-carrying operation could include losses to equipment to personnel death. One of very dangerous risks of these activities associated to loss to installations and the project properties. In this section of the study, the number of 4 is observed the number of danger with high risk grade, the number of 3 is observed the number of danger with medium risk grade and number 0 is observes as the number with low risk grade. That after determining and implementation of controlling approaches the number of these dangers is changed to 0 the danger number with high risk grade, 2 the danger number with medium risk number and 5 the danger number with low risk grade.

Load- carrying operation

This operation is of operations that has many dangers for personnel, equipment, and installation. The resulted consequences of load-carrying operation dangers could include losses to equipments to personnel death. One of very dangerous dangers of these activities is related to losses to installation and project properties. By considering that majority of building activities have load-carrying operations, resulted dangers of load-carrying should be detected and related risk to each danger should be computed. In this study, 22 risks are detected for load-carrying operations, in which 10 risk are observed with high risk grade, 11 risk with medium risk and 1 risk with low risk grade. After determining and implementation of monitoring approaches the numbers of these risks are changed to zero the number with high risk grade, 9 with medium risk grade and 13 the number with low risk grade.

Statistical computation on results of risk evaluation

In this stage, the statistics by Hazid method on obtained results from quantitative risk evaluation.

Table (1)outcomes of primary and secondary risk evaluation

Secondary risk evaluation			Primary risk evaluation			Operation/activity
high	medium	low	high	medium	low	
0	1	5	3	3	0	Work activity in height
0	2	5	4	3	0	Rigeri activity
0	9	13	10	11	1	Load-carrying operation
0	12	23	17	17	1	sum

As it is shown in table 1 that in primary risk evaluation, 5% of risks are placed in low risk span, 48% in medium risk span and 49% in high risk span. And in the secondary risk evaluation, 66% of risks are placed in low risk span and 66 % in medium risk span.

Figure (1). Frequency percent of risks in primary risk evaluation

Figure (2). Frequency percent of risks in secondary risk evaluation

Table 2 considers the number of detected dangers from the point of placement in four basic sections of Sections/ Hazid technique.

Table (2). Results of numbers of detected sections

frequency	number	issue	section
20%	7	External and environmental dangers	one
48%	17	Dangers of equipment and installation	two
29%	10	Health danger	three
3%	1	Dangers of related activities to project administration	four
		35	sum

Table 2 illustrates that 7 risks are placed in section 1, 17 risks in section 2, 10 risks in section 3 and 1 risk in section 4. Also, diagram 3-4 demonstrates the frequency percent in which shows section 2 has the highest frequency in relation to other sections and is 48 %, and other sections, section three with 29% and section 1 with 20% and section 4 with 1 %, respectively dedicated next stages to themselves.

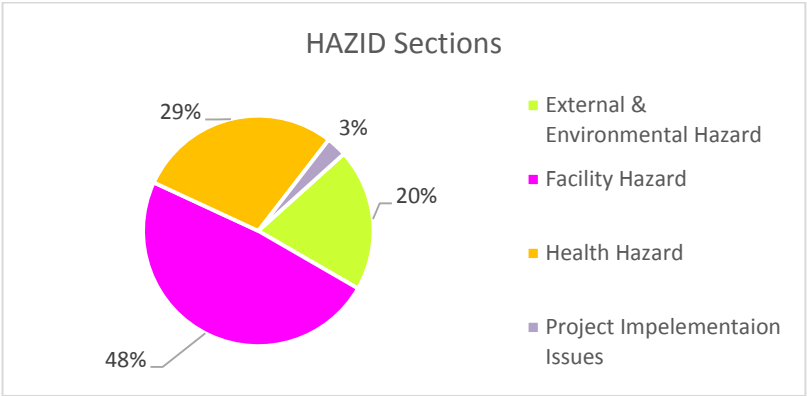

Figure (3). statistical diagram of comparison of considered sections numbers

Results of conducted study of Fuzzy logic process

Determining probability rate by Fuzzy Logic

In this section, at first the probability of incident occurrence should be determined, if dataset be accessible, by referring to it could determine the probability rate and then by considering the intensity if consequences of incident occurrence, could evaluate the considered risk. In the lack of dataset, by using expert opinion could have many uncertainty, so, by referring to asking opinion of experts (Dolfi) from 3 to 5 experts are used to

determine possibility rate. We had selected three experienced experts with different education level and age to conduct this project and according to Dolfi model, from the point that experts with different experience education, age and organization grate, so their opinion on determining possibility rate of dangers occurrence will be different. We had selected three experts to evaluate the mentioned system, determining the possibility rate should be conducted by considering the significance of each expert. To this project, three experienced experts with different specialized, educated level and age are selected, and to each of these items are given scores. Then, each of these experts separately are summed each other and ultimately the total weight of expert is obtained then these weights are summed and the ultimate weight is obtained. Now the weight of each expert is divided and the ratio of each expert is obtained. By referring to this issue that determining the possibility rate by experts is not possible, hence probability determination is not possible for dangers. It is obvious that experts are not able to determine possibility rate, so, to determine possibility by experts, we had used of oral words of very low, low, medium, high, and very high. Now by using Fuzzy logic calculation we change oral words to Fuzzy numbers. Each of these oral words, have Fuzzy number equivalence that are provided in table 3.

Table (3) implementing oral words based on Fuzzy logic

Oral number	Oral word	row
(0.80 , 0.90 , 1.00 , 1.00)	Very high	1
(0.60 , 0.75 , 0.75 , 0.90)	high	2
(0.30 , 0.50 , 0.50 , 0.70)	medium	3
(0.10 , 0.25 , 0.25 , 0.40)	low	4
(0.00 , 0.00 , 0.10 , 0.20)	Very low	5

Now are asked from experts to determine a possibility based on oral words to each of determined risks, then by using equivalences Fuzzy numbers are placed instead of each determined oral words a Fazy four coupled number. Then multiply the proportional weight of each expert to the selected Fuzzy equivalences numbers. After that, according to obtained results and based on Vinkeler formula, these numbers are added together to until we obtain four coupled number. From the point that the obtained answer is a Fuzzy number, we change Fuzzy number to equivalence number by using the following equation.

Eq(1)

$$DF = \frac{1}{3} \times \frac{(a_4 + a_3)^2 - (a_4 a_3) - (a_1 + a_2)^2 + (a_1 a_2)}{(a_4 + a_3 - a_2 - a_1)}$$

In this stage, by Fuzzy logic the cases which are estimated by experts are converted to possibility number. Table 4 illustrates related computation to possibility number for work risks in height.

Table (4). possibility computation of Fazzy logic method for Rigeri activity danger

	W1	Expert Judgment1				W2	Expert Judgment2				W3	Expert Judgment 3			
R1	0.42	0.60	0.75	0.75	0.90	0.30	0.30	0.50	0.50	0.70	0.27	0.60	0.75	0.75	0.90
R2	0.42	0.60	0.75	0.75	0.90	0.30	0.30	0.50	0.50	0.70	0.27	0.60	0.75	0.75	0.90
R3	0.42	0.30	0.50	0.50	0.70	0.30	0.30	0.50	0.50	0.70	0.27	0.30	0.50	0.50	0.70
R4	0.42	0.80	0.90	1.00	1.00	0.30	0.80	0.90	1.00	1.00	0.27	0.80	0.90	1.00	1.00
R5	0.42	0.10	0.25	0.25	0.40	0.30	0.00	0.00	0.10	0.20	0.27	0.10	0.25	0.25	0.40
R6	0.42	0.30	0.50	0.50	0.70	0.30	0.30	0.50	0.50	0.70	0.27	0.30	0.50	0.50	0.70

WE1*EJ				WE2*EJ				WE3*EJ			
0.25	0.32	0.32	0.38	0.09	0.15	0.15	0.21	0.16	0.20	0.20	0.25
0.25	0.32	0.32	0.38	0.09	0.15	0.15	0.21	0.16	0.20	0.20	0.25
0.13	0.21	0.21	0.30	0.09	0.15	0.15	0.21	0.08	0.14	0.14	0.19
0.34	0.38	0.42	0.42	0.24	0.27	0.30	0.30	0.22	0.25	0.27	0.27
0.04	0.11	0.11	0.17	0.00	0.00	0.03	0.06	0.03	0.07	0.07	0.11
0.13	0.21	0.21	0.30	0.09	0.15	0.15	0.21	0.08	0.14	0.14	0.19

	(WE1*EJ)+(WE2*EJ)+(WE3*EJ)				a1	a2	a3	a4	
R1	0.51	0.67	0.67	0.84	0.51	0.67	0.67	0.84	R1=0.67
R2	0.51	0.67	0.67	0.84	0.51	0.67	0.67	0.84	R2=0.67
R3	0.30	0.50	0.50	0.70	0.30	0.50	0.50	0.70	R3=0.50
R4	0.80	0.90	1.00	1.00	0.80	0.90	1.00	1.00	R4=0.92
R5	0.07	0.17	0.20	0.34	0.07	0.17	0.20	0.34	R5=0.20
R6	0.30	0.50	0.50	0.70	0.30	0.50	0.50	0.70	R6=0.50

As it observed from table for six detected risk, the probability number of PR1 to PR6 is shown. Table 5 ilustrates related computation to possibility number for Riger risks.

Table (5). Possibility computation by Fuzzy logic method for Rigeri activity risks

	W1	Expert Judgment1				W2	Expert Judgment2				W3	Expert Judgment 3			
R1	0.42	0.10	0.25	0.25	0.40	0.30	0.30	0.50	0.50	0.70	0.27	0.30	0.50	0.50	0.70
R2	0.42	0.30	0.50	0.50	0.70	0.30	0.30	0.50	0.50	0.70	0.27	0.60	0.75	0.75	0.90
R3	0.42	0.80	0.90	1.00	1.00	0.30	0.80	0.90	1.00	1.00	0.27	0.60	0.75	0.75	0.90
R4	0.42	0.30	0.50	0.50	0.70	0.30	0.60	0.75	0.75	0.90	0.27	0.30	0.50	0.50	0.70
R5	0.42	0.80	0.90	1.00	1.00	0.30	0.80	0.90	1.00	1.00	0.27	0.80	0.90	1.00	1.00
R6	0.42	0.30	0.50	0.50	0.70	0.30	0.60	0.75	0.75	0.90	0.27	0.60	0.75	0.75	0.90
R6	0.42	0.30	0.50	0.50	0.70	0.30	0.30	0.50	0.50	0.70	0.27	0.10	0.25	0.25	0.40
		WE1*EJ					WE2*EJ					WE3*EJ			
		0.04	0.11	0.11	0.17		0.09	0.15	0.15	0.21		0.08	0.14	0.14	0.19
		0.13	0.21	0.21	0.30		0.09	0.15	0.15	0.21		0.16	0.20	0.20	0.25
		0.34	0.38	0.42	0.42		0.24	0.27	0.30	0.30		0.16	0.20	0.20	0.25
		0.13	0.21	0.21	0.30		0.18	0.23	0.23	0.27		0.08	0.14	0.14	0.19
		0.34	0.38	0.42	0.42		0.24	0.27	0.30	0.30		0.22	0.25	0.27	0.27
		0.13	0.21	0.21	0.30		0.18	0.23	0.23	0.27		0.16	0.20	0.20	0.25
		0.13	0.21	0.21	0.30		0.09	0.15	0.15	0.21		0.03	0.07	0.07	0.11

	(WE1*EJ)+(WE2*EJ)+(WE3*EJ)				a1	a2	a3	a4	
R1	0.22	0.39	0.39	0.57	0.22	0.39	0.39	0.57	R1=0.39
R2	0.38	0.57	0.57	0.75	0.38	0.57	0.57	0.75	R2=0.57
R3	0.75	0.86	0.93	0.97	0.75	0.86	0.93	0.97	R3=0.87
R4	0.39	0.58	0.58	0.76	0.39	0.58	0.58	0.76	R4=0.58
R5	0.80	0.90	1.00	1.00	0.80	0.90	1.00	1.00	R5=0.92
R6	0.47	0.64	0.64	0.82	0.47	0.64	0.64	0.82	R6=0.64
R7	0.25	0.43	0.43	0.62	0.25	0.43	0.43	0.62	R7=0.43

As it observed from this table for 6 detected risks, possibility number of PR1 to PR7 are shown. In table 6, related computations to possibility number for load-carrying risks and guiding crane are shown.

Determining amount of consequences intensity by Fuzzy logic

Up to this stage, the possibility of danger occurrence had been determined and by considering that risk evaluation has two indicators of possibility occurrence and consequence intensity which is resulted from related incident occurrence, so, to determine risk number in the next stage should determine the amount of consequence density which resulted from incident occurrence by using two technique, analysis hierarchical process and Fuzzy logic. In this stage, we compute consequence intensity of incident occurrence by using analysis hierarchical process and Fuzzy. These evaluations are conducted on 4 elements (human, environmental, equipment, and organization reputation). From the point that, consequences affect four mentioned elements: health, financial, environmental and credit, so by using analysis hierarchical process (coupled comparison) we weight these four elements.

Table (6). possibility computation of Fuzzy logic method for load-carrying and crane strategy

	W1	Expert Judgment1				W2	Expert Judgment2				W3	Expert Judgment 3			
R1	0.42	0.30	0.50	0.50	0.70	0.30	0.60	0.75	0.75	0.90	0.27	0.60	0.75	0.75	0.90
R2	0.42	0.10	0.25	0.25	0.40	0.30	0.00	0.00	0.10	0.20	0.27	0.10	0.25	0.25	0.40
R3	0.42	0.10	0.25	0.25	0.40	0.30	0.10	0.25	0.25	0.40	0.27	0.30	0.50	0.50	0.70
R4	0.42	0.60	0.75	0.75	0.90	0.30	0.30	0.50	0.50	0.70	0.27	0.60	0.75	0.75	0.90
R5	0.42	0.60	0.75	0.75	0.90	0.30	0.30	0.50	0.50	0.70	0.27	0.30	0.50	0.50	0.70
R6	0.42	0.10	0.25	0.25	0.40	0.30	0.10	0.25	0.25	0.40	0.27	0.30	0.50	0.50	0.70
R6	0.42	0.10	0.25	0.25	0.40	0.30	0.10	0.25	0.25	0.40	0.27	0.10	0.25	0.25	0.40
R7	0.42	0.10	0.25	0.25	0.40	0.30	0.30	0.50	0.50	0.70	0.27	0.00	0.00	0.10	0.20
R8	0.42	0.10	0.25	0.25	0.40	0.30	0.10	0.25	0.25	0.40	0.27	0.30	0.50	0.50	0.70
R9	0.42	0.10	0.25	0.25	0.40	0.30	0.30	0.50	0.50	0.70	0.27	0.10	0.25	0.25	0.40
R10	0.42	0.10	0.25	0.25	0.40	0.30	0.10	0.25	0.25	0.40	0.27	0.10	0.25	0.25	0.40
R11	0.42	0.30	0.50	0.50	0.70	0.30	0.60	0.75	0.75	0.90	0.27	0.30	0.50	0.50	0.70
R12	0.42	0.30	0.50	0.50	0.70	0.30	0.10	0.25	0.25	0.40	0.27	0.10	0.25	0.25	0.40
R13	0.42	0.30	0.50	0.50	0.70	0.30	0.30	0.50	0.50	0.70	0.27	0.30	0.50	0.50	0.70
R14	0.42	0.10	0.25	0.25	0.40	0.30	0.10	0.25	0.25	0.40	0.27	0.00	0.00	0.10	0.20
R15	0.42	0.60	0.75	0.75	0.90	0.30	0.30	0.50	0.50	0.70	0.27	0.30	0.50	0.50	0.70
R16	0.42	0.60	0.75	0.75	0.90	0.30	0.60	0.75	0.75	0.90	0.27	0.80	0.90	1.00	1.00
R17	0.42	0.10	0.25	0.25	0.40	0.30	0.10	0.25	0.25	0.40	0.27	0.00	0.00	0.10	0.20
R18	0.42	0.30	0.50	0.50	0.70	0.30	0.30	0.50	0.50	0.70	0.27	0.60	0.75	0.75	0.90
R19	0.42	0.60	0.75	0.75	0.90	0.30	0.60	0.75	0.75	0.90	0.27	0.60	0.75	0.75	0.90
R20	0.42	0.60	0.75	0.75	0.90	0.30	0.30	0.50	0.50	0.70	0.27	0.30	0.50	0.50	0.70
R21	0.42	0.60	0.75	0.75	0.90	0.30	0.30	0.50	0.50	0.70	0.27	0.30	0.50	0.50	0.70
R22	0.42	0.60	0.75	0.75	0.90	0.30	0.30	0.50	0.50	0.70	0.27	0.30	0.50	0.50	0.70

WE1*EJ				WE2*EJ				WE3*EJ			
0.13	0.21	0.21	0.30	0.18	0.23	0.23	0.27	0.16	0.20	0.20	0.25
0.04	0.11	0.11	0.17	0.00	0.00	0.03	0.06	0.03	0.07	0.07	0.11
0.04	0.11	0.11	0.17	0.03	0.08	0.08	0.12	0.08	0.14	0.14	0.19
0.25	0.32	0.32	0.38	0.09	0.15	0.15	0.21	0.16	0.20	0.20	0.25
0.25	0.32	0.32	0.38	0.09	0.15	0.15	0.21	0.08	0.14	0.14	0.19
0.04	0.11	0.11	0.17	0.03	0.08	0.08	0.12	0.08	0.14	0.14	0.19
0.04	0.11	0.11	0.17	0.03	0.08	0.08	0.12	0.03	0.07	0.07	0.11
0.04	0.11	0.11	0.17	0.09	0.15	0.15	0.21	0.00	0.00	0.03	0.05
0.04	0.11	0.11	0.17	0.03	0.08	0.08	0.12	0.08	0.14	0.14	0.19
0.04	0.11	0.11	0.17	0.09	0.15	0.15	0.21	0.03	0.07	0.07	0.11
0.04	0.11	0.11	0.17	0.03	0.08	0.08	0.12	0.03	0.07	0.07	0.11
0.13	0.21	0.21	0.30	0.18	0.23	0.23	0.27	0.08	0.14	0.14	0.19
0.13	0.21	0.21	0.30	0.03	0.08	0.08	0.12	0.03	0.07	0.07	0.11
0.13	0.21	0.21	0.30	0.09	0.15	0.15	0.21	0.08	0.14	0.14	0.19
0.04	0.11	0.11	0.17	0.03	0.08	0.08	0.12	0.00	0.00	0.03	0.05
0.25	0.32	0.32	0.38	0.09	0.15	0.15	0.21	0.08	0.14	0.14	0.19
0.25	0.32	0.32	0.38	0.18	0.23	0.23	0.27	0.22	0.25	0.27	0.27
0.04	0.11	0.11	0.17	0.03	0.08	0.08	0.12	0.00	0.00	0.03	0.05
0.13	0.21	0.21	0.30	0.09	0.15	0.15	0.21	0.16	0.20	0.20	0.25
0.25	0.32	0.32	0.38	0.18	0.23	0.23	0.27	0.16	0.20	0.20	0.25
0.25	0.32	0.32	0.38	0.09	0.15	0.15	0.21	0.08	0.14	0.14	0.19
0.25	0.32	0.32	0.38	0.09	0.15	0.15	0.21	0.08	0.14	0.14	0.19

	(WE1*EJ)+(WE2*EJ)+(WE3*EJ)				a1	a2	a3	a4	
R1	0.47	0.64	0.64	0.82	0.47	0.64	0.64	0.82	R1=0.64
R2	0.07	0.17	0.20	0.34	0.07	0.17	0.20	0.34	R2=0.20
R3	0.15	0.32	0.32	0.48	0.15	0.32	0.32	0.48	R3=0.32
R4	0.51	0.67	0.67	0.84	0.51	0.67	0.67	0.84	R4=0.67
R5	0.43	0.61	0.61	0.78	0.43	0.61	0.61	0.78	R5=0.61
R6	0.15	0.32	0.32	0.48	0.15	0.32	0.32	0.48	R6=0.32
R7	0.10	0.25	0.25	0.40	0.10	0.25	0.25	0.40	R7=0.25
R8	0.13	0.26	0.28	0.44	0.13	0.26	0.28	0.44	R8=0.28
R9	0.15	0.32	0.32	0.48	0.15	0.32	0.32	0.48	R9=0.32
R10	0.16	0.33	0.33	0.49	0.16	0.33	0.33	0.49	R10=0.33
R11	0.10	0.25	0.25	0.40	0.10	0.25	0.25	0.40	R11=0.25

	(WE1*EJ)+(WE2*EJ)+(WE3*EJ)				a1	a2	a3	a4	
R12	0.39	0.58	0.58	0.76	0.39	0.58	0.58	0.76	R12=0.58
R13	0.18	0.36	0.36	0.53	0.18	0.36	0.36	0.53	R13=0.36
R14	0.30	0.50	0.50	0.70	0.30	0.50	0.50	0.70	R14=0.50
R15	0.07	0.18	0.21	0.35	0.07	0.18	0.21	0.35	R15=0.20
R16	0.43	0.61	0.61	0.78	0.43	0.61	0.61	0.78	R16=0.61
R17	0.65	0.79	0.82	0.93	0.65	0.79	0.82	0.93	R17=0.80
R18	0.07	0.18	0.21	0.35	0.07	0.18	0.21	0.35	R18=0.20
R19	0.38	0.57	0.57	0.75	0.38	0.57	0.57	0.75	R19=0.57
R20	0.60	0.75	0.75	0.90	0.60	0.75	0.75	0.90	R20=0.75
R21	0.43	0.61	0.61	0.78	0.43	0.61	0.61	0.78	R21=0.61
R22	0.43	0.61	0.61	0.78	0.43	0.61	0.61	0.78	R22=0.61

Weighting stages: there are several weights for weighting that among these methods we use computational average. In this method, to obtain computational average, at first stage we add vertical columns and divide on the total sum. That it's result is obtained as a novel normalization matrix. Normalization matrix computes computational average of each line and divides each of line numbers on sum of lines; consequently the weight of each consequence of each item is obtained. Oral words in relation to consequence intensity in each of four elements: health, financial, credit and environmental are obtained from related experts. The corresponding Fuzzy number is written like a matrix and the weight of consequences are multiplied to these numbers. The obtained Fuzzy numbers are added together that show the consequence intensity.

Risk computation

In this section obtained probabilities for risks of different dangers are multiplied to consequences intensity of incident, to achieve risk number.

Table (7). Risk computation

Work in hieght			
Possibility of incident occurrence	Consequence intensity of incident occurrence	Risk number	Risk grading
0.67	**0.762**	0.51054	0.70104
0.67		0.51054	0.51054
0.50		0.381	0.51054
0.92		0.70104	0.381
0.20		0.1524	0.381
0.50		0.381	0.1524

Rigeri

Possibility of incident occurrence	Consequence intensity of incident occurrence	Risk number	Risk grading
0.39	**0.776**	0.30264	0.71392
0.57		0.44232	0.67512
0.87		0.67512	0.49664
0.58		0.45008	0.45008
0.92		0.71392	0.44232
0.64		0.49664	0.33368
0.43		0.33368	0.30264

Load- carrying

Possibility of incident occurrence	Consequences intensity of intensity occurrence	Risk number	Risk grading
0.64	**0.786**	0.50304	0.6288
0.20		0.1572	0.5895
0.32		0.25152	0.52662
0.67		0.52662	0.50304
0.61		0.47946	0.47946
0.32		0.25152	0.47946
0.25		0.1965	0.47946
0.28		0.22008	0.47946
0.32		0.25152	0.45588
0.33		0.25938	0.44802
0.25		0.1965	0.393
0.58		0.45588	0.28296
0.36		0.28296	0.25938
0.50		0.393	0.25152
0.20		0.1572	0.25152
0.61		0.47946	0.25152
0.80		0.6288	0.22008
0.20		0.1572	0.1965
0.57		0.44802	0.1965
0.75		0.5895	0.1572
0.61		0.47946	0.1572
0.61		0.47946	0.1572

Conclusion

Today building due to population growth and increasing need in society have been recognized as one of flourishing and at the same time dangerous activities. So that sometimes its danger threatens people outside of building workshops. Risks and danger focuses of building workshops are very elaborated and varied and lack of expert and precise attention toward this issue could have irrecoverable effects and consequences for different working groups. These incidents could include falling of height, falling of objects, collapsing of debris, falling of suspended objects (working with crane), and electric shocking. So, concerning to the issue of risk evaluation and detecting of danger focuses could strikingly decrease the probability of incidents of building operations and activities. In this study, attempt to detect consequences of project administration by discriminating dangers of movement and metallic building installation by using Hazid method in all four sections. At last the obtained results in the frame of risk matrix includes possibility of occurrence and consequences intensity of events are evaluated and three levels of incident are detected that could be used in decision taking to present controlling approach. In order to conduct technique of detecting dangers by Hasid method, at first, study span or nodes are determined. On the following, all activities, operations, and equations could be detected that in various stages of

project creates losses and damage for human, environment, and equipment and totally on organization reputation. Then, Hazid worksheets are designed and for complementation Hazid worksheets in mental gale meetings, related sections and classification to them are deducted from Hazid checklist that by using determined guidance words in that checklist, dangers, threatens, consequences are determined and scoring to the possibility of occurrence and consequences intensity of incident occurrence that at last risk grade for each of guidance words are obtained.in those meetings existing monitoring approaches are detected and discussed. That obtained results are inserted in related column of each Hazid worksheets. After these stage risk grade are computed with incidents possibility and new intensity. In the following to convert deducted oral words to quantitative numbers we had used of Fuzzy logic method. In evaluation of primary risk, 5% of risks are placed in low risk span, 48% in low risk span, and 49% in high risk span. And in the secondary evaluation, 66% of risks are placed in low risk span and 66% in medium risk span.

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