

## Evaluating reconstruction projects and finding the appropriate response in crisis management (focusing on Plasco reconstruction)

### Abstract

Crisis management is one of the effective factors in reducing the amount of damages and human casualties when accidents occur. In this research, evaluations related to reconstruction projects and finding suitable answers for these evaluations in crisis management with a focus on reconstruction of Plasco have been discussed. The research method of the current research is qualitative and part of applied and descriptive (survey) research. In this research, research tools such as the Internet, articles and related books were used to collect information. Random sampling was used to collect the information that was conducted in the form of interviews, and 60 people were selected. The target statistical population is considered to be all the people involved in the reconstruction of the studied area. SPSS software was also used to analyze the data and check the reliability coefficient. The results indicated that the crisis management in the response and reconstruction phase of the Plasco building has an effect on the control of casualties caused by fire. Also, the employees of Plasco building have the necessary training due to the availability of appropriate resources and equipment, which can be generalized to the entire statistical population. The results showed that it is necessary to prioritize the influential factors in the crisis management in fire reconstruction projects. Finally, the results of the current research showed that proper planning in the Plasco building reconstruction is in a good condition due to the presence of warning systems and the way to respond to the fire crisis.

**Keywords:** *Crisis management, Fire, Assessment recognition, Reconstruction, Plasco building.*

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## 1. Introduction

Crisis management is one of the effective factors in reducing the number of damages and human casualties when accidents occur. Crisis management is a set of skills or research processes that are used when unusual risks or problem situations occur (Longman, 2003). In other words, crisis management is a set of executive activities and managerial and political decision-making related to different stages and all levels of the crisis, to save, reduce waste and damages, prevent interruptions in life, production and services, preserve the environment, and finally repair and rebuild the damage. (Biroudian, 2015). In a general summary, crisis management focuses on five categories; Organization, communication, decision-making, recognition of crisis factors, and stable design (Tajik, 2004). Crisis management requires careful planning and the use of all facilities (Towiej, 2001). If the necessary preparation is obtained before the crisis occurs and people have enough training and practice and enough experience from past crises, there is a greater chance of success in crisis management. Therefore, it is necessary to plan at different national, provincial and city levels based on the crisis management cycle, and according to the frequency and probability of disasters in each region, different scenarios should be prepared and implemented, and by conducting regular and planned exercises, experiences It is necessary to learn about how to manage a crisis in non-crisis conditions, and based on the results of exercises and training, the necessary preparation for dealing with potential crises should be obtained (Garkaz and Atrechian, 2008). Crisis specialists and experts have considered different classifications for the crisis, some of which are: classification based on origin, classification based on losses and casualties, classification based on territory, classification based on the time factor, classification based on the origin of natural crises (natural events) ) and other cases (Kamali, 2016). Post-disaster reconstruction projects are special projects that are affected by many risks and uncertainties and often face increased costs, poor quality, and time delays as a result of poor performance (Carr, 2001). All rehabilitation projects, regardless of project size, are affected by a wide range of risks and uncertainties (Perry & Hayes, 1998). In unexpected events, attention should be paid to the management aspects of a complex, and to achieve the goals of reducing vulnerability, special attention should be paid to the management aspect in addition to the non-structural aspects. Considering the point that the main goal is to save people's lives and then to protect national property and capital, first of all, management and non-structural solutions to reduce the vulnerability caused by the risk of fire

should be included in the preventive measures and disaster preparedness program in the building. Will happen. Secondly, how to use fire extinguishing equipment, first aid, familiarization with emergency evacuation and appropriate response to fire, conducting periodic maneuvers according to the predetermined plan, using accident insurance facilities, preparing emergency evacuation plans and installing them on the floors of buildings and arranging visits A course of fire fighting equipment should be considered. Also, if citizens are given the necessary training and awareness in the field of safety issues and have at least fire extinguishing facilities, they can create a safer environment. After the disaster, it is necessary to decide whether to move the settlements or buildings or to rebuild them in the same original place. The existing experiences show that in most cases of relocation, buildings are not the right way and it is not successful in the long term in terms of people's satisfaction. Because people are dependent on their original place of life for social, economic, and cultural reasons, the cultural, historical, and economic values of the destroyed land cannot be easily transferred to new lands, and relocation requires a lot of investment in infrastructure (farming). , 1385). The design of the steel structure of Plasco is tubular and its exterior has metal coiling (special committee of the National Report of Plasco Fire Accident Investigation, 2016). The main use of the commercial building and most of its spaces belonged to the clothing industry. The building had an open staircase and to use it, the occupants must pass in front of the elevator after passing from one floor to the next floor, then enter the next row of stairs, which in terms of fire safety regulations (the third topic of the regulations) National Building, 2015), is considered a poor design. The height of the floors was about 3.8 meters. On the upper floors, the walls were mostly made of bricks or plaster panels. Shop carpentry has mostly been plastered and sometimes covered with MDF. The concrete slab of the roof was about 30 cm thick, under which a false ceiling was built. The height of the false ceiling, which continued throughout the entire floor and on the shops, was about 50 to 10 cm, which was used for the passage of facilities and electric cables. The Plasco building had many weaknesses in terms of fire safety, including things such as high fire load due to large amounts of fabric, defects in the staircase design, complete communication between spaces through the false ceilings of the facility, lack of protection of the steel structure against fire, Lack of fire-resistant isolation, lack of automatic fire detection, notification and extinguishing systems, lack of proper maintenance of existing systems. The causes of the Plasco building fire according to the report of the Tehran Fire

Department, the Parliament Construction Commission, the Security Deputy of the Tehran Governorate, the specialized working group of the Plasco incident, the report of the members of the engineering system, the presence of capsules

Much liquefied gas, and flammable liquids such as diesel and kerosene on all floors due to the lack of gas piping in the building, worn out and unsafe electrical wiring of the building, the presence of clothes and clothes arranged in the corridors and floors of the building caused the fire to spread to other parts of the building. Fong in 2012, in his research examining the risks in a reconstruction project in "Si Chuan" China, an attempt to enter the field of risk management in the reconstruction project, the risks are divided into 6 categories. Construction and execution, finance, design, human resources, contracts, and environmental risks. Lack of budget for the entire project, increase in the price of materials and equipment, low quality and productivity rate of construction workers, strict terms and conditions of the contract, delays in agendas, low quality of agendas, inability to deliver the project on time, unavailability of equipment, machinery, etc., adverse project land conditions and adverse weather conditions have been concluded as critical risks in various sectors (Fong, 2012). In 2016, in their research entitled "Investigation of the role and method of risk management in the reconstruction phase of earthquake-damaged areas, Giwehchi et al. explained the problem with a definition of reconstruction, and they put forward the concept of rehabilitation, which is a more general concept than reconstruction, and they add that all actions that After the crisis occurs and after the operation is completed, evacuation of relief and rescue takes place, it is called recovery (Givvehchi et al., 2016). Since the Plasco building has experienced an unfortunate fire accident, it is necessary to formulate a plan and present a system for crisis management, which here means fire crisis, according to the variables affecting the accident, which can reduce the damage caused by the accident and a positive step in To prevent the occurrence of unexpected incidents such as fire and its reconstruction, it should be removed. Therefore, the purpose of this research is to identify the risks associated with reconstruction projects and to find suitable answers for these risks in crisis management (focusing on the Plasco reconstruction project).

## 2- Research method

This research is applied in terms of purpose and descriptive-analytical in terms of study method. The method of collecting information in this research is field, documentary, and library. In the documentary method, scientific books, publications, Latin sources,

sites, institutions, and related organizations were used to collect data. In this regard, first, crisis management indicators in the fire were introduced by urban professors and experts and a questionnaire was designed. Then, the questionnaire technique was used to evaluate the status of each index in urban areas by field method. The data were analyzed using SPSS software. In the completion of the situation assessment stage, the SWOT technique has been used as a tool to identify the threats and opportunities in the external environment and to identify the weaknesses and strengths of the internal environment of the target area.

### 2-1- Statistical population

The target statistical population in this research is all the people who have played a role in the reconstruction of the studied area, which includes 15 to 30 people. In this research, the random sampling method was used, the sampling was continued until the data reached saturation, and this research started with 15 people and reached the conclusion.

### 2-2- Scope of the research

The area under study in this research is the Plasco building located in Tehran, which completely collapsed due to a fire in 1995. The Plasco building, located on the eastern side of the Istanbul intersection, was an all-steel structure, even its exterior was covered with steel and its useful life was estimated to be 200 years. This building, which was the first high-rise building with a height of 42 meters and two high-rise buildings with an elevator with 29,000 square meters of infrastructure in Iran, was built in 1339 and was put into operation in 1341. The Plasco building complex included two sections, the tower, and the podium. The tower was in the southern part and had sixteen floors, including a basement floor, a ground floor, and fourteen floors on the ground floor, in which business units and workshops were located. The podium part was located on four floors and a basement on the north side of the complex. The structural system of the Plasco building was similar to a pipe system that was not in accordance with today's standards. In the structure of the Plasco building, most of the columns were located in the shell of the building and only the central four columns were responsible for bearing a significant part of the gravity loads. This building had commercial use and had 590 business units, which were mainly clothing manufacturers. The value of each product was estimated at 200 million Tomans. Although there was a diesel source with a volume of 17,000 liters in this building, most of the clothes in this building were oil-based. In the past years, the Plasco building witnessed several suicide cases, which caused fences to be drawn in front of the

windows of this building. In terms of the sensitivity of the geographical location, this building was located near the embassies of England, Germany, and Turkey. Also, the National Jewelry Museum, the supervision of the National Bank, Mellat Bank, Ferdowsi Passage, and the National Bank Hospital are located near this area.

### 2-3- Measuring tools

The measurement tools in this research are the preparation of a questionnaire and its distribution among the statistical population and the review and analysis of the results of the questionnaires through statistical methods. The data were analyzed using SPSS software.

### 2-4- Validity and reliability

The validity of the research was checked by the professors and experts in urban affairs and it was confirmed after removing the existing deficiencies. "Cronbach's alpha" method was used to measure the reliability of the research questions. The closer alpha is to 1, the higher the reliability. The results of the

calculations show that the value of the alpha coefficient (0.865) is at an acceptable level.

### 3- Results

The frequency distribution of respondents' characteristics in terms of gender, age, education, and occupation is given in Table

1. The results of the research indicate that all the respondents are men, and most of them are in the age group of 25-35 years so 53.57% of all of them are in this age group. The average age of the respondents is 40.13 years, which indicates that the surveyed people are young. 2 people (17.85%) have cycled up to a diploma, 7 people (25%) have post-diploma and bachelor's degrees, and 19 people (85.67%) have post-graduate degrees and above. According to the results of Table 1, most of the people in this research had postgraduate education and higher, and the least people in this statistical population had a cycle to diploma education. Also, 6 people (21.24%) were electrical engineers, 13 people (42.46%) were civil and architectural engineers, and 10 people (35.71%) were mechanical and facility engineers.

Table 1- Frequency distribution of respondents' characteristics in terms of gender, age, education, and occupation

The cumulative percentage	Frequency	Abundance	Gender
100%	100%	28	Man
%100	0	0	Female
...	%100	28	Total
25%/14	25%/14	4	15-25
85%/67	57%/53	15	25-35
42%/93	57%/28	8	35-45
100%	14%/07	2	Total-45
...	%100	28	Total
14%/07	14%/07	2	Cycle to diploma
11%/32	25%	7	Master's degree and bachelor's degree
100%	85%/67	19	Master's degree and higher
...	%100	28	Total
24%/21	24%/21	6	electrical engineer
84%/67	42% .46	13	Civil and architectural engineer
100%	71%/35	10	Mechanical and facilities engineer
...	%100	28	Total

Source: Author

respondents from the spectrum of preparation for building reconstruction, the amount of planning for crisis preparation, the dimension of reconstruction and planning in the design of the Plasco building, and the existence of a necessary policy for crisis preparation in the reconstruction of the Plasco building is shown in Table 2. The results of the research indicate that the average score of the respondents from the spectrum of coordinates for the reconstruction of the Plasco building against the fire crisis of 1995 is 88.14, which is higher than the average score of the spectrum, which is 72, and has a significant difference from it so that the T score obtained from this t-test The variable is  $T = 11.21$ , which is significant with a degree of freedom of 27 at the 95% level, and the result is that crisis management in the response phase and reconstruction of the Plasco building has an effect on the control of losses caused by fire. The results of the research on the amount of preparation planning against the fire crisis indicated that the average score of the respondents from the analysis of the existing situation is 26.7, which is lower than the average score of the spectrum, which is 9. The result of the single-variable t-test shows that this difference is significant so that the t-value obtained is -73.11, which is significant with the degree of freedom of 219 and 21 at the 95% level, and as a result, the employees

of the Plasco building have the necessary knowledge from the They have the situational analysis that can be generalized to the entire statistical population. The average score of the respondents from planning and creating a suitable framework 14. It is 14, which is much higher than the average score of the spectrum, which is 12. The average score of the respondents regarding the presence of appropriate resources and equipment is 11.23, which is more than the average score of the spectrum, i.e. 9. The results of the single-variable t-test show that this difference is significant, so the t-test obtained from this test is 97.12, which is significant with a degree of freedom of 27 at the 95% level, and it gives the result that the employees of the Plasco building received the necessary training from They have appropriate resources and equipment that can be generalized to the entire statistical population. Also, the average score of the respondents from the dimension of warning systems is 10.4. This average is higher than the average score of the spectrum, which is 9. The result of the one-variable t-test shows that this difference is significant according to the obtained amount of  $T = 12.67$ , and the result is that it is necessary to prioritize the influential factors in crisis management in fire reconstruction projects.

Table 2- Significance test of the difference in the average scores of the respondents from different dimensions

Significant level	Degrees of freedom	The amount of T	standard deviation	The average score of the respondents	Spectrum
000 .0	27	11/21	9/32	8/55	Score of respondents Preparing to rebuild the building against the crisis
000 .0	27	12/13	25/4	14/14	Score of respondents Analysis of the existing situation before the reconstruction
000 .0	27	97/712	58/1 04/2	23/11	Score of respondents' spectrum score Reconstruction and planning in Plasco building design
000 .0	27	67/12	5/7	4/10	Score of respondents The existence of the necessary policy to prepare for the crisis in the reconstruction of the Plasco building

Source: Author

Table 3 shows the significance test of the difference in the average score of the respondents regarding the existence of the necessary policy for the preparation of

reconstruction and the structural factor of the Plasco building against the crisis. The existence of a necessary policy or policy in the reconstruction of the Plasco

building to prepare for the crisis by 12 Griy has three factors. The results of the research show that the average score of the respondents from the spectrum of the presence of policies and policies necessary for preparation is 45, which is more than the average score of the spectrum i.e. 36. The result of Faridman's test shows that the average rank score of the respondents is 1. is 75, which is more than the rank average of spectrum score 1.26, this difference is significant according to the obtained chi-square (20.59)= $\chi^2$  and it leads to the conclusion that in the reconstruction of the Plasko building, the necessary policy and policy It can be generalized to the entire statistical population to prepare for fire accidents. The results of the

Table 3- Significance test of the difference in the average score of the respondents regarding the existence of the necessary policy for the preparation of reconstruction and the structural factor of the Plasko building against the crisis

Significant level	Degrees of freedom	Chi-square measure	Rank average	Numerical average	
000 .0	27	59/20	75/1 26/1	23/11	Score of respondents' spectrum score
000 .0	27	1/0	55/1 45/1	71/3	Score of respondents' spectrum score

Source: Author

#### 4- Discussion and conclusion

With the development of societies and the expansion of urbanization and the consequent increase in population and the increasing use of all kinds of artifacts, the majority of which are composed of wood and all kinds of petroleum derivatives, we are also witnessing the high-density of construction in cities and commercial, office and residential buildings. . These reasons have caused a significant increase in employable materials within the city limits, which has led to an increase in the occurrence of fires in cities and an increase in the risk of possible hazards. For a long time, the fire after the earthquake (secondary events) has been considered a big challenge for the metropolis of Tehran, but after the fire incident and the collapse of the Plasco building, the importance and necessity of paying attention to its visible and hidden dimensions and angles is on everyone, including the officials. , those involved and even ordinary people were enlightened. Due to the lack of documented and substantiated experience regarding the occurrence of fire after an earthquake in the country, most of the studies conducted have been examined in the majority of the experiences of other countries, which in many cases are due to the lack of structural, cultural, climatic, etc. results of the studies. And the obtained research has not had the necessary efficiency for exploitation to prevent and reduce the risks caused by the occurrence of fire in the country. Despite the dispute between Tehran Municipality and Mustafafan Foundation regarding the Plasco construction

research about different aspects of policymaking are as follows: The average score of the respondents from the structural factor is 3.71, which is higher than the average score of the spectrum, i.e. 3.

Is. The results of Faridman's test show that the average rank score of the respondents from the spectrum of the structural factor is 1.55, which is more than the average rank score of the spectrum i.e. 1.45, but according to the amount of purchase and obtained ( $\chi = 0.1$  The difference is significant, so we can conclude that there is a necessary policy in the structural factor.

permit, this building is under construction without going through the usual legal and administrative procedures. The new 20-story building, including 5 floors below and 15 floors on the ground, has been built. One floor of this building is designed to commemorate "martyr firefighters". In Iran, no formal and significant measures have been taken to train and provide the fields of participation, which is considered the most important category in the field of accident control, including fire, in many countries of the world today, and the result is the lack of a safety culture and following The confusion of the public can be seen during crises and accidents. Designing a comprehensive plan of public education is a collaborative process, the result of which can be seen in the existence of a documented control and protection system against fire (Taqvai and Karimi, 2019). Considering the past of the Plasco building, the building's old construction, and the wear and tear of its structural system, the business of the Plasco building units had already been warned that they should have improved it, which they did not, and this caused the disaster in 1995. Considering that the type of structure, the bearing capacity of the columns, the type of materials used, and the type of thermal insulation of the building are very important in terms of the duration of the fire and the bearing capacity of these materials during a fire, so these principles should be considered in high-rise buildings. The analysis conducted on the level of people's knowledge of warning systems according to the average score of the respondents

which is 11.23 and is higher than the average score of the spectrum, which is 9, shows that the proper planning or policy for the reconstruction of the Plasco building is due to the presence of warning systems in a suitable condition. has Vafai et al. (1390) state that communication systems are the most important but most vulnerable part, and responsible people need at least one other communication device besides the telephone, and also every hospital should have a crisis management plan with organizations that play a role in the crisis, such as Firefighting, emergency, Red Crescent, etc. should be coordinated. In most fast-moving disasters, the early warning system can inform the lives of many people about the imminent danger and significantly reduce the death rate by conducting emergency evacuation. It is very important to have a written plan for the alarm system. Because having the right information in the shortest time after the accident is necessary to make the right decision and prepare to provide the best services.

Examining the available statistical results showed that the average score of the respondents from the dimension of response mechanism is 45, which is more than the average score of the spectrum, i.e. 36, and as a result, in the reconstruction of the Plasko building, the response to the fire crisis was in a good condition. In another study conducted by Boon (2011), the existence of a safe area during a fire during evacuation is of great importance, which is consistent with the results of the present study. The response is a set of measures and interventions that are carried out during and immediately after the occurrence of disasters to face and deal with the crisis and minimize financial and life losses. This stage itself consists of several sub-stages, the most important of which are search, rescue, relief, emergency evacuation, emergency accommodation, communication, assessment of the current situation, assessment of needs, and provision of basic needs. Examining the respondents' attitude towards their awareness and knowledge of this dimension is low and people had little knowledge of how to put out the fire and leave the place. Identifying the safe spaces of the building is one of the measures that should be taken so that in the event of an accident, it can be used as a command center to deal with the crisis. For this purpose, with the cooperation of the technical officials of the building, the safe space is identified in terms of the facility and building structure, and then it is identified by signs so that the employees are aware of it. After the accident, response teams rush to the scene of the accident based on the type of accident, its priorities, the scenarios they have tested in exercises, and previous experiences to respond to the most critical needs as quickly as possible.

Being prepared and having the ability to respond requires acquiring knowledge, increasing skills, using appropriate equipment and facilities, planning, and using the system to guide affairs. During accidents, every person involved in the operation should know what to do, where and when to start, and what the range of risks and competencies expected to do that work is. Each person must understand his position and that of others. Considering that in the reconstruction of the Plasko building, the standards and regulations of the municipality and national building regulations have been observed, as well as the protection of the building against fire in the event of a fire, the strengthening of the building against earthquakes according to international standards, the design and standard of entrance and exit roads. Necessary and unnecessary building has been designed and implemented.

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#### Offers

- 1- In order to speed up the control of the crisis and its effects, the root of the crisis should be identified and the attention of the forces should be drawn to it, so that they not only focus their efforts on it, but also take urgent action to stop and finally solve the crisis;
- 2- Examining the available documents and documents regarding the crises that happened in that place in the past;

3- If there are documents, it is possible to obtain information from the memories and experiences of people who lived in that place and were present at the time of disasters. In organizations, interviewing senior employees can be useful in identifying crises that have already occurred;

4- The proper management of the building in critical conditions requires double ability and skill. Therefore, it is necessary that every building has a specific crisis management plan or emergency preparedness plan based on its own resources, facilities, risks and characteristics, which is self-sufficient. guarantee the building. Creating a specific plan with scientific and accurate management in all stages before, during and after unexpected accidents through preventive measures in the form of predicting the type and time of the crisis, forming accident groups and committees, training and familiarizing employees and conducting periodic maneuvers In order to prepare and face these incidents, it is necessary to provide an appropriate response during a crisis, to evaluate, review and analyze the improvements after unexpected incidents. It should be noted that all these programs do not take into account a proper comprehensive planning in which all internal issues And the exterior of the treatment centers will be examined, it will have the least result;

5- In terms of planning in a crisis situation, in general, four stages can be mentioned, which are particularly common in crisis situations;

    ) Predicting the occurrence of an accident in advance, this step requires determining the problematic vulnerable parts;

    ) Preparing plans according to the type of incident predicted for a possible confrontation with the crisis, in order to reach this stage, one must first be able to be informed about the occurrence of the crisis in time and know exactly what to do in case of facing the crisis and even what the results of the actions at that time are. will be;

    ) The formation of headquarters, groups or teams that have the ability to deal with and face crisis in unusual conditions. Of course, the capacity and competence of people, whether at the level of managers to make decisions or at the level of people acting in crisis situations, are different from each other. identify the target people, their specialties and personal characteristics and their capabilities;

    ) Trial implementation of plans to face crises in practice, their trial implementation helps to evaluate people in crisis situations and evaluate the accuracy of the contract, the strengths and weaknesses of the program in different dimensions, including human resources;

    ) By installing automatic fire detection devices, both human and financial damages can be greatly reduced. The first function of such systems should be to inform the residents and the fire department of the occurrence of an accident. Fire doors are opened and other doors, such as doors that open to stairways and fire doors that separate units, close automatically;

    ) All employees should be carefully trained on what kind of fire to report. The easiest and safest way is to sound the alarm and not pay attention to the volume and size of the fire and then immediately extinguish the fire. and use a special extinguisher;

    ) Automatic fire alarm systems should be installed in the building in such a way that the sound of the alarm can be heard in all parts of the building.

6- Paying attention to the importance of planning and disaster management measures in policies and determining general policies;

7- Existence of correct rules is effective in the performance of employees and gives people self-confidence. Full understanding of the priorities raised in the stages of crisis management and determining their policies and implementation solutions, as well as determining relevant and responsible organizations and centers in relation to each of them. and creating a system to review the organization's performance after a crisis;

8- Holding a drill or practical exercise on how to manage a crisis, sensitizing people and officials to warnings and attracting their attention to take preventive measures should be considered;

9- The training of personnel and people should be considered in all stages of the disaster management cycle and the required training should be provided with different methods and suitable methods;

10- Preventing the construction of structures, without applying rules and standards;

11- The design of buildings and emergency exit doors should be such that the safety of escaping from the fire place is ensured when necessary. For example, the exit doors should be made in such a way that they are protected from fire and smoke, and each floor should have two separate exit doors. lead to a place other than the inner yard or dead-end places;

12- The person or persons working in the building's fire department must regularly inspect the fire extinguishers and check them from different angles. Hasty decisions based on incomplete information increase the scope of damage several times. Communication in different dimensions plays a very decisive role in crisis control;

13- Examining the effect of building facilities and equipment on the evacuation of people during a crisis;

14- Examining the role of knowledge in reducing vulnerability.

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