



Identification and evaluation of key Assets with approach passive defense (case study: Qazvin province)

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ABSTRACT

The attractiveness of Key assets to the enemy does not have the same value, hence, according to their leveling, the possibility of threats is considered. The present study aims to focus on Qazvin's case study. The present research is an applied research using a descriptive-analytical method. Data gathering instruments are library studies, interviews, and questionnaires, which were selected as a statistical sample using a targeted sampling of 50 experts. The information analysis method for the leveling of assets was done through the guidelines for the leveling of centers of gravity approved by the inactive defense organization, and the assessment of the value of assets was also done through the FEMA technique. The research results in the stratification section show that Qazvin Karaj Freeway, Shahid Rajaei Power Plant, Qazvin 16th Armored Division, Northwest Radio Communications Directorate, and Chicken Ajdad Barkat Company are among the assets with sensitive surfaces. Qazvin Governorate, Qazvin Governorate, Imam Khomeini International University, Shahid Rajaei Hospital, and Qazvin Railway Station are assets with high levels of importance, and in the asset evaluation section, Shahid Rajaei Power Plant with a score of 9/33, Qazvin Governorate with a score of 7.96 respectively. Chicken Ajdad Barkat Company with 7.33, Qazvin Governorship with 6.84, Qazvin 16th Armored Division with 6.8, Shahid Rajaei Hospital with 6.17, Imam Khomeini International University with 5.88, Qazvin Railway Station with 5.75, General Directorate of Northwest Radio Communications with 5.5 and Qazvin Karaj Freeway with 5.48 are of high value

1. Introduction

Key assets include physical or spiritual systems and assets essential to a system. The disruption to its services can have a critical impact on national security, economic well-being (Public health or safety, or a combination of these (Zhang et al., 2015)). Considering the recent wars, including the Quds occupation regime's war against Hamas and the Russian-Ukrainian war, we conclude that the enemy's offensive has always focused on the Key assets rather than at the lowest cost and power. Deprive the country of its defense s and in the strategy of destroying the centers of gravity, the import of Key assets are in the initial circles, and in case of dysfunction and threat to them (The possibility of service

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is denied. Cities and metropolises, due to their high volume of investment and the presence of numerous facilities, critical centers, and vital arteries, are susceptible to significant financial and human damages in the event of human-made threats (Abazarlou, 2016). In metropolises, damages resulting from human-made threats affect Key assets, including a combination of physical harm and disruptions to urban elements. Destruction of structures and buildings, road networks and access points, essential infrastructure such as water reservoirs, power plants, communication lines for telephone, electricity, water, gas, etc., are among the impacts (Hosseini et al, 2011).

- Non-physical defense, as a platform for sustainable development and one of the most effective and sustainable defense methods against threats, encompasses various urban spaces. This type of defense pursues five main objectives: increasing deterrence, reducing vulnerability, ensuring the continuity of essential activities, promoting national sustainability, and facilitating crisis management (Ghazanfari, 2013). In this regard, the research aims are as follows: Evaluation of the value of key asset case studies.

- The research background will be addressed further.

Tavassoli and Abazarlou (1400) in the article "Modeling Vulnerability of Cities' Key Assets using Non-Physical Defence Approach with Fuzzy Logic (Case Study: Tehran District 6)," argue that a fundamental assumption is that the value of an asset is seen from the perspective of an adversarial agent that affects the likelihood of a security incident., the attractiveness of the asset to the adversary is an estimation of the target value for the opponent. Ultimately, for sensitive and essential assets, the radius of vulnerability to explosion is defined, and the vulnerability level of District 6 is modeled (Tavassoli & Abazarlou, 2021:14). In the article "Evaluation of Risk for Key Assets in Bandar Abbas City Using Non-Physical Defence Approach," Mousavi et al. (1399) utilized the FEMA (Federal Emergency Management Agency) technique to assess the risk of Key asset case studies such as the governorate and water treatment plant. However, the mentioned research did not specifically address the statistical method and the process of identifying Key assets (Mousavi et al., 2020:744). Mashadi and Amini Varaki (1394) presented an article titled "Development and Presentation of a Framework for Assessing Threats, Vulnerabilities, and Risk Analysis of Critical and Sensitive Infrastructures with an Emphasis on Non-Physical Defence ." This study aims to provide a framework for accurate and precise assessment of threats, vulnerabilities, and risk exposure of the country's critical infrastructures, considering non-physical defense considerations. Based on the strategies of foreign enemies, particularly the United States, a country's fundamental infrastructures are considered the primary targets of potential attacks. (Mashhadi & Amini Varaki, 2015) Standard et al. (1393), in the article "Damage Analysis of Vital Arteries Considering Dependency Effects in Targeted Attacks In the year 1393, after introducing the water and electricity arteries, by using utilized two models, the graph theory model and the Leontief model, 240 scenarios for Assessment to assess the vulnerability and The risk of these arteries has been calculated that Among the single variable scenarios, the scenario of the explosion in the treatment plant and among the combined scenarios of the explosion of two treatment plants and the electric substation has the highest probability of occurrence (Skandari et al, 2014). Etinay and colleagues (2021), in the article "Urban Resilience for Risk Management," aimed to identify the principles of resilience to assess the risk of Washington, D.C., against terrorist threats, particularly those involving vehicular bombings. The results of this study indicate that the likelihood of terrorist attacks as Car bombing van vehicular in critical city components such as gas pressure reduction stations, power substations, water treatment plants, and gas stations is high. (Etinay & Egbu, 2018). Ongkowijoyo and Dolo (2020), in the article "Resilience Model Based on Risk Concentration for the Reconstruction of Urban Infrastructure Systems," have delved into the subject that the assessment of resilience in urban infrastructure systems, when facing disruptions, relies on a comprehensive risk evaluation. The study examined the interactions of urban infrastructures such as electricity, water, telecommunications, oil, and gas using the Norman method. The results indicated that the electricity and gas infrastructures have the most significant impact on other urban infrastructures, and the water infrastructure is most susceptible to interactions with the electricity infrastructure (Ongkowijoyo & Dolo, 2018). Alcaraz and Zeadally, in the article "Protecting Critical Infrastructures: Requirements and Challenges of the 21st Century," argue that sensitive infrastructures play a vital role in supporting modern society. Reliability, performance, service continuity, safety, maintenance, and protection of infrastructures are national priorities for countries worldwide. The

authors have delved into the examination of vulnerabilities and threats facing modern sensitive infrastructures, With an emphasis on industrial control systems, and have also discussed protective measures.(Alcaraz & Zeadally,2015)

2. Theoretical Foundations

2.1. Passive Defense

Defense is the measures to resist political, military, economic, social, psychological, or technological attacks by one or more allied countries (FEMA, 2003). Defense is of two types: active and passive defense. Passive defense is a form of defense without the use of weapons and is the main complement of the comprehensive defense of the country (Ghazanfari, 2012). With passive defense measures, efforts are made to minimize the impacts of vulnerabilities within the country. The primary approach in this field is to confront or manage threats. This should be done in a manner that minimizes the impact of the threat on the country (Kalantari et al,2022).Defense is essential for the survival of humans and the provider of security. Passive defense means the defense with the lowest management, or passive defense is a reactive and reactive movement agent. So, in times of surprise, the passive defense must be inherently responsive.

Since in attacks, especially the initial attacks, a surprise air attack takes place, the passive defense is a set of measures that keep people safe from this shock. (Jalali & Skandari, 2010).The concept of territorial planning initially has a defensive meaning and later evolves into a developmental concept. However, in many countries, territorial planning and national schemes prioritize development rather than defense, leading to the expansion of vulnerable areas against enemy threats (Collier & Savannah, 2021).

2.2. The Importance of Asset Identification in passive defence

In passive defense studies, the safety of the studied assets is essential to identify the threats. Assets mean anything of value to an organization (Setaheh,2011). To evaluate assets, one has to consider different scenarios to consider them. The most important task is to identify the important assets and understand how important these assets are in the form of human protection and the main use of assets (Farhadi et al, 2022). Another definition of an asset is a valuable resource that requires protection and can be tangible (e.g., people, buildings, facilities, equipment, activities, functions, and information) or intangible (e.g., processes or antecedent and credibility of a company) (FEMA452, 2005). In general, the enemy must have sufficient and logical reasons to target a target. If the city can be likened to a living organism, the assets of strategic importance will be the brains because they influence the key decisions which will destroy the city's decision-making and management power, and gradually with the disturbances the other parts will be disabled, and the life of the city will be disrupted. Therefore, assets of strategic importance are considered one of the most attractive targets for the enemy(Rahmani,2022).In general, if an asset is important to the mission of a system, that system is sensitive to the consequences of the loss of the asset, and its impact on an urban system (Norman,2010).

The importance of an asset is defined in terms of sensitivity based on the value that the organization defines for that asset and also based on the short-term and long-term consequences of damage and destruction of assets (Vallani,2007).

2.3. Identification of Key Assets with Passive Defence Approach

Prioritization is one of the most fundamental tasks in achieving success and accelerating the goals outlined in each organization and organization. According to the Law of Priority (80/20), if

managers in the relevant planning system prioritize work issues and activities based on their importance, 20% of efforts, time, and cost will lead to 80% success. Eighty percent of efforts, time, and money, only lead to 20 percent success in achieving goals (Alikhani et al, 2019).

In this study, the directive for the level of gravity centers of passive defense organization, approved in January 2016, is used to identify the key assets. The directive is a matrix consisting of eight main criteria, nine sub-criteria, and 44 specialized indicators in the passive defense field. The main criteria include: The main importance with a score of 10, the scope of influence with a score of 20, the depth of influence in the governance of the country with a score of 20, the possibility of substitution with a score of 6, being unique with a score of 14, playing with a score of 5, capital value with a score of 10, and the consequences of injury (effect) are scored with a score of 15 which total points are 100. Any asset in the range between 100-81 is a vital asset, between 80-61 is a sensitive asset, and instructions for leveling centers of gravity of the passive (instructions for leveling centers of gravity of the inactive defense organization, 2015). It is worth noting that in this research, the sample assets of the study listed in each of the three levels as key assets. Evaluation method of key assets with passive defense approach Because the number of assets available may be very high in a risk assessment process, and the risk assessment of all of them is generally not feasible or necessary (due to the low importance of some assets) The first step is to evaluate assets, screen them, and perform an initial assessment. To assess the importance and prioritization of key assets, passive defense organization indicators are used based on the numerical spectrum of Likert (the number 1 is the lowest value and the number 10 is the most valuable), which is as follows :(Jalali, 2012)

Role and value of the function

The effects and role of that asset in a system and collection are called. In other words, the asset has a major role in the set process and a sub-role in the system process. And the more the number tends towards 10, the higher the functional value of the key asset in the set.

Quantitative and qualitative beneficiaries:

Beneficiaries or customers can be divided into two categories: low and high quality. The significance of these groups is important for key asset exploiters such as the military, industrial, major commercial, and services. This index will be rated on a scale of 1 to 10, indicating its importance.

Relative economic value:

The same Relative value is the key asset that each asset has more value, which leads to a higher number, 10.

The Impact of Assets in Facilitating Crisis Management:

The greater the impact of the asset on facilitating crisis management, and at the time of threats and risks, i.e., effective in economic prosperity, the more value for the continued operation and promotion of the safety and security of the collection. Methodology

The present research is descriptive-analytical in terms of the type of research. According to the goals and questions of the research, to collect information from library studies and questionnaires the statistical population of the research is the number of experts in the field of research. This research was used to evaluate the value of key assets, a case study of the FEMA (Federal Emergency Management Agency) technique. Study Area

Qazvin province is located in the northwest part of Iran, which has only 1 percent of the country's area close to 10 percent in Iran's economy and production. The reason for choosing Qazvin province as a case sample is as follows:

- High relative population density of the province significantly compared to the whole country (the province is 8.81 and the country 1.49 square kilometers)
- Having more than 8% of the total agriculture production in the country
- Being a property of several industrial cities (Alzer, Caspian 12, Arasanj, Lia) and allocating almost 5% of the industrial investment in the country
- Alborz Industrial City is the first and largest industrial city in Iran
- Employment of more than 130 thousand people in the industrial sector of the Qazvin province
- 5% of the production of mother-fowl chicken, 100% of the production of egg-laying ancestors

About 5% of electricity supply by 2000 MW power plant Shahid Rajaei The fourth position of the country in the production of ornamental fish in the country is the shape of number (1) the political position of Qazvin province.

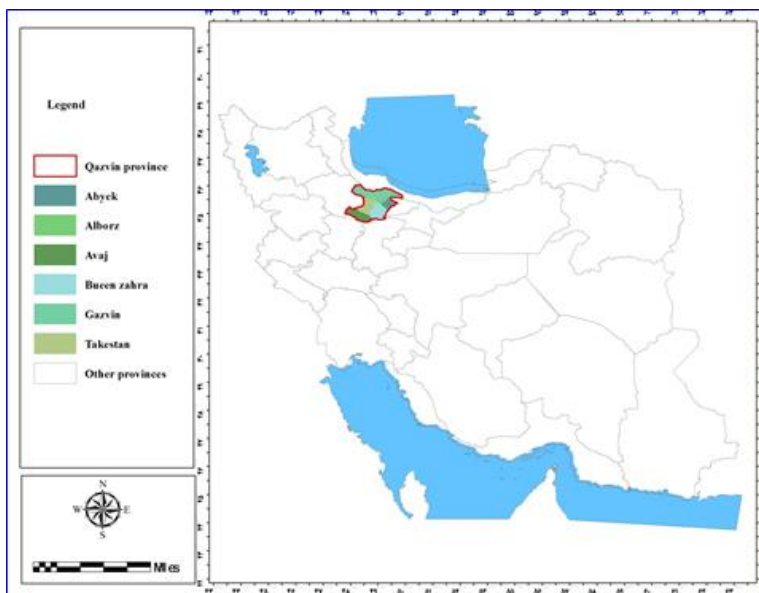


Figure1. Study Area Location. Source: Author, 2023.

Data Analysis

2.4. identifying and levelling key assets Case sample

In this section, through interviews with project experts, key assets of the province were identified with an emphasis on Qazvin city, which are:

Karaj Qazvin Freeway (1), Shahid Rajaei Power Plant (2), Qazvin Armored Field (3), North West Radio Communications General Directorate (4), Blessed Ancestors Chicken Company (5) ,Shahid Rajaei Hospital 6, Qazvin Governorate, Qazvin Governorate, Qazvin Governorate & Qazvin & Qazvin & ^ International University of Imam Khomeini & Co. & Qazvin Railway Station.

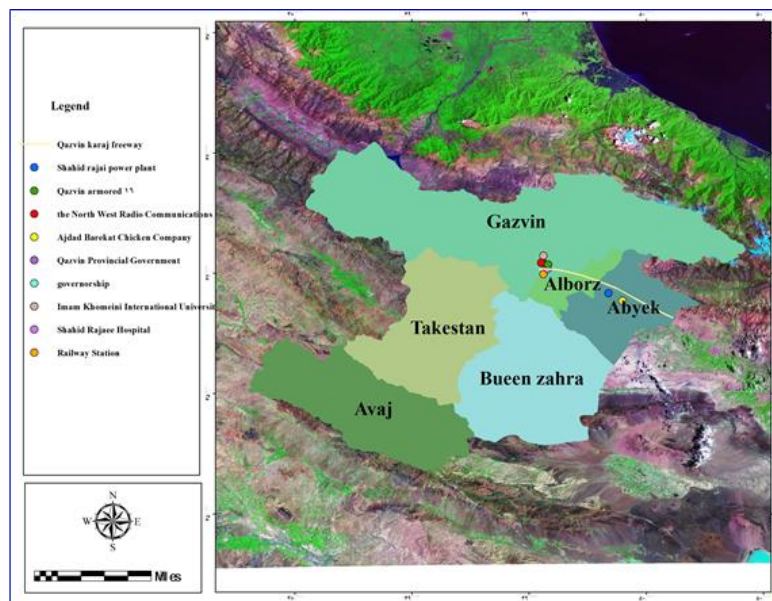
Using the instructions for leveling the centers of gravity according to Table 1, Joan was leveled. The results of the research show that Karaj Qazvin Freeway, Shahid Rajaei Power Plant, Qazvin Armored Division^{١٦}, North West Radio Communications General Directorate ,Blessed Ancestors Chicken Company are among the assets with sensitive level, and Qazvin Governorate. Qazvin governorate, Imam Khomeini International University, Shahid Rajaei Hospital, and Qazvin railway station are the main assets.

Table 1. Asset Levelling in Qazvin Province

Assets	product or activity					geography (selecting only one indicator)					Population	Coating quality (selecting just one indicator)					Management and administration	Providing production services	The people needed to supply	create resources in the discipline			
	Culturally	Defensive security	social	economic	Politicized	Local	Provincial	Nationalizing	Transnational	population density		Public Centers	Free trade zones	Private sector	Government centres	Governmental centres				service delivery	Human resources	Rial and currency resources	Continuity of function
1	1	2	2	2	1	0	0	6	0	0	2	0	0	0	0	0	5	5	4	1	1	1	1
2	1	2	1	2	1	0	0	0	0	3	0	0	0	0	0	3	4	4	4	2	1	1	1
3	1	2	2	1	1	0	0	0	0	5	0	0	0	0	0	4	5	5	4	2	2	1	1
4	1	2	١	1	1	0	0	0	0	5	0	0	0	0	0	4	3	4	3	1	1	1	1
5	1	1	1	2	1	0	0	6	0	6	0	0	2	0	0	0	5	5	4	2	2	2	2
6	0/5	1	1	1	0/5	0	4	0	0	4	2	0	0	0	0	0	3	3	2/5	1/5	1	0/5	0/5
7	1	1	1	1	1	0	4	0	0	4	0	0	0	0	0	4	3	3	2/5	1/5	1	0/5	1
8	1	1	1	1	1	0	3	0	0	3	0	0	0	0	0	4	3	3	2/5	1	1	1	1
9	1	1	1	1	1	0	0	5	0	0	0	0	0	0	3	0	3	3	2/5	1	1	0/5	0/5
10	0/5	1	0/5	1	0/5	0	0	5	0	4	2	0	0	0	0	0	3	3	4	1	1	1	1

possibility of replacement			Being unique			Acting in			value of capital			Consequences of injury			Sum						
systems replacement	substitution	Structural	Level of confidentiality of information	Equipment and facilities	Similar sample/systems	Productive knowledge	Employing specialized human resources	manpower productive knowledge	Health & safety Technology and science of production	Creating prosperity and economic	Capital focus							sequentialism generating	general dissatisfaction	Disruptions in society	
equipment replacement	equipment replacement	equipment replacement									spiritual		Physical								
											National credit	scientists and elites	Foreign investment	plan to have development		the aggregation of facilities	Number of employees				Launching and building value Rial
1	1	1	0	۴	1	0/5	2	0	2	1	1	1	0	0	0/5	۰	1/5	5	5	5	71/5
1	1	1	۱	۴	1	0/5	۳	1	1/5	1	1/5	1/5	1	1	1	1	1/5	5	5	5	73
2	1	1	۲	5	1	۱/۵	2	0	2	1	1/5	1/5	0	0	1	1	1/5	5	3	5	77/5
1	2	2	1/5	۴	1	2	2	1	2	1	2	2	۱	0	1	0	1	5	5	5	73
2	2	1	0/5	۱	1	0/5	2	0	2	1	1	۱	0	1	0/5	0	0/5	5	5	5	71/5
2	1	1	۰	۴	۰	1/5	2	0	2	0/5	1	2	0	1	1	1	1	5	3	3	58
1	1/5	1/5	1	1	1	1	2	0	2	0/5	1	1	0	1	0/5	1	0/5	5	3	3	58
1	1	1	2	۳	1	1	1	1	1	0/5	1	1	0	1	0/5	0	0/5	5	3	3	56
1	1	1	0/5	1	1	1/5	2	2	0	0/5	1/5	1/5	0	1	1	1	1	1	3	3	56
1	1	1	0/5	1	1	1	2	0	1	0/5	1	1/5	0	1	0/5	0/5	0/5	3	5	5	55/5

Figure2. Identification map of the key assets in Case Study: Author, 2023



Assessment of key assets of Case Study

After adjusting the questionnaire, the study used the AHP technique in Expert Choice software to weigh the key asset assessment indicators. Figure 3, and Table 2 illustrate the results.



Figure3. Weighting of key asset evaluation indicators of the studied sample in Expert choice: Author, 2023.

TABLE 2. THE WEIGHTS OF THE EVALUATION INDICES OF THE KEY ASSETS

Weight	Asset assessment indicators	Row
0/487	Functional Role	1
0/079	Quantitative level of beneficiaries	2
0/156	Qualitative level of beneficiaries	3
0.048	Relative economic value	4
0/230	effectiveness in the process of facilitating crisis management	5

Total	0/230	0.048	0/156	0/079	0/487	Total	effectiveness in the process of facilitating crisis management	Relative economic value	Qualitative level of beneficiaries	Quantitative level of beneficiaries	Functional role	Encrypts	ASSETS
5/48	1/61	0/43	0/94	0/55	1/95	33	7	9	6	7	4	1	Qazvin karaj freeway
9/23	1/84	0/48	1/25	0/79	4/87	46	8	10	8	10	10	2	Shahid rajai power plant
6/8	1/8	0/3	0/8	0/4	3/4	32	8	7	5	5	7	3	Qazvin armored
5/5	0/69	0/48	0/78	0/63	2/92	32	3	10	5	8	6	4	the North West Radio Communications Directorate General
7/33	6/1	0/3	0/9	0/6	3/9	35	7	7	6	7	8	5	Ajdad Barekat Chicken Company
6/17	1/61	0/48	0/94	0/71	2/44	37	7	10	6	9	5	6	Shahid Rajaei Hospital
7/96	2/07	0/43	1/25	0/32	3/9	38	9	9	8	4	8	7	Qazvin Provincial Government
6/84	1/84	0/34	0/94	0/32	3/41	32	8	7	6	4	7	8	Qazvin Governorship
5/88	1/15	0/38	0/62	0/۳۲	۳/۴۱	28	5	8	4	4	7	9	Imam Khomeini International University Qazvin
5/75	1/61	0/43	0/31	0/47	2/92	30	7	9	2	6	6	4	Qazvin Railway Station



FIGURE4. PRIORITIZING THE VALUE OF KEY ASSETS: SOURCE: AUTHOR, 2023

FIGURES 4 AND 5 INDICATE: SHAHID RAJAEI POWER PLANT WITH A RATING OF 9/10, QAZVIN GOVERNORATE WITH 8/10, BLESSED ANCESTORS CHICKEN COMPANY WITH 7/10 QAZVIN GOVERNORATE WITH 6/10, QAZVIN ARMORED DIVISION 5/10, SHAHID RAJAEI HOSPITAL WITH 4/10, IMAM KHOMEINI INTERNATIONAL UNIVERSITY WITH 3/10, QAZVIN RAILWAY STATION WITH 2/10 NORTHWESTERN RADIO COMMUNICATIONS DIRECTORATE WITH 1/10 KEYANA AND QAZVIN FREEWAY KARAJ WITH 0.5/10 GHAN ARE OF GREAT VALUE. ACCORDING TO THE FEMA TECHNIQUE IN EVALUATING KEY ASSETS, THE ASSET RATING SCALE AND SPECIFYING THE GROUPING OF EACH ASSET IS BASED ON THE SCALE PRESENTED IN THE TABLE (1).

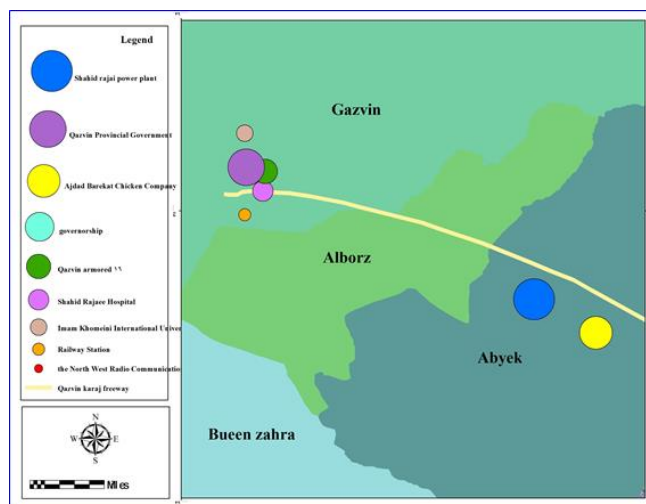


FIGURE5. PRIORITIZING THE VALUE OF KEY ASSETS IN CASE STUDY: SOURCE: AUTHOR, 2023

Table 4. Key asset value scale in a infrastructure and asset group determination

Scale	Score	Interpretations	groupings
Group 1	the loss or destruction of key assets will have tremendous and dire consequences, such as the killing of large numbers of people, very severe injuries & loss of all basic user services or processes	10	very high
	The loss or destruction of key assets will have serious consequences, such as the killing of a number of people, severe injury, loss of all basic user services or processes	8-9	high
Group 2	loss or breakdown of key assets will have very bad consequences, such as serious injuries and disruption to major airport uses for the long term	7	Average upward
	The loss or breakdown of key assets will have bad consequences, such as injuries and disruptions to major airport uses and processes	5-6	Average
	loss or breakdown of key assets will have relatively bad consequences, such as mild injuries and poor disruption of major airport uses and processes	4	Average downwards
Group 3	The loss or breakdown of key assets will have dire consequences, such as gentle disruptions to major airport uses and processes for the short term	2-3	low
	The loss or destruction of key assets will have bad consequences that are expendable.	1	Very low

Source: (Bayat Aqblaghi, 2012: 64)

Table 4, and Figure 6 illustrate key assets of Qazvin Freeway, Qazvin Armored 16 Division, North West Radio Communications Directorate General & Blessed Ancestors Chicken Company is one of the assets with a sensitive level, Qazvin Governorate, Imam Khomeini International University & Shahid Rajaei Hospital and Qazvin Railway Station are among the assets of the second group and Shahid Rajaei Power Plant, Qazvin Governorate are among the assets of the first group.

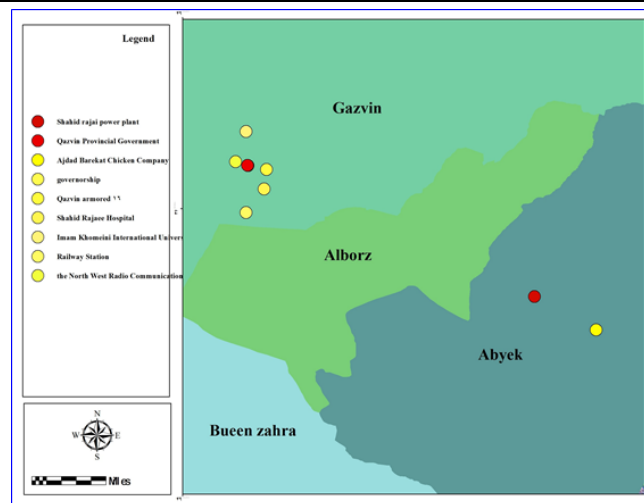


FIGURE6. GROUPING OF KEY ASSETS IN CASE STUDY: SOURCE: AUTHOR, 2023

IN THE FOLLOWING, THE VALUABLE REASON OF ASSETS IS PRESENTED IN TABLE (5).

Table 5. Valuable Reasons for key Assets of Case Study

Worthy Cause	ASSETS
Most car and passenger traffic, connecting province to west and east of country	Qazvin karaj freeway
In addition to being the home electricity supplier of the province, it strengthens the productive posts, supplies power to the industries and production units, and 3/5 Grades provide the percentage of electricity to the entire country.	Shahid rajai power plant
It provides security and promotes its defense development, which is located within the territory for military use. Other functions include Army Hospital, Tank Parking, Hosseinieh, and Peacekeeping Battalion.	Qazvin armored 16
Increasing the quality of communication of mobile operators in servicing provincial and improving subscribers' Communication status of villages in the province	the North West Radio Communications Directorate General
The largest chicken production unit of the country's mother's broiler ancestors and the production of 20 percent of the country's chicken ancestors	Chicken company ancestors blessing
Most beds in ICU sections, burns and surgery in the province	Shahid rajai hospital
Maintaining the order and security of the province	Qazvin governorate
As decision-making and planning centers in the provincial cities, public security, economic planning, monitoring the supply of people's needs, monitoring the work of departments	Qazvin governorship
The university accepts students from non-Iranian students for being international and is the only official academic reference for teaching and transferring Iranian-Islamic culture and Persian language to non-Persian speakers who are receptive to students More than 1% of the country	Imam Khomeini International University
Placing Qazvin on the exchange highway of the province on the Tehran to the northwest of the country railway route	Qazvin railway station

3. Conclusion

Key assets, one of the existing uses in cities, require development in the context of passive defense to minimize their vulnerability. The present study aimed to identify and evaluate the value of key assets in Qazvin province, emphasizing Qazvin city.

In this research, to identify the key assets of the study sample, the guidelines for the leveling of gravity centers of passive defense organization were used, which accordingly, with the benefit of experts and experts based in Qazvin province (Karaj Qazvin Freeway, Shahid Rajaei Power Plant,

Qazvin Armored Division ۱۶, North West Radio Communications General Directorate, Bareh Blessed Chicken Company, Qazvin Governorate, Qazvin Governorate, Imam Khomeini International University, Shahid Rajaei Hospital and Qazvin Railway Station were among the key assets. In the following, according to the guidelines for the leveling of public gravity centers, the results show that Qazvin Freeway, Shahid Rajaei Power Plant, Qazvin Armored Division 16, North West Radio Communications Directorate, Blessed Ancestors Chicken Company is one of the assets with sensitive level and Qazvin Governorate, Qazvin Governorate, Imam Khomeini International University, Shahid Rajaei Hospital and Qazvin Railway Station are among the critical assets. Also, to prioritize the value of key assets, a case study was conducted using the FEMA assessment technique of asset evaluation, which the results of the research show that Shahid Rajaei Power Plant with a rating of 9/33, respectively, Qazvin Governorate with ۷/۹۶, Blessed Ancestors Chicken Co. with 7/33, Qazvin Governorate with 6/84, Qazvin Armored Division 6/8, Shahid Rajaei Hospital with 6/17, Imam Khomeini International University with 5/88, Qazvin Railway Station with 5/75, North West Radio Communications General Directorate with ۵/۵ and Qazvin Freeway Karaj with 5/48. They are of great value.

When comparing the findings of our current research to previous studies, it's important to note that previous research did not outline a process and instructions for identifying and prioritizing the value of key assets. Previous research relied solely on expert opinions and qualitative assessments. In contrast, our present study utilized guidelines for prioritizing key assets and evaluating their value within the passive defense organization, leading to more accurate results.

References

- Abazarlou, S. (2016). Assessing the vulnerability of cities with the approach of passive defense, a case example: Sabzevar city, confidential issue of passive defense science and technology magazine, Malik Ashtar University of Technology, Tehran.
- Alcaraza, C., Zeadally, Sh. (2015). Critical infrastructure protection: Requirements and challenges for the ۲۱st century, International journal of critical infrastructure protection, 53–66.
- Alikhani, A., Barzegar B., Akram, B., & Nurollahi, H. (2018). presentation of a comprehensive assessment model of the vulnerability of urban areas by dividing the constituent layers of the city with a passive defense approach, Crisis Management Journal, Volume 8, Number 2. Serial No. 16, pp. 33-46.
- Bayat Aqbalaghi, M. (2018). translation of Report No. 452: Risk Assessment and Guidelines for Reducing the Potential of Terrorist Attacks, United States Federal Emergency Management Agency, Iran Power and Water Resources Development Company.
- Collier, S. J., Cox, S. (2021). Governing urban resilience: Insurance and the problematization of climate change, Economy and Society, 50(2), 275-296. <https://doi.org/10.1080/03085147.2021.1904621>
- Eskandari, M., Omidar, B., Tavakoli T. (2014). Analysis of the damage of vital arteries considering the effects of dependency due to targeted attacks, a case study of the water and electricity network in an urban area, two quarterly journals of crisis management, special issue of passive defense week, pp. 19-30.
- Etinay N. Egbu Ch. (2018). Building Urban Resilience for Disaster Risk Management and Disaster Risk Reduction, Procedia Engineering 212: 575–582.
- Farhadi, E., Pourahmad, A., Ziari, K., Sabokbar, H., & Tondelli, S. (2022). Indicators Affecting the Urban Resilience with a Scenario Approach in Tehran Metropolis, Sustainability, ۱۴, ۲۰۲۲ <https://doi.org/10.3390/su141912756>
- Fema426. (2003). Reference Manual to Mitigation Potential Terrorist Attacks Against Buildings, Federal Emergency Management Agency, USA.
- Fema452. (2005). Risk Assessment, a How to guide to Mitigation Potential Terrorist Attacks Against Buildings, Federal Emergency Management Agency, USA.
- Ghazanfari, M. (2012). Pathology of metro stations against man-made threats and providing solutions to reduce vulnerability (case study: Valiasr station), Master's thesis, Malik Ashtar University of Technology, Tehran.
- Guidelines for Leveling the Centers of Gravity of the Non-Active Defense Organization. (2014). Physical Vice-Chancellor, Non-Active Defense Organization, Tehran.
- Hosseini, A., Zanganeh, S., Hosseini, M., & Qanbari Nasab, A. (2013). Investigation of vulnerable elements and considerations of passive defense in the Harim of the metropolis of Tehran, the first scientific-research conference on urban planning and architecture with the approach of passive defense, University Malik Ashtar Industry, Tehran.
- Jalali Farahani, Gh. (2012). an introduction to the method and model of threat estimation in passive defense. Tehran: Printing and Publishing Institute of Imam Hossein University.
- Jalali Farhani, Gh., Eskandari, H. (2010). passive defense knowledge for managers of executive bodies, second edition, Bostan Hamid Publishing House, Tehran.

- Kalantari Khalil Abad, H., Abazarlou, S., & Heydari., A. (2022), Identifying the Vulnerability Process of Cities with Passive Defense Approach, First Edition, Art University Press, Tehran.
- Mashhadi, H., Amini Varki., S. (2014), Compilation and presentation of threat assessment model, vulnerability and risk analysis of critical and sensitive infrastructures with an emphasis on passive defense, the first national conference on risk management in infrastructures, Tehran.
- Mousavi, R., Panishtegar, Y., & Kalantari Khalil Abad, H. (2019).risk assessment of key assets of Bandar Abbas city with a passive defense approach, *New Attitudes in Human Geography*, 12 (4) (consecutive 48), pp. : 761-744.
- Norman, T. (2016). *Risk Analysis and Security Countermeasure selection*, CRC press, USA.
- Ongkowijoyo Citra S., Doloi H. (2018). Risk-based Resilience Assessment Model Focusing on Urban Infrastructure System Restoration, 212(18), Pages 1115-1122, <https://doi.org/10.1016/j.proeng.2018.01.144>.
- Rahmani, M., Lotfata, A., Khoshnevis, S., Javanmardi, K., & Akdogan., M. (2022). Resilience assessment of health-care facilities within urban context: learning from a non-profit hospital in Tehran, *International Journal of Disaster Resilience in the Built Environment*, 6(8). <https://doi.org/10.1108/IJDRBE-11-2021-0151>.
- Setareh, A. (2011). risk management in passive defense, assessment of assets, threat and vulnerability, Andishe Zahor publication, Amash and passive defense academic complex, Malik Ashtar University of Technology, Tehran.
- Tavasoli, Mohsen, Abazarlou., S. (2021). Modeling the vulnerability of key assets of cities with a passive defense approach using fuzzy logic (Case study: District 6 of Tehran), *Shahr Ayman*, 4 (4), 14-22.
- zhang, z., xiangyan,li. (2017). A quantitative approach for assessing the critical nodal and linear elements of a railway infrastructure .*International journal*.



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