Application of Passive Defense in Location of Industrial Estates

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Abstract

Select an appropriate location for various activities, the decision is very complex. Since the resource management is needed to real information, should a large amount of detailed information to choose different places become to collect, combine, analyze, to properly evaluate the factors that may influence the selection may be achieved. Finding a suitable location for industrial estate is one of the basic principles of passive defense and if it according to scientific methods and planning can be Staying safe in this settlements or at least reduce the damage is in times of crisis. This article positioning and passive defense, the application of the principles of passive defense impact on the positioning industrial estate is offered.

Keywords
Passive defense, location, industrial estate.

1. Introduction
Location has existed from the beginning of founding of an intelligent human on earth in order to obtain food resources, to find an ambush for hunting and fighting, and to establish a shelter and a workplace. Proper location has always been the first and the most important step taken in passive defense process. In order to do so, one should try to act upon selection of appropriate locations considering required limitations and capabilities by the said plan. While considering the policies for foundation and expansion of industries and observance of required arrangement in the area of location of the said industries in regular time and in crisis, it is required to pay attention to various social, economic, regional and military elements. Also, in the industrial estate investment too great for the construction and the establishment of the industry is considered and as well as a great human resources which working therein, upon such natural disasters as flood, earthquake and wars as well as tourists leading to demolition of financial and human assets, industrial estates, that are considered great investment for foundation and establishment of industries, are actually vulnerable. Hence, upon application of fundamentals of passive defense in location of such estates and in consideration of respective indices of the passive defense in location, a desirable place should be selected for industrial estate. The main objective of this research is to render certain concepts for decrease of vulnerability of industrial estates against natural and artificial ones. A major question is: How can we immune industrial estates against such threats? The answer is: It so seems that relevant fundamentals of passive defense in location of industrial estate lead to immunity of such applications against threats.

2. Passive defense
It refers to a collection of measures that require no weapons and/or upon implementation of such measures one can prevent financial damages incurred by vital and major military and civil installations and equipments and human death or decrease the amount of such damages and losses to a minimum scale [12].

2.1 Measures taken by different countries in passive defense:
In order to remain safe from natural and artificial threats, each country is seeking for a collection of measures by which it can minimum corresponding damages incurred by financial and bodily damages of its personnel. The following is a brief summary of measures taken by various countries in the field of passive defense [2]:

Table 1: Passive defense measures in different countries

Country	Measures
Germany	Compilation of laws and required support for passive defense Double use of facilities, shelters Compilation of preparatory measures for foundation of cities in the area of land aiming at equal distribution of small and medium cities after World War II
Switzerland	Establishment of a safe subway in proper depth functioning as urban life and shelter Necessity for public shelters, multipurpose, in required numbers at desirable areas of the country Compulsory development of shelters by private units through public partnership and financial encouragement of the government
Former Soviet Union	Use of shelters and evacuation plan by people regarding major and target areas to safe places prior to attack of the enemy Construction of simple and light shelters for people - Construction of strong shelters for maintaining industrial installations and workers - Great depth of the subway for required policies to be used by people as shelters
America	Construction of similar military stations and dispreading of the same Strengthening of Intercontinental ballistic missiles and headquarters and control of telecommunication centers thereof Construction of light and atomic fall resistant shelters for protection of population and public evacuation of highly populated areas
Sweden	Construction of shelters at residential buildings to be used as parking space, storage room at the peacetime Establishment of power centers, fuel reserves and urgent supplies beneath ground Execution of the plan for probationary evacuation of threatened areas by the people to more safe areas
Denmark	Construction of shelters at personal buildings and factories
Finland	Establishment of group shelters made of reinforced concrete and drilling inner rock shelters
Pakistan	Taking cautionary measures such as control of lighting system of roads, camouflage and concealment
North Korea	Adoption of decentralization policies aiming at decrease of vulnerability of vital and significant resources Transfer of a major part of vital and critical facilities and civil installations to the depth of earth and inner parts of rocks
India	Use of voluntary public organizations in urban defense operations
Italy	Use of specialized services for civil defense: mountaineering federation and … Convention of briefing classes at schools with respect to passive defense
Former Yugoslavia	Having enough food reserves in a country and control of market as well as ration of significant items such as gas station Closing down schools and universities at the wartime and use of the said places by army
China	Foundation of military and nucleus centers at mountaineering areas and forests Development of Chinese defending wall as the clearest and the most effective measures taken earlier by humans regarding passive defense
Iraq	Construction of shelters, hospitals and communication centers in depth of earth Fixing restrained aerial balloons surrounding economic, military and vital centers
France	Teaching people to campaign against dangers and protection themselves and passive defense measures Mazynv wall construction as an important passive defense

2.2 Objectives of passive defense:

1. Decrease of vulnerability and decrease of damages by installations, equipments and manpower of vital, significant and major military and civil centers against threats and attacks of the enemy
2. Saving weapons and manpower power costs
3. Raise of the threshold of public resistant against natural and artificial mishaps

4. Improving defending power
5. Distribution of wealth, population and public assets across the nation through application of decentralization policies, land preparation, and distribution of key infrastructures and vital and significant centers producing key products (power plant, refinery, industrial, military, food, water supply and the ones)
6. Preserving entire unity, national security and independence of the country [3].

3 Location

Location is a process through which one can designate the best appropriate location in the view of conditions put forth for a certain utilization considering existing resources and facilities [8].

3.1 Theorems of location

The most theorems, for industrial location, have been formulated by knowledge economy aiming that bonding the element of location to main body of economic activities. On the other hand, location dimension of economic activities and space relations have drew attention of many of geographists. Upon mutual collaboration of the said two groups and by merging their thoughts, suitable ground has been established for forming certain rules for location and determination of the best location for industrial institutions. It so seems that costs of the element of transportation, that of manpower and those expenses that are decreased due to centralization and economic density is effective for location aiming at optimum interest of industries and location of activities.

3.2 Location: a major element for space planning:

Location is a type of space planning during which the location for establishment of certain activities is designated. During regular space locations, first, particulars of zones are given. Then, considering the particulars of each zone, certain activity/ies appropriate for various zones is/are determined. However, in location, first, particulars of a certain activity are given. Then, relevant zone/s/location/s that has maximum conformity to the particulars of the respective activity is determined.

3.3 Determination of location indices and their weights:

For the purpose of location, many indices should be taken into consideration. The said indices include social-economic, natural and political ones. Since there are various indices for each type of activity or location of any site, from among all indices, particular ones of each type of activity should be determined and in consideration of degree of importance of the said activity, they are evaluated or weighed [6].

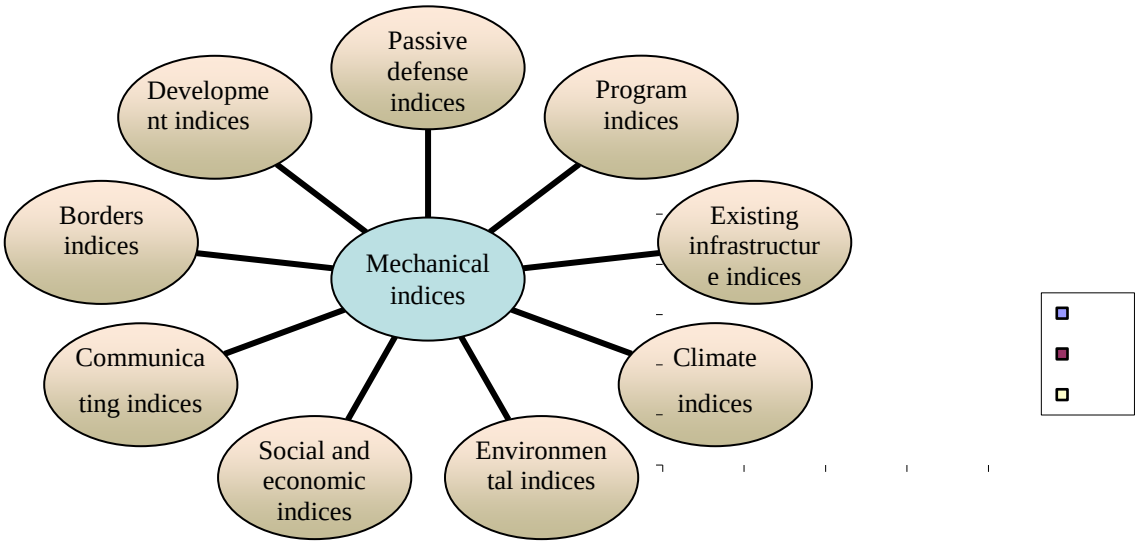

Figure 1: Indices of location

3.4 Location standards for land utilization:

Location standards in land utilization refer to a standard by which optimum location of a utilization of a city is evaluated. Location standards refer to any utilization of land, reflecting social, economic and strategic conditions of

cities and people that shall benefit from the said land in the future. In other words, local particulars and necessities of urban inhabitants and institutions and organizations residing in cities, are base for determination of location standards of urban land utilization [13].

Table 2: standards of the Urban locate in functions [5]

Compatibility	The most significant of efforts taken for urban development is location for various utilizations across the city and separation of incompatible utilizations. Utilizations that are produced by smoke, odor, noise and crowdedness should be separated from other utilization including residential, cultural and social ones. This separation is not absolute. However, sometimes, we can limit mal effects of disturbing utilizations through certain arrangements. Upon space separation of utilizations, such elements as expenses, interest and relative self-sufficiency of the same are taken into consideration.
Comfort	Considering location standards, the two elements of distance and time are measurement units of degree of comfort and welfare. Such items as close distance or comfort distance for life, walking distance, accessibility of transportation, urban facilities and installations usually bear the concept of comfort and welfare. Easy accessibility of required urban services and facilities by various utilizations and being far from disturbances of a few crowded utilization are regarded as elements of comfort.
Efficiency	Urban land price pattern is a main element and a fundamental standard for location of land utilization. Each utilization in the view of economic and investment is land price estimation, and its conditions considering preparation and development expenses, that are determined through cost-profit analysis method.
Desirability	Appeal and desirability mean making effort in preserving natural elements, views, open and green space wideness, formation of roads, buildings and urban spaces. This element is crucially significant in the view of design of accessibility roads system. Road networks and their direction may be in such a way that pedestrians and drivers see the most of nice and pleasing intra-urban and interurban views and enjoy such views as well.
Health	Nowadays, in order to improve spaces, buildings and industrial places, observance of executive standards of health and environment is crucially important. Relevant standards of a healthy city and regulations known as environmental effects evaluate any urban activity in the view of environmental protection, protection of social health and preserving cultural heritage. Consequently, through application of environmental and hygienic rules, industrial disturbing elements and any producing or service operations or even establishment of highways, terminals and airports is actually controlled and these standards find more importance day by day. Hence, standard of cleansing and environmental control are regarded as main and determining elements of each project to benefit from land.

Safety	On a whole, safety standards depend on protection of urban installations and defend of city against probable attacks of war. Centralization of urban industrial installations in a particular area actually differs from defensive policy of a city. Protection and safety of a city against natural disasters such as flood, storm and earthquake are also effective in location standards of various activities and utilizations. In order to prevent the degree of destruction of cities upon flood, storm and earthquake, location values of activities and establishment of urban operations should also be taken into consideration in addition to unique technical and safety standards and building regulations. Adjacency of incompatibility, disturbing and dangerous utilization should be avoided.

3.5 Effective elements in location:

Various elements are affecting location. The following are the most effective elements:

Table 3: Factors affecting the location [8]

Effective factors in location	
Natural elements	Topographic and gradient of earth
Infrastructure elements	Network and resources of energy and water and communicating networks, ports, airports and ….
Environmental elements	Possibility for development of urban and outside city environment and environmental interactions.
Strategic elements	Manpower and employment, situation on chain, distance from density limits, replacing industries, vulnerability and scattering
Climate elements	Moisture and temperature, wind and precipitation
Technical and economic elements	Conditions for supply of materials, facility for resources and energy, regional technical know-how, transportation conditions, complementary industries and levels of costs
Land elements	Flat or plains land, mountains and forests
Water elements	Quantity, quality, hardness and depth, etc
Soil	At this part, conduction of vegetation studies, potential power of soil, penetrability and soil mechanics should be taken into consideration.
Topography	At this part, surface waters, waterways, accessibilities, local climate and layout should be studied.
Orientation	At this part, studies for establishment orientations are recommended in order to receive optimum solar energy, desirable winds and views.
Plant species	At this part, species of plants with respect to location is taken into consideration. Such items as shadow decrease of environmental temperature, regulating moisture, prevention of reflection of sunbeams, leading of desirable winds, windbreak and air filter, acoustic, provision of desirable and nice environment as space characteristics of a location can be targets of studies.
Sun	Direct radiation of sun and natural brightness in various spaces considering function of each may be desirable or undesirable. In this respect, layout and orientation of buildings are crucially important in consideration of internal functions of the same with respect to sunbeams in different seasons.
Wind	Speed, temperature and direction of wind are major elements that should be taken into consideration in layout and even in evaluation of lands.
Rain	The quantity of rain and natural waterways are effective in layout of buildings and strategic design of the said buildings. Moreover, protection of buildings against rains

	with wind or chemical rains in polluted environments should be taken into consideration.
Communicating elements	Transportation Accessibility roads Time distance to destination
Passive defense elements	Concealment, camouflage, deceiving, scattering and strengths

3.6 Restrictions in location

Different factors are recognized as limitations that hinder location of which the most important ones are listed hereunder: Border (artificial or natural) like rivers, power transmission lines, land erosion area, demolition of pastures, limits with sliding lands, saltines lands, loading capacity, flooding, seismic lands, major faults, minor faults, running faults, probable or hidden faults, cultural or religious elements, limits of historical buildings, protected lands such as forests, licensed lands by environmental protection organization, penetrability or non-penetrability of soil, week materials such as pebble, made-ground and garbage disposal an the ones, stone holes of limestone lands, economic value of mineral reserves, direction of earth layers location, quality of water, lagoon, distance from sea, shadow status at the level of project (slope direction at different times), air pollution, hot and cold climate conditions, precipitation, flooding, morphologic elements affecting land utilization, erosion, change of river bed, river sediment, erosion of seaside rocks [8].

3.7 Indices of passive defense in location

Application of respective indices of passive defense in location of urban land utilization will help decrease of vulnerability upon crisis leading to decrease of damages incurred in this regard. Some of the most significant passive defense indices in location are named here below:

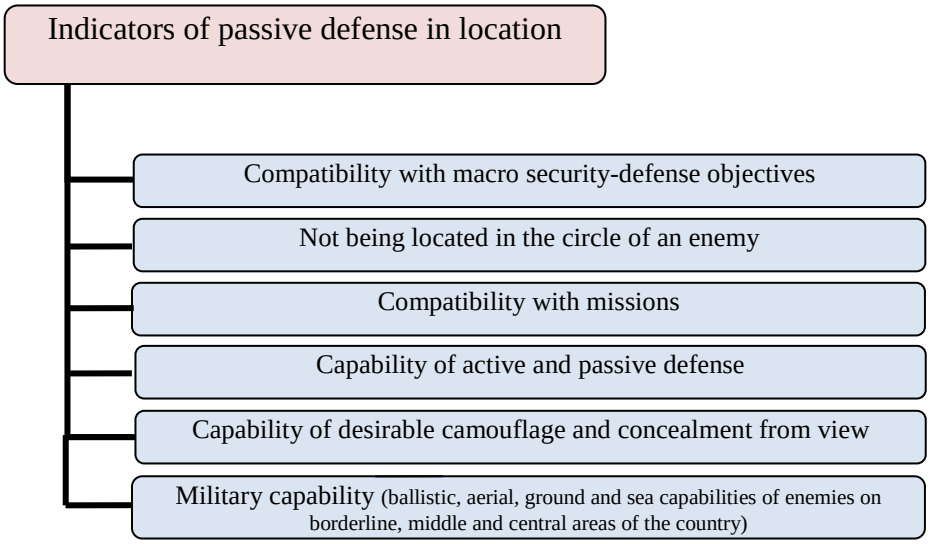

Figure 2: Index of passive defense in the locate

3.8 Advantages of location of urban utilizations from the viewpoint of passive defense

Desirable location is among the most significant passive defense measure aiming at decrease of vulnerability of vital and crucial centers. Because if at zero zone of the project for design, erection and establishment of vital and crucial centers, corresponding elements and values of defense and security such as maximum use of natural factors, preparation for establishment, observance of scattering, avoiding mass development, primary strengthening and many other existing opportunities available, are observed, controlled and supervised, many other problems, which are typically complicated and cost too much will be avoided as well. Location is to select the best and the most desirable point for establishment so that hiding and concealing manpower, equipments, devices and activities can be done in the best way possible.

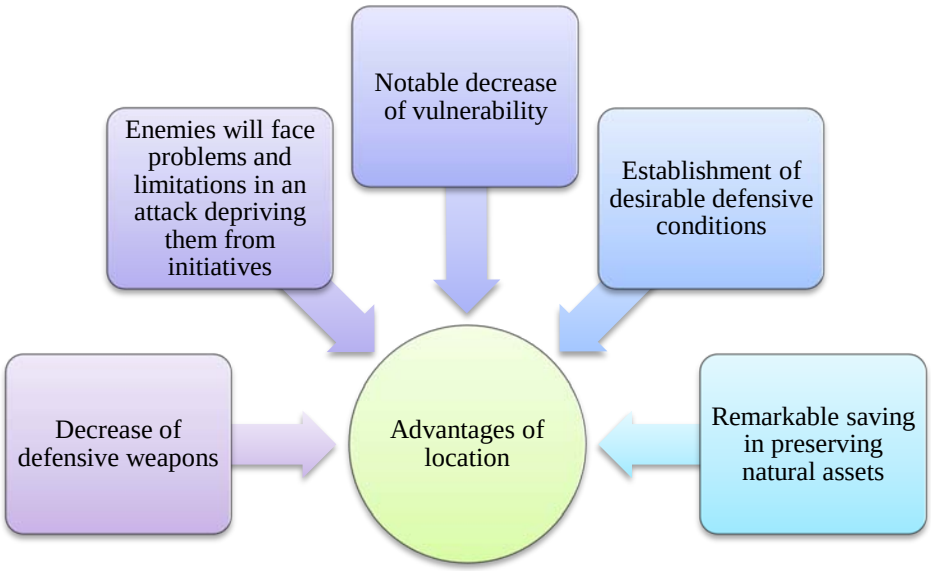

Figure 3: The benefits of advantages of location

While doing required planning for removal of defects with vital and significant centers and installations established earlier, the most crucial fundamentals of defense of primary location should be of great interest for the location of vital and crucial centers that will be established spending much and remarkable capitals [9].

3.9 Location and passive defense

The collection of concepts of passive defense is only dealing with accessibility of domestic forces of required areas and cut-off of accessibility of enemies of crucial areas that are hinders in location and put forth at national level. The rest of concepts are propounded at respective site and its surrounding areas. In other words, other concepts of passive defense i.e. concealment, camouflage, deceiving, scattering and bunkers at all areas across the nation benefiting from various methods, which are more or less possible, shall not address certain parts of land.
In location at regional level, all concepts of passive defense are involved and in location of area located, design of an industrial building complex and architectural design are actually done for implementation of policiee [11].

4. Industrial estate

An industrial estate is a place has certain site and limits, comprising a collection of industries and provides the owners of industries with parts of infrastructure facilities and required services in consideration of type and startup of the park and a combination of existing industrial activities [14].

4.1 The importance of location of industrial estate

The significance of location is studied from two points of views:

1. The importance of location of industrial estate from the viewpoint of government: From the government's point of view, location is crucially important with respect to political considerations, environmental issues, regional distribution and scattering of population, regional distribution of political activities, industrial and economic development and social justice.

Political considerations	• Political characteristics and capacities of each region are effective in location and foundation of economic, and specially activities and attraction of assets of private sector and governmental facilities.
Environmental considerations	• Environmental considerations are among the most significant elements that should be taken into consideration in the areas of location of industrial parks. Regarding any industrial project, certain pressures will be put on environment and environmental limitations shall have certain effects on the project accordingly. Awareness of environmental problems and causes raising the said problems are crucially significant.
Regional distribution and scattering of population	• Location of industrial estate and allocation of facilities for establishment of the said parks is crucially important aiming benefiting from population at different areas at larger extent, either for compensation of lack of balances or for short-term, midterm and long-term planning of population transfer at national and regional level.
Regional distribution of economic activities	• Upon precise guidance of capitals toward rendering infrastructure services and establishment of facilities and by establishment of industrial parks at optimized areas, we can do action as a desirable economic sign and regional booming.
Regional economic development	• The theorem of unbalanced growth in its regional form and the theory of growth poles indicate the importance of the subject of location in regional development considerations. Of course, leading and planning are also implicitly are taken into consideration in selection of areas and locations.
Social justice	• Employers can attract investment in various areas and more booming of the said areas through location of industrial parks at various areas and provision of a secure environment for investment.

Figure 4: Two views of the importance of switching places

2. The importance of location of industrial estate in the view of social employers: In location of facilities under his control, the employer should consider economic "cost-profit" considerations as well. In other word, the economic employer should act upon selection of locations for foundation of his facilities and installations at larger and broader scale so that the selected locations shall bring about more profits for the employer [7].

4.2 Location of industries

Location of industries means allocation of a particular type of industry/ies to a particular area in consideration of profits and other affecting elements thereof.

4.3 Indices and parameters affecting location of industrial estate

There are various indices and parameters affecting location of industrial estate. Each of the relevant elements has a great share in location of industrial estate, which depends on conditions of location and lands for the establishment of such industrial estate. Moreover, selection of a desirable location for industrial estate is among the most complicated decisions that should be studied considering various views and elements. Hence, a great deal of major and minor information should be gathered, combined and analyzed for selection of such locations in order to come up with a precise evaluation of the elements that may affect such selection.

First, we offer an analytical model for the location of industrial estate in order to provide a general view of such location. Then, effective indices and parameters on such location of industrial estates and areas are explained in order to indicate the generalities of parameters and standards affecting such selection. All elements are explained in detail. Finally, our conclusion is given [4].

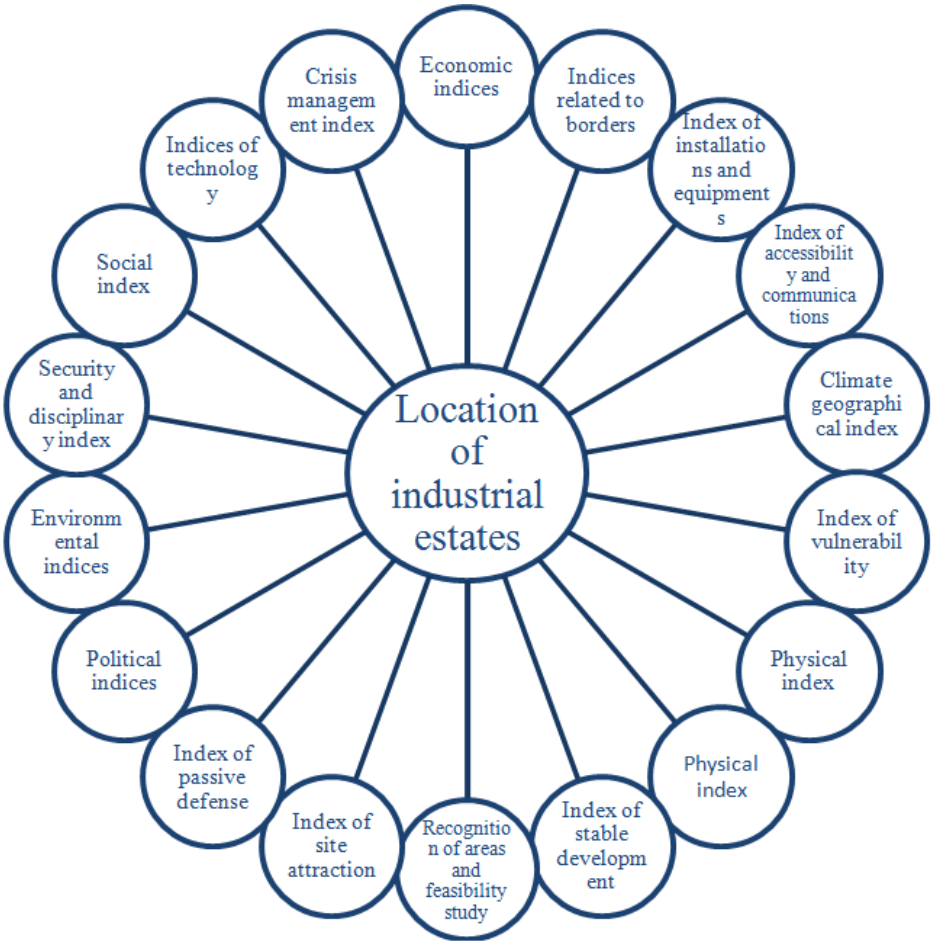

Figure 5: Parameters influencing the industrial estate location

4.4 Principles of passive defense in location of industrial estate

Consideration of the fundamentals of passive defense in location of industrial estate upon crisis is crucially significant. In consideration of certain threats with which such countries as Pakistan, Japan and USA have encountered in the recent years, we can perceive the importance of the case of passive defense in location, especially in location of industrial estate where there are a lot of human and financial resources. The following indicates a brief summary of such mishaps: The flood occurred in Pakistan in 2010 was so severe that following seasonal rains it caused raising level of water of rivers in Sind, Sarhad, Sind and Punjab and Baluchistan provinces in Pakistan. It left 2000 killed and over one million hours were destructed. Earthquake and tsunami of Japan in 2011 occurred with a power of 90 degrees at northeast of Japan. Following this severe earthquake, a warning for tsunami was given to all costal areas of Japan, beside Pacific Ocean requesting immediate evacuation of such areas. The said warning was also given to other 20 areas in South and North America as well. The said earthquake brought about huge damages including severe demolition of roads and railways and caused severe fire in a few regions in Japan accordingly. Some electrical generators stalled and at least, three nuclear reactors exploded due to accumulation of Hydrogen Gas. Thus, all areas at the 20-km of the nuclear power plant No 1 of Fukushima and at the 10-km of nuclear power plant No 2 of Fukushima belonging to Tokyo Power Company were evacuated. Central Bank of Japan injected a sum of 183.- Billion Dollars to the banking system of this country in order to normalize market conditions. After the

said earthquake, certain measures have been taken in order to campaign against Tsunami of Japan and other twenty countries along with the border of North and South Pacific Ocean including North America and Chili. The highest degree of warning was given in Japan and the Japanese people were asked through loudspeakers, radio and television to evacuate costal areas very quickly going to highlands. The said Tsunami was predicted for 10 m in height. More fatal and destructive effects of Tsunami than those of the earthquake were expected. Following announcing the news of the earthquake and the atomic disaster of Fukushima throughout the world, number of tourists who came to Japan in March was decreased by 50.3 percent compared with that of the last year and this has been the least number of tourists since 1961 [15].

The attacks occurred in September 11th, which is indicated in English as 9/11 refer to a series of suicidal attaches that were done in the territory of USA on Sept 11, 2001 [16]. The mishap of Sept 11, 2001 has been the greatest terroristic operations done in the history of the USA, which has brought about various political, economical, security and military consequences for this country [15]. Considering respective threats with which the countries may encounter, certain passive defense measures would be taken in location of industrial estate leading to decrease of vulnerability of the said areas in the future. Some of the said measures are given hereunder:

- Usually, during wars, after military and main administrative centers, an enemy attacks industrial centers.
- Scattering: The more extensive geographical area the location of industrial estate has, the less vulnerability they encounter in the future.
- Camouflage and concealment: Through camouflage and concealment of major centers of industrial estate such as electrical and gas stations, water resources and the ones, return to normal conditions is possible after occurrence of crisis.
- Strengthening and bunkers: Considering crucial centers such as installations and storerooms and warehouses of flammables, which cause crisis by themselves, strengthening and bunkers will be true.
- Location: Location is one of the principles, which help desirable location of industrial estate.
- Shelter: Establishment of desirable shelters for persons, medical spaces and the ones is among the most serious determining elements. Through prediction of required items, it may be materialized at parts of factory halls of industrial estate.
- Damage control: Through prediction of issues, corresponding damages incurred in crisis by the industrial estate, will be minimized to a great extent.
- Training and creation of the culture of defense: As industrial estate have various branches, required trainings for decrease of damages in crisis are possible.
- Firefighting: Prediction, provision and establishment of firefighting devices and kits in industrial estate at vital and crucial centers prior to natural and artificial mishaps are possible in order to control, to handle and to prevent extension of fire to personnel, corresponding equipments and installations should be available to the areas adjacent to the place where fire occurs.
- Warning: Considering social gathering of people of industrial estates at sites and industrial centers, warning about war and natural disasters is of great importance.
- Evacuation: One of the points that should be taken into consideration for design and improvement of design of industrial estates is swift evacuation of people. This will not be realized unless through control of the width of entrance and exit roads of the said centers.

5. Conclusion

The conclusion that may be put forth for application of passive defense in location of industrial estate is to prevent centralizing industries in a particular industrial area. It actually contradicts to the policy of urban passive defense. Because following a military attack to cities, demolish of industrial areas is the most important military targets of the enemy. On other hand, adjacency of such parks to residential areas is very dangerous. The said areas should be located far from the residential areas. Considering protection and safety of industrial estates against such natural mishaps as flood, storm, and earthquake, which are also effective in the standards for location of industrial estates, and regarding respective standards, borders of ravines and rivers should be observed and establishment of any type of industrial estate along the said borders should really be avoided. Moreover, at the time of earthquake, which is one of the most important dangers threatening cities, faults become active resulting in vast destructions and occurrence of human and financial disasters. Full observance of standards for zoning of earthquake considering faults and also application of standards for location of industrial estates shall decrease the extent of danger. Hence, it is required that for location of industrial estates, based on degree of importance and possibility for constant activity in crisis, fundamentals of passive defense be taken into consideration in proportion to capabilities.

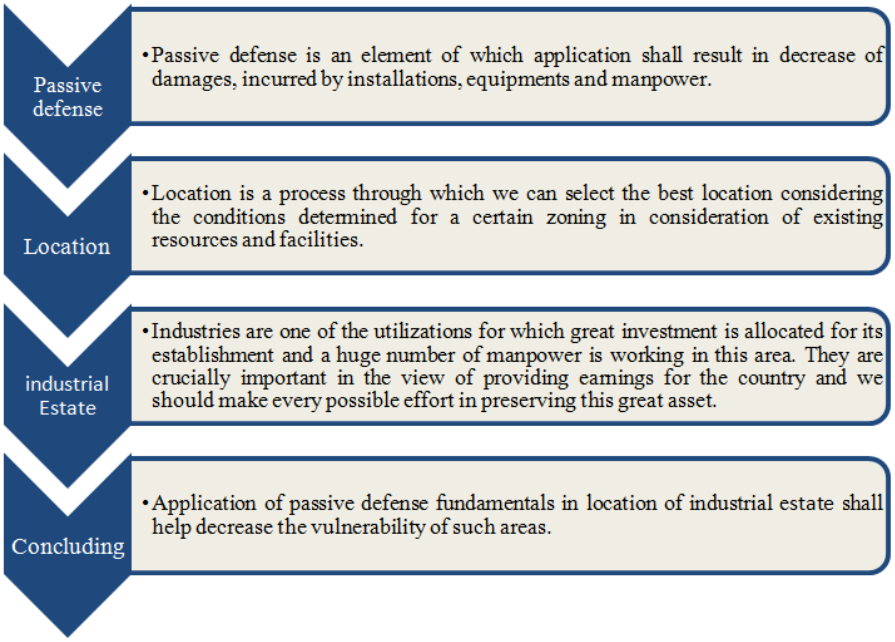

Figure 6: utilization of passive defense in the industrial Estate location

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