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Achieving an integrated approach to reduce urban vulnerability against earthquake

Case Study: Metropolis of Mashhad, Iran

By

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In the name of God

Declaration

I hereby declare that this final paper is the result of independent Investigation. Where it is indebted to the work of others, Acknowledgement has been duly made.

Date: Signature:

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Balancing PhD research with normal family life is not easy. Maryam and Ghazal have suffered more than I did. I am very grateful for their constant supporting and understanding and now it is my turn to do more for them. Particular thanks go to Maryam, my wife, for her endless love and I would like dedicate this thesis to her.

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Abstract

The linkage between spatial planning and disaster management has been ignored in the urban area of Iran longtime. By extending of urbanization and industrialization in Iran, cities are faced problems such as expansion on hazard prone areas.

The central issues of this study are to explore the risk relationship between risk reduction and urban development for spatial planning in both theory and practice, and to emphasize the need for better cooperation between spatial planning and disaster management in rapidly urbanizing regions The main goal of the study is to examine and develop a spatial planning methodology that is led to promoting the urban resilience. Several research questions concerning the integration of disaster management and spatial planning, and information for planning support, have been examined. Extensive literature review, quantitative and qualitative analysis based on the primary and secondary data collection have been applied to answer these questions. Based on the theoretical considerations, disaster management possess four phases, i.e. mitigation, preparedness, response and recovery, all of which need to be integrated into spatial planning.

The status of mitigation phase is closely related with the land use conditions of disaster prone areas and zones. In order to mitigate the negative impacts and exert the positive ones, land use planning in disaster prone areas must consider proper spatial organization and measures to integrate the goals of urban resiliency. Only through the cooperation between spatial planning and disaster management can these measures become effective. This study proposes that proactive-integrated policy and approaches need to be promoted in order to gain enough capacity to organize and preserve the mass and space against natural disasters along with spatial requirement of urban development. Spatial requirements for achieving to urban resilience should be considered in advance and therefore it is important to have a paradigm shift both in disaster management and spatial planning and design.

In the Iranian context, urban planning and disaster management are both undergoing a complex transformation process in concepts, contents, working approaches and institutionalization. The city of Mashhad is the case study. Mashhad urban development process presented in chapter 5 shows that the goals of disaster management in disaster prone areas have not been adequately reflected in the spatial planning system. A multi-disciplinary approach to deal with the conflicts of disaster risk reduction process and land use impacts in the urbanizing areas has not yet been fully developed.

With the rapid urbanization and industrialization of recent decades, urban land use conversion has become faster than ever and this reality is reflected in planning's failure, to some extent, in protecting the natural environment and in regulating proper land use. A common concept for disaster management is not fully shared among spatial planners, nor has a integrated policy framework for disaster management system been established. Even though since 2005, various policy efforts from spatial planning and disaster management have gradually converged on goals and processes, institutional segmentation has brought about low efficiency of policy implementation.

Since the 1980s, Mashhad's urban expansion has massively encroached upon the disaster prone areas of the city. Because disaster prone areas are occupied by informal settlements, the impacts from urban development and land use conversion on these zones is completely visible.

The captured the results of field observations show that urban development has had a significant impact on increasing urban vulnerability. In the meantime, the time-lag between the two policy processes for disaster risk reduction and urban development has made it difficult for urban planners and disaster managers to adopt effective measures to address the vulnerability issues in an integrated and coordinated manner.

Risk reduction issues in Mashhad's urban region have so far not been tackled in an integrated way due to the lack of systematic policy arrangements at the strategic and local level, the lack of effective mechanism for institutional cooperation and the lack of approaches to incorporating disaster risk reduction aims into spatial planning.

The experiences of developed countries show that how a cooperative approach in spatial planning and disaster management is helpful to reach to urban resiliency. The experience of developed countries spatial planning and disaster management offers many valuable lessons not only in planning content, but also planning process for Mashhad or other cities in Iran.

Good horizontal and hierarchical cooperation is important for spatial planning and disaster management to work together to reduce urban vulnerability. In the meantime, a positive implementation instrument, such as risk assessment and management, was regarded as a useful tool to effectively stimulate the dialogue between disaster managers and urban planners. These experiences show that integrating risk reduction issues in spatial planning could bring opportunities for making a resilience city with safe space.

The trend of urban development in Mashhad shows that the size of the urban expansion spatially informal settlements will be larger in the coming decades and the pressure on high risk and disaster prone areas. Several new problems which may emerge on an even larger scale will make the situation more serious and complicated especially when an integrated solution of disaster risk reduction has not been fully realized. Therefore it is urgent to have integrated planning options from the strategic level to the local action level. This is the key point of the conceptual model for integrated plan-making process for urban planning system presented in this study.

At the strategic level, proactive land use planning for urban development should consider hazard issues at the initial stage before negative impacts occur. Sharp lines of responsibility between different departments should be demarcated so as to harmonize the fragmented and dispersed local efforts dealing with the disaster risk reduction issues regionally and locally.

Public participation is encouraged during the process in order to achieve consensus among the different stakeholders. At the local level, the measures of zoning to control construction and land use in and around the hazard prone areas can be used but should reflect the consensus of views from various agents such as urban planners, disaster managers and the public at large. Useful information and knowledge is crucial during this process and therefore spatial data infrastructure (SDI) is urgent to be promoted.

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1-8- Introduction

The urbanization is increasing rapidly and will continue during the next decades. United Nations Inter-Agency Secretariat of the International Strategy predicted for Disaster Reduction that more people will live in cities than in the rural areas for the early 2007. The highest growth will occur mainly in the cities of Asia. Both of a high birth rate and an increasing migration from the rural areas that is reinforced by "push-factors" such as :(unemployment, low standards of housing and infrastructure, lack of educational facilities) and "pull-factors" such as (economical opportunities, attractive jobs, better education, modern lifestyle) have been led to the very dynamic growth process. Most of this growth is taking place in the poor quarters of the cities.

Natural and man-made disasters are the most threatening human beings, infrastructure, and human activities. Statistics from the Emergency Events Database (EMDAT; available from http://www.emdat.be) show that there were more than 500,000 casualties in the past 15 years from different types of natural disasters, including earthquakes, tsunamis, floods, droughts, wind storms and landslides. Recent events include deadly earthquakes in Iran (July 1990-December 2003), flooding in Pakistan (July 2010), a landslide in China (August 2010), a volcanic eruption in Indonesia (October–November 2010), and a tsunami in Japan (March 2011).

"Cities are complex and interdependent systems. Also, they are vulnerable to threats from both natural and human-induced hazards extremely. The very features that make cities feasible and desirable their urban physical structures, land uses, population concentrations, places of assembly, and interconnected infrastructure systems—also put them at high risk to hazards" (Godschalk, 2002)

In other words, the vulnerability of disaster prone areas to natural disaster is relatively a consequence of long term of urban planning activities that have failed to take sufficient account of hazards in land use planning and decision making (Commission, 2007).

Urban planning covers many various dimensions in formulating strategies and policies that affect the future distribution of space and activities. Planning is mainly used as a tool to create a good quality of life for urban citizens by harmonizing and coordinating the development parts and appurtenances in the urban areas. Planning can also play an essential role in developing strategies and procedures to integrate land use and hazard mitigation.

The ''Second National Assessment on Natural and Related Technological Hazards'' concluded that: ''No single approach to bringing sustainable hazard mitigation into existence shows more promise at this time than increased use of sound and equitable land use management'' (Mileti & Dennis, 1999; Burby, Deyle, Godschalk, & Olshansky, 2000). Likewise, one of the five challenges identified by the Scientific and Technical Committee of the International Decade for Natural Disaster Reduction (IDNDR) is to integrate natural disaster management into overall planning.

Integrating natural hazard management into spatial planning process can help a community become more resilient. Spatial planning involves gathering and analyzing information on sustainability for developments in locations exposed to natural hazards, so that citizens, potential investors and government officials understand the limitations. Urban plans specify community goals, principles and actions. In preparing plans, local governments must engage in a consensus-building process so that crucial issues regarding the use of hazardous areas can be resolved.

According to Burby et al., 2000; Sengezer, 2005; Godschalk, 2003 a better level of disaster mitigation may be attained by integrating hazard mitigation efforts into normal development review. The attitude towards disaster mitigation should be reviewed and modified, together with urban and regional planning processes, legal arrangements and financial and social models, so as to develop a sustainable settlement system disaster.

In an integrated approach disaster management body proposes a duty for urban planning which enables it - from the beginning of a planning process - to forecast and perceive the consequences of disasters as part of the important factors in achieving planning aims.
The main reason for adopting integrated approach is the realization that risk potentials are increasing and that it is not sufficient to restrict risk policies only to the response phase of the emergency management cycle. Rather, in order to promote a sustainable development, it is an indispensable prerequisite to reduce vulnerability—a task for which spatial planning has to develop appropriate tools.
However this view is still a relatively new topic in many developing countries. The research proposes means to reduce urban vulnerability against earthquake hazard by emphasizing the role spatial planning in disaster management process in an integrated approach.

1-8- Terminology

Spatial planning and disaster management are both interdisciplinary. It is essential to use terms and words that are defined according to the integrative perspective of the task. Most of the time, disciplines define terms according to their particular needs, which is a basic issue for precise communication. The approach of the glossary presented here mostly addresses the needs of the dissertation, but the predestined aim is to define relevant terms for disaster management with urban planning relevance in such a way that they can be applied in different scales in Iran. For this purpose most of the terms used in this glossary are based on existing international definitions, thus trying to present an integrated harmonized approach.

The glossary cooperates with other hazard glossary approaches in the world, mainly the extensive glossaries developed by a multilingual approach being develop by the ORCHESTRA project (http://www.eu-orchestra.org/) and Disaster Risk Reduction (2009) available at http://www.unisdr.org/eng/library/UNISDR-terminology-2009-eng.pdf

- **Acceptable risk**

The level of potential losses that a society or community considers acceptable given existing social, economic, political, cultural, technical and environmental conditions.

- **Building code**

A set of ordinances or regulations and associated standards intended to control aspects of the design, construction, materials, alteration and occupancy of structures that are necessary to ensure human safety and welfare, including resistance to collapse and damage.

- **Capacity**

The combination of all the strengths, attributes and resources available within a community, society or organization that can be used to achieve agreed goals.

- **Coping capacity**

The ability of people, organizations and systems, using available skills and resources, to face and manage adverse conditions, emergencies or disasters.

- **Disaster management**

The organization and management of resources and responsibilities for addressing all aspects of emergencies, in particular preparedness, response and initial recovery steps.

- **Exposure**

People, property, systems, or other elements present in hazard zones that are thereby subject to potential losses.

- **Geological hazard**

Geological process or phenomenon that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.

- **Land-use planning**

The process undertaken by public authorities to identify, evaluate and decide on different options for the use of land, including consideration of long term economic, social and environmental

objectives and the implications for different communities and interest groups, and the subsequent formulation and promulgation of plans that describe the permitted or acceptable uses.

- **Natural hazard**

Natural process or phenomenon that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.

- **Resilience**

The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions.

- **Risk assessment**

A methodology to determine the nature and extent of risk by analysing potential hazards and evaluating existing conditions of vulnerability that together could potentially harm exposed people, property, services, livelihoods and the environment on which they depend.

- **Risk management**

The systematic process of using administrative decisions, organization, operational skills and capacities to implement policies, strategies and coping capacities of the society and communities to lessen the impacts of natural hazards and related environmental and technological disasters. This comprises all forms of activities, including structural and non-structural measures to avoid (prevention) or to limit (mitigation and preparedness) adverse effects of hazards.

- **Sustainable development**

Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

- **Vulnerability**

The characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard.

- **Vulnerability assessment**

A vulnerability assessment is the process of identifying, quantifying, and prioritizing (or ranking) the vulnerabilities in a system. Examples of systems for which vulnerability assessments are performed include, but are not limited to, urban systems, energy supply systems, water supply systems, transportation systems, and communication systems.

- **Spatial planning**

Spatial planning refers to the methods used by the public sector to influence the distribution of people and activities in spaces of various scales. Discrete professional disciplines which involve spatial planning include land use, urban, regional, transport and environmental planning.

- **Spatial data infrastructure**

A spatial data infrastructure (SDI) is a data infrastructure implementing a framework of geographic data, metadata, users and tools that are interactively connected in order to use spatial data in an efficient and flexible way.

1-8- Problem statement

During recent decades, has been considered to aims of disaster management in development activities in order to reducing the vulnerabilities of the communities increasingly. The “Hyogo Framework for Action 2005-2015” urges governments to attention to the issue of disaster management in their development planning and decision making (Section 4, paragraph 19) (Nations, 2005). Nevertheless, little research has been carried out in respect of how risk reduction can be mainstreamed in the developmental sectors of spatial planning in developing countries.

The first step to achieving the above aim is that current spatial planning system and disaster management process should be examined and assessed in order to find out, how spatial planning deals with risk information . Also, how disaster management process is transferred within the spatial planning system.

In developing country such as Iran , many urban areas are susceptible to natural hazards especially earthquake due to their geologic setting. While Iranian cities have experienced rapid growth, spatial planning has not kept pace with development Low quality of building stock. Some researchers believe thousands of people were killed in different earthquakes in Iran due to the lack of adequate attention to spatial planning regulations were among the key reasons.
Furthermore, there has not been a lot of discussion about spatial planning measures for risk reduction .Also; there isn't emphasis on importance of integrated approaches in Iran. In other word, it is necessary to have more creativity and innovation for the new concepts .also, is necessary new approaches both of spatial planning and disaster management. Based on my personal academic and practical experience, the problem exists within the structure of the planning process in both spatial planning and disaster management. The dissertation is more concerned with two main issues which are important for improving the linkage between two domains in Iran: the nature of integration between processes of spatial planning system ,disaster management, ,communication and collaboration between agencies within the government bureaucratic system, , agencies and the public.
Due to, there is discrepancy between cases, there is no a single acceptable guidance on how to mainstream disaster risk management in the spatial planning system. Therefore this research has adopted a case study approach. Also, it is focusing on an urban area that is threatened by the impacts of earthquakes currently.

1-8- The Research Aim and Objectives

The research's purpose is to emphasizing the role and importance of spatial planning in reducing urban vulnerability against natural hazard especially earthquake. In other words, to achieving a spatial planning approach that would decrease urban vulnerability against earthquake by integrating disaster management with urban planning process. The dissertation is divided two parts. At first, will be a review literature of spatial planning and disaster management policies in general. Also, was studied their development process in Iran by focusing on how to communicate spatial planning and disaster management in Iran. At second part was examined the role of spatial data, dimensions of institutional capacity through the case study example of Mashhad. It hopes that the results will contribute to the definition of new values and methods in the current Iranian spatial planning system for creating a new paradigm shift. In order to achieving the aim, have been defined some objectives ,they are:

1. Investigating current situation of disaster management and spatial planning in the Iranian context including an identification of the strengths and weaknesses of such a situation.
2. Identifying the issues and challenges of achieving to integrated approach between spatial planning and disaster management.
3. Developing a conceptual framework for in ~~order~~ to achieving an integrated approach to reduce risk in urban areas.
4. Emphasizing on the importance of spatial data in the integrated approach.
5. Envisaging the ways and means of integrating the two parallel but highly inter -related areas of urban planning and disaster management.

1-8- The Research Questions

The research begins with the concept questions and an emphasis on the opening issues of the study which are relevant to spatial planning, to the dimensions of disaster management. The concept questions lead to the research questions, which are developed from the literature review in interaction with the case study. This research looks for answers, from within the research literature, regarding the relationship between local and national authorities, spatial plans and urban and disaster governance .also, it is seeking to highlight any ambiguities concerning these areas within the literature. The purpose of the research is to answer the following question:

- How can be achieved to integrated planning approach in spatial planning system in order to decreasing physical vulnerability of urban area in Iran*?*

In order to answering the main question, the research are included the literature review as a chronological and analytical study of spatial planning theories and disaster management in a transformative era. This will consequently raise sub-questions which look for a detailed answer to the specific episodes of policy and planning in the case study. The sub-questions are:

With regard to integration of disaster management and spatial planning

- How does spatial planning system in Iran take into account the risks of earthquake as a natural disaster?
- What kinds of new planning concepts can be used to integrate disaster management in spatial planning to create resilient urban space?
- How can be started (initiated) cooperation between spatial planning and disaster management in Iran?
- How should be reformed the current spatial planning system in Iran in order to integrating disaster mitigation measures?
- To what extent can be implemented an integrated approach concept in studied area (Iran)? Also, how can be generalized the results?

With regard to information for planning support

- How can spatial information systems support suitable information provision for and sharing of the information by spatial planners and disaster managers in Iran?

1-8- Research method

--1. Research conceptual framework

As shown in Figure 1-1, in order to achieving mentioned Research objectives was designed conceptual framework. It was divided two parts. Also, there are four stage processes. The theoretical and descriptive part is used to investigate issues and challenges in the current practices in spatial planning and disaster management. Also, is studied their linkages worldwide, in addition to Iran. First stage involves studying the conceptual that has been produced

By reviewing and summing-up the findings of the parallel experiences worldwide. Second stage analyzing the current state of both spatial planning and disaster management in Iran in terms of their linkages. Therefore, find the strengths and weaknesses of such systems. It also raises the importance of tackling disaster risk reduction problems at the very beginning of the spatial planning procedures and of advocating a common language shared by spatial planners and disaster managers.

The empirical and prescriptive part is used to proposing a conceptual framework for integrated spatial planning and disaster management in order to reduce vulnerability. So in third stage, based on the conceptual framework, Are proposed framework of an integrated spatial planning and disaster management system that was prepared by reviewing findings of the parallel worldwide experience as well as the second stage analyzed in Iran . Finally, fourth stage involves the application of the proposed framework in the second stage in Mashhad.

The case study is designed to capture local knowledge in order to understand the constraints and opportunities for integrating disaster management with urban planning practice. The emphasis is on problem identification, evaluation of the former planning policy, the urgent reform in the current planning practice based on disaster risk reduction policies, the development of new planning approaches and cooperation with disaster management.

At finally , both of theoretical and empirical studies will be led to spatial planning system based on urban resilient and sustainable principles.

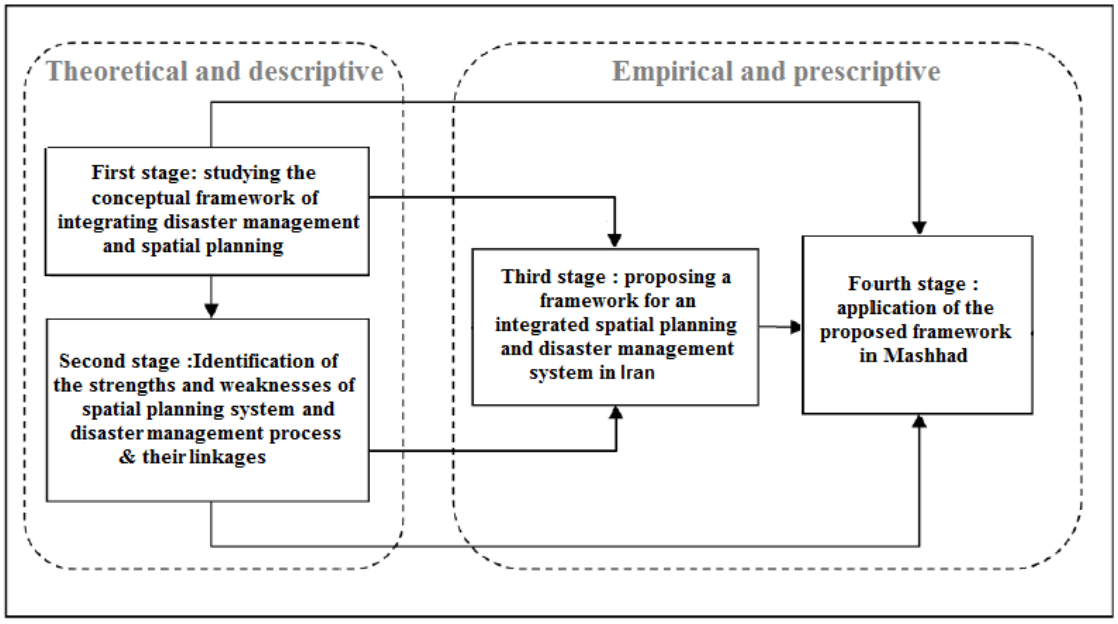


Figure 1-1 Research design framework

1-7-Research Methods

The research methods and techniques that are used in this study are shown in Figure 1-2. In the theoretical and descriptive part is done extensive literature review in order to establishing a scientific and theoretical basis

This theoretical and scientific basis is conducted to find the existing methods that are available in scientific literature, agency reports and publications and to use them as the basis for developing an integrated framework. Data collection is conducted in the case study areas to capture the local knowledge. Evaluation and data analysis are for understanding the local context. Further details are given below.

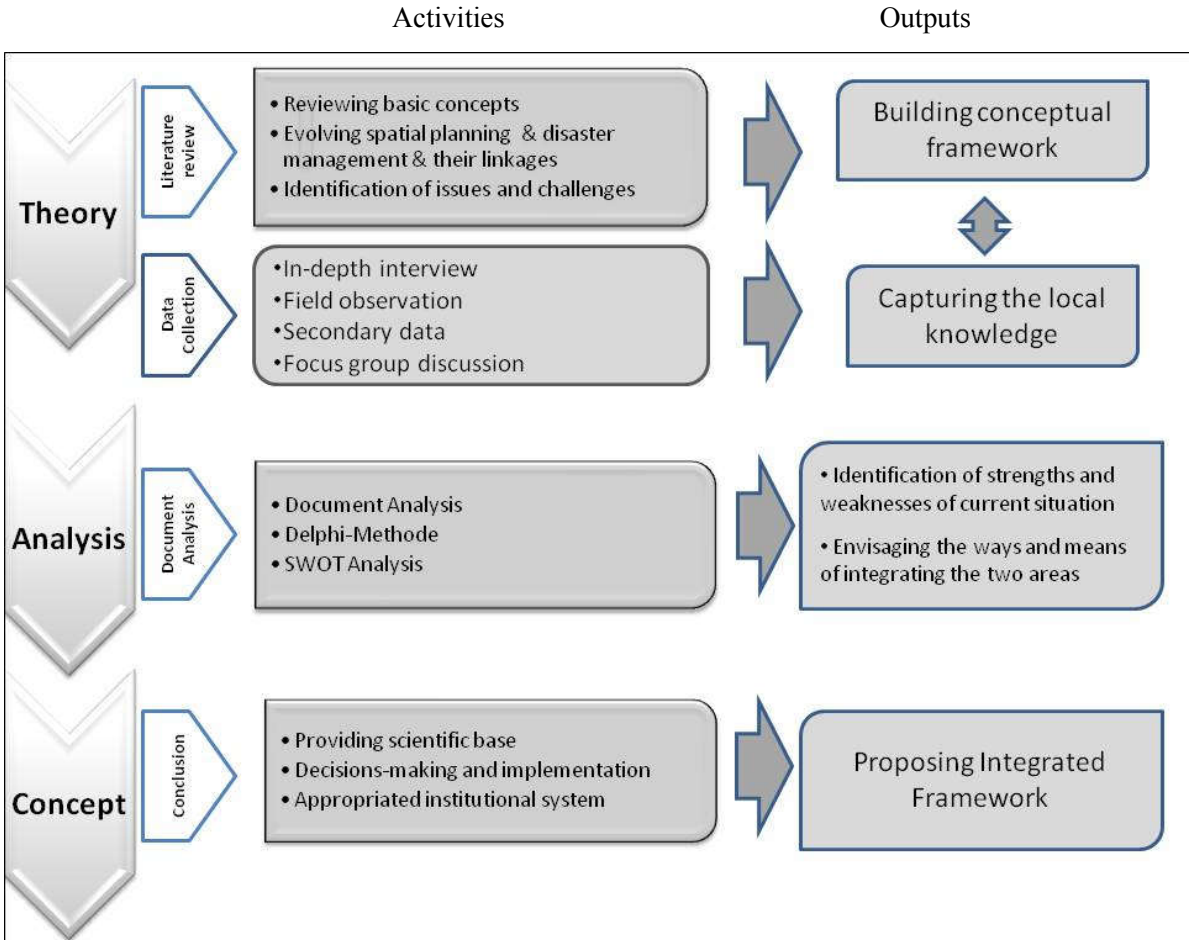


Figure 1-2 Framework of research methodology

1-7-1. Data Collection

Primary and secondary data in this study was collected during the fieldwork. Primary data comes from site investigations, field observations and in-depth interviews of managers and experts. Secondary data comes from official documents and reports (e.g. spatial plans and disaster management policies), maps and local literature, statistical data, digital spatial data and remote sensing data.

'In-depth interview is a suitable method for exploring the complexity and in-process nature of meanings and interpretations'. In-depth interview is a qualitative method which is best used for 'problems requiring depth of insight and understanding' (Liamputtong & Ezzy, 2005). Disaster management and spatial planning issues involve various interests of different stakeholders and they are in association with more than one organization. Different people, based on their positions and experiences, may possess quite different opinions about spatial planning and disaster management, especially in urban areas. This brings complexity of disaster management and spatial planning. Beside, experts, managers and other stockholders play an essential role in information-supply and decision-making in practice. Their ideas and opinions are vital for realizing the strategy and policy context of the local and national situation and user demands.

Therefore, in-depth interviews were conducted with different stakeholders in dual scale of national (Iran) and local (Mashhad) level, including planners, government officials, consultants and disaster managers. It is tried that all of interviewee to be with senior experts both in spatial

planning and disaster management and most play key roles in policy making. After performing interviews, the interviewees are requested to participate in the focus group discussion about challenges between spatial planners and disaster managers.

1-7-2. Data Analysis

This study was applied a combination of quantitative and qualitative analytical methods. In order to analyzing Qualitative methods, was used SWOT technique The SWOT analyses were done based on four indicators including institutional and organization, legal and legislation, spatial data system , situation, citizen participation and education Also, was used Delphi method in order to determining indicators. so , six professor participate who work in spatial planning and disaster management fields in different universities in Iran

The main purpose is to explore the driving forces, limitations of the present policies and potential innovation in the future policy-making.

Quantitative analysis used Delphi technique to identify effective factors on integrating disaster management and spatial planning in Iran. Helmer described the Delphi technique as a method of refining group opinions and substituting computed consensus for an agreed-upon majority opinion (Helmer, 1966). Delphi technique is a major method used in program planning, need assessment, development of curriculum political decisions and resource utilization. According to the literature, the Delphi technique has several advantageous features including (1) anonymity, (2) writing responses, (3) controlled feedback.

1-8-Outline of thesis

In this dissertation, chapters 2 and 3 are theoretical exploration. Chapter 2 , include literature review of urban planning and the basic specifications of disaster management relationship. The main purpose is to examine the feasibilities and possibilities of the attention for the role of disaster risk reduction in urban planning and why this issue is essential to achieve of urban resilience. Chapter 3 explores planning approaches which may be used in integrated approach. Together both chapters establish the theoretical foundation for the further study.

Chapters 4, 5 and 6 are empirical case studies. Chapter 4, 5 introduces the context of urban planning and disaster management in Iran and the case study area in Mashhad in order to understand their transitional characteristics at the national and local level. Chapter 5 particularly elucidates the results of analysis on the relationship of spatial planning process and disaster management system in the area of the case study. Policy limitations and the challenges are illustrated. Based on the theoretical and practical discussions, Chapter 5 extends the integrated model based on Iranian background. The research limitation and suggestions for future research are presented in the final chapter.

Chapter Two
Review of Concepts and General Theories

Chapter Two: Review of Concepts and General Theories

Introduction

The aim of this chapter is to identify the general conceptual elements of the research. It is necessary to utilize spatial planning theories and disaster management history which shape the most recent urban policies and practices. It is conceptual as it is derived from academic and research ideology, which influences and directs spatial planning and disaster management initiatives; yet it is general because there is no specific theory which underpins disaster management frameworks from all aspects. It is valuable in itself as it expands the researcher's understanding of the theories behind disaster risk reduction plans, and at the same time it provides a framework to study and analyze the literature review and empirical material. However, in a fast-changing world of theoretical and spatial features, finding a thorough answer is difficult and almost impossible.

This chapter contains of two major sections. The first section starts by elucidating previous experiences and policy-oriented on spatial planning systems that have impressed planners for the recent decades. Its focus is on the evolution and paradigm shift in planning approaches. The second section looks at several disaster management issues such as the history of disaster management systems, the characteristics of disaster management cycle, risk management and assessment in urban areas and finally the relationship between disaster management and sustainable development.

2-1- Evolving Spatial Planning Approaches

Modern planning activities originated from the massive industrialization and urbanization of the nineteenth century, which initially became manifest in the developed countries (Ward, 2002, p11-43; Wegener, Button, & Nijkamp, 2007). Subsequently, urban and regional planning developed as a professional specialization at the beginning of the twentieth century. Planning theory and planning practice has thus evolved with the development of modern society for 'the interaction between [planning] theory, urban change, and planning practice is symbiotic and asynchronous. As a consequence of this interaction, there have been many debates and long-standing disputes in this field. Such debates fuel the progress and evolution of planning approaches and planning practice, even today.

2-1-1- Spatial Planning

Spatial planning is the process of allocating, forming, sizing and harmonizing space or land for multifunction uses (Azizi & Akbari, 2008). This activity is the responsibility of planning agencies at different levels of government and jurisdictions. It requires input from many disciplines, such as planners, economists, sociologists, public administrators, transport analysts and geo-information specialists. The objective of spatial planning is to develop a plan that ensures the sustainability of land resources to fulfill the needs of citizens and future generations in term of economic activity, livability, environmental protection and socio-cultural life.

Many factors affect the process and outcomes, including existing land use, population growth, economic development, environmental carrying capacity, infrastructures, transportation policies, socio-cultural aspects and natural hazards. Natural hazards are essential to ensure that current and future development will not be set back by future natural disasters. Further, political groups and the business community also try to influence spatial plan development to gain the highest benefit.

There are several ways to classify a spatial plan (Berke & Godschalk, 2006; Greiving & Fleischhauer, 2006b). The first is the scope of plan coverage. There are national or federal,

provincial or state, and district or city-level spatial plans. National or federal level plans cover the entire country. They are represented in small-scale maps that depict general and macro-level plans. Provincial or state level plans are represented by larger-scale mapping with better-detailed coverage compared to the national plan. District or city-level plans cover smaller areas and are represented in a larger-scale map. At the district or city level, there are comprehensive and detailed plans. Comprehensive plans comprise all designated land use plans, and detailed plans focus on sub-district, or several sub-district, plans. On the other word, two main levels of spatial planning can be distinguished:

National and Regional planning

National and regional planning refers to the settlement of spatial or physical structure and development by making national and regional plans, which is considered as an integral part of an official planning system in a state. National and regional planning is used to delineate the overall goals of spatial planning (Greiving, Fleischhauer, & Wanczura, 2006).At the regional level, it indicates the pivotal connection between a state-wide view of development and the specific decision makings on land uses adopted at a local level in keeping with municipality's planning about the land-use. The textual and cartographic decisions and data achieved in this way are normally in a scale of 1: 1:100,000 to 50,000.

Urban and local planning

Urban and Local planning is used to refer to setting policies at a local/municipal level which serves as a guideline for the internal land and resource use plans within the administrative municipality charged with this task. Sometimes, it is used with the term "urban planning" interchangeably (Greiving, Fleischhauer, & al., 2006b).The major tool of urban planning island-use planning and zoning ordinances. Land-use planning is subset of regional planning consisting of two stages: 1) a generic or preparatory land-use plan (scale 1:50,000–1:5,000) for the entire municipality and 2) an elaborate land-use plan for its smaller sections, which is often legally binding (scale 1:5,000–1:500).

A successful spatial plan should meet a set of requirements. Berke and Godschalk suggest four core values to be achieved: environmental protection, equity, economic development and livability. Environmental protection values relate to the issues of land resource utilization and the production of waste, with environmental sustainability as the main element. Equity values aim to maintain the harmony of the social situation and promote the equitable distribution of resources, services and opportunities. A spatial plan needs to consider the benefits of better management of land, since land and location are important factors in production and investment. Land value and land market are significant elements that affect, and are affected by, land use allocation. These general principles need to be attained to develop a successful spatial plan; however, the unique characteristics of each location are equally important.

Urban and regional planning launches with a description of these main values that are relevant to the areas. This will guide the formulation of the spatial plan (see Figure 3-1). Advances in computers and geographic information systems (GISs), as well as more complex data requirements and the involvement of more stakeholders, have led to an increased need for effective PSSs. However, there are impediments to its widespread use (Sutanta H. , 2012). The function of a PSS is to gather, manage and analyze spatially relevant information, thus facilitating spatial plan development.

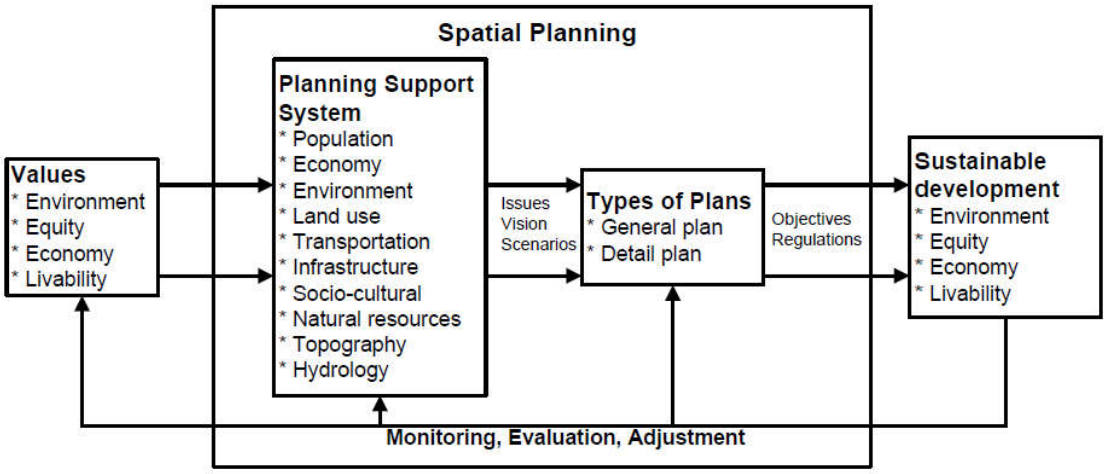


Figure 2-1 Development of spatial plan
(Modified from Berke & Godschalk, 2006)

2-1-2- A Perspective on Spatial Planning Debates

Planning is about making strategies and polices for transmogrifying the natural and built environment (Rydin, 1993). Urban planning is a future oriented acting and a public sector activity that emphasize on the physical environment. Because of this physical emphasize, planning theory has been dominated by design or blueprint approach for a long time.

Planning theory has embraced knowledge from many disciplines because physical development has the intertwined connection with political, social and economic processes. In the light of the scientific exploration of planning theory, Faludi identified two types of theory in this field: theory of planning and theory in planning. The former is process-oriented i.e. 'theories of the planning process', also called procedural theory (Faludi, 1973). He offered that 'procedural rather than substantive theory should be regarded as planning theory proper' (Faludi, 1973). His perspective has infused complementary and different standpoints.

Archibugi augmented that ashore the theory of/in planning, some kind of theory on planning to make connections between procedural and substantive planning were needed (Archibugi, 2004). He offered that planning theory could argue logically and methodologically the connections among the diverse scales, sectors and units of planning. Paris regarded planning as an activity which is connected to the social, economic and political context and he insisted that exploring how this context changes over time is the essential task for planning (Paris, 1982). Beauregard criticized that 'theorists delved more and more into an abstract process isolated from social conditions and planning practice….few planning theorists concern themselves with the physical city' (Beauregard, 1990).

In the interim, the disputations of planning theory have challenged between comprehensive against incremental planning, centralization against decentralization, top-down against bottom-up leadership, objectivity against advocacy, and planning for people against planning for place. In addition, there are a plenty of perceptions, ideologies and opinions in association with planning concept, planning content, planning procedure, planning role, planning equality etcetera (Taylor, 1998; Healey P. , 1996; Friedmann, 1998; Fainstein, 2000; McGuirk, 2001; Archibugi, 2004; Fainstein, 2005; Buitelaar, Lagendijk, & Jacobs, 2007). Although planning theory and practice varies among countries based on their different political, economical, and social background, the general progress of planning systems based on the American and Europe experiences can be briefed in Table 2.1. Thus it can be seen that since the post-war period, planning systems have been subjected much argument and evolution in planning ideologies or theories.

Period	Paradigm	Socioeconomic & philosophy context	Key issues & concepts planning	Planning approaches & activities
1920s-1960s	Design centered & comprehensive planning	Economic recession; postwar boom; reconstruction; positivism; blueprint-base; central public administration; procedural &rational planning theory	Sanitary &public health; suburban growth; rapid development; Garden city, integrative planning; new town; regional planning; two-tier system structure plans& detail local plans	Master & detail plans; national & regional planning; residential development; house-building boom; transportation planning
1960s-1980s	Systems & rational planning	Oil crisis; new technology; new liberalism; system theory; complexity & uncertainty organization theory; marketing in urban policy	Excessive substantial growth; environmental problems; policy implementation; local politics; urban conservation	Planning process model; development control; urban conservation, Inner city renewal; housing redevelopment; construction plans; urban modeling
After 1980s	Collaborative & democratic planning	Economic globalization; sustainability; information era; community participation; liberal political economy; urban governance	Sustainable development; climate change; strategic planning; compact city; smart growth; participatory governance	Environmental assessment projects; urban regeneration; hierarchy in urban plans, urban design projects;

Table 2-1 Evolution of planning system based on the Europe's experience
Source: Summarized from the books of Rydin (1993), Ward (2002) and Hall (1996, 2002)

Since the 1990's, however, the urban planning system has given more advertency and consideration to the conflicts and challenges of managing and allocating natural resources, conservation of environment and economic competition. The planning process has increasingly emphasized on good governance and more cooperation between professional, political and societal stockholders.

2-1-3- Paradigm Shifts in Spatial Planning

This part emphasizes the analysis on two main paradigm shifts. The first is from the blueprint approach to the systematic approach. Another one is from the scientific view of planning to an integration of scientific and political viewpoints that is comprised in the idea of collaborative planning and sustainability discourse.

The Blueprint Approach and comprehensive view

The purpose of urban planning was fundamentally formed in the Garden City idea of Ebenezer Howard (1902, re-edited in 1965) and his contemporaries. Fishman believes that the three father founder of new urban planning in planning history: Ebenezer Howard, Frank Lloyd Wright, and Le Corbusier, were regarded as the pioneers at the beginning of the twentieth century (Fishman, 2003). They attempted to define the ideal urban form for the industrial society. Their planning thoughts were characterized as utopian, anti-urban, spatially ordered and expert-oriented, and this

thinking has shaped many cities in developed countries. Subsequently, their ideas have also influenced the developing countries. Their contribution helped to set up the orthodox city planning theory and widely influenced the planning conception and practice until the middle of the twentieth century.

Taylor explained the major features of this pre-war planning in United Kingdom as physical, design-centered and detailed blueprints (Taylor, 1998). The results of this planning were expressed as master plans for urban form because spatial planning was envisaged as an exercise in planning and designing the physical form. In the meantime, the planning theories were absorbed with visionary plans or designs that showed how the ideal town or city should be spatially organized. However, since the mid-twentieth century in the western countries, the concept and principle of 'ideal types' of cities for the future, such as 'Radiant Garden City Beautiful' (named by Jane Jacobs (1961, p25)) in planning history has been subject to much criticism (Jacobs, 1961). The major criticism for this kind of planning approach is that it lacks consideration and understanding of dynamics of specific urban areas. This planning approach is aimed at physical outcomes. Finally the City Beautiful Movement was too sumptuous, costing more than the problems it was intended to solve. In Taylor's words (1998, p55), 'what planners lacked, and what planning theory had failed to provide, was an adequate empirical understanding of the world they were seeking to manipulate'.

Taylor mentioned various restrictions: first, their physical and design bias neglected the social aspects by excessive focusing on the physical aspects so as to lack public participation. Second, blueprint approach that generated final documents did not cover the transformations of continuing development process of towns and cities while planners neglected to recognize the urban dynamics. Finally, the normative and utopian ideals showing a pursuit of anti-urbanism exhibited very few tendencies to understand and perception the challenges of real-life cities during the plan making process (Taylor, 1998). Urban complicacy and dynamism was failed without consideration of diversity interests and values of various stockholders.

It was gently perceived that a plan cannot be a static document because the city is all the time confronted with evaluating social, economic and physical circumstances. Following criticism in the 1950s, the blueprint approach shifted to the systematic approach. (Table 2-1).

Systematic and rational approach

The emersion of the approach of systematic planning in the early 1960s was emerged as a logical response to the lakes of the blueprint planning theory when it was found out that using a static method to deal with the dynamic challenges was not adequate. Recognizing how cities work by system analysis was accentuated. Planning was assumed as a direction and an outgoing process of rational action reflecting the ambiguity of the future rather than producing an 'end-state' or 'blueprint'. This approach started the first revolution bringing the interest of science into planning theory. Chadwick and Faludi clearly mentioned that such an approach was more about the means or methods of planning (Faludi, 1973). It was the procedural planning theory that facilitated a wider scope for spatial planning, particularly at the strategic level.

The systematic approach much more focused on the technical and scientific work. It faced another wave of criticism at the end of the 1970s. It was criticized for its abstractness and generality, thereby being empty in terms of content, its lack of substance. As Taylor explained (1998, pp 95-109), there were two criticisms of it. First, planning as a purely technical or scientific activity did not develop further to empirically understand the real city, which Jacobs and Alexander persistently emphasized on it. The essence of planning as being political work was downplayed, while it was recognized after the 1970s that the political-economic context could remarkably shape and form the essence and efficacy of planning works. The lake of a substantive core and political attention has led to planning loss of influence, direction and legitimacy.

Another criticism was on the top-down approach of planning that determine the planning process as distinct phases i.e. identifying goals and objects, formulating alternatives, evaluating alternatives, implementing and monitoring. This approach distracted attention from the crucial question of how plans and policies were implemented even though the stage of implementation

and monitoring was included inside the process model. The linear and step-by-step planning process was criticized for separating problem/objective identification from implementation. The primary phase got much consideration while the final phase was mainly ignored. Such a rational process model was 'generally described as a model of rational decision-making, rather than a model of rational action' (Taylor, 1998, p112). As Taylor (ibid, p114) emphasized, it is dangerous to view and undertake the tasks of every stage in a separate and linear way.

There has been great emphasis in planning theory, since the 1970s, concerning social/economical issues, political issues, and implementation issues in the planning domain. Planning cannot be isolated from a social, economic, and political context and the implementation issues should be considered at the same time as plans start to be prepared. Planning was progressively regarded as communicative and negotiated action since efficacious implementation needs the interpersonal skills of negotiation and communication among various stakeholders. Moreover, the substantive subjects which planning deals with were also reemphasized and a problem-centered planning approach was brought forward. This is concerned with value judgments and problem-focused analysis as a basis for developing possible future policies. The planning paradigm has been shifted on one side to problem-oriented research and on the other side to the issues of institutional transformation and communicative and network approaches in plan-making and implementation process.

Collaborative and democratic view

The importance of communicative planning and essential of understanding the political-social context of planning was tightly proved by the 1980s. It is now recognized that planning process must use more than before from public participation. Communicative or collaborative planning has emerged in response to the challenge of the dynamism, increasingly complex society with social, economical, and political fragmentation, shared power and conflicting values. Seeing planning as a communicative or collaborative process 'is an attempt to find a way forward for planning, to justify its existence and provide a normative basis which it has lacked since the rational comprehensive approaches of the 1970s' (Allmendinger, 2002). Many researchers have contributed to the development of this planning theory during recent decades.

Lawrence believed that collaborative planning involves two overlapping components (Lawrence, 2000). First concentrates on the communicative action and the other focuses on consensus building. Innes and Booher noticed consensus building that planning is not just communication, but it is a social learning that converts previous participant held opinions and helps them to develop new shared concepts, purposes, and creative approaches to otherwise complex problems (Innes & Booher, 1999).

Brand pointed out the concept of communicative and collaborative planning through ontology, epistemology, ideology and methodology aspects which offer perspective to the presumptions about reality, knowledge, values, and practice (Brand & Gaffikin, 2007). He mentioned that reality in collaborative planning literature is concerned with the complex context of society, knowledge in collaborative planning refer to facilitate the negotiation of emergent interest and a call for the 'co-construction' of knowledge, values for collaborative planners note the importance of candid and explicit discussions about values in planning processes and finally practice in collaborative planning literature refer to new methods for policy-makers and planners, such as discursive and participatory forms of governance, modes of negotiable problem definition and consensus building.

Patsy Healey has made an outstanding contribution in advocating collaborative planning. She regards communicative planning approach as a new approach to address the spatial organization of urban regions and spatial strategy. She explained the inclusionary communicative approach for strategic discourse construction and strategic consensus-building in five aspects, i.e., arenas for discussion, the scope and style of discussion, sorting through the arguments, creating a new discourse, and agreement and critique (Healey P. , 1998a). Healey mentioned the essential of an interactive method including different stakeholders in the process of collaborative planning according to collective concerns with quality of place. She emphasizes that this transfers the work

and duty of urban and town planning from 'building places' to develop the institutional capacity in communities in order for ongoing 'place-making' activities (Healey P. , 1998a).
Healey in her book, Collaborative Planning, combined the value of environment sustainability in the exploration of collaborative planning. This book expanded both an institutional approach to understanding urban and regional dynamism and a communicative approach to the design of governance systems, emphasizing on methods of developing collaborative, consensus-building practices according to the perspective of urban planning as a 'field' of public policy (ibid, p5-6).
Healey pointed out that planning, in the multicultural communities, is an interactive process instead of a purely technical process of design, analysis and management (Healey P. , 1997b). This kind of planning, as an approach to governance, epitomizes a policy-driven approach with a long term and strategic orientation, and interrelated economic, social and environmental dimensions of issues in methods which recognize their complex space-time dimensions. Therefore the compliment of spatial planning is a concentrate on the qualities of localities, areas and places through the collective management of shared concerns about spatial and environmental qualities. For Healey spatial planning is a task which is not just a response to problems, but rather a potential for crystallizing the continuous flow of events and attitudes (Healey P. , 1999).
Healey indicated that how we recognize the environment is dependent on how we see our place (Healey P. , 1998a). In other words, it means that improving the quality of urban environment requires clarity of the rights and responsibilities in where we live. In order to fortify the local capacities for solving various conflicts, she suggested for focusing on two stages: i.e. the soft infrastructure of inclusionary argumentation by which better realizing on making policy and action could be developed, and the hard infrastructure of rules and resources of policy systems (ibid, p 243-283). Collaborative planning could be recognized by approaches combining these two aspects.
Nevertheless, there have also been criticisms of theoretical and practical insufficiencies of collaborative planning (Fainstein, 2000; Huxley & Yiftachel, 2000; Laurian, 2004; McGuirk, 2001; Margerum, 2002; Brand & Gaffikin, 2007). Fainstein criticized that communication theorists ignore of the context and the results of planning when focusing on the planner in the central element of discussion. Therefore, she believes that there is a gap between rhetoric and action in practice. Huxley and Yiftachel emphasized more theoretical debate on issues of power, of the state and of political economy. Brand and Gaffikin believed that collaborative planning as a conceptual means for practitioners is in need of renovation. Margerum focused on the effectiveness of implementation. Apart from the challenges and shortages of its theoretical and empirical legitimacy, a communicative or collaborative approach of planning does offer valuable insights for planning systems.
Global challenges must in part be tackled by initiating local actions. Localizing concern about the natural and man-made disasters is therefore necessary for sustainable development globally. But local conflicts closely relate to the multi-sided interest groups with different lifestyles. When the objectives of resiliency are translated into actual local contexts, when planning turns to respect and advocate diversity and vitality in urban areas, and when increasingly planning theorists realize that the planning decision-making process is often 'disjointed and incremental' or 'muddling through', new approaches and instruments should be more negotiation-oriented in order to reach compromise. Urban planners have to develop a communicative and democratic approach for attaining a spatial organization based on the resiliency principles.
Truly from the urban resilience point of view, urban organization requires public participation, therefore planning should be more negotiable, open minded, and integrated. Thus integrating the resiliency principle and collaborative and communicative planning approach could propose an innovative mode for problem-oriented and procedural approaches in the planning practice. It is the basis in this study to explore the approaches integrating disaster risk reduction in urban and regional planning in the Iranian context.

To summarize: it can be mentioned that the foregoing flows of planning theory and practice do not displace each other. Contrariwise they complete each other to some extent from different point of view. At the local level the physical form of good design remains a necessary and significant consideration for urban planning. It is at the strategic level of planning that the concept of systematic approach plays a vital role. On the other side, collaborative and participatory planning can facilitate to move towards a common understanding about impasse, challenges, objectives and alternatives so as to gain good quality of urban areas. The new paradigm of planning highlights the need to be partial, experimental, incremental, working on problems as they arise.

2-2- **Disaster Management at a Glance**

Disaster management is the establishment of plans through which communities decrease the impact of disasters and cope with disasters. Disaster management does not avert or remove the risk; as an alternative it emphasizes on establishing plans to reduce vulnerability to hazards. Failure to establish a good plan could lead to harm and damage to assets, human mortality, and lost revenue. Events embraced by disaster management include acts of terrorism, industrial sabotage, fire, natural disasters (such as earthquakes, whirlwinds, etc.), public disorder, industrial accidents, and communication failures (Phillips, Neal, & Webb, 2011).

The purpose of this part is to define the natural disaster concepts, to introduce the four phases of disaster management, and risk assessment and management and also to examine paradigm shift on disaster management.

2-2-1- Natural Disasters

- *Disaster*

Disaster is explained as an emergency condition causing widespread havoc beyond our ability to recover. Therefore, there is not a perfect ideal system that eliminates risk as it is not the same as a disaster. Only when the damage is beyond our ability to recover, the term disaster can be applied.

One point about disasters is that they are should not be treated as discrete events. The technological and scientific advances allow to predict the occurrence, time, place and severity of disasters reasonably and even with a relatively high degree of accuracy.. the studies show that they follow a specific occurrence pattern and therefore to the extent of damage can be largely reduced, though there is not much to do to reduce the scope of damage.' (Sundar & Sezhiyan, 2007) .Types of Disasters:

Disasters are largely of two types,

1. Natural disasters. e.g. – landslides, floods earthquakes, etc.
2. Man-made disasters. e.g. – war, bomb explosion, chemical leaks, terrorism, etc.

The disasters mostly differ in terms of their subsequent medical consequences or the scale of damage caused. For instance, earthquakes can inflict heavy physical injury,, floods can take the life many people and cause widespread infections, chemical leaks can cause give rise to toxic manifestations, etc. It is cleared that in more recent literatures suggest that the sharp delineation between natural and man-made disasters does not exist anymore as natural disasters always have a man-made component (triggered by human activities; increase of vulnerability by human activities) (Greiving, Fleischhauer, & Wanczura, 2006).

- *Natural Disaster Definition*

When the origin of a hazard derives from nature, it is named a natural hazard. A natural hazard is the product of a geological, geophysical or hydro-meteorological activity in the form of an earthquake, landslide, volcanic eruption, flooding or storm (Benson & Clay, 2004). When it strikes an uninhabited area and has no effect human activities, it is still a natural phenomenon. A natural hazard can be reshaped into a natural disaster if it directly impacts on human life and infrastructure.

A natural disaster is a combination of the exposure of parts at risk to hazards and vulnerability and resilience (UN/ISDR, 2009). While the resilience of communities to face natural disasters is decreasing, the exposure of people and their asset to hazards is also increasing, which in turn

results in an increase of the disaster risk. The degree of disaster risk confronted on an especial location is a function of hazard, vulnerability and resilience, as presented in the following formula:

Disaster Risk = Hazard x Vulnerability – Resilience

In this formula, vulnerability is a condition of the potential to suffer damage or loss due to hazards. Resilience is the condition whereby a community faced with disaster can withstand its impacts using its own resources to restore its pre-disaster conditions and functions. However, it is not easy to quantify resilience; therefore, other methods need to be used to calculate risk in the economical or structural terminology (Benson & Clay, 2004).

It is commonly accepted that natural hazards often evolve into man-made disasters with the increasing action and reaction between human activities and natural phenomena. The originally pure natural phenomenon can be intensified by human activities and become a human-enhanced disaster, with further and larger impacts. Land use changes change the natural path of hazards, creating human-made or human-influenced hazards (Sundar & Sezhiyan, 2007). Thus, it is essential to intently manage land use changes to reduce the effect of natural disasters. This requires the incorporation of natural disasters into spatial planning.

Natural disasters have various severe impacts on community and infrastructure. The affected features can be categorized as follows (Benson & Clay, 2004):

- Human: disasters can cause deaths, injury, disease and psychological impact from traumatic experiences.
- Economic: disasters can disrupt economic activities, causing loss of land, property, income and economic opportunity, destruction of economic infrastructure and financial losses due to the re-allocation of funds for response and reconstruction efforts.
- Physical: includes destruction of road networks, bridges, railways and utility networks.
- Environmental: includes loss of wetlands, changes in land cover, biodiversity loss and destruction of ecological areas.

These effects have ability to strike human and infrastructures. Some kind of natural disaster can trigger a sequence of disasters, where the primary disaster (e.g. volcanic eruption) can lead to a secondary disaster (e.g. destruction of agricultural fields) and perhaps a tertiary disaster (e.g. starvation).

Disaster management needs regard of the progression and predictability of the hazards. Progression is an outcome of the increasing magnitude of the hazard sources and/or the land use changes that occupy disaster-prone areas. Predictability refers to the eventuality of early projection about on where, how, and when a particular disaster will happen. The improvement of scientific ways and technology has made advanced measurement methods and early warning systems available for some natural disasters, including floods, volcanic eruptions, tsunamis, hurricanes, land subsidence and landslides. Some disasters are predicted in days or hours. But earthquakes are still unpredictable (Sutanta H. , 2012).

Natural Disasters and Cities

‘Disasters have caused major disruptions in both low- and middle-income countries, often wiping away decades of development gains in moments. Major recent natural disasters in developing countries include earthquakes in Haiti (early 2010), which killed more than 220,000 people, the Nargis cyclone in Myanmar (2008), which killed more than 138,000 people; and the Sichuan earthquake in China (2008), which killed more than 87,000 people, and the Bam earthquake in Iran (2003), which killed more than 26,000 people. While the economic losses from disasters tend to be greater in high-income countries (in absolute terms) due to higher value of properties and assets, low- and middle-income countries tend to face higher fatalities and disruptions to hard-earned development gains. On average, around 82,000 people are killed annually by disasters, with most fatalities concentrated in low- and middle-income countries’ (World Bank, 2012).

'Urban areas are more exposure to vulnerability than rural areas. The statistics shows that more than 50% of the world's population lives in cities, with an additional 2 billion urban residents expected in the next 20 years. Much of the population growth is expected in small and medium-sized cities in developing countries, yet 1.2 billion urban residents already live in slums, and this too is expected to grow; rural-urban migration can cause low-income settlements to double in size every 5 to 7 years' (World Bank, 2012).

'Africa and Asia, which have the highest rates of urban growth globally, are also experiencing the fastest rate of increase in the incidence of natural disasters over the last three decades. Not surprisingly, many urban areas sustained heavy losses due to disasters in the last 10 years (table 2-2). Given these trends, without major changes in the management of disaster risks and urbanization, risk to city residents will increase in the future as populations grow' (World Bank, 2012).

Table 2.2 Large Disasters from 2001 to 2010 with Major Impacts on Cities

Popular name	Main countries affected	Date of event	Type of hazard	Main cities affected	Total number of deaths	Total number of affected	Total damages US$
Haiti earthquake	Haiti	January 12, 2010	Earthquake	Port-au-Prince	222,570	3,400,0000	n/a
Sichuan earthquake	China	May 12, 2008	Earthquake	Beichuan,	87,476	45,976,596	85 billion
Cyclone Nargis	Myanmar	May 2, 2008	Tropical cyclone	Yangon	138,366	2,420,000	4 billion
Java earthquake	Indonesia	May 27, 2006	Earthquake	Yogyakarta	5,778	3,177,923	3.1 billion
Kashmir earthquake	Pakistan	October 8, 2005	Earthquake	Muzaffarabad	73,338	5,128,000	5.2 billion
Hurricane Katrina	United States	August 29, 2005	Tropical cyclone	New Orleans	1,833	500,000	125 billion
Mumbai floods	India	July 26, 2005	Flood	Mumbai	1,200	20,000,055	3.3 billion
South Asian tsunami	Indonesia, Sri Lanka,	December 26, 2004	Earthquake and tsunami	Banda Aceh, Chennai	226,408	2,321,700	9.2 billion
Bam earthquake	Iran	December 26, 2003	Earthquake	Bam	26,796	267,628	500 million
European heat wave	Italy, France, Spain, Germany	Summer 2003	Extreme heat	Various	72,210	Not reported	Not reported
Dresden floods	Germany	August 11, 2002	Flood	Dresden	27	330,108	11.6 billion
Gujurat earthquake	India	January 26, 2001	Earthquake	Bhuj, Ahmedabad	20,005	6,321,821	2.6 billion

Source: EM-DAT: The OFDA / CRED International Disaster Database (www.emdat.net), Université Catholique de Louvain; and the International Federation of the Red Cross (2010).

Table 2-2 Large Disasters from 2001 to 2010 with Major Impacts on Cities

Urban areas are more susceptible to disaster risk than rural areas due to urban expansion, the aggregation of people, infrastructure and assets, and inadequate management. The accommodating of population in disaster prone areas is mostly a result of rapid and uncontrolled urbanization along with intense competition for land, decaying vegetation cover, land use variations, and wider variability in climate. These drivers change population distribution, relative wealth, and disaster risk in short term. In addition, these drivers will continue to exacerbate existing risks to natural hazards when they combined with inadequate urban management.

Therefore, strategic action should be taken in the short time to avoid creating unmanageable levels of risk to a city's built environment. This becomes of still vital and essential when focusing on the impact of small-scale or recurrent disasters that impact slum areas. 'Such events are rarely recorded and it has been argued that their aggregate impact in cities exceeds losses associated with low-frequency, high-impact hazards that capture news headlines' (World Bank, 2012).

'The urban poor living in peri-urban areas and informal settlements are particularly vulnerable due to their tendency of residing in high-risk areas and faulty shelters, having limited access to basic and emergency services, and a general lack of economic resilience. The urban poor have to make difficult choices in regard to where they reside. This decision involves tradeoffs between proximity to economic opportunities, security of tenure, provision of services, protection from extreme events, and cost. As a result, informal settlements are often built in high-risk areas. A household's ability to handle a disaster also varies according to income levels, house type,

geographic location within the city, and the holding of insurance policies to offset incurred damages.' (World Bank, 2012).

2-2-2- Disaster Management

Disaster management generally includes managing of natural catastrophes such as landslide, floods and earthquakes. Disaster management is a multidisciplinary which is dealing with vulnerability and risks (Bansal, 2014). It requires a proactive approach to deal with a disaster, disaster response (For instance, large0scale decontamination, emergency evacuation, quarantine,, etc.) and measures to sustain and rebuild the society when a natural or human-made disasters strikes.

Overall, emergency management is the ongoing process by which all individuals, groups, and communities manage hazards in an effort to alleviate the disasters-induced damages. The adopted measures depend on the perceived risk by those exposed to such risks. Effective disaster management rests on systematic incorporation of plans aimed at reducing disaster risk at various government and non-government levels (Bansal, 2014). It is clear that managing the governmental disaster is a task of civil defense organizations as defined in the ordinary structure of the emergency services. On the other hand, the disaster management in the private sector is often associated with the sustainability of business plans.

- **History of Disaster Management**

The archeological findings suggest that our prehistoric predecessors confronted with relatively the same risks as we do today: starvation, inclement weather, dangerous wildlife, and human-induced violence, disease, inadvertent injuries, flood, earthquake, and more. Nonetheless, they went out of their way to avoid falling prey to hazards.. Evidences suggest that they adopted measures to decrease, or alleviate such risks. The fact that these people chose caves as their shelter is indicative of this proposition.' (Coppola, 2011)

Most of the ideas that help today's practice can be traced back to the accomplishments of ancient civilizations. While the disaster management from the early history of mankind was restricted to single reacts or respond addressing single risks, most of these achievements were completely formed, comprehensive, and amazingly impressive at alleviating both human misery and environmental damage.

There is not any international formula for the way different countries expanded their disaster management systems. However, there is a specific period that manifests the biggest attempt toward a centralized maintaining of citizens-the Civil Defense era.

Disaster management in its modern sense did not begin to appear until 1950s. In most countries, this change was an answer to particular disaster events. In the meantime, the public sector played an important role in maintaining and responding to disasters, the legal base that enabled such a transfer was the outcome of advances in warfare technology (Coppola, 2011).

Most of the developed countries began to form complex civil defense systems in response to the threats presented by an upcoming nuclear attack. These systems consisted of enhanced detection systems, reinforced shelters, search and rescue teams, early warning alarms, and local and national coordinators. Most countries also established legal systems to support the preservation of these systems by passing laws, creating national and local-level civil defense units, and the allocating funds to hire personnel.

Nonetheless, some civil defense offices extended more comprehensive disaster organizations. But the legal framework developed to support them was in effect and formed the basis for modern disaster management in its modern form.

While the structures of disaster management are different across countries, country, there can be found some corresponding patterns that are formed independent and distinctive from each other. Many countries build up their disaster management infrastructure in response to the emergencies and the appreciation of the need by their governments to allocate both the staff and the budget required address such risks. Still some countries rather than developing their disaster management structures for the purpose of civil defense, are obliged to reinforce it as a result of popular

criticism against the poor management of a natural disaster (The noteworthy example of such countries are Peru in 1970, Nicaragua in 1972, and Guatemala in 1976 which had to enhance their disaster management structure in response to the destructive earthquakes that hit their countries). Also, there are some states that irrespective of their history of disaster, feel the lack of a real emergency management structure.

International Decade for National Disaster Reduction :On December 11, 1987, the United Nations General Assembly announced 1990s as the "International Decade for National Disaster Reduction" (IDNDR).This act was an attempt to reinforce internationally coordinated measures taken to mitigate the material losses and social and economic consequences of natural disasters, particularly in developing countries. As such, the IDNDR was taken to task to enhance the capacity of each United Nations (UN) member capacity to inhibit or mitigate the detrimental effects of natural disasters and to lay down guidelines about how to utilize the science and technology to alleviate the impact of natural disasters.

On December 22, 1989, following the UN Resolution 44/236, the General Assembly proposed the objectives they expected to obtain during the IDNDR. In addition to setting up a special UN office in Geneva to organize the operations of the IDNDR, the resolution required all UN agencies to:

1. Enhancing the capacity of each country in prompt and efficient alleviation of the effects of natural disasters, Highlighting the importance of helping developing countries in estimating the potentials of disaster damage and establishing early warning systems and disaster-resistant structures when and the situations arises.
2. Providing proper guidelines and strategies to draw on the current scientific and technical knowledge, with a view toward the cultural and economic diversity of nations.
3. Promoting scientific and engineering attempts with the aim of bridging the critical knowledge gaps to mitigate life and property losses.
4. Spreading the existing and recent technical information concerning the measures used for analysis, , prediction, and alleviation of natural disasters.
5. Adopting measures for the analysis, prediction, prevention, and alleviation of natural disasters through initiatives such as technical assistance and technology transfer, demonstration projects, and training in accordance with particular disasters and locations, and to measure the efficiency off those plans (United Nations, 1989).

- **The Phases of Disaster Management Cycle**

The disaster management process often consists of a two-phase cycle in which the there is a mutual interaction between the post-disaster recovery step and the pre-disaster risk mitigation. The disaster management cycle portrays a constant process through which various businesses, governments, and civil societies set forth their planning to alleviate the adverse effects of disasters, respond during and immediately after a disaster, and adopt measures for recovery after a disaster. The importance of this concept lies in its ability to encourage a holistic approach to disaster management and illustrate the interrelation between disasters and development.

The post-disaster phase deals with issues such as recovery and reconstruction which are required immediately after a disaster. After the occurrence of a disaster, the first step is to aid people affected to recover from the preliminary shocks of the disaster. The goals of reconstruction is to help rebuild the basic infrastructure and services necessary for bringing people to their normal life pattern.. The significance of a 'transitional phase' to bridge the immediate recovery phase and long-term reconstruction phase has been addressed in the literature. After the rebuilding of major infrastructure and the social and economic institutions, the efforts may be more directed toward the longer-term recovery and reconstruction.

Conventionally, the construction industry deals with the long-run reconstruction stage in the management cycle; however, it is increasingly acknowledged that spatial; planners plays a wider role in predicting, evaluating, preventing, preparing, reacting, and recovering from troublesome challenges. In this learning package, the notion of a disaster management cycle is presented and the share of the construction industry at various steps of the process, from pre-catastrophe

planning and alleviation, to sustainable reconstruction required after the occurrence of the disaster.

- **Disaster management cycle**

The objectives of disaster management include decreasing or preventing the potential losses of hazards, ensuring the accessibility of immediate and proper assistance to possible victims, and implementing prompt and effective recovery. It portrays the continuous process through which civil communities, governments and businesses make planning to reduce the effect of disasters, respond during and promptly after a disaster, and adopt measures to recover from a disaster. Appropriate measures adopted at all steps of cycle stimulate heightened preparedness, improved warnings, lower vulnerability or the disaster control in the next round of the cycle.

The entire disaster management cycle is characterized by formulating public policies, introducing plans that can either alleviate the roots of disasters or reduce their impacts on people, buildings, and infrastructure. The alleviation and preparedness stages are carried out when disaster management developments are introduced in preparation for a disaster event. Taking the developmental considerations into account is integral to the alleviation and preparation of the society to effective management of a disaster. After a disaster, disaster management forces, especially humanitarian organizations, initiate the prompt response and implement the long-term recovery stage.

It is noteworthy that the four phases of disaster management shown in Figure 2-2 should not be treated separately or in a particular order. There is often cycle overlapping with the duration of each phase depending to a large extent on the magnitude of the disaster.

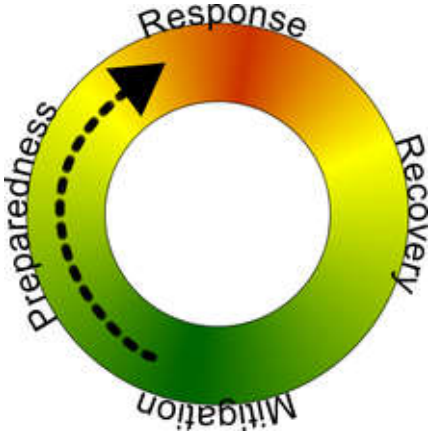


Figure 2-2: Disaster Management Cycle

Mitigation

Mitigation activities seek to remove or reduce the chance of disaster reoccurrence, or alleviate the impacts of inevitable disasters. Such measures include designing codes; vulnerability analyses up dates; zoning and land use management; formulating regulations and safety codes; preventive health care; and public education.

Mitigation will be a variable of incorporating proper measures in national to local development planning. Its efficacy also rests on the accessibility of data on hazards, emergency risks and probable countermeasures (ibid, p6). The mitigation stage, and the entire disaster management cycle involves formulating public policies and plans that seek to alleviate the roots of disasters or reduce their effects on people, buildings, and infrastructure.

Preparedness

The main objective of preparedness is to reach an acceptable level responsiveness to emergency situations via plans that promote the technical and administrative ability of governments, institutions, and communities. These measures include logistical readiness for disasters management that can be fostered by formulating response mechanisms, rehearsals, initiating long-term and short-term strategies, public training and designing early warning systems.

Preparedness can also involve an analysis of strategic reserves such as food and water supplies, equipment, medicines and other necessities preserved in cases of national or local disasters. During the preparedness phase, governments, organizations, and people make plans to save lives, mitigate the disaster damages, and promote responses to disasters. Preparedness measures consist of preparation plans; emergency exercises/training; warning systems; emergency communications systems and evacuations procedures and training; resource inventories; emergency forces/contact lists; mutual aid agreements; and public awareness/training.

Response

The emergency response intends to offer immediate support to maintain life, promote health and boost the morale of the victims. Such assistance runs the gamut from offering particular but limited aids, such as providing transportation vehicles, temporary shelter, and food supplies for refugees, or setting up semi-permanent settlements in aid camps(ibid, p63).Moreover, it includes carrying out preliminary repairs to harmed infrastructure. This phase focuses mainly on fulfilling the basic needs of affected people until the provision of more permanent and sustainable assistances. Humanitarian organizations play a vital role in this stage of the disaster management cycle.

Recovery

After the early emergency responds, the population in the affected areas gains the ability to implement a host of activities to go back to their normal lives and restore the underlying infrastructure. It is not easy to determine the exact point when early relief aids transforms into recovery which is then followed by long-term sustainable development. During the recovery period, there are plenty of opportunities to promote prevention and preparedness, thereby mitigating the vulnerability. In a perfect world, a modest transition from recovery to continuous development is desirable.

Recovery activities are pursued until the normal or even better function of all systems is achieved. Short and long-term recovery measures involve restoring vital life-support systems to the least defined standards; temporary housing; public information; health and safety training; reconstruction; counseling programmers; and studies of economic impact. Information resources and services may involve collecting data about the reconstruction, and documentation of previously-trained lessons. Table 2-3 shows some examples of activities or measures taken in each phase of disaster management with respect to earthquake as a one of natural disasters.

Disaster Phase	Earthquake
Mitigation	- Seismic design - Retrofitting of vulnerable buildings - Installation of seismic isolation/ seismic response control systems
Preparedness	- Construction and operation of earthquake observation systems - Preparation of hazard maps - Food & material stockpiling - Emergency drills - Construction of early warning systems - Preparation of emergency kits
Response	- Rescue efforts - First aid treatment - Fire fighting - Monitoring of secondary disaster - Construction of temporary housing - Establishment of tent villages
Recovery	- Disaster resistant reconstruction - Appropriate land use planning - Livelihood support - Industrial rehabilitation planning

Table 2-3: Example of Measures in Each Disaster Risk Management Phase

- **Risk Assessment**

Risk

Risk refers to a the probability (or frequency) of a natural hazard coupled with the extent of its consequences which is a variable of the assets vulnerability and its perceived potential impacts in a society or system(Greiving & Fleischhauer, 2006a, p. 740; Sutanta, Rajabifard, & Bishop, 2009, p. 342). On the other hand, risk is where a hazard, exposure, and vulnerability overlap (Randolph, 2004). The word risk refers to the expected losses (lives lost, persons injured, damage to property and disruption of economic activity) from a given hazard and is the product of hazard and vulnerability. The International Strategy for Disaster Reduction (ISDR, 2002b) formulates risk as:

Risk=Hazard * Vulnerability / Capacity

To remove this combination of negative (hazard and vulnerability) and positive (Capacity) factors proposed to replace capacity with its opposite, deficiency in preparedness, and presented the equation as

Risk = Hazard * Vulnerability * deficiency in preparedness

Figure 2-3: the Risk Triangle

The deficiency in preparedness includes conditions which inhabit the population, the respective authorities, and disaster- response agencies from responding efficiency to minimize loss (particularly human loss) during the disaster event. This equation can be visualized as triangle whose sides are the equation components and its area represents the risk.
For calculating building vulnerability due to earthquake, the above equation can be written as:

Risk = (Earthquake intensity * Building Vulnerability)

Risk = (Earthquake intensity * site Vulnerability * building quality).Thus for the estimation of buildings damage by probable future earthquake events, all the three factors

mentioned above should be studied.

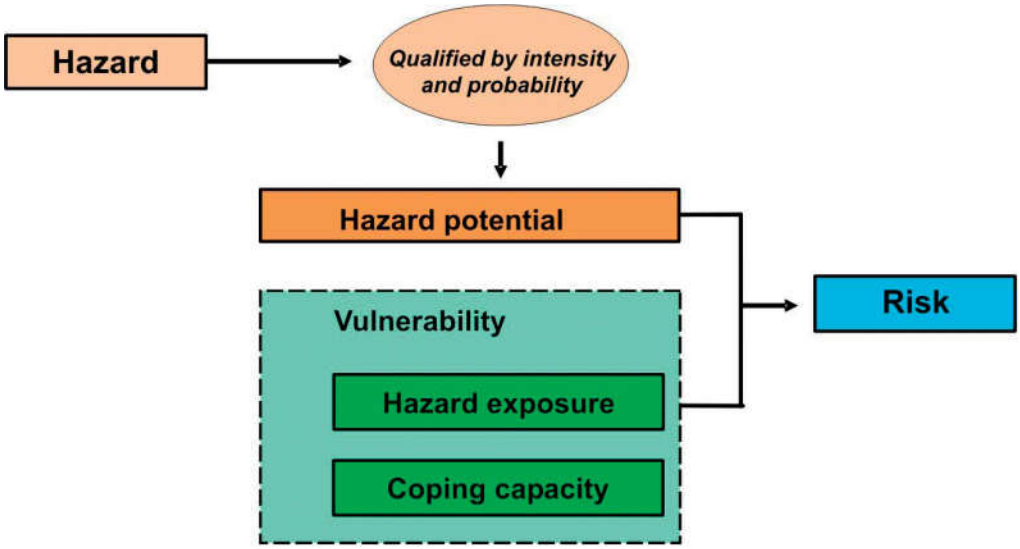


Figure 2-4 Components of risk
Source: Schmidt-Thomé

Risk analysis involves combining the assessment of relative hazard, the exposure, and vulnerability as well as analyzing the probability of occurrence. This statistical assessment relies on inventory, historical, and scientific data. For example, flood hazard probability relies on historical hydrologic data, and earthquake probability is based on subsurface geologic data.
Blaikie et al. highlighted the rapidly increasing risk found in urban regions of developing countries. These areas usually lack sufficient organizational, preventive and evacuative systems or disaster preparation plans. Developed countries, on the other hand, have designed a number of methods to protect themselves against the impacts of disasters by predicting their risks through adoption of prevention and planning measures. Such measures are mostly absent in developing countries, in which a large percentage of the population is exposed to precarious conditions.
A study published by the Office of United Nations Disaster Relief Coordinator in 1978 concluded that natural disasters are often associated with a development problem in most cases suggesting that an integral part of development costs was related to the prevention costs, especially with respect to such simple s step as a vulnerability analysis These extra costs are justified due to the incalculable benefits achieved in terms of lives saved and physical damage avoided.
"The major concern of classical risk analysis is exploring the risks threatening a firm (or any other object), its design and functions. Such analysis usually concentrates on the underlying causes and the direct outcomes of the studied object. In the same manner, vulnerability analyses deals with the implications for the object itself and its primary and secondary implications for the neighboring environment. It seeks to consider the possibilities of mitigating such consequences and promoting the capacity to handle future incidents." Overall, a main goal of vulnerability assessment is to "classify key assets and guide the risk management process."

- **Vulnerability**

Vulnerability is understood as a key component of risk and consists of hazard exposure and coping capacity. In recent studies, disasters are considered to be the product of two interrelated variables: hazards (e.g., the stimulating agents derived from nature, or human activities) and vulnerability (e.g., exposure to damage or loss engendered by a range of physical, socioeconomic or cultural factors) (McEntire, 2001; Henstra, Kovacs, McBean, & Sweeting, 2007.
In this regard, it is noteworthy that there is not a general consensus regarding the definition of these terms. However, it seems that reaching shared understanding with respect to a given knowledge base is more important than finding a common definition. A number of definitions

have been offered for vulnerability, in the literature. When discussing the concept of vulnerability, first of all a distinction should be made as to the sources of vulnerability:
Launching the International Decade for Natural Disaster Reduction 1990-2000, United Nation Disaster Relief Coordinator defined vulnerability as "the gravity of loss in given factors at risk or set of such factors caused by the incidence of a natural disaster of a particular magnitude and expressed on a scale from 0 (no damage) to 1 (total loss)."
Cambridge Architectural Research Limited defines Vulnerability as the degree of loss to a given element at risk (or set of elements) resulting from a given hazard at a given severity level and is usually expressed as a percentage loss or as a value ranging 0 to 1. People or buildings or other elements, which would be affected by the hazard, if it occurred, are termed as the elements at risk.
EPSON Monitoring Committee (2006) defined vulnerability as "the degree of expected damage of natural, socio-economic and physical systems of a community as of the effect and the ramifications of natural hazards which is rooted in the interaction between a system and its environment". This is related both to the internal system of a society how this system interacts with its external environment.
In its general sense, vulnerability refers to a potential for loss, though the type and nature of such loss is not clearly defined In this context, the following types of losses—and thereby sources of vulnerability—can be identified:

- *Individual* vulnerability it is the potential or sensitivity to losses that are materialized in spatial and non-spatial spheres ().
- *social vulnerability:* It refers to the susceptibility of social classes in particular or the society in general to possible structural and nonstructural losses triggered by perilous events and disasters, which are transpired in distinctive spatial outcomes or models and variation over time.
- *Biophysical vulnerability* it refers to the potential for loss which is a result of the interaction between the society and biophysical conditions that influence the preparedness of the environment to react to the hazard or disaster. They also influence the adaptation of society to such changing conditions, occurring also in explicit spatial outcomes.

In addition to origin-based categorization, the concept of vulnerability has been studied from three distinct perspectives (ibid, p. 531):

- *Vulnerability as risk/hazard exposure: It explores* the origin (or potential risk exposure) of technological or biophysical dangers concentrating on the distribution of perilous conditions as well as human settlement in hazardous areas coupled with hazardous occurrences.
- *Vulnerability as social response:* It centers on coping responses such as social resistance and flexibility in face of hazards. Oftentimes, hazardous events are taken for granted —or at least seen as a social construct rather than a biophysical condition. In this case, the emphasis is on the social nature of vulnerability, which is embedded in historical, socio-cultural and economic processes (Chambers, 1989; Bohle, Downing, & Watts, 1994; Blaikie, Cannon, Davis, & Wisner, 1994).
- *Vulnerability of places:* It takes into account a mixture of the components from the above two directions, but is more geographically oriented, serving as a biophysical risk and a social response though confined to a particular area or geographic scope.

In this paper, the approach of "vulnerability of places" has been adopted for at least two reasons: first, the physical nature of hazards is undeniable. Second, as will be disused later, risks are to a large extent dependent on societal factors such as the perceived risks, cultural or economic dimensions.
In line with these concepts, structural vulnerability of the buildings due to earthquake can be defined as probability of physical loss that buildings would face when a particular level of shaking occurs. It depends on aggregate performance of its components as well as with the characteristics of expected hazard, characteristics of the ground where it stands and its environment such as other buildings.

- **Risk assessment process**

Risk assessment is the determination of quantitative or qualitative value of risk related to a concrete situation and a recognized threat hazard. Quantitative risk assessment requires calculations of two components of risk, the magnitude of the potential loss, and the probability that the loss will occur (Lacey, 2011). The starting point of the risk assessment is the identification of hazards. This task is mainly a determination based on scientific and technical findings. This scientific, deterministic approach also characterizes the next step, the risk analysis as a mathematical calculation that includes the investigation of a hazard and its outcomes. The risk analysis can be understood as a description of certain hazards and their element's frequency of occurrence (hazard component) and magnitude of consequences (risk component), respectively. With regard to risk perception, it should be noted that sometimes those who did not study the relevant statistics draw conclusions of certain risks from a significantly "incorrect" (from a statistical perspective) judgment of the probabilities of potentially hazardous events (so called heuristics). However, risk perceptions are a fact of life that shape, for instance, policy, legislation and mitigation efforts. Therefore risk perceptions can be seen as incorporated in norms, practices and probability calculations. There are many factors known to affect an individual's perception of risk, namely familiarity with a risk, control over the risk or its consequences, proximity in space, proximity in time, scale of the risk or general fear of the unknown (the so called "dread factor").
Apart from these factors, individual risk perception is also shaped by how the community or a certain socio-cultural milieu generally deals with a special type of risk or risky situations. An important and interesting aspect of risk perception is the variation in different cultural (regional, national) contexts, a perspective studied within the cultural risk paradigm. Risk perception enters the risk management equation through differing estimations on, for example, how probable an event may be, and how much money is to be spent on preparedness. Furthermore, individual risk perceptions are to be distinguished from the way "institutions think".
Risk evaluation consists of the outcome of risk analysis and risk perception (the general view of risk shared by a person or group that includes both feeling and judgment). Risk analysis on its own is partly subjective because the precise knowledge required to be truly objective is rarely available (for example, full information about frequency and magnitude). Thus, it could be right that decisions are made partly in response to pressures generated by perceptions of risk. Due to this fact, extensive public participation would be a suitable indicator for fulfilling this requirement. In the end of risk assessment, an objective weighting of all significant effects on the environment will be carried out. This assessment is an essential task for the spatial planning authority and has to be integrated into the weighting process.

In summary, the risk assessment process involves six steps as follows:

1. Defining the target geographic area.
2. Identifying the type and extent of data necessary to conduct the risk assessment.
3. Identifying the potential hazard(s) in the risk area.
4. Identify vulnerability.
5. Preparing an inventory of elements at risk.
6. Incorporating hazard specific harms functions to the inventory to quantitatively determine the direct damage or estimate potential damage

Apply loss functions to damage outcomes to offer a quantitative analysis of the extent of financial, individual, or property losses and estimate potential losses.

2-2-3- Paradigm shift on Disaster Management

Recent findings suggest that disaster management is shifting its focus from response and recovery issues to mitigation issues (although not much has been done in terms of developing recovery plans) – a shift that involves a viable role for public participation (Australia and New Zealand Standards Associations, 1995). Disaster management provides a framework that can be used for methodical employment of policies, procedures and practices of management to recognize, analyze, assess, treat and observe risk. It not only acknowledges the necessity of a top-down policy, but also stresses that a bottom-up policy at local level can also provide the necessary

stimulus for undertaking the alleviation strategies and a implementing a successful disaster management process. According to Salter (Disaster Preparedness Resources Centre, 1998) the change in disaster management can be summarized as follows (Table 2-4):
The modification in disaster management planning covers a number of interesting dimensions. First, rather than emphasizing the specific hazards, it integrates general vulnerabilities into the process of disaster management. These vulnerabilities take into account both the property concerns (for example, buildings with shaky construction), and the concerns regarding the community population. Second, the change of emphasis from reactive to proactive activities has been accompanied with a shift of orientation from response and recovery measures to the highlight of community planning in disaster management (e.g. land-use policies, floodplain management, etc.). Third, this multidisciplinary approach to disaster management addresses various views prevalent in the community, seeking to establish partnerships and bring together competing interests while retaining the common goals. Fourth, emphasis on working and relating with communities requires the disaster managers and social planners to incorporate the public in their planning.
It is projected that disaster management pay greater attention to these concerns in their policy makings and activities, as other policy sectors are expected to do so. Even more optimistically if the entire agenda of sustainable development or subsidiary matters are taken into consideration there will be more common grounds with disaster management. Consider Salter's summary of the shifting emphasis in disaster management:

From:	To:
Focus on hazards	Focus on vulnerability
Reactive	Proactive
Single agencies	Partnerships
Science-driven	Multi-disciplinary
Response management	Risk management
Planning for communities	Planning with communities
Communicating to communities	Communicating with communities.

Table 2-4: Paradigm shift on Disaster Management

With a few changes, this can be considered as a summary of recent developments in resource and environmental management which is in congruity with the newly- defined agenda of sustainable development (see Dovers and Wild River, 2003). Further, it is evident that disasters pose threats to the sustainability of societies, and their underlying environmental resources. Also, with the change of emphasis from 'natural' disasters to risks engendered by human beings, settlement, consumption, and policy makings, its relation with the issues of sustainability and human development has gained prominence.
Figure 2-4 indicates that various obstacles including political or social unrests, financial crises, environmental deterioration and natural disasters hamper the creation of sustainable world. Natural disasters precipitate catastrophic consequences which can be compounded by a plethora of other factors. Disaster management is thus integral to the fulfillment of sustainable development.

High rates of urbanization, environmental degradation, and industrial and residential development in disaster-prone areas increase natural disaster risks extensively. Deforestation, desertification,

overuse of pastures, weak management of irrigation and centralized agriculture are examples of land-use activities that cause certain natural disasters.
Significant population changes in developing countries during recent decades—natural population increase on the one hand and mass migration of population from rural and small urban areas into large cities on the other—have resulted in a tremendous rate of urbanization, which along with a great need for industrialization has caused an increasing trend in environmental degradation that not only threatens biodiversity in the country, but also puts critical and strategic natural resources at great risk.
Un sustainability of contemporary cities due to inappropriate development policies leads to inadequate functioning of public services, utilities, and facilities, and supplying of communities' basic needs, on the one hand, and rapid development, based on overuse of inappropriate modern technology, on the other, increase vulnerability to disasters. Development planners often do not consider disaster risks as part of their planning activities. Rather they regard disasters as external factors that interrupt the development process every once in awhile. Sustainable development cannot be realized without due consideration of natural disasters.

2-3- **Hyogo Framework for Action 2005-2015**

The World Conference on Disaster Reduction was held from 18 to 22 January 2005 in Kobe, Hyogo, Japan, and adopted the present Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters (here after referred to as the "Framework for Action"). The Conference provided a unique opportunity to promote a strategic and systematic approach to reducing vulnerabilities and risks to hazards. It underscored the need for, and identified ways of, building the resilience of nations and communities to disasters.

- **The Yokohama Strategy: lessons learned and gaps identified**
- The Yokohama Strategy for a Safer World: Guidelines for Natural Disaster Prevention, Preparedness and Mitigation and its Plan of Action ("Yokohama Strategy"), adopted in 1994, provides landmark guidance on reducing disaster risk and the impacts of disasters.
- The review of progress made in implementing the Yokohama Strategy identifies major challenges for the coming years in ensuring more systematic action to address disaster risks in the context of sustainable development and in building resilience through enhanced national and local capabilities to manage and reduce risk.
- The review stresses the importance of disaster risk reduction being underpinned by a more pro-active approach to informing, motivating and involving people in all aspects of disaster risk reduction in their own local communities. It also highlights the scarcity of resources allocated specifically from development budgets for the realization of risk reduction objectives, either at the national or the regional level or through international cooperation and financial mechanisms, while noting the significant potential to better exploit existing resources and established practices for more effective disaster risk reduction.
- Specific gaps and challenges are identified in the following five main areas:
- Governance: organizational, legal and policy frameworks;
- Risk identification, assessment, monitoring and early warning;
- Knowledge management and education;
- Reducing underlying risk factors;
- Preparedness for effective response and recovery.

These are the key areas for developing a relevant framework for action for the decade 2005–2015.

- World Conference on Disaster Reduction: Objectives, expected outcome and strategic goals

A. Objectives

10. The World Conference on Disaster Reduction was convened by decision of the General Assembly, with five specific objectives:6

- To conclude and report on the review of the Yokohama Strategy and its Plan of Action, with a view to updating the guiding framework on disaster reduction for the twenty-first century;
- To identify specific activities aimed at ensuring the implementation of relevant provisions of the Johannesburg Plan of Implementation of the World Summit on Sustainable Development on vulnerability, risk assessment and disaster management;
- To share good practices and lessons learned to further disaster reduction within the context of attaining sustainable development, and to identify gaps and challenges;
- To increase awareness of the importance of disaster reduction policies, thereby facilitating and promoting the implementation of those policies;
- To increase the reliability and availability of appropriate disaster-related information to the public and disaster management agencies in all regions, as set out in relevant provisions of the Johannesburg Plan of Implementation.

B. Expected outcome

11. Taking these objectives into account, and drawing on the conclusions of the review of the Yokohama Strategy, States and other actors participating at the World Conference on Disaster Reduction (hereinafter referred to as "the Conference") resolve to pursue the following expected outcome for the next 10 years: The substantial reduction of disaster losses, in lives and in the social, economic and environmental assets of communities and countries.

The realization of this outcome will require the full commitment and involvement of all actors concerned, including governments, regional and international organizations, and civil society including volunteers, the private sector and the scientific community.

C. Strategic goals

12. To attain this expected outcome, the Conference resolves to adopt the following Strategic goals:

- The more effective integration of disaster risk considerations into sustainable development policies, planning and programming at all levels, with a special emphasis on disaster prevention, mitigation, preparedness and vulnerability reduction;
- The development and strengthening of institutions, mechanisms and capacities at all levels, in particular at the community level, that can systematically contribute to building resilience7 to hazards;
- The systematic incorporation of risk reduction approaches into the design and implementation of emergency preparedness, response and recovery programmes in the reconstruction of affected communities.

2-4- **Sendai Framework for Disaster Risk Reduction 2015-2030**

The Sendai Framework for Disaster Risk Reduction 2015-2030 was adopted by UN Member States on 18 March 2015 at the Third UN World Conference on Disaster Risk Reduction in Sendai City, Miyagi Prefecture, Japan. The Sendai Framework is the first major agreement of the post-2015 development agenda, with seven targets and four priorities for action.

Chapter Three

Integrating spatial planning with disaster management

Chapter Three:
Integrating spatial planning with disaster management

As explored in previous chapter, the stability and safety of our habitat against natural hazards are parts of planning that is spatial duties and undoubtedly play an important role in promoting the concern for urban resilience and sustainable development. This chapter moves on to the discussion of the gap and relationship of spatial planning with the management of disaster processes, the public participation impact on spatial planning and the management of disaster, the prominence of spatial data in both spatial planning and disaster management, and appropriate institutional development for integrated approach. Furthermore, a theoretical conceptual model for integrated approach in urban disaster management is also brought forward.

3-1- The Gap between Disaster Management and Spatial Planning

Spatial planning and disaster management are derived from various ideological backgrounds, although they do involve some shared characteristics: Both of them, have been carried out separately, both of them , are about physical aspects ,also they are centered on local government and both of them adopt prediction as an approach to planning .

Literature affirms that a discrepancy between the various career groups and fields, which as a matter of fact should include duty for risk decrease. The experts who are with quite various educational backgrounds are short of the proper understanding and enough institutional structures needed to give support in the best possible way to their contribution to decrease risk and to synthesize their efforts. (Tearfund, 2003)

Indeed, their difference is ,spatial planning enjoys a detailed scientific history . It involves theoretical and designing bountifulness, is long range, is inclusive, and it has often been condemned for involving too much optimism "both about our analytical capacities and about community members' altruistic trends". Disaster management planning, on the other hand, has just appeared from the middle of 1950s, and it has usually been recognized not as much as a primary career for police forces who are retired and military members. In has only been a recent phenomenon that scientific organizations have started to launch degrees in this field. Disaster management is engaged with the short condition (for instance renovation of the ruined houses in flood plains and after earthquakes), to have a more detailed analysis, and to be doubtful. For instance, on numerous occasions disaster management people have analyzed worst-case scenarios in an unrealistic fashion like the intensive earthquake that destroys entire cities.

It is clear those huge differences between, on the one hand, spatial planner's problems and disaster management individuals, and on the other, the worries of spatial planners and other development individuals. The causes behind this are inspected in the following.

- **Historical separation**

Arguments on disasters have conventionally happened in the arena of urgency relief, which resulted in an organizational and cultural division and even skirmish between departments of development and disaster. For example, Twigg and Steiner (2002) confirm this with respect to NGOs. Consequently, spatial planners seldom see risk decrease as their area of activity. Spatial planners often relate disasters just to fire stations and the Red Cross since the issue of risk decrease is not adequately embedded in their curricula.

This condition keeps on deteriorating together with the progressive conversion of architecture and planning schools into the houses of art and design, which have not integrated social values into their educational plan (Davis, DMC). Therefore, risk decrease is usually not properly developed in spatial planning practice. This condition is more worsened by the lack of spatial planners experience in immediate post-disaster practice in comparison to other professionals (Keipi, IDB). As a matter of fact, the members of disaster response team and relief experts often organize the structuring of (now age) housing and settlements after a disaster, none of whom essentially enjoy a spatial planning background.

To conclude, the historical detachment and relevant shortage of learning and experience on the side of spatial planners in the area of risk reduction end in disaster management people seeing the planning section as one of the hardest development sections, since educated and experienced professional are not common. In their defense, spatial planners reason that, because of a series of political, organizational and financial limitation, the planners that know specifically about risk reduction cannot transform it into action (Gavidia, UN-HABITAT). These limitations are explored in the next sections in the paper.

Working concerns, notions, terms and instruments

The traditional separation ends in the exploitation of different working concerns, notions and terms that later adopt the gulf between various experts. In the following, we shall touch upon several cases in point. Literatures, such as Bull-Kamanga et al. (2003), state that spatial planner deal more with life, medical condition or livelihood endangering routine threats, while disaster crew consider life threatening condition of occasional big disasters. Besides, disaster people make use of concepts and words such as 'risk', 'mitigation', 'preparedness' and 'prevention', while development ones like to use terms such as 'security' and 'security measures'.

Even though the notion of sustainable livelihoods is potential of integrating disaster management people and spatial planers (Christoplos, Mitchell and Liljelund, 2001) generally speaking, those working within the criteria of the management of disaster do not use this concept. In contrast, spatial planners who possess a background in social science have a disposition to 'ignore' the constructed condition as a livelihood asset. Actually, it is compared to 'livelihood aspects', spatial planning is not important. This overlooks that for example, built environments are vital physical, social and economic asset (Hamdi, CENDEP). To a great surprise, although spatial planners are known as a having a central role in the arena of development people, they are, usually, not that familiar with the concept of livelihood. This as well is relevant to the fact that spatial planners do not usually see non-structural performances together with small-scale risk decrease actions (for example, using ropes to tie down the roofs), as duty, so impinging on the progress of shared knowing with other development people (see Figure3-1).

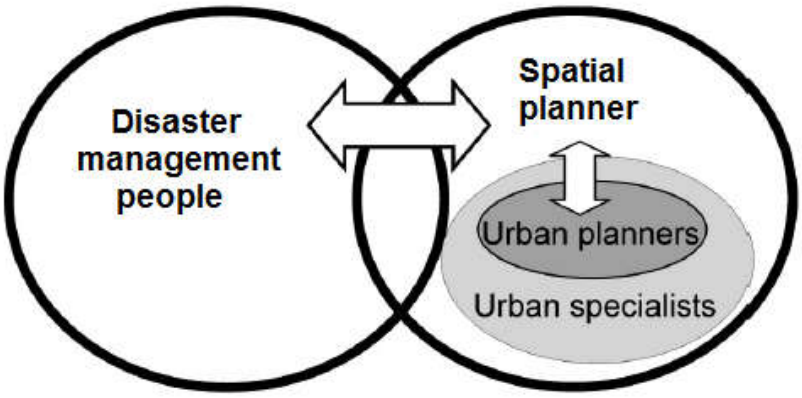


Figure 3-1 The gap between disaster management people spatial planners

Spatial planners are often not that acquainted with environmental facets and, therefore, with the Environmental Impact Assessment (EIA), an instrument used for foreseeing and examining the environmental consequences of scheduled activities, that in the general sense are required by donors for any scheduled progress or novel development. In reality, spatial planners are yet distant from delivering and knowing an EIA or even cooperating with the individuals that carry out this kind of evaluation (Hamza, IC).

The uniqueness of humanitarian concerns—to save life and decrease extreme human suffering—together with the notions of 'neutrality' and 'impartiality' together with disaster management people produce more clash conflict, since these professionals think as development projects more

political (Schaar, Sida). Moreover, whereas there are various types of working approaches in each section, disaster management individuals (regardless of NGOs workers) and spatial planners are criticized for their propensity to use a more centralized and top-down procedure, a procedure that sticks to pre-defined organizational constructions and practices. Conversely, spatial planners tend to speculate more in a bottom-up fashion, with a vision of decentralization, which is dependent on the probabilities provided by organizational and regulatory frameworks.

The various opponents and networks adopted by spatial planners to complete projects, as well as the relevant working approaches, also produce clash between them and the management of disaster individuals (Doyle, IDB). Spatial planner, who are disposed to work in a more direct fashion with those who benefit, view the cooperation between urban programmers and the private sector made to give housing, infrastructure and services.

- **Legal/organizational structures**

The gap between professional with a background in spatial planning and disaster can be proved and further strengthened by the following five organizational facets:

1: the inner and inter-institutional construction of national institutions usually may not go with an approach that is multidimensional and general, which impinges on collaboration and the production of integrated risk decrease projects (Schaar, Sida).

2: the inner organizational structure of national institutes, with separate, district-based or national centers, can impinge on the synthesis or mainstreaming of risk decrease, with head bases that struggle to involve risk decrease in territorial and local agendas (Bastable, Oxfam).

3: the time table of national projects usually prevents those procedures that are required for integrated spatial planning and relevant completion processes, which also results in time limits for more participatory approaches (Gavidia, UN-HABITAT).

4: organizational and lawful rules for risk decrease and spatial planning at the national stage are more often independent, absent or are short of national–municipal cooperation, which ends in decreasing the probability of raising more integrated planning projects (involving risk reduction) via international organizations. The shortage of national–municipal cooperation is shown by the story of New Delhi, India, in which an agreement produced by the Ministry of Housing was cancelled the next day by the municipal division for infrastructure development (Rowell, CARE).

To sum up, both spatial planning and disaster management planning are important in maintaining community safety, therefore it is very strange that the integration of the two disciplines is not so much in run. As catastrophic damages from catastrophes increase, previous disaster management techniques are understood as insufficient. Change seems unavoidable, and the trend is conspicuous: make sure of more community engagement, guarantee basic local responsibility and guarantee that connections exist between disaster management planning and urban planning. Practically speaking, the connections between disaster management planning and urban planning are numerous. As a matter of fact, they may end in providing regional laws to keep away from high-risk areas, establishing laws to decrease the results of threats, mitigation techniques to amend the potential of dangers etc.

Furthermore, disaster management people perceive things in a different manner from spatial planners. For example, to urban planners, the renewal of older masonry buildings shows a chance to protect regional history and culture together with increasing tourism; for disaster managers, such structures show fallen buildings in an earthquake. However, despite their various disposition and experience, urban planners as well as disaster managers share a set of particular goals: protecting the safety of the community while maintaining the cultural heritage and increasing the life quality.

While considering the connection between disaster management process and spatial planning, we have to deal with two types of phenomena: (1) the planning activities which happen before the disaster, and (2) ones which take place in or after the disaster. Mitigation actions happen in every

step of the management of disaster and usually contribute to the collaboration and synthesis of the disaster manager and the spatial planner. As an instance, most communities possess official program that schedule their advancement and future development. Any planning should address both the regional disaster manager and urban planners. New progresses should not be done regardless of both actual and future-coming hazards and risks. This is particularly necessary with respect to schools, hospitals and other important centers. As communities improve the prevalent underlying structures, disaster managers as well as urban planners should be directly entangled with discussions and making decisions.

3-2- Links between Spatial Planning process and Disaster Management Process

3-2-1- Spatial Planning Process

The theoretical stages of a spatial planning process will be explained and completed by illustrating how the steps of disaster management can be synthesized with the spatial planning process. Perceiving the various visualizations of planning processes, a various flowcharts, like the "classic" flowchart of a planning process by Harriscan is recognized. Nevertheless, a better look proves a few rudimentary similarities that are normal for all planning processes (see Figure3-2).

Typically, a planning process starts when particular situations are known as unpleasant or in urgent need of action. The primary stage of a planning process is thus called problem analysis. A basic requirement for the problems to be identified perceiving the environment by planners or other agents and the explanation and evaluation of the prevalent information. To keep away from an unreasonably high effort of data gathering, planning targets should be determined and the incentives developed explaining the favored future situation. Such objectives are not determined generally but are to be perceived as instead contingent and always are behind certain changes. When gathering the relevant data, it is necessary that only the information be surveyed that is important for illustrate the relevant situations. Afterwards, the existing situation could be analyzed in the light of the intentionally gathered information. The goal of this analysis is to recognize the dependencies, connections and interrelations between the perceived situations and influential variables.

In the second stage, the required measures may be after planning other options have been evaluated. Experience proves that the improvement of options under complete consideration of all facets that are under question usually ends in proper outcomes. In such condition, it is necessary to measure the approximate effect of the options or alternatives. To evaluate the other measures, a very precise argument of the shown alternatives is required. A necessary feature is to inspect whether and how much various steps serve to meet the desired objectives. The complexity of the alternatives leads to the use of formalized assessment methods such as cost-benefit analysis or value-benefit analysis.

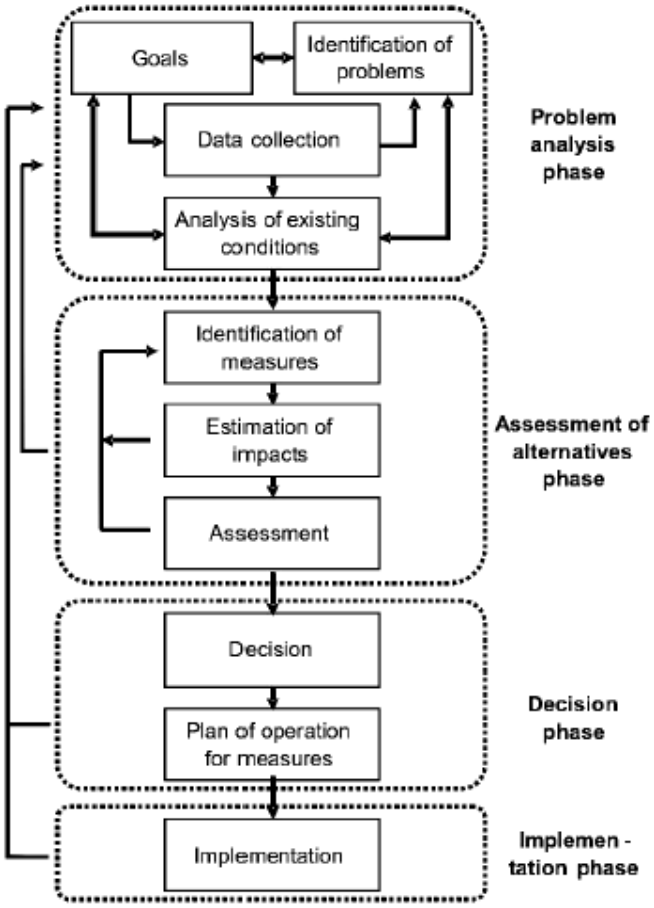


Figure 3-2 Planning process
Source: Schmidt-Thomé 2005

After the completion of the discussion on all of the alternatives, the third stage of the planning process may get started. It is time to decide on which suggestion is known to be the best. At the same time, the required steps to fulfill the chosen alternative can be decided and prepared.
The completion of the chosen alternative ends in the alteration of the initial situation. Generally speaking, it is important to see whether or not any effects and progress has taken place and also to make sure if out-of-blue (and often undesired) side effect has appeared. Meanwhile, the general situations might have varied and consequently, new issues could come up that need a new start for the planning process. As a matter of fact, in actual life a planning process rarely happens an ideal way like this, but rather should be conformed to certain situations.
Very properly developed measures usually no influence at all because of the presence of normal planning problems (e.g. fit, relationship and scale). The trouble of interplay plays a crucial role in overcoming spatial risks. Most organizations interact with organizations of the same type both horizontally and vertically. Horizontal relations happen at the social organization level. Vertical interaction is the consequence of a cross-scale interactions or connections involving organizations that are at various social organization levels. Relationship between or among organizations might appear in the shape of practical interdependencies or happen as a consequence of plans of organizational design and management. The presence of a variety of actors leads in the problem of interplay. Typically, systems designed for national planning hold a second, sectoral dimension with its own organizational units, instruments and officials. The distinction in goal between the different official figures does not allow any inner harmonization via a shared superior authority.

The relation between inclusive spatial planning and sectoral planning divisions is an important reason for eliminating spatial risks.

3-2-2- Disaster Management Process

Disaster management process consisting of both risk assessment and risk management will be recognized as the systematic use of management policies, techniques and practices to the duty of recognizing, analyzing, evaluating, solving and monitoring risk. The descriptions given in below are together with risk assessment and management process flowchart (see Figure3-3):

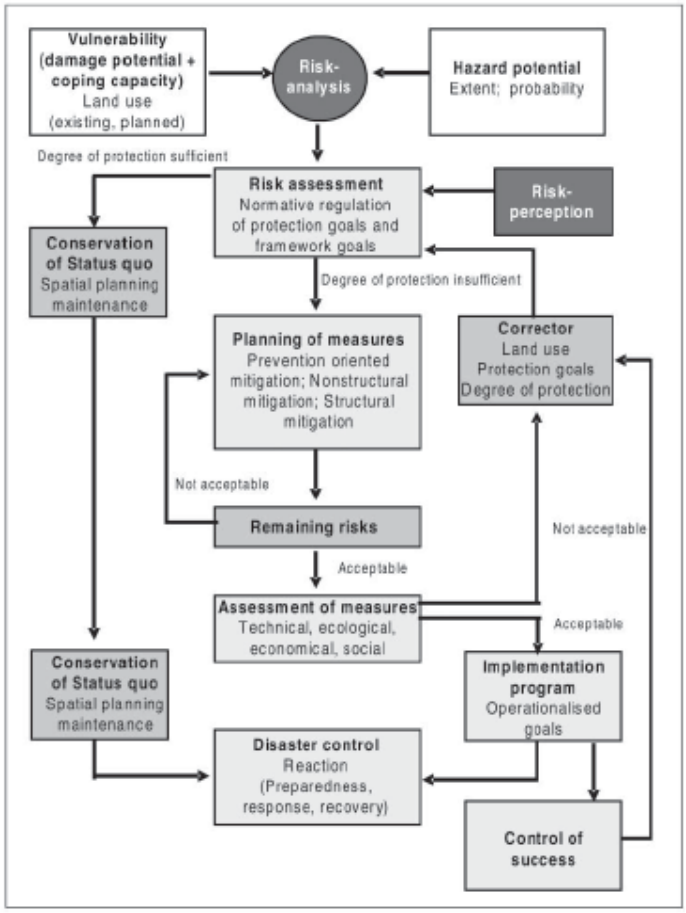


Figure 3-3 Disaster management process
(Greiving 2002, p. 248)

As Greiving has shown, the beginning of the risk assessment is the understanding of natural dangers. This duty is foremost the decision based on scientific and technical results. Identification or recognition just the same as analysis of dangers and risks is mostly tasks for the sectoral planning divisions because of their certain competencies. Hence, a soon and full collaboration between the spatial planning authorities (who for example act as the officials in charge of zoning instruments preparation) and the related other authorities, would be an important requirement for an influential planning process.

it is important for the authorities and stakeholders that are active within the spatial context to adopt special approach to risk, which includes those individuals or organizations that make decisions that are spatially important, normally containing great deals of information and complex process of decision making that includes normative weighting techniques. These actors might like a spatial risk assessment approach since their responsibility is to ensure spatial development (land

use programming, local development financing) or spatial structures (giving insurance or reinsurance services).
Casein the best condition, the required data can be obtained from the existing danger and risk maps with, as a matter of fact, a proper spatial scale. However, a harmonized risk mapping methodology could act as important for the quality of the consequences and the comparison between the spatial risk evaluations one by various planning officials within one area that is threatened by a specific hazard.
As argued in detail by Greiving, four main characteristics form the basis of spatially oriented risk assessment methodologies. Primarily, it needs to get hazard-based. This signifies that it should be more than sectoral considerations of risks (Greiving & Fleischhauer, 2006a; Schmidt-Thomé, 2006).Secondly, only those threats which possess a spatial value should be taken into account. This means that omnipresent risks such as epidemic illnesses or traffic crashes are not within the realm of the analysis. Thirdly, just collective threats that endanger a society as a bigger whole are related, but not single risks such as driving a car or smoking a cigar. Lastly, the synthesis of risk elements (dangers and exposure) is required.
According to above, a risk assessment of spatial-hazards consists of three components (Figure 3-4):

Hazard maps: For all of the spatially related dangers, an independent danger map should be produced, map that illustrates the places where this danger happens and the depth of this hazard.

Vulnerability map: data on the danger exposure together with coping capacity with respect to potential dangers is synthesized to make a map illustrating the overall vulnerability of each place.

Risk map: The data derived from the hazard map and the vulnerability map are put together to make a map which illustrates the risk that each region is exposed to.

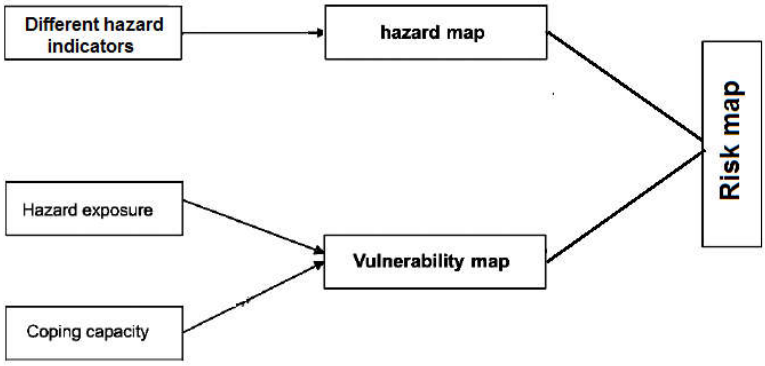


Figure 3.4 Components of spatial risk assessment.
Based on Source: Greiving (2006)

Hazard maps just illustrate the place in which individual hazards happen. It also shows the intensity of these hazards. These maps do not include any clue on regional vulnerability. Therefore, these maps are only hazard maps, but not risk maps. Another main element of a risk evaluation or evaluation is the evaluation of regional vulnerability to dangers. The last element shows regional hazard exposure (infrastructure, industrial facilities and production capacity, residential buildings) and the human impairment potential (defined by the regional population density). On the contrary, dealing with capacity shows the response potential of regional population. Regional population density and the economic, socio-cultural and organizational capacity to deal with a disaster define the regional coping capacity.

At last, we shall combine the exposure and danger. Distinguishing between those areas that are only dangerous and risky, such as those that also have a high amount of vulnerability is allowed by new integrated risk index. This methodology will be more discussed and develop in chapter five.

Normatively is a feature of decision making as a core element of risk management, politically influenced technique of standing or changing risks? Those in charge (normally democratically legitimized) have to determine the main planning objectives that are relevant to coping with hazards. For instance, what are the objectives of various protection objects jeopardized by certain hazards or what are the predictable environmental impacts from a scheduled object in the condition of a dangerous phenomenon happening? From a cost-benefit viewpoint, it is necessary to determine the protection objectives with respect to the protection objects. Whereas it is beneficial to save a highly vulnerable industrial facility or a settlement area against rarely happening bad events, single estates or farmland areas protection is more or less in no avail. However, such a decision demands enough information that has to be taken into account in the decision making process. Proper measures need to be taken as an essential element of decision making for the relevant plan or programme with respect to the defined protection objectives.

Such measure and alternative could be differentiated into prevention-oriented mitigation, non-structural mitigation and structural mitigation respectively. In Addition, measures about disaster preparation, response and recovery have be an important element of a risk management process. All of the measures need to be assessed based on their technical functionality, economic costs and efficiency together with social and ecological impacts. The completion and implementation of measures is a central part of the completion of the plan or program by the planning authority itself and/or other planning authorities who are in charge of the sectoral tasks. Therefore, implementation process should include sectoral planning divisions together with the units of emergency control units, have to be a component of the implementation process. Otherwise, companies or private stakeholders that are the focus of a specific plan or program may be responsible for the development of their own structures or facilities.

A crucial element of a risk management process includes monitoring the impacts of implemented measures. Monitoring shows how the results of the risk assessment has been delivered, affirmed or not confirmed compared to the original information base. For this monitoring, an indicator based notion would be appropriate for making distinction between the dangers and protection objects. These indicators must answer the question if the selected measures are capable of fulfilling the decided protection objectives or not.

3-2-3- Links between two Processes

As explained in detail by Greiving, disaster management process as components in the decision process about spatial plans could be constructed along 3 major lines of discussion:

1. *Scientific basis:* Is there proper information, are the required data and evaluation methods available (danger maps, risk maps) for raising a scientifically appropriate basis for the process of decision making?
2. *Political decisions:* How much is the scientific basis considered when political decisions are taken? What are the grounds for ignoring information on dangers and risks? How had the consequences of risk assessment been considered when making decision on specific plans or programs?
3. *Implementation process:* How sure will a measure be taken (e. g. reconstruction of a dike), when a decision is taken once? What are the possible obstacles?

Figure 3-5 illustrates how the three lines of discussion are put into the planning processes. Disaster management has to be embedded within the spatial planning process to reach a better sustainability. At the resiliency of society's development by procedural and methodological requirements should be attained.

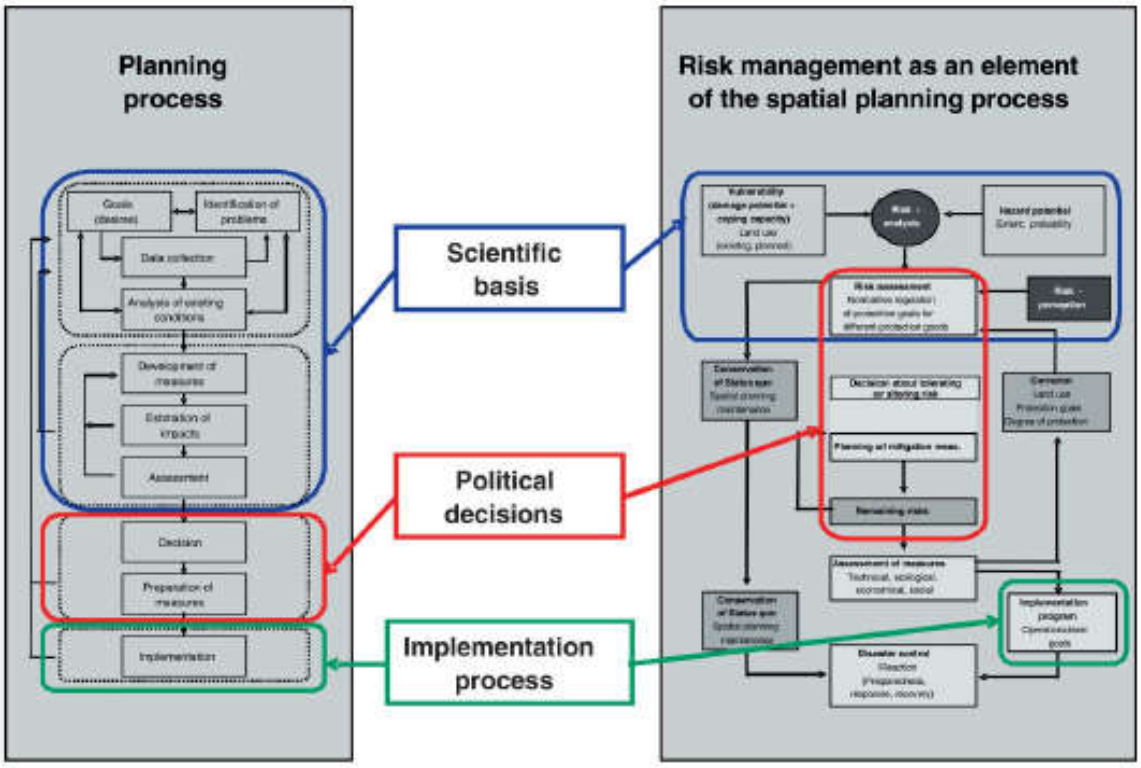


Figure 3-5 Links between disaster management and spatial planning processes.
Based on Source: Greiving (2006)

3-3- Effects of Spatial Planning on Disaster Management Phases

One could define Space as a place where people and their belongings are jeopardized by spatially related dangers. The feedback of tolerating or changing risk can be perceived as an important part of the relevant social and financial structures with spatial planning as a specific part of a reaction. Spatial planning determines how specific spaces will be used and even if they are used in a given society. Thus, spatial planning more or less affects vulnerability in conditions including existing spatially related natural dangers. The spatial feature of a danger could either be described by spatial impacts that might happen if a danger changes into a disaster or by the probability of a suitable spatial planning feedback. This also poses questions on the relationship between various levels of spatial planning together with the relationship to sectoral planning. In addition, the essence of spatial planning heavily is need of a multi-risk approach that takes into account all of related dangers which jeopardize a specific region together with regional vulnerability instead of a science area (sectoral, like in many natural sciences).

Each danger has a spatial aspect (it takes place somewhere). Nevertheless, spatially related does not yet denote spatial planning relevance, yet nevertheless it may favored by a sectoral planning division or an emergency response unit. The so called external effects show one of the most acute shortcomings in this context: a spatial and temporal discrepancy between opportunities and risks that are interrelated with every decisionon a future land-use or a concrete investment on a specific site. There are plenty of examples and experiences for this planning trouble are represented by the clash between actors..

These examples and experiences indicate that planning based decisions that are on the basis of an agreement among all stakeholders can derail with respect to the temporal and spatial facets. The similar decision is probably due to free market exchanges. Even if all of the participants of a land transaction (a land that is designated for construction) would come to a consensus, they may derail with respect to an inappropriate use of shared pool goods. Having this argument in mind, the connection between the discussion on risks and the principle of sustainable development becomes

very comprehensible. In addition, considering the benefits of generations to come, the urgent need for regulative spatial planning is completely clear. These decisions are on the basis of normative results, taken by national policies as a framework for local weighting- up processes in spatial planning.

Such an approach ends in a process-oriented knowledge of disaster management as a function of spatial planning. Spatial planning must predict the results (or opportunities and risks) of deeds from the start of a planning process, as a component of the planning objective results. Moreover, a progressive assessment and evaluation planning objectives, implemented measures and their influence over the environment have be considered. The basic parts of sustainable development, delivered in the Rio Declaration in 1992 have to be remembered. The progress of communities could not be sustainable from the view point of risks that increase and are derived from natural and technological dangers. The US National Science and Technology Council state that "Sustainable development has to be resilient with respect to the natural variability of the earth and the solar system". Godschalk et al. argued "that a resilient community is one that exists in harmony with nature's varying cycles and processes". This contains catastrophes such as earthquakes, tornadoes, and floods s, which only damages a non-sustainable society.

Consequently, a fourth area has to be added to sustainability's financial, social and ecologic facet. One can recognize sustainability as a mission for the improvement of mechanisms for adaptation of communities to future outcomes of the present processes. The improvement of a detailed group of tools and steps that function as a type of limiting constraint for planning action should fail due to the nature of planning. Even theoretically speaking and having in mind the unforeseeable nature of the society development and natural processes, it is not possible to produce measures that can be accurate for each individual condition and situation of planning.

In addition, the great number of related hazards that maybe in interplay with the consequence of cumulative impacts needs to be considered. Lastly, due to the number of planning systems and the variety of natural and socio-economic condition and the pre-existing distinction in the national planning organizations, It is impossible to formulate coherent tools or concrete measures. Therefore, it is more fruitful to formulate guidelines for harmonizing a prosperous planning process and group of methodologies than to formulate general measure that is suitable for all of the dangers..

It is vital to emphasize that municipalities do not necessarily possess knowledge of information resources, present agents and relationships, the expense and influence of various measures. In such conditions, the presence of any type of support for the introduction of a disaster management process on a local level by a guideline or a handbook for risk management can be perceived as strength.

In this situation, spatial planning reply to earthquake as a natural disaster that helps disaster management system will be explained in terms of the phases of disaster management process (Table3-1).

Disaster management activities	Linkages between spatial planning and disaster management systems	Aims
Risk assessment	• Providing vulnerability-related information for land suitability analysis and future development in spatial planning	• Provide awareness about high-risk, medium risk and low risk areas
Mitigation/ Risk reduction	• Prohibition / restrictions of land-uses and activities based on of identification of risk priority zones	• Reduce building damage and casualties
	• Regulating locations of significant public services of the city	• Reduce vulnerability of public services
	• Decentralisation of elements at risk	• Reduce the risk of failure
	• Decentralisation of population densities	• Reduce casualties
	• Strengthen service networks	• Reduce the risk of failure
	• Application of legislative powers and administrative functions	• Setting up building regulations
Preparedness, response, and recovery	• Distribution of urban facilities and infrastructure necessary to respond to the disaster	• Increase coping capacity
	• Rebuilding planning	
Key:	Main responsibilities of disaster management division toward spatial planning	Main responsibilities of spatial planning toward disaster management division

Table 3-1 Responsibilities of disaster management and spatial planning
Source: writers (2013) based on various sources used in this article

3-3-1- Proactive Activities: Mitigation

Disaster management may be achieved in two ways: passive and active. In the passive method no active measure is taken before a disaster to control and reduce disaster impacts. In fact, by accepting the risk, all measures are directed toward post-disaster activities such as rescue, relief, and rehabilitation. In the active method, however, efforts are made first to assess the hazard, risk, and vulnerability, and then measures are taken in both structural and nonstructural areas to reduce the risk to and vulnerability of seismic activity-prone areas. Structural measures are intended to increase the strength of buildings against disaster through disaster-resistant structures, while nonstructural measures include laws and regulations, insurance, public awareness, education and training, early warning for preparedness, and an integrated disaster management network. It is obvious that these measures may also be used before a disaster to increase resistance against future disasters.

One more point to be remembered in disaster management is the relationship between disaster mitigation costs and disaster risks. Normally there is a reciprocal relationship between these factors that implies that the more money spent on disaster mitigation, the lower the disaster risks. Scarce financial resources, as well as the logarithmic relationship between these two factors, however, means that reducing risk level to a desired minimum might never get achieved by spending a very large amount of financial resources. It is therefore necessary to look for an optimum acceptable level of cost and risk, on the basis of community needs and resources. This is especially vital in the developing countries where scarcity of resources is always critical.

The removal or decrease of long-term risk to human life and their properties from any type of danger occurring well before the catastrophe happens. Normally, performed by a coordinated mitigation strategy or plan. Although long-term actions are a feature of mitigation, the last three actions (preparedness, response and recovery) center on short-term activities in the case of a catastrophe and thus can be recognized under the term reaction.

The efficiency of disaster risk management is dependent on the coping capacity. The concept of capacity addresses coping abilities and obviously refers to "institutional preparedness". Based on UNISDR definition, capacity is "the fashion in which individuals and institutions employ the present sources to attain different fruitful purposes during atypical and harsh situations of a disaster event or process. The capability of coping capacities often makes resilience to withstand the impacts of natural and other dangers". To a great extent, coping capacity contains "institutional preparedness", that is one of the major facets of the way spatial planning copes with danger and risks. The strengthening of coping capacities usually builds resilience to withstand the effects of natural and other hazards.

The analysis of risk impacts to spatial planning techniques especially land use guides planners and policy makers in determining where and what development could be further undertaken in their localities, as well as what could be done to improve current development conditions, thereby reducing risks to population and properties. Critical here would understand the vulnerability of population and assets since by addressing these vulnerabilities, coping mechanisms are improved and the possibility that hazard events do not turn to disasters is improved. By strengthening of coping capacities eventually leads to reducing risks.

For earthquake, as a common natural hazard, stopping the real geological or meteorological process from happening is impossibility and spatial planning has no power for decreasing earthquakes, thus the mitigation techniques focus on masseurs to decrease both disaster effects and damage power. Spatial planning possesses the certain duty in (a) deciding on long-term utilization of ground and (b) giving community the adapted spaces to allow it to use the following mitigation actions:

- **Prohibiting future development in certain areas**

Development rules are the conventional site development instruments of present planning. They govern the place, kind, and intensity of new improvements. These can include: flood zone regulations; setbacks from faults, steep slopes, and coastal erosion sites; and zoning overlay zones for sensitive lands, such as wetlands, dunes, and hillsides. Environmental effect assessment is employed to evaluate site-specific dangers and suggest methods to mitigate their effects in some states.

Areas known as high-risk have to be designated as risk sensitive zones in priority. The impacts can be clearly decreased, provided that in greatly prone areas development would be banned and limited, particularly in terms of public sector equipment, which is easier to put control over than those ruled and determined by the private section Based on the division of risk priorities, two kinds of prohibition /limitation would be used.

1. All uses should be excluded but, the priority use. Priority use is the allowed application of land/space because of the probable happening of earthquake.
2. Endangered facilities (e.g. schools, hospitals) and dangerous facilities (e.g. chemical plants).

- **Regulating the use of land or instruments for zoning:**

A vital step in decreasing the vulnerability of community is choosing the place sector facilities in public and major infrastructure with great care. Important and public facilities policies influence public or quasi-public facilities. These policies include long-term capital improvement programs, location of schools non-dangerous sites, and place of public facilities to minimize disruption from hazards. A clear plan is to avoid putting public facilities in dangerous places. Moreover, the facilities must not be placed in which there is a great positional for hazard.

- **Decentralization of population densities:**

A more compact concentration of individuals will often be less favorable than a more scattered pattern. In this situation, allowed progress densities in city plans should show the spatial division of hazard seriousness. At local levels, the condensation of population and industry in one city usually has more disaster capability than the increase of development over a larger region.

- **Design of service networks to decrease failure risk:**

With respect to roads, pipelines, and cables, long lengths of lines in circular systems, which are exposed to risk if they are slit at any point, are more in danger than the radial networks.

- **Building standards:**

These actions regulate the details of building construction. They involve flood-proofing requirements, classic building codes, , retrofit requirements and seismic design standards for the existing buildings. Legislative powers and administrative functions are procedural tools intending particular compulsion to save buildings or other facilities and keep them safe from potential hazard effects. Based on the information about potentially hazardous zones, it will be fruitful to use particular compulsions within a lawfully binding urban plan with the aim of the protection of buildings that could be improved within the threatened regions. These duties could involve safety standards, construction rules and building laws. Rules probably have scant impact unless they are reinforced by officials

- **Land acquisition and fiscal policies:**

Acquiring property is used to purchase hazardous properties with public money and convert them to less dangerous uses. This may involve acquisition of un grown land, acquiring rights of development, moving development rights to safer locations, change of building places or uses, and acquisition of ruined buildings. Also taxation is employed to more equitably shift public expenses to the owners of dangerous property. These plans may involve impact taxes for hazardous area development, tax incentives for decreasing land use intensities in dangerous regions, and risk-based taxes to back urgency control services.

- **Information dissemination:**

Making free flow of information aims to influence the choices individuals and public officials have about the location and feature of urban development. Programs involve public data, teaching of construction experts, hazard revealing requirements in real estate exchanges, and making of signs that give warning to individuals' about highly dangerous places.

These tools permit decision makers to employ a few approaches to decrease dangers. Some emphasize long-range strategies, while other people have reaction to present development proposals. Some individuals seek to decrease development in dangerous areas, while others approve such development but they emphasize site and building design to decrease vulnerability. Some redirect public investment, but most try to regulate or influence private development. Some are regulatory, and others are voluntary.

3-3-2- Reactive Activities: Preparedness, Response, and Recovery

Preparedness involves short-term actions, such as evacuation and short-term property safety, which is undertaken immediately when a disaster warning is received. Response reveals short-term helps for emergencies and assistance, just like searching and rescuing operations, in the moment or after the disaster. Recovery is the last stage of post disaster activities, like the renovation or retrofitting of structures that are damaged. Emergency response units are the important actors of reaction. Two prerequisites can be understood as the spatial planning duties in the reaction stages:

- Division of urban facilities and infrastructures that are required to answer the disaster:

Some facilities involve search, rescue and relief stations, temporary accommodation, emergency medical and health centers, and emergency ways. The presence and proper division of these characters may lead to fast services after the disaster and as a result decreasing injuries and fatalities imposed by the earthquake.

- Renovation of buildings and infrastructures: Urban programming can be seen as a major factor in case of recovery activities when a catastrophe happens. The require renovation of houses and infrastructure need to be combined with planning that is ideally based on rudimentary risk management rules such as avoiding dangerous regions.

It is also important to note that in the aftermath of large-scale disasters, rehabilitation of affected areas should follow the principle of building back better or building back elsewhere, which have very strong urban plans and land use implications. This will require a rethinking of existing urban plans, much earlier than the prescribed period of planning and updating.

3-4- Roles of Spatial Planning in Disaster Management

Spatial planners are responsible for decisions regarding the long-term utilization of land and the interaction between people and space. Although planners are not in direct responsibility for disaster management, the planning process plays a rudimentary role in decreasing disaster risk. The main application of spatial planning in disaster management is to reduce the exposure of the elements at risk to the disaster sources and to modify the pathway of the disaster event.

The first function can be achieved by appropriately managing the relationship between present and future land utilization and potential disaster sources. This requires the projection of future development (an inherent function of spatial planning) and the progression of disasters. By avoiding a collision between these two frequently opposing transitions, the exposure of the elements at risk can be eliminated or reduced, both in the present and in the future.

The second function relates to the modification of disaster pathways by applying proper land use management. These functions can be achieved only in the medium to long term, which means that spatial planning is not a suitable short-term remedy for disaster mitigation, except for prohibiting certain land use types.

3-4-1- The Importance of Local Planning in Disaster Management

Local planning has an important role in reducing the exposure of components that are at risk to disaster. It has the power to direct land use in ways that are beneficial to risk reduction, and to reject suggestions that raise the vulnerability of people and infrastructures. These roles mainly lie in the long-term arrangements of interactions between space utilization and disasters. Fleischhauer and et.al identified four potential functions of spatial planning in the decrease of disaster risks:

- Prohibit future development in specific regions: in high-risk areas, especially with a background of disasters, progress should be stopped. Areas needed for public use during emergency response and retention should be kept free.
- Classify different land use zoning for different levels of disaster-prone areas: each disaster has its own acceptable risk in different land use classes. Agriculture fields, but not residential areas, may be located in five-year return floodplains. Steep slopes that are highly susceptible to landslides should not be in residential or business use, but they may yet be appropriate for plantation.
- Regulate land exploitation or zoning programs with lawfully binding condition: in an area exposed to earthquakes, regulations on building codes and building density are crucial to decrease the effect of building destruction.
- Hazard modification: spatial planning can be important in promoting soft engineering ways to decrease flooding risk. For example, a retarding basin that is required to contain floodwater should be keep free from development in order to maintain its function.

The need to embed disaster risk decrease into spatial programming has been advocated by many researchers (Menoni & Pergalani, 1996; Menoni, 2004; Campbell H. , 2006; Greiving, Fleischhauer, & Wanczura, 2006; Berke P. R., 2010). In addition, several recent international initiatives have taken the message to a wider audience. They include the Hyogo Framework for Action (HFA) and the Incheon Declaration (HFA, 2005; Incheon, 2010). Specifically, the Incheon Declaration stated the vitality of regional government activities in disaster risk reduction.

The endorsements in the HFA and Incheon Declaration are relevant to the hierarchical nature of spatial planning, as disaster risk reduction is best carried out at the regional government level (district or city). The local government is initially required to respond to the disaster, in the hope of averting a catastrophe. During the phase of prevention it is responsible for preparing a extensive policy on disaster alleviation. Figure 3-6 shows the relationship between the local disaster, planning and action.

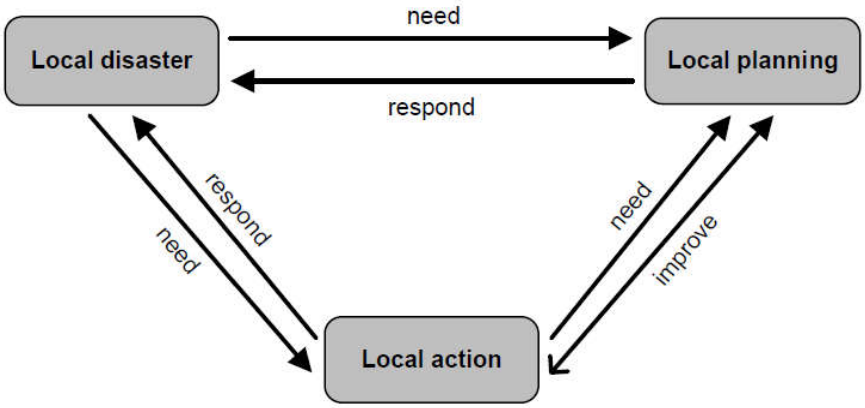


Figure 3-6 The importance of local planning in disaster management.

As disaster occurrences originate in a small geographic area, the local government has the responsibility and authority to prepare plans to overcome the consequences. Any disaster incidents will require local planning and actions. In this respect, the local government is indispensable in developing a mitigation strategy that clearly incorporates disaster risk information, preferably into its spatial plan. The advantage of local government involvement is its knowledge and understanding of local contexts.

With this in mind, predicting how disasters happen in the future is a necessary component of raising a disaster-resilient spatial plan. Foreseeing is more probable to be accurate for slow onset disasters with gradual development, like land subsidence and sea level rise. Disasters of these types produce noticeable signs for their extension in the long term, although in the short term, they may not be visible. In addition, their impacts may not be immediately felt by residents. For rapid onset disasters, combination between hard and soft engineering methods is more suitable to protect people and infrastructures.

In all natural catastrophes, programmers and scientists face uncertainty, for example, in geographical coverage of the disasters, their intensity and frequency. The uncertainty factor makes risk assessment difficult and requires several safety measures to be taken into account. To accommodate a problem that is larger than predicted, a safety margin should be employed. However, the safety margin should not be higher than the level necessary to reduce the associated cost required, and it should not remove the development potential.

Essentially, reducing disaster risk by utilizing spatial planning requires an integrated approach. It requires input from a broad range of disciplines, involving many stakeholders and facilitated by a spatial-enabling platform. The realization of an integrated approach concept requires projection of the population growth as well as progression of infrastructures and natural disasters. The first two have been commonly conducted by planning agencies; however, the latter has only recently received increasing attention. Local governments may have deficiencies in this aspect, thus requiring assistance and supervision from higher levels of government.

With growing pressure from population growth and the limited availability of disaster-free land, developments affected by natural disasters are unavoidable. Residents must adjust to living with disasters. However, there is a certain level at which the impacts of disasters are beyond the capacity of the residents to withstand them. Setting up an acceptable level, whereby the potential

loss and cost of protection are tolerable (Schmidt-Thomé, 2006; UN/ISDR, 2009), is part of the formulation of a spatial plan. The common language used to estimate the acceptable level is economic valuation. It requires detailed information on natural disasters, buildings, land uses and infrastructures.

3-4-2- The Role of Urban Design Implications on Disaster Risk Reduction

Urban areas and other human settlements can be coped with natural hazards when making safety of physical aspects is became as an main objects in the whole broadside on spatial planning. Spatial planning is defined as the whole comprehensive, co coordinating spatially oriented planning at all scales (from national to local levels), aiming at an efficient and balanced territorial development: spatial planning operates on the presumption that the conscious integration of (particularly public) investment in sectors such as transport, housing, water management, etc. is likely to be more efficient and effective than uncoordinated programmes in the different sectors.
The minimum scale of this process is architecture and maximum is national level planning. Among the various levels of planning, the premium and optimum level to reduce urban vulnerability is in a mid-level or same as the urban planning and design (Asgary & Willis, 1997). The Studies show that the majority of losses and fatalities are contingent on undesirable state of urban planning and urban design. A miss position of settlements, undesirable urban land use, poor street pattern, compact urban textures, high urban density, unprofessional infrastructures, infelicitous distributions of urban open spaces and etcetera have a main role in urban vulnerability.
Therefore in many cases, undesirable urban circumstance is the main reason that becomes a natural hazard to a catastrophe and disaster. Thereupon we can decrease the urban vulnerability with ameliorate of urban planning and design. This means that the safety of the city against natural hazards such as earthquake must be the most significant element in urban planning process. Prime concepts of urban planning and design have straightforward repercussions in reducing urban vulnerability. Concepts such as urban structure, urban fabric, urban density, urban road networks, site selecting of urban elements and so forth have positive correlation in urban vulnerability against hazards. In the following we discus about the concepts of urban planning have direct role in disaster management.

- **Land use planning**

As previously mentioned, Land plays a significant role in society. It is an important factor for production needed for agriculture, industry, and other economic activities (Godschalk, Beatley, Berke, Brower, & Kaiser, 1999). But it also serves as a principal instrument in fostering “social justice, development, provision of decent dwellings and health conditions, and therefore should be used in the interest of the society as a whole”.
The way man uses land, therefore, would have a decisive influence on the overall development prospects of societies, not only for this generation but for future generations as well, consistent with the principles of sustainable development. Certain global development trends such as population growth and rapid urbanization lead to land use conflicts, increased vulnerabilities and disaster risks.
Some studies show that the urban areas are horizontally developing in the unsafe places with potential exposure to landslide, earthquake liquefaction effects and urban flood (Asian Disaster Preparedness Center) (Azizi & Akbari, 2008). Researchers generally agree that land use planning as a heart of urban planning which is an important tool for reducing losses in natural disasters. Knowledge of the relationships of development, land use and disaster risks provide planners a deeper understanding of what drives people to locate themselves in high risk areas. The location of residential areas, industries, critical public facilities and services are important parameters that define the vulnerability of communities to hazards (Godschalk, 2002). In this context, land use planning is instrumental in addressing the challenges posed by natural hazards on built environment. Through land use planning, vulnerability parameters can be modified to reduce

risks. With its array of regulatory and non-regulatory techniques and mechanisms, land use planning can become an effective tool for disaster risk reduction.
Through the use of disaster risk information in land use planning, planning units would be able to:

- Identify areas

- That is of high risk from impacts of hazards such as flood prone areas
- That needs lessening of effects of hazardous events such as water retention areas
- Where it is necessary to ensure effectiveness of response activities such as escape routes

- Land-use planning is essentially opportunistic: there has to be a need for the location of new buildings (e.g. an expanding city), a choice between alternative areas in which location is possible, and a difference between the expected earthquake performance of the different areas
- Land use has to be controllable. In many very rapidly expanding cities, principally in developing countries, urban planning authorities have almost given up attempting to control detailed land use, because the administrative framework for planning controls is impossible to maintain.
- Limited opportunity for changing the earthquake risk through land use. In the more stable cities, for example in the developed world, where well-established planning control mechanisms is available, the city already exists and will largely retain its historical layout, reducing the choices in land use planning

In third world cities, land use plan might not be effective due to the absence of mechanism for monitoring and control of land use and development according to the plan, which should includes a series of city regulation and law enforcement mechanism (Asian Disaster Preparedness Center). Large resistance can be faced in the enforcement of such kind of restrictions in land use, especially in the areas where settle those who are less fortunate, such as low income population of urban migrants in third world cities.
For them, the choices are more limited to the cheap, often illegal, available lands in the dense squatter areas or urban villages, with very little or no infrastructure services. The reasons to locate in those vulnerable areas could be closeness to their social-economic activities, cheap land price or land rent, togetherness with other fellow migrants from the same village. Construction standards, basically from non-formal – non-engineered construction types, could be very poor and neglecting good earthquake resistance practices (Godschalk, Beatley, Berke, Brower, & Kaiser, 1999). Other approaches than land use plan should be then employed to reduce the vulnerability of this type of settlement areas, such as improving their awareness to at least using safer materials and construction practices, improving their social livelihood and their ability to self help and reduce their own vulnerability, improving their social network and increasing the ability to recover quickly after an earthquake.

- **Urban Structure**

It is not the purpose of the research to provide a complete discussion of the idea of urban structure or even of spatial urban structure (Bahrainy, 2003). However the idea of urban structure is problematic, since any given city is structured in multiple ways and along multiple dimensions. A preliminary task required regarding any discussion of evolving urban structures is to clarify terms and concepts and to suggest framework within which this evolution can be discussed. A City can be Structured a long many lines, Social, Economical, political, Cultural, Imaginary, and the structure themselves can have multiple dimensions such as spatial, organizational, administrational, racia. In this volume urban structure refers to a cluster of concepts concerned with the arrangement of urban space.
The way that urban public space is arranged affects many aspects of how cities function and has implications for accessibility, environmental sustainability, safety, social equity, social capital, cultural creativity and economics. Physical segregation of city and singular nucleus or multiple nuclei of city are other aspects of the urban structure. The structure of any city is affected by quota of correspondence with natural or artificial environment. In fact, a city is located among the network or hierarchy of physical-functional relations with surrounding. Scrutinizing of this point that which structure of a city is more unwavering against the earthquake is an independent

research issue. Notwithstanding, this is fact that various structures of cities have different resistance against the earthquake and it seems that multiple nuclei model are more resistant than singular nucleus (Wamsler, 2006).

- **Urban fabric**

The morphological characteristic of the city as urban fabric has formed from interaction and relationship between the social, cultural, economic and political dynamics of the city. The reflections of these interconnections, which affect the urban space, are the human artifacts in physical dimension.

According to Kostof, the most enduring features of the city are its physical build (pattern, language, geometry, fabric, order, layout, landscape etc.) Urban form is considered inclusive, non-linear, multidimensional entities which express human concerns and environmental factors through its physical presence (Kostof, 1993). The features of the physical structure were described by Spreiregen that "suppose that we think of urban form in the following way: a city or town is generally thought of in terms of size – its population and physical extent (Spreiregen, 1965). Size is closely linked to shape – the physical outline in horizontal plan form and vertical profile or contour.

Size and shape are qualified by pattern – the underlying geometry of city form. Size, shape, and pattern are further modified by density – the intensity of use of land by people and buildings. Density is determined by urban texture and grain – the degree of homogeneity or heterogeneity of use by people or buildings." The characteristic features of the urban fabric could be seen with "an urban pattern is the geometry, regular or irregular, formed by routes, open spaces, and buildings. Grain is the degree of fineness or coarseness in an urban area. Texture is the degree of mixture of fine and coarse elements." (Spreiregen, 1965)

The whole lots of urban fabrics have particular resistance against natural hazards. For instance, the organized and regular fabric has more resistance averse to natural hazards than disordered and irregular fabric. This is true for discrete and detached urban fabrics in comparison with continues and attached urban fabrics, also.

Reaction of each urban fabric in the event of natural hazards has direct liaison with wherewithal spaces for citizens to running and sheltering, paraphernalia for aiding, quality of erecting again, cleaning and temporary accommodation. Domain of these factors is extended not only in the designing of buildings but also in the urban design and disaster Management. Main components and elements of urban fabric include buildings, urban block patterns, urban street patterns and open spaces. We can categorize above factors in three portions in order to vulnerability assessment of urban fabric (Azizi & Akbari, 2008):

1- Buildings characteristics: form and composition, altitude and the number of floors, materials and building age.

2- Fabric characteristics or composition of elements: plot pattern, formation types of the block structure (form- size), the permeability of the block structure, land use pattern, space and mass, heterogeneous or homogeneous of fabric, street pattern, juxtaposition of plots with pathway

3- Characteristics of natural basin and their factors: topography and slope, rivers and aqueous sources, vegetation and tectonic features.

In land subdivision the geometrical form (ordered or disordered), the plot area, measure and dimension, coordination in ratio of length to width of a plot are the paragon. As the crow flies, effects of these characteristics are due to construction and communications network which are also affected in coefficient of vulnerability or efficiency. Characteristics of constructing on the each plot is the another component at the assessment of plot classification. Therewith, separated buildings in each plot and sort of its occlusion due to the demolition of building in open space have a momentous function in vulnerability.

In an urban fabric, besides the cells (plots and construction), also street pattern have a momentous role in efficiency of the urban fabric (Kostof, 1993). The factor is significant in street patterns consist of physical characteristics such as length and width of street. The pattern doesn't involve in vulnerability directly and spontaneously but its physical features in which derived from

adjacent patterns of roads and buildings are interferer in vulnerability of urban fabrics. Major part of urban context ability- particularly in residential wards- is taken from adjacent specifications of fabric units (In other words, indices of elements and components composition). Quality of plot blending and arranging is crucial in style of a fabric and its vulnerability. Composition of components led to an ordered urban fabric that reduces vulnerability due to the effect of transmission of monotonous forces into the adjacent buildings.

Apart from urban plot patterns, model of constructions and open spaces of adjacent plots are other indices in assessing urban vulnerability. According to these characteristic, quality of adjacency of the detracted plots evaluated in order to surveying of quality of openness and the rate of occlusion. Potentiality of fabric, model and measure of urban blocks, road and blocks composition patterns are other indexes in estimation of urban resistance against the natural hazards. These indexes are effected in compactness or ordering of constructions and subsequently in the rate of fabric vulnerability. Open-space pattern in the whole area of the fabric of residential wards is another factor on increasing of urban fabric efficiency (Watson & Adams, 2010). Location of open space in sidelong of buildings, floor area ratio and natural phenomena with regards to its extension can damage the open spaces.

Each city can has incongruous form such as linear, multi-central, extent, mono-central or heterogeneity. Any city hasn't been made that minimize the natural hazards. Lynch discuss that open forms are more flexible than compact forms. Also researches show that extent and multi-central formations have the optimum functionality against the earthquake.

- **Urban density**

The concentrations of people and buildings represent targets of high potential loss. Deconcentration of cities spreads the elements at risk by reducing densities and decentralizing facilities. Deconcentration and density limitations are desirable in cities for other reasons too, including environmental improvements and limitations on service provision. Most urban plans already limit densities of development.

Whatever the urban density be less and the spatial of the urban density distributed equally, the urban vulnerability will decrease progressively. The other way around, the high population density in urban areas equate with more casualties and devastations. In addition, the urban high density consists of lacking in the proper space for victims, more casualties due to the collapsing of debris, blocking of passageways, the impossibility of escaping and difficulty to rescue the wounded due to blocking the communication ways (Jones, 1975).

Urban authorities buying up plots and demolishing to create open space among the blocks or developments at lower densities can reduce the densities of existing urban areas. In some earthquakes, in the past the city authorities buying up the sites of collapsed buildings and making them into urban memorial parks have achieved this. Such urban parks, even if they are small, add greenery to the city, help with urban hydrology, humidity and microclimate and provide areas for emergency facilities or population evacuation or temporary housing in the event of any future disasters. However, in developing countries there are many cases that cities do not have sufficient resources or mechanism to procure and manage open spaces.

In the planning of a new town in a hazard prone area it is important to limit the size and potential for high-density over-concentration of development (Wamsler, 2006). Density controls include restrictions on building height, limitations on the plot ratio of allowable development for any site, and limitations on access to basic services.

Where direct density controls are easily enforceable, other methods of achieving lower densities include the design of street patterns, wider streets and limiting plot sizes by physical planning means, using the design of the layout of the town and positioning of street furniture to maintain street frontages and to limit plot development (Craig & Haskey, 1978). There are, however, no absolute levels or recommendations about density targets for earthquake safety, urban population densities vary considerably from country to country and town to town, and the vulnerability of the building stock is the overriding factor in determining how much the population is at risk from earthquakes.

In the third world countries, cities are growing at rapid rates, accommodating more and more migrants from the surrounding areas due to the higher opportunities for living offered by their functioning, which unfortunately are not complemented with adequate basic infrastructure services, such as road networks, electricity, sewerage and sanitation services, etc. Rapid urban settlement development creates pockets of slump areas in uncontrolled way, often built on illegal land parcels, and contributes significantly to the local, vulnerable building density (Craig & Haskey, 1978). The chief risk for fire or earthquake disaster in many cities is in those squatter areas or informal developments. These are likely to be beyond conventional planning measures, but general programmes to upgrade squatter areas should include reductions of density, access routes for fire and other emergency service vehicles and discouragement of sitting on hazardous slopes.

All in all, the human density has an unassailable role in the variant indexes of welfare, hygienic, education and approachability to equipment. Notwithstanding, the correlation between population density and earthquake is more complicate. It goes without saying that population haven't direct connection in the intensity of demolition. Rather, the role of density is after the disaster.

While hazardous events such as floods and earthquakes are naturally occurring phenomena, the amount of damage they cause has been exacerbated by the conventional land use pattern of decentralized sprawl, which has fostered a massive buildup of development in areas subject to natural hazards. New Urbanism design has been promoted as an alternative to possibly counter certain adverse societal outcomes of conventional sprawling development (Duany, Plater-Zyberk, & Speck, 2000; Calthorpe & Fulton, 2001; Talen, 2005). Based on a set of design principles that are intended to foster more intentional delineation of open space, a better mixture of land uses built at relatively high densities, and pedestrian-oriented transportation networks, New Urbanism design has also drawn increasing attention for its potential to reduce natural hazard vulnerability (Thompson, 2005; Miller, 2007).

Despite this potential, however, when a New Urbanism development locates in a hazardous area, its relatively high development densities can mean that more people and property are placed at risk than would have been the case with a low-density development on the same parcel of land (Berke & Campanella, 2006; Berke, Song, & Stevens, 2009). Recent research has compared New Urbanism developments with conventional low-density developments to determine whether local communities put forth more effort in reviewing proposals for New Urbanism developments, and whether that effort appears to translate into design that is more resilient to natural hazards. Berke et al. found that, on average, in comparison with conventional developments, New Urbanism developments (1) were subject to stronger local government development management regulations, (2) involved greater levels of public participation and local government planning staff technical assistance during the development review process, and (3) incorporated more natural hazard mitigation techniques.

- **Decentralization of metropolitan**

In many countries, there are efforts to decentralize capital cities and other major regional centers. In the developing countries, programmes to reduce the rate of urbanization generally and to discourage large-scale migration of rural population to the cities should be encouraged. Both of these measures reduce earthquake risk in a seismic region (Nelson, 1990). Decentralization of major conurbations reduces earthquake risk by reducing concentration of people and building stock and earthquake protection is an additional argument for decentralization. Decentralization is commonly tackled using a number of methods including the development of 'satellite centers' (local services in the suburbs), necklace development (suburban development beyond green belts), the promotion of secondary town in the region, or moving ministries and other key facilities to other cities, or promoting relocation grants for industry and preferential provision of services in order to reduce development pressures on an over-centralized city.

After the city of Tangshan was devastated in 1976 by the most lethal earthquake of the 20th century, the Chinese planners rebuilt the city as three separate smaller towns, several kilometers

apart, partly in order to reduce the potential for an earthquake to cause another similar disaster. However, this approach might be successful in one country (such as where the role of the government is very strong), but will not be easily implemented in some other countries due to differences in the cultural and governance context.

Resistance to change might come from various interest groups in the process and there is no single general solution to this kind of situation. During recovery planning in post-earthquake situation, experience in various places showed that it would be beneficial for cities to maintain comprehensive plan with long-term goals that transcend disasters, and mid-term projects that can be adjusted if conditions radically change (Nelson, 1990). Planning is an on-going process and it is important to have an active planning process that is publicly accepted and in place before a disaster, which will set the stage for effective post-disaster planning.

- **Urban Life lines and infrastructures**

Planning new facilities and managing existing infrastructures in urban areas are a vital part of the earthquake protection of the community (Chang, McDaniels, Mikawoz, & Peterson, 2007). Spatial planners are likely to be involved in the sitting decisions for many privately owned large scale facilities, like major industrial plants, shopping malls, office complexes and the major private developments. The location and design of public services and utilities, transportation networks, terminals and many other facilities are all a part of urban planning in its broadest sense.

Urban infrastructure refers to hard infrastructure systems generally owned and operated by municipalities, such as streets, water distribution, gas networks, Sewage systems, and sewers. It may also include some of the facilities associated with soft infrastructure, such as parks, public pools and libraries. These networks and systems are made of paraphernalia and impedimenta that any city must equip to them in order to citizens can live in the whole part of a city such as residential, commercial, administrative, industrial and communal etcetera parts.

Many cities rely heavily on utility and transportation systems for its daily activities and when the systems are destroyed or disrupted in the event of a major earthquake, chaos will follow and various secondary disasters could occur (Chang, McDaniels, Mikawoz, & Peterson, 2007). Included in the lifelines are basic urban services such as:

- Water supply
- Sanitary drainage
- Storm drainage
- Electricity supply
- Gas and oil supply
- Telecommunication services
- Road, highway and bridges
- Railways
- Ports
- Airports

There are also facilities that are considered as critical lifelines/facilities that are important factors during the emergency response and relief stage, i.e.:

- Media (broadcast TV/Radio, newspaper)
- Fuel supply
- Food supply
- Health services
- Fire-fighting

It is recognized that there is interdependence between various lifeline infrastructures. Some utilities depend more on the others than some other utilities, such as water supply infrastructure needs the support of electrical power and/or fuel supply. Telecommunication service depend also to availability of electrical power and to some extent, water supply. Health service is a critical facility badly needed immediately after an earthquake disaster, and it needs to be supported by

adequate water supply, electricity, telephone facility, transportation access, food and medical supply as well as fuel supply. Basically water supply, electricity supply, telecommunications, transport infrastructure and fuel supply need to be restored as soon as possible after an earthquake disaster event (Chang, 2003).
Transportation systems are vulnerable to the damage of a small part of them, for example a collapsed bridge can effectively isolate large areas of a city or prevent movement between the city and its surrounding areas. A localized failure of railway network could cause enormous damage to the local and national economy. The population is vulnerable to the impairment of transport infrastructures, because people will suffer from the direct effects of the transport disruption and the lack of access s to other critical facilities such as emergency services (medical, fire-fighting, police, food relief aid).
The disruption of a port operation due to earthquake (and tsunami) in Flores Island in 1993 has affected the supply of goods for the population, as it is the only access for bulk goods to the island, and long recovery meant the economic disruption in the island, which adds to the suffering of the population (Chang, McDaniels, Mikawoz, & Peterson, 2007). Informal communities can be particularly vulnerable as access to these areas is often limited in normal circumstances and they may be isolated after an earthquake disaster. Independent coping mechanism developed within the informal communities might help reduce their vulnerability.
Water supply and distribution systems are vulnerable to disruption due to earthquake, which could hit any part of the system, such as raw water intake system and transmission pipe, water treatment plant, distribution pipe etc.
The power supply and distribution systems are vulnerable to disruption of service due to earthquake. Power plant, switch yard, transmission line, transformers, distribution lines etc. can be knocked out of service, causing power outage, which is badly needed for the operation of various other critical lifelines, such the hospital and health centers' operation, water supply pumping and treatment systems, telecommunication system, other emergency operations etc (Chang, 2003).
Damages that is caused by earthquake, increases catastrophically due to the demolition of infrastructures like that aqueous, electricity and gas networks and communications destruction. Damaging of urban gas network can be cause a gas leakage in space and Large fires. The same accident took place in 1995 at Kobe city in Japan.
Securitization of urban infrastructures against the earthquake has an important role in the increasing of the urban resistance. Urban planners must be aware of the positioning of structures such as power stations. Infrastructures like this must be located far from the city. Infrastructures have multiple roles in citizen's life, from welfare to vulnerability during the natural hazards.

- **Urban communicational network**

Communication network have a sensitive role in urban vulnerability against the natural hazards. If the urban communicational network resists against the earthquake, the amount of victims decreases considerably. This is in virtue of that accessibility to make safe places, running from perilous positions and transit and traffic of emergency transportations is obtained incontestably (Arvai, Gregory, & McDaniels, 2001).
For optimizing of urban communicational network, the analyzing of status quo must be done in order to recognition and identification of problems and disadvantages. Following factors can result reducing urban vulnerability;

- Decreasing of destinations between urban variant land-uses
- Properness among common land-uses and communication network
- Being hierarchy in networks
- Increasing of traffic jam in networks
- Providing of running, sheltering and evacuating in networks
- Liaison of significant land-uses to each other

The center of communication in large and medium cities should not be concentrated in one area. The multiple systems must be use alternatively and change with old systems emergently.

Communicational networks must be so resistant and unshakable in which natural disasters and hazards can't overthrow them without a hitch. Together with those that said above, the scientific researchers must be provide continuously, ceaselessly and thoughtfully about earthquake, geology, faults, soil and so on.
Telecommunication systems are especially critical during the emergency response phase. The weak links in the system might include exchange stations and switching units, transmission towers and lines, network lines (buried and hanged cables, including telephone poles) etc. The disruption of telecommunication system could hamper rescue and relief operation and disrupt coordination of various administration services. Each organization dealing with the provision of the utility services should be prepared with vulnerability assessment and vulnerability reduction plan and is responsible to implement it to reduce the vulnerability of life lines.
The main axes in the city are the most elements of the urban physical characteristics that play its worthwhile function during the acceptability to axes and networks (Arvai, Gregory, & McDaniels, 2001). Natural characteristics of axes is considered in slope smoothness and finally in accessibility to aiding and cooperating. Pattern of communication ways are affected in quality of approachability for aiding to victims, immediately of servicing, accessibility and feasibility of alternative communicational subways and multiplicity and broadness of axes.
Sort and hierarchy of road networks are affected in aiding operation with decorum. The model of the roads usage (according to sort of transition and the amount of using from the road) and the temporal models for roads usage are liaised to acceleration, possible content and susceptibility of clearing operations in each axes.

3-5- Citizen Participation as a Vital Element for The both Fields

3-5-1- Citizen Participation

Citizen participation is not a new topic in the public policy-making arena. Since the 1960s, researchers have argued the importance of citizen and public participation and showed the methods and procedures where communities and the citizen can actively participate in governmental policy-making (Levine, 1960; Burke, 1968; Arnstein, 1969; Boaden, Goldsmith, & al., 1980). The emergence of citizen participation cannot be separated from the issue of democratization and the increased demand for greater transparency and accountability of public decision making. The citizen is increasingly curious about how their future is determined by the government. In model of public cooperation, the top ladders are reserved for activities that are classified as having a high degree of public cooperation. They include partnership, delegation of power and citizen control. The lowest ladders— manipulation and therapy—occur when there is no involvement from the public inthe process of making decision.
Several definitions of citizen participation have emerged, as well as similar terminologies. Some researchers previously used the term 'public participation'; however, the use of 'citizen participation' is now more widespread. Citizen participation is the process of providing the public with an opportunity to express their concerns, needs and values, and to incorporate them into the government's decision-making process (Glass, 1979; Creighton, 2005). However, it is notable that planning agency has a mandate to perform the development and will be responsible for the output.

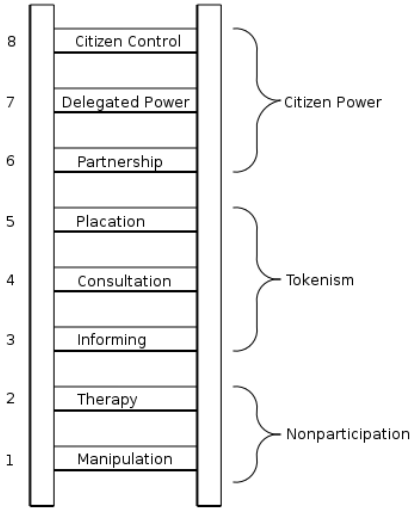


Figure 3-7 A Ladder of Citizen Participation
Source: Arnstein (1969)

Many government projects directly affect people; thus, citizen involvement in the decision-making process is vital. Citizen participation is one step further than the previous method of Decide, Announce and Defend (DAD). In DAD, the government decides the best solution to a particular problem announces its decision and defends it to any critics. This top-down approach worked well in the past, especially in countries implementing authoritarian-style governments with strong central-government control. However, this approach has been heavily criticized for ignoring people's aspirations, assuming the community to be an object and disregarding local knowledge. As a response, a bottom-up approach has been introduced to overcome the top-down approach's weaknesses and limitations.

The bottom-up approach aims for greater inclusion and to gather input from the people likely to be affected by the development, as well as grass-roots people and beneficiaries. Other objectives include information sharing, educating stakeholders and supplementing decision making (Burke, 1968; Glass, 1979). Community participation is an alternative to government-centered development planning, which seeks to empower communities and allow them to have greater influence in development activities. Internationally, the importance of citizen participation was highlighted in the Earth Summit, which was held in 1987, with an emphasis on sustainable development. Local participation is one of the methods used to achieve sustainable development objectives, along with greater government decentralization. The functions of citizen participation also align with the five components of good governance: accountability, legitimacy, respect, competence and equity.

3-5-2- Citizen Participation in Spatial Planning

In the economic and political conditions prior to 1960, spatial planning was taken into consideration by governments, especially on its economic and management aspects, so it had imperative and top-down characteristics. On the other hand, growing trend of industrialization and urbanization caused the domination of scientific and technocratic elites especially engineers and architects in this scope.

From 1960 on, vast critical reactions impacted this situation and caused spatial planning change from imperative and technocratic to participatory and democratic shape. Sustainable development1, rapid growth of democracy and human rights, development concepts of civil society and present cultural reactions placed spatial planning in a critical situation in a type of theoretical and practical difficulties. In order to release from this critical situation, spatial planning

begins with democratic methods, searching justice and human aims. In fact, spatial planning in the beginning of 21th century goes to a revolution in duties, aims and methods.
Some researchers and specialists believe that we ought to speak about 'planning through debate' and 'communicative turn' in planning theory. Most practical and struggles that have been made in theoretical perspectives in this field are based on a combination of methods and principles of planning to democracy, public and private sector participation, defense of poor people and protection of cultural values, thus providing justice and social welfare.
In his recent contribution to communicative planning theory, Sager elaborates two planning models—rational-scientific planning and dialogical instrumentalism— which are in opposition to each other concerning the relation between knowledge and communication. The differences can be summarized as follows: rational-scientific planning accepts the means-end scheme and relies strongly on analytical technique, whereas incremental planning rejects the means-end scheme and depends heavily on communication. The policy makers in the synoptic process possess nearly vast calculative capacity, and those in the dialogical incremental process nearly vast communicative capacity. Therefore synoptic and incremental planning can be viewed as opposites with regard to information, knowledge and communication. To Habermas's terms, synoptic planning involves a strategic rationality whereas dialogical instrumentalism involves a communicative rationality. Obviously, one single form of planning has rarely been entirely adhered to in reality. However, through this ideal type of formulation, Sager creates fixed reference points for discussing communicative aspects of planning.
Communicative Planning offers new roles for planners. Traditional planners have important roles in the planning process, such as Investigators, Analysts, Evaluators and Controllers. However, it is evident that there is also a need for complementary planners with a new and different kind of competence based on communicative rationality in roles as Facilitators, Intermediaries, Negotiators, and Mediators.
In order to improve the decision-making processes towards participatory ones, many efforts have been made by international organizations, among which the role of plans and actions of organizations related to the U.N. is obvious. One of the most important efforts of this kind was the 'Habitat II conference' held in 1996 in Istanbul with undertaking of governments to develop urban governance in the world in two ways; firstly acquaintance with urban governance parameters by starting world discussion in this field and secondly acquaintance and propagation of sample actions—Best Practices— or successful local actions in providing urban governance in different cities of the world.
The importance of participatory planning can also be seen in 'Local Agenda 21 Programme'. Since 1992, local government has been making progress towards Local Agenda 21. Agenda 21, which was signed at the 'Earth Summit in Rio', is an agreement to work towards sustainable development. Local authorities have a particularly poignant and important role in the delivery of sustainable development, because "as the level of government is closest to the people, they play a vital role in educating, motivating and responding to the public to promote sustainable development". Local Agenda 21, calls for all local authorities to consult with their communities and develop a vision and plan of action for the future of their locality. Public participation and consultation are central to Local Agenda 21.
Local Agenda 21 offers an opportunity to radically reappraise and revise local authority participative structures, and to develop fresh and innovative methods of working with and for the community. Therefore, one of the most important characteristics of the new urban planning theories and international programs is the concept of citizen participation in decision-making process.

- **Functions of Citizen Participation**

Planning academics and practitioners call widely for citizen participation in planning decisions. The literature provides theoretical and practical functions and reasons for this emphasis on citizen participation.

- In the communicative planning paradigm, for example, participation is at the core of deliberation among agencies, stakeholders, and the public at large.
- In practice, there are two kinds of normative and instrumental functions for citizen participation:

The normative functions of participatory planning are related to demands for direct (or indirect) democracy. One of the arguments is that in an active democracy the voice of citizens should be listened to. Another discussion is that participation is necessary to enlarge the legitimacy of the decision-making process. Participation is also valuable as a political goal, because it increases social capital and empowers citizens as they seek a stronger voice in decision that affects their lives. Participatory planning is seen as central to the promotion and protection of their interests. The instrumental function for participatory planning is related to the use of participation to make influential, effective and efficient planning products.

The instrumental argument of a participatory approach for government implies that participation provide citizens with an opportunity to influence decision-making. It is recognized as a method to gain control, because positions and interests remain transparent. Participatory planning contributes to effectiveness, because it enables the inclusion of lay knowledge in decision-making and improves public support for policies and improves planning outcomes. And finally, participatory planning contributes to efficiency, because it provides a way to gain time (shorter decision-making process in long-term), and averts implementation problems, objections and appeal. Citizen participation also has the potential to strengthen the planning profession by increasing the visibility and value of planning in the citizens' eye (Woltjer, 2002; Laurian, 2004).

- **Limits to Citizen Participation**

Citizen involvement in the process of spatial planning has suffered from a number of problems and limits. Researchers and planners have resolved some of these limits, while others have remained unresolved. Here, I refer to the main issues that planners face.

Lack of resources and staff are likely to be a major constraining factor on both local authorities and other organizations that are involved in process at a local level. Good quality participation demands administrative support and other resources. Although, citizen participation gains time and money in long-term, but it needs financial resources and time in short-term. A second problem is lack of clear guidance from national government about the relationship of citizen participation to other areas of activity of local government. More importantly, citizen participation rarely reached a good-quality level where citizens had some power to influence decision-making. Logically, continuous lack of good quality of citizen participation can create the citizens' apathy. Sometimes local planners and politicians have no incentive to make an effort to maximize citizen participation (ibid, 1998). The need to achieve consensus in the participation process is another major problem. How should this be achieved when views are directly conflicted?

Many problems also exist due to the participants themselves. For example, most of the participants are from a restricted social spectrum— middle class and well educated—that implies an unrepresentative process. Similarly, it is hard to gain lower and lower middle income residents' participation, because they see development matters as threats and possibly costly. More importantly, it seems inevitable that objectors will be those with a personal interest in an area, because this is where the planning system manifests itself in the reality of people's everyday lives and is the point at which personal interests need protection. Objector's opinions contrary to those of the planning officer are likely to be rejected on grounds of NIMBYism. These groups of people try to legitimize their concerns by supplementing them with less self-interested reason for objection.

Finally, although there are rational reasons for citizen participation in planning, power structures have a rationality of their own in the form of networks of interest— interests of authorities and developers. Citizen participation programmers will no longer be successful if the roles and the structures of power are not aptly recognized and considered.

3-5-3- Citizen Participation in Disaster Management

Rubin recognizes that the frustration of the members of community is increasing not just because of being casted out of the decision-making processes involved in community schedule, but also with being casted out of those engaged in disaster management programming. When the citizenis not engaged in the process of disaster management, it usually, not to our surprise, disagree with the decisions and activities of the people in charge

For community members to affect politicians, they must possess access to the data necessary to logical decision making. Due to the International Federation of Red Cross and Red Crescent Societies (1995) statements, the public's chance to have data is a basic character of democracy and is vital to disaster management: "when information as a right – are within the reach of people, not just from their country's government, local authorities, companies and interest groups, but also from international organizations and aid agencies, they can then plan for themselves, make informed choices, and act to reduce their vulnerability." As a matter of fact, a community is not large, and, as Boothroyd and Anderson discuss, those engaged in social planning should always ask the question: "planning for whom?" since if the varieties within any given society are not addressed prior to a disaster, and then typically they impinge recovery efforts.

Disaster risk information should be disseminated to residents using methods such as newspaper articles, government websites, leaflets, books and school lessons, as well as through seminars, workshops and other types of public meetings. Neighborhood meetings are a good forum for disseminating information and discussing disaster risks—particularly disasters that have a direct local impact.

Regarding spatial planning, neighborhood-level discussions on disaster risks are particularly important. Through these meetings, in-depth discussions can be conducted in a relaxed environment, thus reducing the power gap between those with knowledge and those without. A neighborhood usually has important local knowledge on natural disasters and practical mitigation strategies. The public needs to be able to voice its concern regarding disaster risk information provided by the local government. Information from the public will enrich the disaster database by providing locally sourced information.

- **How to utilize citizen participation in disaster management**

As a matter of fact, despite its prominence, with respect to sustainable hazard mitigation, integration of citizen cooperation and disaster management are not always easy. How citizens are summoned to cooperate in disaster management is vital to the achievement of that cooperation. The last work of Dorcey and McDaniels, while analyzing citizen cooperation in Canadian environmental cases, has much to suggest with respect to citizen participation in disaster management. After all, both disaster management and spatial planning focus on complex issues that are about risk, and both concern themselves with sustainable development.

Nonetheless, Dorcey and McDaniels (1999) point out that, while the need for citizen participation was queried in the 1980s and 1990s, in the twenty-first century the question is not "if" citizen participation should be utilized but "how." They argue that there has been a general shift, at least in principle, from a managerial perspective (which trusts elected officials and administrators to act in the public good) to a pluralist perspective (which views government as an arbitrator among various organized interest groups). Citizens have become increasingly interested in a popular perspective (which calls for the direct participation of citizens, rather than their representatives, in making policy). Thomas sees the increased education of citizens as a root cause of this shift. Together with this altering of perspective has been an exciting interest in employing negotiation, facilitation and mediation procedures to the citizen participation process.

Providing citizens with information is of course essential, but it is not sufficient. Many communities have available, and even distribute, an assortment of brochures and pamphlets. However, regardless of whether or not this material is read (never mind implemented), communities must do more to ensure that their residents become an integral part of their disaster management processes. Posting notices for opportunities to participate is important, but unless

disaster planners make active efforts to directly involve community residents in the planning process, these opportunities may be ignored.
What can be done about the difficulty of getting disaster management programs established and getting local governments to recognize their importance? I would suggest that rather than asking ourselves how community participation can become an effective process within disaster management, we should be assuming that community participation will ensure that disaster management will become an effective process within the community. According to Berke and French (1994), high levels of government must dedicate themselves to encouraging community commitment to disaster planning. This dedication may manifest itself through education and consensus-building processes that heighten citizen ownership of any given disaster management plan.
In summary, it is also clear that any successful approach to disaster management must be participatory in nature and must be linked with the local decision-making level. The researches show that, in most situations, shared public decision making is crucial to any effective approach to mitigation. Citizen participation in combination with both disaster management and spatial planning results in sustainable development.

3-6- **The Importance of Spatial Data for the both Fields**

Geographically referenced information has become indispensable for numerous aspects of spatial development, planning and management. The increasing importance of spatial information has been due to recent strides in spatial data capture (especially satellite remote sensing), management (utilizing GIS and database tools) and access (witness the growth in web mapping), as well as the development of analytical techniques such as high resolution mapping of environments.
Spatial information has been gathered by different organizations or institutions. This is the cause of a decentralized data warehouses and next interoperability shortcoming due to varieties in database plans. In other words; spatial information may be derived from another agency and often put forward in different format, projection system, visualization, semantic, and scale. A very rudimentary challenge is on the heterogeneous of spatial data because inappropriate combination of data may end in directing decisions in a bad way. Similarity or interoperability on data format and projection system is also required.
Spatial planning inclusively employs spatial information, as well as non-spatial data. Spatial data and information are crucial in various phases of spatial planning process, starting from preparation and development to the presentation. It is obvious that most of the roles of spatial planning in disaster management extremely depend on spatial data and information. In other words, Implementation of spatial planning functions in disaster management has to be effectively carried out by reliable data. The role of the spatial programming in preparedness, decrease, response, and recovery phases of disaster management and the role of spatial data in spatial planning process is very important. To look at that from another angle, the necessary data also have to exist and be in access to provide the maps on the basis of the data. Even though, the information exists, it should be in reach too.
Information for disaster management and spatial planning are also derived from various agencies in various formats. Standard information format is chosen to enable smooth data transfer and sharing, particularly on spatial information. A fundamental basic component is on the interoperability of spatial data, because improper combination of data may end in false decisions. Similarity or interoperability on data format and projection system is another requirement. Various visualization coding might be employed by various institutions to show the same features. Categorization of categorical data for instance slope steepness, among organization has to be made identically. A problem exists on the use of scale. Danger coming from nature, such as landslide and flooding are often represented in little scale map. Whereas, detail spatial planning needs big scale representation for zoning goal.
The data on disaster may appropriately be kept in industrial countries, but are scant in numerous developing countries. Access and constraint of the historical data can influence the foreseeing the

future possible events. With respect to thematic maps, these items are needed for the integration with spatial planning:

1. disaster past events of
2. Maps of hazard risks
3. risks map elements

The embedding of disaster management strategy in spatial planning includes active collaboration from a variety of government agencies together with public participation. A platform for facilitating this task is needed; to make the smooth data transfer and exchange. Spatial Data Infrastructures (SDI) based on a Planning Support System (PSS) has to be set up for fulfilling such a goal.

3-6-1- Planning Support System

The advent of new computer technology and improvements in GIS software has enabled the emergence of PSSs since the late 1980s. The term 'planning support system' was first coined by, when he discussed the use of GISs among planners. Following, a PSS is explained in this thesis as a devoted framework to back planning tasks. It includes elements for information collection, information modeling and visualization. A PSS is specifically directed for planning relevant to spatial facets. Although PSS functionality is provided largely by geo-information technology, it is different from GIS in the sense that GIS serves general purpose tasks while PSS focuses on planning tasks.

PSS users are planners, geo-information specialists, government officials and politicians, citizens and other stakeholders. They use PSS at the various stages of plan development, with planners and geo-information specialists at the forefront. They design, develop and use PSS at the early stage of plan development, including presentation in the deliberation process.

PSSs have been widely used in assisting spatial plan formulation; however, it seems that there are geographical biases. Most users originate from the United States, Europe and Australia. As a subset of geo-information technology tools for supporting planning, the implementation of a PSS must be preceded by the mature use of a GIS. That is, if there are no operational and extensive uses of GIS in a planning agency, there is little chance of having a PSS implemented. The operational use of a PSS requires extensive GIS data and experience in GIS modeling. These requirements are not always found at the local planning agency in developing countries.

To date, various PSSs have been developed with diverse approaches and scopes. Most PSSs are designed for general purpose use, such as WhatIf?, CommunityViz, INDEX, SLEUTH and UrbanSim, and only small numbers are built for specific tasks. Many more PSSs are available from research organizations and the financial sector. A comprehensive list of the PSSs available in the market and at research institutes is provided in. Table 3-2 provides a list of the PSS software that is currently used in many cities and countries.

	Approach	Modelling	Application scope	Visualisation
CommunityViz	ArcGIS extension	Rule-based model	Local level	2D, 3D, Google Earth
CUF	Independent—open source	State-change model	Regional	2D
INDEX	ArcGIS extension	Rule-based model		2D, 3D
METROPILUS		Large-scale urban model	Regional	2D, 3D
SLEUTH	Independent—open source	Cellular automata	Regional	2D, 3D
TRANUS	Independent—open source	Large-scale urban model	Local-regional	2D
UrbanSim	Independent—open source	Large-scale urban model	Regional	2D
WhatIf?	ArcGIS extension	Rule-based model	Local-regional	2D

Table 3-2: Review of PSS software.

Different techniques are applied by a PSS, including a large-scale urban model, rule-based model, state-change model and cellular automata. The selection of the most suitable model for a particular planning agency depends on several factors, such as the objectives of the modeling, the capacity of the planning agency and the data availability.

3-6-2- Citizen Participation using Planning Support System

There is a loosely coupled link between a PSS and a public participation mechanism. A PSS itself can be effectively operated without public participation. However, public participation in spatial planning is necessary. Through this connection, the linkage was formed. A public engagement does not necessarily mean that all inputs from the community should be accepted. The link should aim increase the use of all PSS functions to facilitate collaboration between planners, decision makers and the community.

Here, the PSS's main function is to provide the results of different scenarios, which can be used to improve the deliberation process. The information contained herein is essential for informing the public of the spatial plan. In the traditional method, the community can only share its concerns and inputs in the map. The result of changing parameters and scenarios are not immediately available to participants. The community may be provided with the result of these changes in the following meeting, whereby the context and atmosphere will be different. A PSS offers the capability to change the period for seeing the results.

In a workshop facilitated with a PSS, participants could interactively play with the draft of the plan and see the real-time effects of changing parameters in different scenarios.

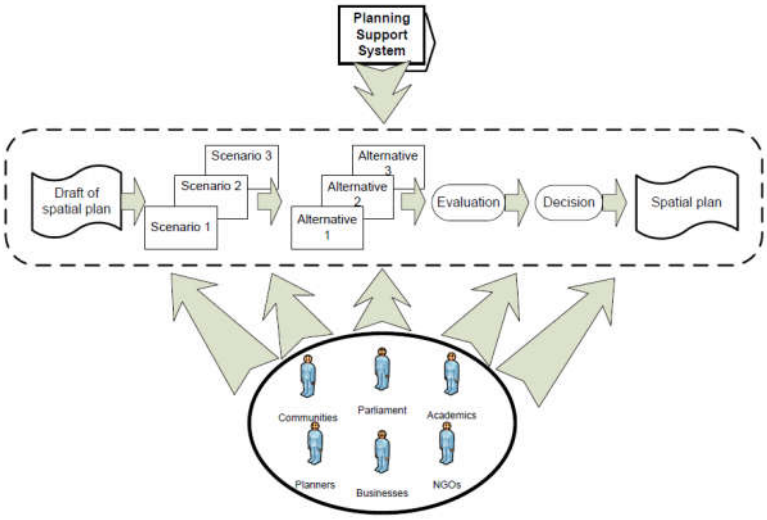


Figure 3-8 Schematic view of the use of PSS in the public participation.

In spatial planning, the situation and requirements are different. It requires in-depth discussions and intensive deliberations that can only be optimally fulfilled in a face-to-face meeting. There are some difficulties if the collaboration is conducted in a different place and at a different time. A different-place meeting, such as using video conferencing technology, can replace face-to-face meetings. However, in developing countries, the use of video conferencing techniques is rarely part of daily operational use due to limitations in the Internet infrastructures and bandwidth.
However, the Internet plays a fundamental role in spatial planning, although it is not used for online collaboration. It is required for disseminating drafts of spatial plans and gathering public input through websites. Online digitization is also useful for obtaining other perspectives on land use designation. Nevertheless, a full spatial analysis of the impact of different people's choices could not be immediately visible in the Internet collaboration. The current practices of Internet collaboration show that the methods are mostly aimed at gathering input from the public. A connection with the PSS engine for impacts analysis is yet to be developed for web collaboration. In this instance, digital charities, which can be conducted in face-to-face meetings, cannot be run.

3-6-3- Spatial Data Infrastructures for Spatial Planning and Disaster Management

- **Spatial data infrastructure concept**

SDI is a framework for exchanging and sharing spatial data between stakeholders utilizing spatial data. It aims to maximize the use of spatial data among stakeholders, at the same time reducing duplication in spatial data acquisition and maintenance as well as any related costs. In some countries, it is common to find that several government organizations develop and manage similar datasets. SDI helps to find relevant spatial data located at repositories in different organizations.
SDI is an indispensable element in facilitating and streamlining the flow of data between government agencies. SDI is not only used in spatial data sharing, but also in discovering the types of spatial data that other agencies have developed.

- **Spatial data infrastructure components**

The core components of SDI are the people, data and technology. SDI has a dynamic nature that is related to changing people and their requirements (ibid, 2002). Figure 3-7 presents the nature and relation between SDI components.

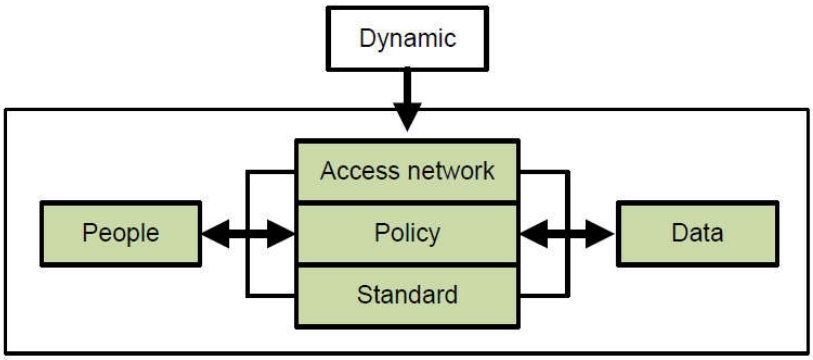


Figure 3-9 Relation between SDI components and its nature
Source: Rajabifard et al, 2002

SDI components include users, access networks and technology, policies, and the fundamental data. Users include producers, providers, users, administrators and custodians of the data. Users may consist of the public, business entities, value-added resellers and particularly government agencies.

Access networks and technology are required to facilitate the sharing of data from one node to another. Before the advent of SDI, data sharing was conducted by physically moving the data using a tape or disk. Policy is fundamentally required to provide legal protection, direction of use, development and regulation of use. In non-federated countries, SDI policy is issued by national governments to ensure national compatibility for all government agencies at all levels. In federated countries, each state has its own policy. SDI is to be combined at the provincial or national level.

Important data placed in an SDI is typically the fundamental dataset, and there are variations among countries regarding what constitutes this dataset. Generally, it consists of a geodetic control network, administrative boundaries, topography, geographic name, hydrology, road network and land use. In many cases, land parcel maps are indispensable but may not be part of the fundamental dataset. Each sectoral application may define additional datasets in this category to fulfill its specific needs. However, it is essential that all involved parties at all government levels are able to access the fundamental dataset.

- **SDI for spatial planning and disaster management**

A major goal of application of spatial data is to support the planning process. It is generally agreed that 80 per cent of the decisions made at the urban level involve some aspect of location, including spatial planning. Spatial planning is an inter-agency cooperation that requires an efficient function of spatial data access and sharing. Among the potential benefits of SDI supporting spatial planning as identified by, for example, are:

- Reducing duplication in data production, thereby reducing cost
- Facilitating platforms for better-informed decision making
- Improving data availability and accessibility
- Facilitating public participation to response to increasing collaboration among relevant government agencies.

Reducing duplication in data production can be achieved, as the information regarding the available data is known to the other parties. SDI at the local or municipal levels will enhance spatial planning at the local level as well as at the higher level.

On the disaster management, recent examples from large-scale disaster occurrence have provided lessons on the importance of having a good SDI in place. It is required during all stages of the disaster management cycle: emergency response, reconstruction and rehabilitation, preparation, and disaster mitigation. The specification for each stage is different, especially related to the immediacy of access. SDI equips potential users with knowledge regarding whether the required

data exist, where the data reside and how to obtain them. Emergency response is time-critical, while mitigation phase in disaster management is not a time-critical activity. However, timely and compatible data are required in both activities.
SDI is an information infrastructure. It could also work as a proper framework in synthesizing disaster response elements as well as facilitating making decisions for the management of disaster as depicted in Figure3-8. By developing an SDI model for a disaster management society, and by using related data and communication technologies (ICT) in disaster management, there is the possibility of taking better decisions and raising the effectiveness influence of all sorts of disaster management measures from mitigation to preparedness, response and recovery stages. The consequence of such great decision-making then can explicitly help the sustainable development of the jurisdiction or society with respect to social, economical and environmental development (Figure3-8).
Inside such a framework, we need to understand that, the challenge of planning, building, implementing, and maintaining an SDI uses various rules and needs the inspection of various reasons and things related to the theoretical, technical, socio-technical, political, institutional and economic viewpoints. As a result, it is vital that those who make decision in disaster management community recognize the importance of these reasons as well as the necessity of human and societal issues that help the achievement of SDI progress. It should be noted that these factors and issues have to be known in long-term to attain sustainable and progressive development of SDIs for disaster management environment.

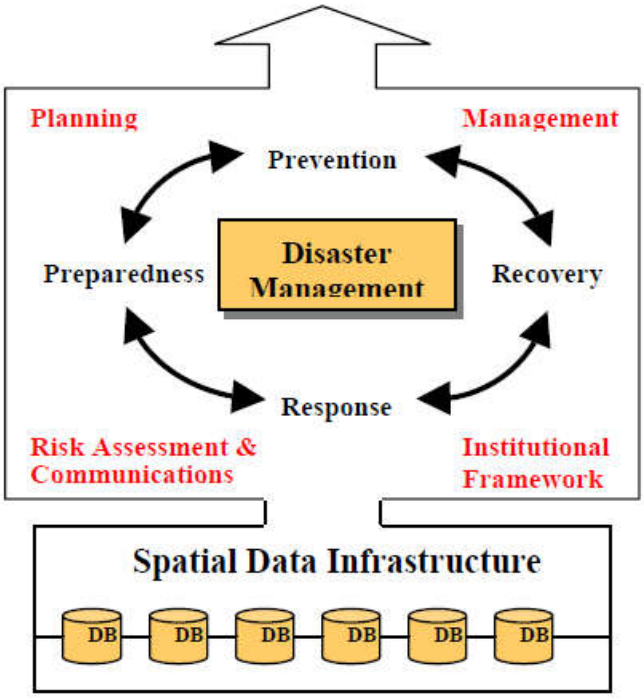


Figure 3-10 SDI to Facilitate Disaster Management

For the emergency response, the spatial data are ideally available in as little time as possible, and with high currency, while the accuracy may be at the lower level. Conversely, during the preparation stage, the accuracy is highly important, while immediacy is not as urgent. In this respect, SDI for disaster risk decrease has to be accurate, serve all stakeholders and provide detailed information.

3-7- **Institutional Development for Integrated Approach**

As aforementioned, an effective way for integrated approach is to raise awareness so that people understand how to define and measure the problems at the initiate stage and agree on the follow-

up alternative solutions. How we perceive the human relations with the natural hazards may affect how we deal with the associated disaster problems. Therefore, in order to achieve a common awareness and prejudgment before the potential risk becomes reality, institutional development as a strategy is necessary for both the spatial planning and disaster management spheres.

Many researchers view institution as being different from organization (Hoek, 1992; Healey, 1999). Organization is defined as structures of recognized and accepted roles, while institution is regarded as 'stable, valued, recurring patterns of behavior' or 'enduring regularities of human action in situations structured by rules, norms, and shared strategies, as well as the physical world'. Israel defined institutional development as 'the process of improving the ability of institutions to make effective use of the human and financial resources available'. In one way or another, institutional development has been advocated both in spatial planning and disaster management for involving more inclusionary approaches to integrative policy.

From a perspective of institutional development, the integrated urban disaster management has to be embedded in the social context or social networks in order to gain the support and cooperation of the public. Good performance of institutions on in urban region rests with common public awareness as well as good urban governance concerning political and administrative elements. Healey has reviewed spatial planning as a field of public policy and perceived that the quality of space depends critically on local capacities for managing various conflicts of urban activities.

She suggested that the organizational capacity building in governance should provide a structure of challenges 'hard infrastructure' to limit and change major centers of power (i.e. rights, duties and competence),and a relation-building 'soft infrastructure' via which attaining proper agreement and mutual understanding may happen ibid, p200). In Healey's view, spatial planning cannot exist apart from the world of economic activities, social life and the natural environment.

In many countries, the administrative structure for disaster management and spatial planning has existed separately at national, regional and local levels. This to some extent creates a kind of administrative inertia to cooperatively deal with disasters. Integration of disaster management with spatial planning thus demands a broader societal framework within which there is a need for significant changes to existing administrative systems concerning disasters, land use, and related resources. Such change should facilitate the interactions between different stakeholders within the spatial planning and disaster management spheres with divergent interests.

However, alteration of conventional or established views, whether in spatial planning or disaster management, is not easy. In fact, it is a complex and controversial process which is fully backed by 'political will', 'appropriate information' and 'adequate administrative and managerial capabilities'. Hoch pointed out that 'plans are more likely to be successfully implemented when they are based on shared beliefs, especially beliefs that are acquired through efforts to build consensuses. In other words, integrating disaster management in spatial planning requires a paradigm shift of planning process towards more consensus building, participation and collaboration.

Klein also encouraged planners to use consensus-building strategies to improve collaboration among citizens and interest groups. He put forward 10 consensus-building principles including: (1) involve interest as immediately; (2) tailor the process; (3) be inclusive; (4) identify and nurture shared interest; (5) share credible information; (6) provide impartial and collaborative leadership; (7) consider using professional help; (8) maintain momentum; (9) validate results; and (10) involve the media (ibid, p430-438).

In this study, consensus building is regarded at two levels: professional level (especially between spatial planners and disaster managers) and public level (among public officials, developers, property owners and citizens). Professional consensus is the priority of this research. Professional consensus building leads to the technical support for strategic policy formulation and action programming while public consensus building assists policy making and successful implementation. During the decision-making process, in order to emphasize a more continuous interaction among government, multidisciplinary experts, business and citizens by consensus building, the following key issues need to be paid attention:

1. New concept formulation and acceptance at strategic level.

Planning at strategic level (i.e. master planning, comprehensive planning or land use planning) normally covers a wide range of objectives. The guiding principles, location selection and preservation framework have to be put forward with the consideration of disaster risks in the contents of strategy. The analysis and formulation of space for achieving safe place based on the local context needs the public involvement and motivation. The main purpose is to arouse public and professional attention and achieve the agreement of stakeholders with different interests so as to provide a broader framework for urban resilience at the strategic level. Such agreement includes disaster risk problem definition and understanding the goal of using disaster management as an element for ensuring quality of space. Spatial planners and disaster managers need to work together at the outset of plan-making process to offer better information and new theory to emphasize the importance of urban disaster management.

2. Regulations and rules at action level.

Zoning and subdivision regulations of land use are common tools for plan implementation. Many property owners and developers might be affected by these regulations. In order to make their individual purposes consistent with the official plans, collaborative communication is needed before regulation is enacted, as well as public education.

3. Organizational structure.

Overlapping and often undefined responsibilities make implementation difficult even though some good ideas are brought forward. Accordingly integrating disaster management in spatial planning is unlikely to be viable unless institutional barriers are removed and institutional incentives are in place. The functions of spatial decision-making and the management of disaster need to be linked and their administrative responsibilities need to be clarified. Disaster management needs to have more power and responsibilities for disaster impact evaluation and control, and spatial department needs to have more duty to space protection and land use control against hazards. A vulnerability assessing system needs to be established and used as a tool for plan appraisal and evaluation of implementation. This is a continual process of organizational restructuring or institutional capacity building for spatial organization.

3-8- **Conceptual Model for Integrated Approach**

What can spatial planning do for disaster management in order to promote sustainability and resilience policy for urban disaster management could be classified as ‘reactive’ and ‘proactive’, or ‘sect oral’ and ‘integrated’. A ‘reactive’ policy is one which is taken after events happen while a ‘proactive’ policy refers to one which is seeks to alter the course of events before adverse events happen. Reactive approaches take measures when problems occur and hence need a large amount of investment to correct the prior damage. On the contrary, proactive approaches intend to prepare for and avoid the potential damage.

The ‘sectoral’ policy often tackles the problems within a single department while ‘integrated policy’ emphasizes the early involvement and substantive consideration among different departments. Consequently integrated approaches advocate more cooperation in the formulation of development plans and projects than sectional approaches. Figure 3-9 shows four groups of policy and approaches by the combination of these two trends: (I) Reactive-sectional; (II) Proactive-sectional; (III) Reactive-integrated; and (IV) Proactive-integrated.

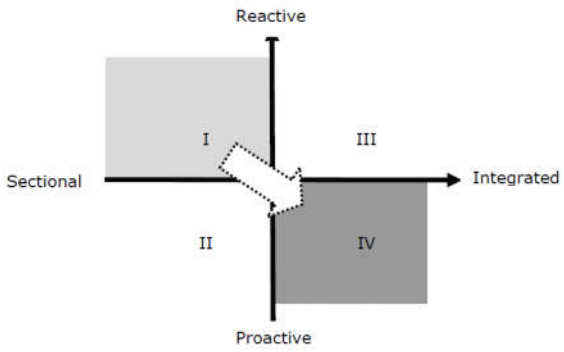


Figure 3-11 Conceptual Models for Integrated approach

As analyzed above, the effect of many hazard problems (flood, landslide, earthquake etc.) is often invisible at the outset. In addition, the negative impacts of human activities are not limited to the locality where the activity takes place, but adversely, they often spread into a larger area and are prolonged. These lag-effects normally make reactive-sectional approaches dominating disaster management field and spatial planning spheres. But when disasters happen, it is always too late to make up a deficiency. Therefore, to attain adequate capability to give order to and reduce hazards effect along with urban areas, proactive-integrated plans and approaches need to be enhanced. In this regard, plan-making needs to take consideration of opinions from professional experts in different spheres and the opinions from citizen participation.

Chapter Four

Characteristics of spatial planning system and disaster management process in Iran & Mashhad

Chapter Four: Characteristics of spatial planning system and disaster management process in Iran & Mashhad

This chapter reviews the development of the spatial planning system and disaster management in Iran and Mashhad metropolitan. The transitional trends and institutional reforms in both fields are examined. Here, at first are discussed demographic, political, socioeconomic and geographical structures of Iran and Mashhad . Subsequently, is discussed Iran spatial planning generally. It includes contemporary urbanization process and spatial planning system. Some ideas are for policy challenges to integrate disaster management in spatial planning that has been put forward.

4-1- **Geographical, Social, Political, and Economic Structures of Iran**

4-1-1- Geographical Structure

Iran has 1,648,195 km²area. It is located in the north of the temperate zone, between latitudes 25° 03' to 39° 47' north and longitudes 44° 14' to 63° 20'east. It shares border with Turkmenistan (1205 km), Azerbaijan (759 km), Armenia (48 km), and the Caspian Sea (765 km) on the north, Afghanistan (945 km) and Pakistan (978 km) on the east; the Persian Gulf, the Strait of Hormuz and the Gulf of Oman, (2045 km) on the south and Iraq (1609 km) and Turkey (511 km) on the west. In general, the borderline (land and water) of Iran is approximately 8865 km.

Iran is mainly characterized by arid or semiarid climate with subtropical climate across the Caspian coast. As to the elevation extremes, the lowest point is-28 m in Caspian Sea and the highest point is 5671 m in Damavand Mountain. This country is rich natural resources such as oil, natural gas, chromium, coal, manganese, copper, iron, zinc, lead and sulfur. Of the primary natural hazards threatening Iran are sporadic droughts, sandstorms, floods, dust storms, , and earthquakes, with the latter posing a major threat. Recently, there have been two severe earthquakes in the city of Bam (in the south) and city of Rudbar (in the north) which took the life of thousands of people. In the map of Iran (Figure 4-1) you can see the its major cities as well as national borders. As can be seen, Mashhad city, as the case of this study, is situated in the north-east of Iran.

Figure 4-1: Iran position

4-2- **Population and Social Structure**

Iran, similar to many countries in Asia and the Middle East, has experienced a rapid population growth in the last six decades. The total population of this country increased from 18.9 Million in 1956 to 75.2 Million in 2011 with a population growth rate of 1.29 percent in 2011; however, this growth rate was not uniform in rural and urban areas. Despite a growth rate of 2.14% in urban areas, the rural areas witnessed a -0.60% decline in population growth. With Compared to many developed and developing countries, this figure is relatively high, but it has dropped during the last decades (Statistical Center of Iran, 2011).

Year	Total Population	Total Population Growth Rate	Urban Population Growth Rate	Rural Population Growth Rate
1956	18,954,704	-	-	-
1966	25,788,722	3.13	5.02	2.13
1976	33,708,744	2.71	4.93	1.11
1986	49,445,010	3.91	5.41	2.39
1991	55,837,163	2.46	3.47	1.21
1996	60,055,488	1.96	2.95	-0.64
2006	70,495,782	1.61	2.74	-0.44
2011	75,149,699	1.29	2.14	-0.60

Table 4-1: Population Changes of Iran (1956-2011)

The rate urbanization has been rapidly due to migrating rural area to cities. With the deteriorating living conditions, many people in rural areas were forced to migrate to cities in search of employment opportunities. An analysis of urbanization in Iran during 1956–1976 and 1976–1996 can provide several implications:

- First: the urban population of Iran rose from 5.9 million to 15.9, then 36.8 million over 40 years.
- Second, with respect to the hierarchy of urban settlements, there was only one city in 1956, four in 1976 and nine in 1996, which accommodated over half a million people. This indicates a huge gap in the hierarchy of urban settlements.
- Third, there was an increase in the number of metropolitans (which is defined here as the cities with a population of at least 250,000) from 3 to 8 and then 23 with their share of the urban population rising from 31.6% to 47% and then 61.3% of the total urban population of Iran.
- Fourth, there was a surge in the number of medium-sized cities (defined as cities with a population of 100–250,000) from 15 to 36, but their share of total urban population dropped from 42.5% to 5.4% to 13.9% in the period of 1956–1996. This suggests that medium-sized cities were not the main destinations of rural and urban migrants and they preferred to move to large cities which promised greater opportunities.
- Fifth, there was a growth in the number of small cities (population less than 100,000) from 190 to 533, though it was accompanied by a decline in their share of total urban population from 49.1% to 31.3%.

According to the 2011 national census, there are 20,703,953households in Iran, which considering the total population of Iran (75,149,699), each household consists of 3.6 members. with a life expectancy of 74 years for every Iranian. Other demographic features and social structure are shown in the following Figures (Statistical Center of Iran, 2011):

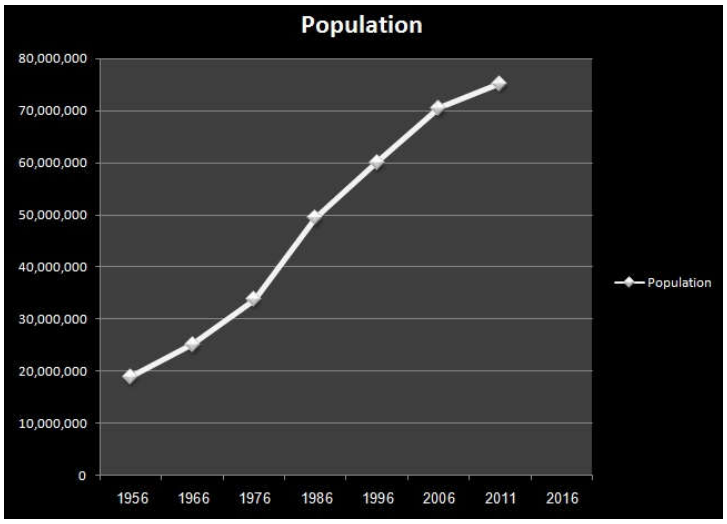


Figure 4-2: Diagram of population of Iran (1956-2011)

Age Structure: 23.40% of Iranians are less than 14 years old, 70.90% are between 15 to 64 years, and 5.70% are above 65 years.

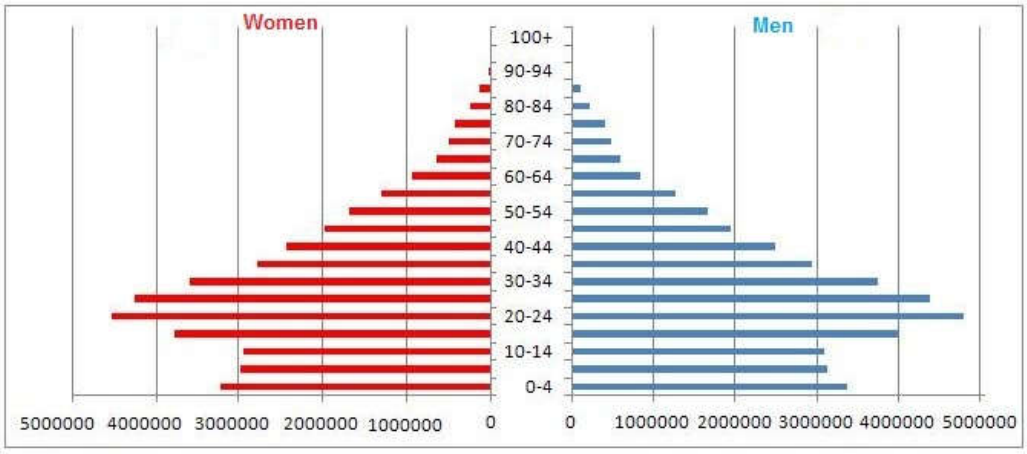


Figure 4-3: Midyear Population by Age and Sex Iran 1390

Ethnic groups: Iranians are dominated by Persian, but there are other ethnic groups such as Azeri, Gilaki and Mazandarani, Kurd, Arab, Lur, Balouch, Turkmen—in the order of their population share—.

Language: As the official language of Iran, Persian (Farsi) is spoken by the majority of people. . There are also other major languages such as Azeri in the northwest (Azerbaijan and Ardebil provinces), Arabic in the southwest (Khuzestan), and Kurdish in the west (Kurdistan province). Turkmeni, Luri, Mazandarani, Gilaki, Balouchi are other minor languages and dialects spoken in Iran.

Religions: Muslims constitutes a 99.43% majority in Iran followed by Christian (0.16%), Jewish (0.01 %), and Zoroastrian (0.03 %,) and other creeds (0.37%).

Literacy: The Statistical Center of Iran (2011) defines a literate person as someone aged 6 and over with the ability to read and write. The literacy ratio is 93.2% in total population (Statistical Center of Iran, 2011).

4-3- **Government and Political Structure**

The political structure of Iran has been based on Islamic Republic since 1979 (after Islamic Revolution), with the Tehran as the capital. . The most recent administrative and political divisions have introduced 31 provinces. In Iran, the politics and government are organized within the Islamic framework. Constitution of Islamic republic of Iran has been defined in 1979. Also its amendment has defined in 1989.

Supreme Leader

According to the principles of governance in Islam (Velayat - al - amr), the Constitution allows for the leadership of a Faqih (Jurisprudent) with qualifications such as scholarship, piety, sociopolitical prudence, bravery, determination, and administrative techniques for leadership. Thus the Vali-e-Faqih (Supreme Jurisprudent) is one who supervises and correlates Government policies with divine decrees. The election or dismissal of the Supreme Leader is determined by an Assembly of Experts in keeping with the qualifications and popular esteem. This Assembly is also in charge of monitoring the legal actions of the Supreme Leader.

Assembly of Experts

The Assembly of Experts, which consists of 86 members who are elected by popular vote for an eight-year terms, is in session at least twice a year. Its members mainly include prominent jurists and scholars in the Islamic jurisprudence. In addition to drafting the Islamic Republic's Constitution, the Assembly is responsible for appointing the proper candidate for the post of Velayat Faqih. The Supreme Leader is selected by the Assembly, which has the constitutional power to remove him from power at any time (Mansour, 2004; Iran Trade Point Network, 2008).

City and Village Councils

The establishment of City and Village Councils has been the most recent development in the political system of Iran. . According to Article 7 of the Iranian Constitution, the engagement of citizens in decision-making is main perquisite of a participatory system. To ensure the popular participation, this Article introduces several popularly elected consultative councils. . As such, in February 26 1999, the first national election of city, town and counties was held, which for many Iranians is seen as one of the most important socio-political events of Iran.

As the agents of transparency, these Councils have various functions including the monitoring and auditing of the revenues and expenditures in the municipalities; approving loans given and taken from municipalities; endorsing or rejecting Articles of Associations or other legal issues of companies and institutions associated with the Municipalities, electing mayors; investigating socio-cultural, economic, educational, health, , and welfare demands of their constituencies; planning and organizing national participation in the execution of socioeconomic, constructive , cultural, educational and other matters. In this section, we will discuss the function of the City Councils in the spatial planning. An analysis of this subject will be provided in section chapter five.

Three Sovereign Branches of Government

In the Iranian Constitution, the power id distributed amongst Executive, Legislative and Judicial branches, which are structured as followed (Mansour, 2004; Iran Trade Point Network, 2012):

Executive Branch

According to the Constitution, the president is the highest state authority after the Supreme Leader. The President, elected by the direct vote of people for a four-year term, can extend his/her term for another four years. As required by the law, the presidential candidates ought to be Iranian nationals with a good record and reputation for piety and honesty. The President, as the Head of the Council of Ministers, is directly in charge of planning and budgetary affairs, which can be delegated at the President's discretion. The cabinet consists of some twenty one Ministers who are approved individually by the Parliament and should be accountable for their actions. Each Minister can be rebuked by the Parliament, which has the power to remove Ministers at any time.

Legislative Branch

The Iranian Parliament, also known as the Islamic Consultative Assembly, (Majlis-Shora-e-Islami) comprises of 290 candidates that represent various constituencies. The Majlis is responsible for drafting legislations, endorsing international treaties, and approving the national budget. The Constitution allows for an increase in the number of Majlis candidates every 10 years if necessitated by demographic, political, geographical or other factors" with a maximum number of 20 seats for every 10 years. Majlis Elections are held every four years and sessions are administrated by a governing board that consists of a Speaker, a First and Second Deputy Speaker, a Secretary and two Board Members. Majlis has 22 permanent committees that monitor a variety of affairs including governmental and socio-legal activities as well as accounting and public petitions.

Judicial Branch

In Iran, the Judiciary Ministry acts independent of the executive and legislative branches.The Minister of Justice is just the link between the Judiciary and the other two branches. The head of Judiciary is appointed by the Leader for five years tenure. As stipulated in the Constitution, the head of the Judiciary should be a just jurisprudent that is cognizant of judicial affairs resourceful and possess managerial skills'.

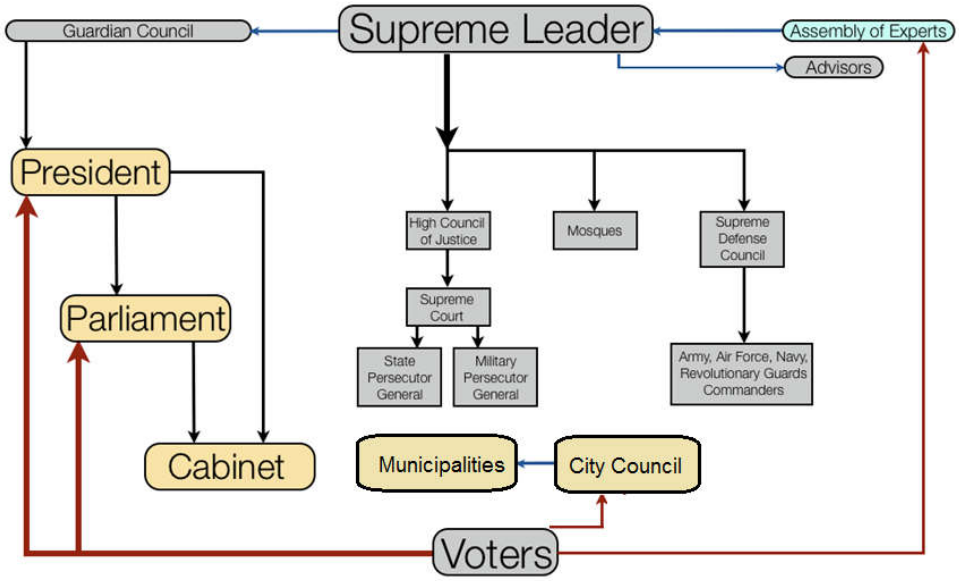


Figure 4-4: Political structure in Iran

4-4- Economic Structure

As to the economic structure, Iran has a so called transition economy in which the government struggled with a strong labor force of 23.5 million people in 2011.Accordingly,to keep the annual economic growth of above five percent, Iranian job market should be able to accept more than 900,000 new labor force each year. In reality, however, the economic growth rate of Iran was -1.9% in 2011 (Central Bank of the Islamic Republic of Iran, 2012).

According to the statistics, Iran's Gross Domestic Product (GDP) amounted to $US168 billion in2011, is estimated to reach $US 481 billion in this year. Petroleum, which accounts for a large portion of Iran's exports, valued at $51.3 billion in 2011.As the second producer of oil and gas in the world, Iran's non-oil exports came to $16.3 billion in the year leading to March 20. That is, 7 crude oil and gas constituted 76.1% of Iranian export with the non-oil export merely accounting for 23.9% of exports in 2011.Nonetheless, the government intends to reduce the share of oil in export through economic diversification by investing revenues in areas such as artisan crafts, petrochemicals, vehicle production, pharmaceuticals, agriculture, food processing (especially sugar refining and vegetable), utilities, electronics, telecom, , textiles, cement, and other

construction materials, , metal fabrication and armaments.. Industrial commodities constitute 70% of non-oil export (Trade Promotion Organization of Iran, 2012).
Iran has huge development potential in tourism, mining and information and communication technology (ICT). Iran ranks 7th in tourist attractions, but it possess an insignificant share of global tourism trade. Further, as a main producer of agricultural products like grains, fruits, sugar beets,, nuts, cotton, dairy products, caviar and wool, Iran ranks fourth in the world in terms of the diversity of agricultural products (Trade Promotion Organization of Iran, 2012).
Iran is commonly considered as middle-income country with significant improvement in healthcare provision and education services obtained in the period of Millennium Development Goals (MDGs). In 2010, the average monthly income of a citizen was about $500 (with a GNI per capita of $13,000 in 2012). A minimum wage level is set for activities in different sectors, which is defined by the Supreme Labor Council. In 2009, this wage limit was approximately $263 per month ($3,156 per year). As reported by World Bank in 2001, nearly 20% of a household income was spent on food, 32% on fuel, 12% on healthcare and 8% on education.

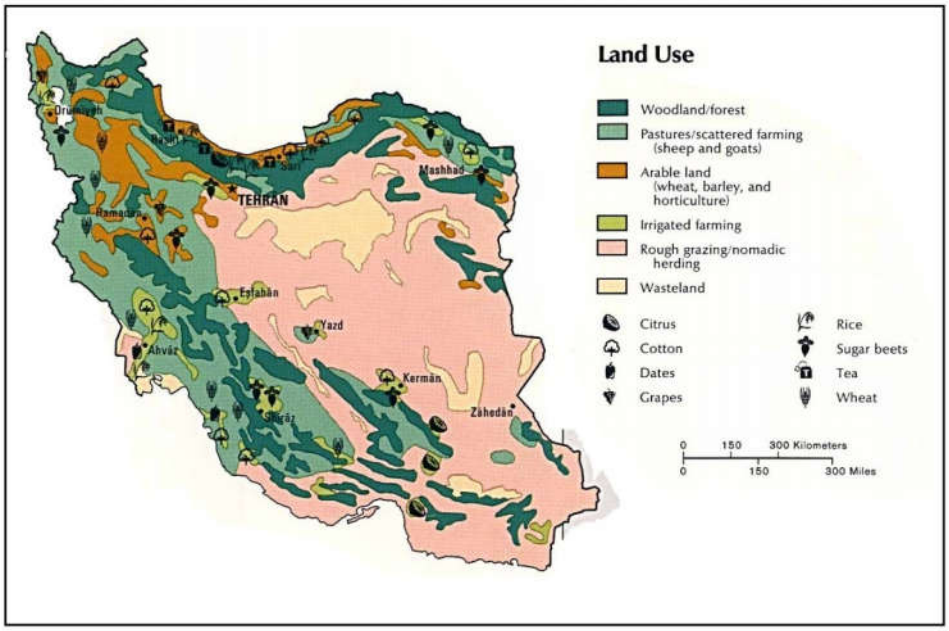


Figure 4-5 Arable land in Iran Source: Agriculture ministry of Iran 2012

In the year leading to March 20, 2008, the official poverty line in Tehran , was approximately $9,612, whereas the mean national poverty line was $4,932. In 2010, According to the Department of Statistics of Iran, 10 and 30 million Iranians lived under the absolute and relative poverty line respectively.
Also, based on reported by the Iranian Center of Statistics (2011), the unemployment rate was 12.2% in 2011, which shows a decline compared to the recent years. Nevertheless, the inflation rate surged to 31.5% in 2012 (Central Bank of the Islamic Republic of Iran, 2012).

4-5- **Urbanization Process in Iran**

General Background to the Urbanization of Iran

Urban settlement in Iran is a historical phenomenon. However, the rapid growth of urban area is a new phenomenon relatively but has been experienced only within the last few decades.
Despite the invasions and natural forces that put the country under pressure, it consists of “a marked feeling for form and scale, structural inventiveness, especially in vault and dome

construction, genius for decoration with a freedom and success not rivaled in any other architecture".

This process is common throughout the world, but it is particularly interesting within Iran, as Naged points out that "first because of its precocious emergence in time, we are dealing here with almost but not quite the oldest towns in the world, and also because of the strong control imposed in the Iranian context by geographical environment." There was also, as English (1966) has noted, often a strong continuing link to the local region, as a market and a focus of services, and this could exist alongside important external trends and administrative relationships. Despite the long tradition of city life in Iran, at the start of the twentieth century the country was still an overwhelmingly rural society, with only a small fraction of the total population living in cities. But after the 1940s, the pattern of urbanization increased rapidly, and after the Islamic revolution, the process of urbanization was enhanced even further.

This rapid urban growth from the 1940s onward has been strongly influenced by:

- The exploitation of new resources (gas and oil) which established new centers of activity;
- The change in trade patterns with other countries (growing importance of the Persian Gulf and the converging of communication axes on Tehran);
- The explosion of modernity and new lifestyles within Tehran.

In terms of the population in Iran, urban settlements can be categorized into three distinct types: towns with more than 100,000 inhabitants, small towns of less than 25,000 inhabitants, and medium-sized towns of between 25,000 and 100,000 inhabitants (SCI, 1985). This categorization is still applicable, however, migration as well as a high birth rate has increased the number of many small and medium-sized cities dramatically. Plans to manage urban sprawl and take control of urbanization became a top agenda item for the government from the early 20th century, and these are explained below. In order to understand the nature of urban policy in Iran, it is necessary to review quickly the history and characteristics of the planning system. Two important periods can be identified for the history of urban development in contemporary Iran: before and after 1979 (which are in fact pre- and post-Islamic revolution).

- **Mechanism of Urban Growth**

Although the natural growth of urban population and rural-urban migration are well known as the major factors causing the growth of urban centers, there are some other minor contributory factors. Unexpectedly, in Iran, migration does not appear to be the major factor in urban growth, as the natural rate of growth is more effective than migration (ibid). Opportunities which attract migrants are not evenly distributed amongst the urban regions. Some places are more attractive to rural migrants than others, and as a result, the pattern of the distribution of urban population has tended to become geographically unbalanced. The way in which Iranian cities are changing reveals a series of dynamic trends which may result in a more even distribution of urbanization throughout the country.

Government policies and regulations are important for urban growth, the housing market and economic feasibility. The spatial structure of cities is one of the bases for the location of services and houses, and can be divided into three distinctive periods: the pre-Islamic period, the Islamic period, and the contemporary era. These periods differ in terms of their dominant ideologies, technologies and economic conditions; each of them has left their mark on the present spatial structure of the cities, but to various degrees. What is relevant to this thesis is that the last century's alterations and impacts created a new form of supply and demand. The international style of architecture and urban design in recent years has been the most influential factor in the cities.

Up until the early 1930s, when new road projects began and new urban legislation was introduced, the location of activities reflected the dominance of commercial, defensive and social satisfaction factors. The proximity of some land to the bazaar, local centers and the city's cold water wells have produced advantages for certain land plots. Because of the economic and

administrative weakness of central government prior to the 1930s, the location of government offices had less effect on the location of activities (ibid).

After the 1930s, population expansion, physical growth, road projects, the importance of the state, more security and a decrease in the importance of social stratification based on religious, tribal and occupational ties considerably changed the location of activities. Firstly, the construction of roads and physical growth resulted in the concentration of business premises alongside the newly-built roads, and consequently increased land prices in the vicinity of these roads. Secondly, the bazaar lost a considerable amount of its production function to industrial producers in Tehran and other cities, due to imports and to the newly introduced banking system (ibid). The bazaar's function as a shopping centre was also threatened by shops alongside the streets which developed in town centers. The reduction in the bazaar's economic importance was accompanied by a relative reduction of land prices in those areas. However, it did not last long, as at the present time not only is the land by the bazaar expensive, but also all of the land beside roads.

Thirdly, the government's growing presence at the urban level resulted in it making decisions about particular locations, which had a considerable impact on land prices, and thus on land-use patterns. Initially, government offices were located near city centers, but after the 1950s, with the massive expansion in the size of the state and in the number of functions undertaken, government departments and related organizations and institutions became more conscious of their locations and deliberately moved to the more affluent parts of the cities. Large plots of land outside the cities went under construction, and this created a new social class, who were mainly government employees and were looking for a medium but modern architectural style of buildings (ibid). This, in a way, was responsible for the urban development pattern, as it produced a potential demand for business activities, and consequently a number of shops, especially retailers, who preferred to acquire premises near them.

Fourthly, changes in the basis of social stratification decreased the importance of neighborhoods and led to the movement of more prosperous households into newly built-up suburban areas. Finally, essentially, industrialization based on import substitution reinforced the process of the concentration of activities, and led to a more rapid expansion of the urban population in the largest cities, particularly the capital city, Tehran, and the centers of Iran's engineering industry, like Isfahan. This exerted pressure on certain activities to move out of the centre, resulting in shifts in land-use, e.g. residential areas changed into commercial areas, producing mixed land usage, embracing functions of a higher order such as shops, offices and hotels, as well as usage by immigrants who took over the vacated houses creating multi-family dwelling units, and sharing the rent.

The creation of satellite towns for industrial decentralization around Mashhad, like Golbahar and Binalod, or even around large provincial cities, were reflected in the setting up of industrial areas which were completely separated from the cities. This new dimension (for the time being) of urbanization, the deliberate policy of creating industrial satellite towns, or even the increasingly marked trend towards establishing activities beyond the cities‟ comprehensive plans‟ 25-year growth boundaries, entail the creation of veritable urban regions (Ministry of Rod and Urban Development, 1976). During the 1960s and early 1970s three major laws enabled the government and local authorities to acquire the required land for housing and urban planning and service programs:

- The Land Appropriation Law of 1960, which granted compulsory purchase power to the government and local authorities.
- The Urban Development and Redevelopment Law of 1968 allowed municipalities to acquire land required for public services, redevelopment schemes and street widening. It supported the provision of comprehensive plans and determination of city boundaries.
- The Plan and Budget Law of 1972, which ensured reasonable land prices.

In the early aftermath of the revolution, a large number of pieces of land in the cities and suburban areas were simply appropriated by people. In addition, the government endeavored to satisfy people on low incomes in the urban areas by allocating land to landless people, which caused a

big wave of migrants towards the cities. It did not stop there, as the Revolutionary Housing Foundation (founded in 1979), under the Islamic Revolutionary Housing Fund, allocated 125,000 plots of land to underprivileged families and helped them to become homeowners (ibid). Though this encouraged the price of land and housing to decrease dramatically, it caused a massive number of migrations to the cities from rural areas.

According to the Urban Land Law of 1982, the Urban Land Organization (ULO) was established to address issues relating to land ownership, supply, allocation and preparation for housing in urban areas. Expansion of settlements inside and around the city boundaries required services, electricity, water etc. To allocate and provide public urban facilities, the Urban Land Development Organization (ULDO) (founded in 1979) became responsible for granting building permission for the plots which were subject to the Deserted Urban Land Expropriation Law 1979 (ibid). According to this law, urban land is put into three categories; virgin, derelict and developed land.

The government or the municipality has the right of compulsory purchase of the third category for building public facilities and other urban planning schemes. Land in this category that can meet certain criteria should be granted permission for development, and the rest can be allocated for urban public services according to the demand of the urban comprehensive and detailed plans. However, the Urban Land Law was amended in 1984 as a result of pressure from landlords (ibid). This helped to decrease the land supply, but because of the financial problems of government organizations, they could not play an important role in housing construction and supply.

Other public development agencies were, and are, also allowed to take advantage of this land for official purposes. Housing cooperatives and developers who accept working under the supervision of MRUD are allowed to apply for land from ULO. The most recent group of cooperatives/ developers has to follow the regulations of MHUD in terms of the quality and quantity of buildings, the sale price, and the preparation process. The process involves the state, banks, and perhaps private construction firms working together according to the city master plan. For instance, banks can purchase designated land from ULO, select consultants who fit the MRUD criteria, commence building work, and after completion, sell it at not more than 7% profit to eligible applicants (ibid). However, there are other factors such as regulations and taxation which have an impact on land value in urban areas.

- **Urbanization Changes in Iran**

Urbanization process in Iran, as some other developing countries, has been faced with a rapid growth during the last five decades. It was due to increasing a high rate of population and wide migration of rural population to the urban area. On the other hand, increasing the number of cities is other reason.

While total population of Iran has increased from 25.7 Millions in 1966 to 75.2 Millions in 2011, the urbanization ratio has increased from 38 percent in 1966 to 71.1 percent in 2011. Moreover, the number of Iranian cities has increased from 199 cities in 1956 to 1331 cities in 2011. In other words, the total numbers of Iran cities have increased more than six times during last fifty years.

Indicators/ Year	1966	1976	1986	1996	2006	2011
Total Population (Millions)	25.7	33.7	49.4	60.0	70.4	75.2
Urban Population (Millions)	9.7	15.8	26.8	36.8	48.2	53.5
Urbanization Percentage	38	48	48	61.2	68.5	71.1
No. of Urban Settlements	272	373	496	612	1012	1331
No. of Cities with more than 500,000 Population	1	4	8	9	12	15
The Rate of Population Increase in Urban Areas	-	4.93	5.41	3.2	2.74	2.14

Table 4-2: Indicators for the urbanization process in Iran (1966-2011)
Source: Statistical Centre of Iran

The increasing number of large cities in Iran is the important point that creates some problems which with old and simple managerial methods cannot be confronted. The table (4-2) shows the urbanization process and the number of cities in terms of population categories respectively.
Urbanization changes in Iran have not been caused by the improvement and betterment of economic and social functions and the methods of production; rather they have been caused by the high income gap between economic sectors and the unavailability of work to rural dwellers. Therefore, whereas the growth of urbanization has not been a result of the evolution of economic and social relations and has not necessitated national development, it is not imagined as an index or criterion of development, progress arising from the economic structure.

Population Categories	Number of Cities/ Year						
	1956	1966	1976	1986	1996	2006	2011
1000 000 and over	1	1	1	2	5	6	8
500 000 to 1000 000	-	-	3	6	4	6	7
250 000 to 500 000	2	5	4	8	14	13	14
100 000 to 250 000	6	8	15	25	36	51	56
50 000 to 100 000	9	15	22	46	60	70	81
25 000 to 50 000	22	30	45	67	94	102	103
10 000 to 25 000	56	72	109	145	166	206	292
10 000 and lower	103	141	174	197	233	558	770
Total (Iran)	199	272	373	496	612	1012	1331

Table 4-3: Number of Cities in Terms of Population Categories (1956-2006)
Source: Statistical Centre of Iran

Also, Cities are facing problems in their development. Some of the important spatial problems affecting the expansion of Iranian cities are as follows:

- Limiting factors, including their geographical position and the nature of the soil;
- The loss of agricultural land due to encroachment on agricultural and orchard lands.
- The apparent absence of a coherent and overall solution to the problems of transport; these problems are more apparent in concentrated cities than lower-density settlements.

Development plan documents impose restrictions on urban growth. Although they have not achieved their goals completely, they have important role in cities evolution. Arguably, as Madanipour believes, government policy, which included the "investment of public money, introduction of development policies, control of the planning system" and dramatic changes accompanied by the modern lifestyle imported into the country, caused rapid and to a large extent uncontrolled development of the cities in Iran.
The complexity of urban problems has put pressure on the government and demanded systematized urban planning. The economic boom, in line with religious-led social policy, has been the main driving force of rapid population growth and the hasty development of cities. The urban population of the country rose from 5.9 million in 1956 to 9.7 million in 1966, and to 35

million in 1998 (Statistical Center of Iran, 1998), which has had an extreme impact on the internal and external structure of many Iranian cities. The structure of institutions which formed and re-formed through time is characterized by a powerful centralized system. Although the process of urban development, national and city planning and urban regeneration is specific to this country and is a young issue, the need for sustainable urban management and planning is needed more than ever. However, in Iran, the process is characterized in a different way. In newly industrialized countries like Iran, economic and political stability can lead to comprehensively better economic growth, housing standards, education, health and the standard of living in general. However, in the case of Iran, the above ideas are not valid, especially in the housing market, because of self-sufficient and insular policies. Even post-1980s, changes to the international economy, which have liberalized trade and extensively integrated national economies with the international economy, have not had a major impact on the internal economy of Iran, as it has closed its doors to others.

- **Major Cities and Distribution of Urban Population in Iran**

According to Table 4-4, the urban population of Iran in 2006 it was nearly (8.04 times) increase than 1956.By comparison, the total population of the country during the same period (3.72 times). In 1956 just Tehran was a metropolitan city with over a million populations, but in 2006 (the last official census), there are 6 metropolitan cities in Iran nearly with seven million populations. To help to understand the population growth of urban centers, it is possible to compare the five largest cities. In the year 1956 from a total of 15 million people, 25.4% were residents of Tehran city. Tabriz city with 4.87% was the second largest city in the country. Table 4-4 Although in the following years the share of Tehran compared to the total urban population was reduced, in 2006 more than 16% of urban population of the country lived in this city..

The population increased in Tehran slower than the other major cities. Statistical Centre of Iran indicates that between the years 1986- 91, the population of Tehran increased with a growth rate of 1.84 percent per year. According to the last population census of the country in 2006, Mashhad city with 5.0% after Tehran is the second largest city of the country, the city of Isfahan with 3.3% in the third place, Tabriz with 2.9, and Shiraz with 2.5% in fourth place and fifth place. These figures indicate the situation of Tehran as an overpopulated city, which is slowly losing its absorbing power. (Statistical-Centre-of-Iran, 1986, 2006, 2011)

MAJOR CITIES	1956		1986		2006		2011	
	URBAN POP.	%	URBAN POP.	%	URBAN POP.	%	URBAN POP.	%
TEHRAN	1,512,082	25.4	6,042,584	22.5	7,705,036	16	8,154,051	16
MASHHAD	241,989	4.1	1,463,508	5.1	2,410,800	5	2,749,347	5.1
ISFAHAN	254,708	4.3	986,753	3.7	1,583,609	3.3	1,756,126	3.3
TABRIZ	289,996	4.9	971,482	3.6	1,378,935	2.9	1,494,988	2.8
SHIRAZ	170,659	2.9	848,289	3.2	1,214,808	2.5	1,460,665	2.7
TOTAL	5,953,563	100	26,844,561	100	48,259,964	100	53,646,661	100

Table 4-4: distribution of urban population in major cities
Source: Statistical Centre of Iran, National Census of Iran

As is shown in the table, while the nature and processes of urbanization differ from one city to another, Tehran (the only metropolis) has attracted most of the population in the urban system of Iran. The gap between Tehran and the second city (i.e. Mashhad) in population growth is about 11.8% in 2001 and about 13% with the third city. While Tehran has always been the biggest and the most important city in the urban system, naturally it has absorbed most of the economic, social and cultural facilities and forces for development.

However, this city has faced a decrease in its population growth rate after 1991 on. This is mainly because of its high development and education facilities in comparison to other cities; Tehran has absorbed mainly the highly educated and higher economic/social class migrants.

4-6- **Mashhad metropolitan**

The holy city of Mashhad as the capital of "Khorasan Razavi" province is 850 km from the northeast of Tehran. With an area of 204 km^2, it is at 36.20º north latitude and 59.35º east longitude at an elevation of 985m in the valley of the Kashaf River in the neighborhood of Turkmenistan. Mashhad is located between Binalood and Hezar-masjid mountain ranges adjacent to the Afghanistan and Turkmenistan borders (see Figure 1). Located in the vicinity of mountains, Mashhad has cold winters, pleasurable springs, gentle summers, and lovely autumns. Mashhad with the population of around 2.7 million (2,427,316 in 2006), around 2% growth rate , average age of 27.2 years old, age and family structure as shown in Table 4-5, and more than 15 million pilgrims and tourist that visit Holy Shrine of Imam Reza and other attractions of this city each year is the second important city of Iran. As the administrative heart of Mashhad County, Mashhad includes three town of Torqabeh, Ahmadabad and Razaviyeh at its suburb with a population of 510,000. As to the urban divisions, it consists of 13 smaller districts. Mashhad due to its excellent situation in pilgrimage, touring, commercial, agricultural and emigration power is under rapid development, especially in past 15 years and as it will be seen throughout this proposal.

Census year	Population	Rate of Growth	No. of Family Unit	Avg. Family Size	Ratio: Man/ Woman	Age Structure (%)		
						0-14	15-64	>65
1986	1,463,508	8.16	300,317	4.9	1.042	46.5	50.5	3
1996	1,887,391	2.57	408,299	4.6	1.029	39.4	56.9	3.7
2006	2,427,316	2.1	637,427	3.8	1.11	16.9	70.7	12.4
2011	2,760,000	1.9	788,600	3.5				

Table 4-5: Mashhad Population and its growth in past 20 years and its age and family structure

Figure 4-6: Topography and Geographical Map of Iran, Khorasan-Razavi Province and Location City of Mashhad

4-6-1- Urban development process of Mashhad

Until 1890, Mashhad was encircled by a city wall; but with the introduction of urban developments in Iran, the city wall was knocked down to give rise to the expansion of the city towards the west. During the urban developments, a large number of villages were attached to the city and many self-generated neighborhoods were developed as a result of urban-rural migration irrespective to the urban structure. The uneven urban development to the west left the eastern part of the city in spatially and socioeconomic seclusion, generating a loop of deprivation.

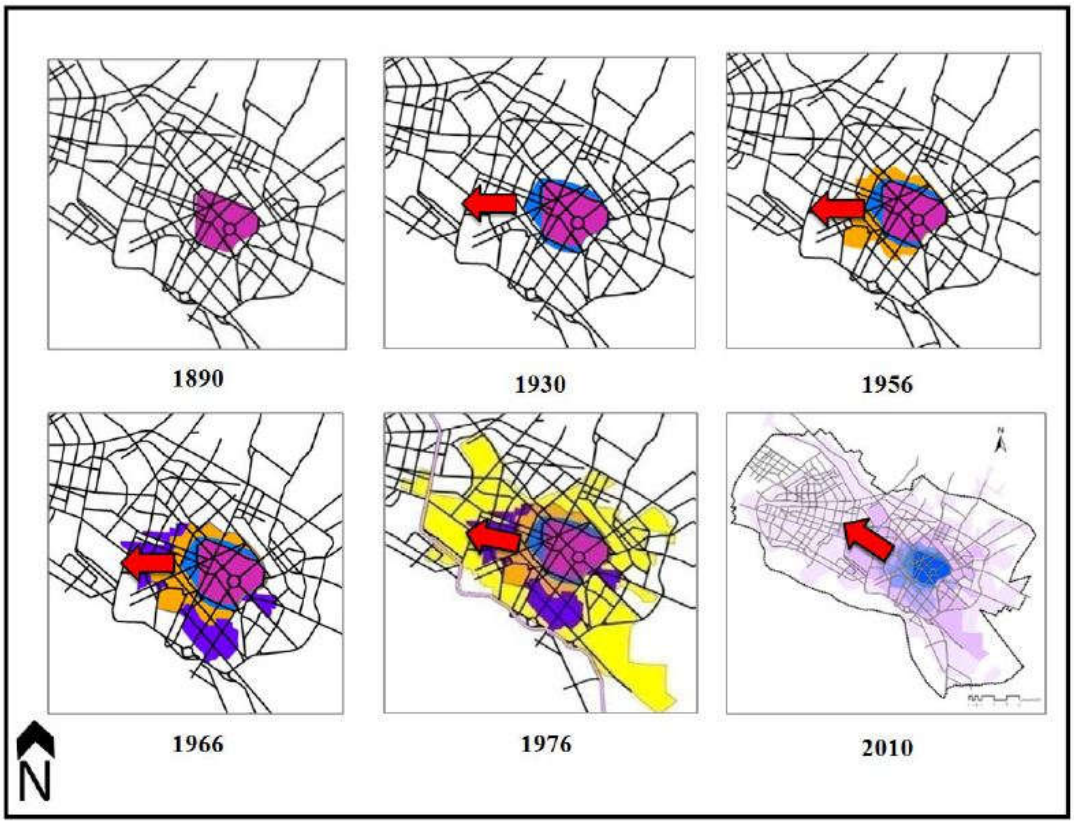


Figure 4-7: The city expansion process (Farnahad, 2009)

As mentioned, Mashhad has expanded dramatically over the past century. Its population had increased from 45,000 people in 1897 to 176,000 people in 1940, only to reach 241,000 people in 1956. In the period between 1976 and 1986, the city had a staggering growth rate of 8.16 driven by widespread migration of people from Afghanistan and Western and Southern parts of Iran (The Iran-Iraq war and the civil war in Afghanistan were the underlying causes of this migration). As a result, the population increased to more than 2.4 million people in 2006. That is, the population has increased over ten-fold over a half a century. In Figure 8, the urban population changes between 1956 and 2006 have been shown.

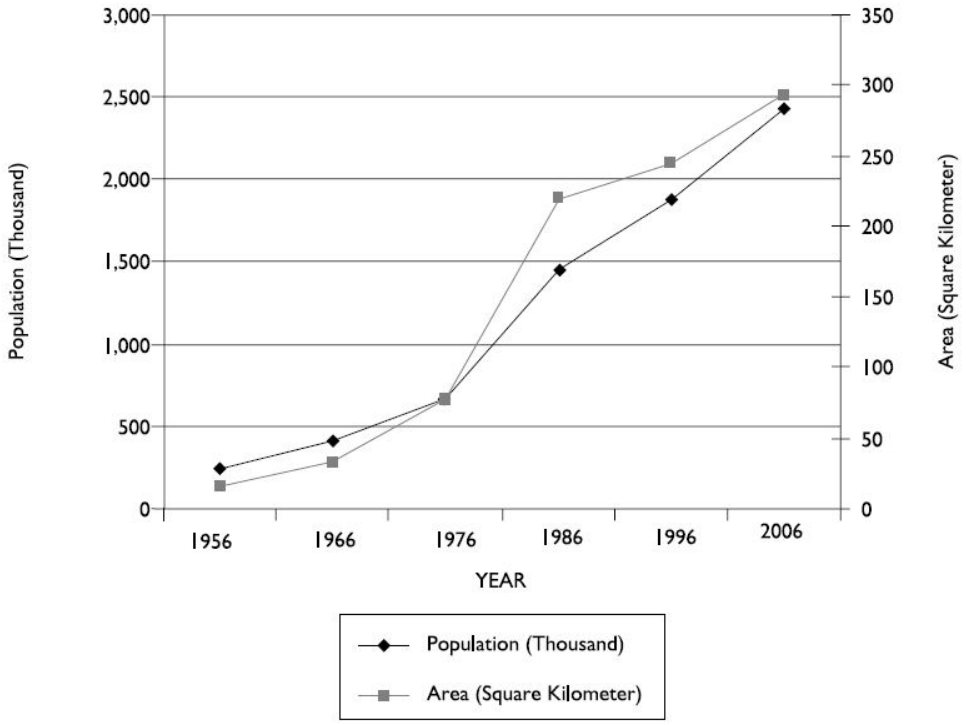


Figure 4-8 : Demographic Changes and the Physical Expansion of Mashhad

According to UN statistics, Mashhad is amongst 163 most populated cities in the world. More than 76.64% of Khorasan' population lives in 'Mashhad city. In Table 6 the population growth rate during 1956–2011 has been shown.

Census	1956	1966	1976	1986	1996	2006	2011
Population	241,989	409,616	667,770	1,463,508	1,887,405	2,430,800	2,740,727
Growth rate	2	5.39	5.01	8.16	2.58	2.56	2.55

Table 4-6: Population and Population Growth Rates in Mashhad City
Source: Municipality of Mashhad

An analysis of population statistics and the area of the Mashhad in 1956 -2006 period show that 79% of area expansion was due to the population growth whereas 21% can be attributed to the planned horizontal growth. Thus, approximately a quarter of the external expansion of Mashhad city rather than being caused by the population growth is due to the horizontal expansion of the city.

4-7- **Spatial planning in Iran**

This part firstly reviews the evaluation of the spatial planning system in Iran. So, are examined the transitional trends and institutional reforms subsequently, was examined spatial plans that including some general characteristics, the hierarchy of urban plans and its strength, weaknesses, opportunities, and threats.

The Iranian spatial planning system has suffered a flexuous course since the 1950s. It was just at the end of the 1960s when Iran started its modernization reform. Urban planning began to recover its place in society. This transformation is still in progress. In the early 1987s, Urban planning office re-established in many cities. Also, spatial planning work was emphasized again as being an important task for local government.

. The Western planning philosophy replaced the former traditional model. On the other hand, were introduced the ideas of the comprehensive study of Patrick Geddes and the radial city of Le Corbusier widely. Although somewhat outdated, established spatial planning system effect to plan-making process in many cities until now.

4-7-1- Literature review of spatial planning in Iran

Reza Shah (1925) was the first ruler who attempted to change the features of cities, based on academic plans, when he introduced assorted government Acts which encouraged rapid modernization. These efforts were mostly concentrated on physical changes in cities, including the widening of roads, the construction of government offices, the use of the international building style, and streets built in a grid pattern and squares. The first modern planning law in Iran was concerned with buildings and street widening. It was passed by parliament in 1933, reviewed in 1941 as the Street Widening Law, but was abolished in 1968 when the Urban Development and Redevelopment Law was introduced. As the title of the Street Widening Law shows, it was basically enacted to ease the process of implementing the planning of new road networks in cities, especially where this affected the old urban fabric.

Since then, the focus of the municipalities has been on growth management and physical planning. These physical changes were implemented with the consideration of new ideas, differing from the past socio-cultural function of different parts of the cities, in a revolutionary way, to promote people's culture and lifestyle. The Shah's quest for both modernization and grandeur was expressed in public buildings, reflecting the forms of "Achaemenid" and "Sassanid" architecture. Inevitably, such a radical policy led to the deterioration of many ancient and historical buildings, which could not fit into rapidly modernising cities. Municipalities were given the responsibility of imposing urban policies.

In this period, urban policy was in fact used as a practical mechanism for controlling and directing urban development, which could not compete with the rapid growth of population and land speculation. Massive injections of finance to the industrial and development sectors of the economy and a different fiscal policy than in the past affected the housing construction industry and caused the prices of land and housing to reach the highest levels of that time, and speed up the growing squatter settlements. The spread of satellite settlements around the cities turned out to be the major characteristic of modernization, and the major weakness of planning control on the urban environment. According to international declarations, these informal settlements are a reflection of poverty and lack of success in formal market operations and governmental policies, and pose a serious threat to the unity and sustainability of cities.

The common features of irregular and spontaneous settlements in the suburban areas, predominantly of larger cities, are:

- "Hurriedly constructed settlements, often built by their final occupants without a construction permit outside the scope of the formal planning, created irregular compounds;
- Concentration of disadvantaged or deprived groups … physical segregation;
- A housing with low quality of life with extremely insufficient urban services, derelict infrastructure and high population density" (MHUD, 2004, p.35).

This movement was so fast that local councils could not provide the public facilities and urban infrastructure to keep up with the needs of the new areas.

However, the National Development Plan (1951) was the first scientific rational planning document in Iran. The first National Development Plan, produced for the period 1951-1955, was only implemented for two years due to the nationalization of the oil industry and subsequent economic changes. The plan did focus on agriculture, housing, provision of water and electricity. The main strategy of the second plan (1955-1962), was also to encourage agricultural development and modernization while concentrating on transportation and communication. The third plan's duration was five years, from 1963 to 1967. At this stage, urban development and housing were seen as two independent and separate subjects in the whole plan, with a limited share in the budget.

The establishment of the Town Planning High Council (TPHC) in 1972 had the aim of providing legal bases for planning procedures, and put forward a clear definition of comprehensive plans, detailed plans and master plans. These are colored maps and regulation handbooks which give certain details about the city development pattern. They differ in the degree of detail they provide for building density, road widths, and the use of land. The master plan, in its most general form, indicates the overall development policy, whilst the comprehensive plan includes more specific guidelines regarding housing density, the percentage of land occupancy or transport roots.
A detail plan is specific about certain neighborhoods or projects, and it gives details of how a project should be designed. Although, in the pre-revolutionary period, the TPHC was the only main decision-making body which could approve the comprehensive plans, after further reorganization part of its authority was divided between provincial authorities. However, the decisions on the decentralization and distribution of planning activities, and also the preparation of general regulations and criteria for urban planning, remained in the hands of the TPHC.
The financial resources of the Fifth Plan (1973-1977) dramatically increased due to the rise in the international oil price (ibid). But the main strategy of the plan - influenced by the government's national policy - was devoted to defense, whilst the percentage share dedicated to the urban development and housing sector was reduced. However, in this era, the city was considered as an economic tool for the rapid modernization movement, ignoring its socio-cultural elements. The government tried to institutionalize all such policies through amending a set of rules, and the municipalities‟ empowerment, giving them more abilities and autonomous functions (ibid).
The first spatial plan was proposed in 1974 when the Ministry of Housing and Urban Development (MHUD) was established. The plan set the spatial structure of the country, considering the resources and potential of urban and rural areas, and at the same time it was based on, and aimed at, the objectives of the national economic plan. It also considered the present and future town and city plans and growth. Therefore, the urban plans were to be produced in line with the national spatial plan, and it was the Planning and Budget Organization's (PBO) responsibility to put institutional powers into practice.
To reduce the pressure of migrants to Tehran, and the distribution of the population to other regions, the pre-revolutionary government decided to encourage this outward migration. Master plans were prepared for nine large cities, for a 25-year period. The initial idea behind this plan was to choose some big cities as the growth poles for future industrial expansion, in the hope of increased employment opportunities. The small cities did not receive comprehensive plans but short-term physical plans, which introduced modern streets to their close-knit historic fabric (ibid).
Two significant urban policies before 1979 proposed in response to the high number of migrants were, first, to establish new towns to meet the needs of the fast-growing cities and, second, for the emergence of the metropolitan areas, especially as an inevitable result of the fast growth of big cities, like Tehran. They were an immense plan which always had funding problems, compounded by infeasible locations and other technical inefficiencies. The lack of a standard infrastructure, being far from work for some residents and being less attractive, are some of other issues for the new towns initiative (ibid).
City planning often restricted the development of areas within cities, and encouraged the new town policies. New towns are, indeed, a compelling ideal in rapidly urbanizing countries. Whether built on economic or military criteria before the revolution, or controlling population growth after it, the new towns‟ aim is to target people on low incomes, protect farming land around the cities and disperse the concentration of industry and the service sector away from the larger cities. According to, new towns are constructed in keeping with the following goals:

- "To control the swift and unorganized growth of large cities by restricting their population;
- To absorb 6 million extra population of big cities;
- To overcome the urban housing problems by constructing affordable housing;
- To transfer or relocate some industrial firms from big cities;

- To prevent the development of informal settlements on the skirt of large cities" (p.417)

This led to the appearance of many planned and unplanned neighborhoods surrounding big cities. Thus it was an important task to provide adequate services and infrastructure for those neighborhoods, for which the local authority was responsible. However, the need for reorganizing and revitalizing cities remains a necessity. This includes social and economic development and adequate services to keep city centers animated and attractive. Rigid and inflexible spatial planning, poorly managed infrastructure within the cities, restrictions on land-use program and insufficient investment in infrastructure resulted in the expansion of settlements in peripheral areas and agricultural land.

Name of program	**Period**	**Main aims and objectives**
	1933	- Street Enlargement and Formation of Cities Law
	1948-1952	- Laying out roundabouts and streets in Tehran and other major cities - Building of official and governmental buildings in city centers
First National Development Plan	1953-1957	- Introduction of planning projects
Second National Development Plan	1958-1962	- Production of master plans in English for cities such as Sanandag, Isfahan and Bijar, according to Truman Act - Production of guide plan by peas group
Third National Development Plan	1963-1967	- Presentation of guidelines for producing master plans - Foundation of Ministry of Housing and Building (MHB) as well as High Committee of Architecture and Urban Design (HCAUD), for observation purposes on planning procedures - Preparation of master plan for Tehran by Iranian and foreign consultancies
Fourth National Development Plan	1968-1972	- Approval of 20 master plans which had been commenced in the previous Development Plan - Introduction of the new idea of appealing public participation - Creation of MHB regional and local offices
Fifth National Development Plan	1973-1977	- Start-up of studying and gathering information for cities with more than 25,000 population according to 1963 census - Creation of connections between master plans and the National Social and Economic Development Plan
Islamic Revolution and the First Five-Year Development Plan	1979-1986, 1989-1994	- Land Preparation program - Raising of debates about finding suitable land and allocation - New Towns Initiative - Work on regional potential and its use in master plans
Second Five-Year Development Plan	1995-2000	- New Towns Master Plan and construction - Production of regional plans for some parts of the country - Provision of county plan and the making of links between the master plans and regions - Production of Iran's National Guide Plan - Reconstruction of the country's Urban Planning Framework - Review and reorganization of plan guidelines - city council elections and introduction of decentralization of power - Preparation of Villages" Reorganization Plan
Third Five-Year Development Plan	2001-2005	- Decentralisation of administrative functions and transfer of public service and infrastructure responsibilities to province and city level - Preservation of historic buildings, sites and monuments - Emphasis on privatisation of housing development
Fourth Five-Year Development Plan	2006-2010	- Preparation of comprehensive low of architecture and spatial planning - Identity of the urban landscape - Immunization and retrofitting buildings against hazards - Preparation of hosing comprehensive plan

Table 4–7: Summarizes the process of producing Iran's urban development plans
Source (Karimi,1998, p.34; Pakdaman, 2001, p.41; President's Deputy for Strategic Planning and Control, 2011; Rafiee, 2001)

In general, the system of urban planning in Iran is still at its early stages. At the outset of the 20th century, when the modern central government of Iran came to power following the model of French and Belgian administrative system, an unsystematic bureaucratic administrative structure was created to be charged with the task of urban developments.
While Iranian cities have experienced rapid growth, urban planning has not kept pace with development Low quality of building stock and lack of adequate attention to urban planning regulations were among the key reasons why thousands of people were killed in different earthquakes in Iran. Issues that need to be dealt with include: defunct urban planning; ineffective development control regulations; inadequate database and institutional capacities for urban planning; and, whether or not these disaster mitigation was addressed in the course of urban planning.
In one hand traditional planning frameworks in Iran have not been able to address the issues related to all aspects of growth of cities, including disaster risk mitigation. On the other hand inter-agency coordination or sharing of information and a unified vision is lacking among various agencies; local governments do not perceive disaster mitigation as their responsibility. Furthermore, accurate maps and spatial databases to guide critical decision-making, risk identification and mitigation do not exist and traditional and appropriate techniques of traditional and modern mapping are rarely used.

- **Hierarchy of Spatial Planning in Iran**

Today spatial plans are implemented at three national, regional and local levels in Iran. The hierarchy of spatial planning has been shown in Figure (4-4). As discussed earlier, this system is comprised of three levels to which the county/ sub-regional level has been added recently.
According to the Figure, the structure of all four levels is presently at work, but they are not operating as a coherent system. Since there is a preparation time lag at any level, they are unable to provide a framework for the next level, which makes their weak and unstable. Some of the important plans will be discussed in what follows.

Master Plans of Cities

A city master plan is a long-term scheme in which general land use, residential, commercial, industrial and administrative zoning, urban utilities, equipment, and other public facilities, street network, terminals, airports, ports, urban renovation and restoration plans their pertinent rules and regulations and laws of protecting historical monuments and sites and natural landscapes are specified. The city master plans are drafted by consulting engineers supervised by the Ministry of Housing and Urban Development (ibid).

Urban Guide Plans

A guide plan is made for small towns (with a population of less than 50,000 people) and seeks to predict the future developments or expansion course of the town, identify different land uses and present effective temporary solutions for critical problems in towns without a city master plan(ibid).The Ministry of the Interior formulates the guide plans , with the assistance of technical offices of the provincial government, which are finally approved by a provincial board called 'The Committee for Approval and Review of the Guide Plans'.

Detailed Plans

Having prepared and approved the city master plan, a detailed plan is drafted which often serves as the foundation of the city master plan. In this plan, he land uses at the level of boroughs along with the precise location and area of land are determined. It also offers detailed stipulation of street networks and the density of population in urban areas. The considerations about the

renovation, development, expansion, and solution to urban problems as well as the conditions for implementing different urban elements are addressed in this plan (ibid). The consulting engineers supervised by Ministry of Housing and Urban Development are responsible for drafting the detailed plans through the Provincial Housing and Urban Development Organizations.
Drawing on the general framework presented in the master plans, the detailed maps prepared for districts and boroughs stipulate the street network at a small scale, the exact land use maps with details about the location of housing and urban services such as population and density of buildings, instances of urban design for public places in cities, and the rules for land subdivision, constructions, expansions and so on. The detailed plans are finally ratified and examined by a provincial committee and sent to municipalities for implementation.

Hierarchy	The Name of Plans
National Level	• Five-year Economic, Social and Cultural Development Plans • National Physical Plan of Iran • Spatial Plan of the Islamic Republic of Iran • Acts of parliament and government circulars • Sectoral National Plans such as national agricultural plans, ports, airports and so on.
Regional Level	• Regional and Provincial Plans • County Structure Plans • Development Plans of Metropolitan Areas
Local Level	• City Comprehensive (Master) Plans (for large and medium cities) • Detailed Plans (for large and medium Cities) • Guide Plans (for cities with less than 50,000 population) • Rural Guide Plans • New Towns Plans • Provision of Site and Services Programmes • Reconstruction and Innovation Plans for Old City Fabrics

Table 4-8: Different Levels of Spatial Planning System in Iran
Source: Hanachi and Moradi Massihi, 2001

- **Preparation Process of Spatial Plans in Iran**

As has been mentioned before, main spatial plans in Iran include the master plan, the comprehensive plan, and the guide plan. Contract Type 12 is the official distinctive guideline in preparing spatial plans, consisting of several chapters explaining the whole procedure. Within the three stages of identifying, analyzing and planning, the aim is to study the project area comprehensively. The guide has given an extensive explanation of the land-use planning system, but not of the socio-economic aspects. This means that social, economic or physical impetuses can influence the city's development direction. Failure of the guide in the past, during the life of the master plans, has not raised any awareness on the government's part to revise this method, and it is still the same for all cities. As has been mentioned before, Iran's HCAUD, which includes representatives from eleven ministries, is the main body responsible for decision-making, introducing regulations, and producing and allocating funds for these plans. The general process of spatial planning practice consists of various phases, including:
Phase One: When it is identified that the city needs a plan, the municipal office or other relevant government agencies submit a request for an urban development plan to the provincial office of MHUD, which is responsible for assessing the city's enquiry within the overall aims of the province. The result of the assessment is sent to the relevant ministry in the case of an urban development project, or to the Housing and Urban Development Organization (HUDO) in the case of a land-use or master plan. Once HUDO approves the project, the council needs to allocate the budget, on the basis of national and provincial planning priorities, and send it for competitive bidding to private consultants. The chosen consultancy then will sign a contract with the municipal office, and should provide the plan within the government's framework and city's specification to the HUDO provincial office for approval.

Phase Two: The approved plan is then sent for technical evaluation to one of three committees (land-use, economic or social groups) of the provincial city planning council (ibid). Once the plan is approved, it is sent to the Clause Five Committee4 at the provincial council. For cities with a population less than 200,000 and which are not the capitals of their province, this is the final stage of the approval process. For other cases, when the plan is approved by this committee, it will be sent for final approval to the technical committees of the National Council of City Planning and Architecture in Tehran. After being approved by this process, the plan is sent to MOI, which delegates the responsibility for implementation to the mayors and city councils. HUDO is the supervisory body of the plan; however, the relevant municipality is the main organization in charge of putting the plan into practice. If the plan is put into practice not in accordance to the proposed standards in housing, such as building density or a change of the height of the building, the case is reported to the Clause 100 Committee, which consists of three representatives from the city council, the court and the provincial level of MOI. The municipality and the landlord are obliged to accept this committee's decision.

The Clause Five Committee often gives local authorities and organizational representatives the opportunity to put their idea on the table. However, there is no obligation for them to use the plan. The plan, theoretically, contains land-use guidance, information about building density and the road layout map. The aims, to a large extent, are buried under the complications of bureaucracy and disagreement amongst government organizations. Subjects such as neighborhood regeneration, regional planning and improving urban quality are replaced by density, or the number of parking places, or debates over the land plot.

There is an obvious contradiction in the obligatory tools of putting urban development plans into practice. The variety of legislation and their complexity, on one hand, and the weakness of the city councils in putting them into practice on the other, have reduced the plans achievements and credibility. Lack of observation and analysis of the projects, as well as the lack of accountability of the councils in putting all aspects of the plan into practice spreads instability and weakness. For instance, Clause 99 of the Municipalities Law puts the city council in charge of drawing the city boundary lines and considering the suburban areas for future development of the city. In contrast, the Land Registry Office, based on Clause 147 of the Registry of the Land and Property Law, is compelled to register, and give full registry documents, to those buildings and properties which were built before 1988. Surprisingly, according to Clause 14 of the Urban Land Law, the landowners of non-residential properties can apply for registration documents by transferring 70% of their land, or the equivalent value in money, to the council. Based on the verdict of the High Court, landlords are not obliged to obey the council's plans and can apply for land registry documents for residential purposes.

Clause 84 of the Second Five-Year Development Plan is concerned with how central government may help municipalities and related organizations to gain land for economic, social, and cultural purposes. HUDO's responsibility is to buy suitable land for service and cultural activities at an affordable price and pass it to the organizations in charge of providing schools, sports grounds, health centres, fire stations, waste land, community centers and other public services.

Writing the financial programme for master plans also has a pivotal role in the planning process, and it is part of the consultant's contract to provide the council with a list of different projects within the time limits of one, three and five years, and most importantly give suggestions on financial aspects of the plan. The proposed approach for the funding of the projects of the master plan also has to be approved by MHUD and MOI. However, as there is no specific guideline for working on financial aspects of the plans, each consultancy interprets its own understanding of the situation and makes suggestions.

In the absence of a sufficient finance system for local councils, and due to lack of economic autonomy, municipalities have no choice but to sell buildings at a density greater than the limit given in the master plans. This is definitely not a sustainable solution, and studies need to be done to find other alternatives. Every year central government helps the local councils and other

authorities by providing financial help for some projects that are perhaps not even in the councils" annual plan and financial programme.

There is no clear distinction between expenditure for the provision of services and the long-term development expenditure, and as the national FYDP indicates, the main focus of the government is on implementing city modernization activities such as upgrading and widening streets, whilst some of the plans which have not been put into practice are more than 20 years old (ibid). This shows how much city councils are suffering from the lack of a sufficient budget, and how much those people whose properties are being considered for becoming public spaces are dispirited.

Private Sector Participation: From the regulations perspective, the private sector is an important alternative for speeding up the development plan and providing services. Nevertheless, it has played a very small part in the municipalities' management system. The regulatory framework for privatization in Iran can be found, principally, in four areas of law and regulations:

1. The Constitution of the Islamic Republic of Iran points to three main sectors of society, public (government, foundations and municipalities), cooperatives and the private sector. However, later it states that private property is protected "except where the law states otherwise," and the constitution reserves the majority of social, economic and political affairs to the state.
2. The Third FYDP (2001-2005) aims to achieve privatization as a means of decentralization, especially of the administrative system, the municipalities" services and rural development.
3. The Annual Budget again gives permission to city councils to have contracts with private bus companies.
4. Laws and regulations pertaining specifically to municipal services are the other resources which give permission and guidelines to the municipalities in terms of the legal framework, either through the Municipalities Law 1995 or the Third FYDP, Clause 136.

According to a recent report, the above laws, though not without defects, "provide an appropriate framework for private sector activity. However, contracts should be sent to the sub-provincial governor who can reject them if he feels that they fall outside the municipalities" responsibility or the law.

As can be seen, the planning procedure is a top-down decision-making process, which sometimes does not include any representatives from the local level. The proposed use of land in the plan has, in many cases, never been approved by the relevant organizations or allocated funding from their annual budget. According to Kazemian (1991),

> "*Public planning in Iran is completely centralized, all deliberations start and finish with the centre. In this system, local, social and economic interests, as well as the citizens, play almost no role in either decision-making on policy or implementation. The result is the absence of growth and development of local forces and of local popular participation*"
>
> (p.81)

Even after the local council's election, these questions remain: to what extent has the establishment of elected local councils changed the planning procedure? Has the initial idea of political decentralization led to the decentralization of the planning system? In order to answer these fundamental questions, further study and consideration of the functions of local government and the impact of economic and political reform on the local government system are required. Although the locally elected councils and mayors are, indeed, a novel feature of the state structure, and to some extent this has led to changes in the mechanism of city planning and integrated urban management, the centralized structure of planning has not been altered significantly.

Kazemian (1991) rephrased this question in the form of "City Council or Mayor's Council?" and pointed out that city councils ideally the legislative bodies at the city level have only supervisory authority over the functions of the mayor's office and have no power over other agencies, such as the Education Ministry or Water and Sewage Departments, that hold important and essential roles in shaping city and urban space. Also, mayors are not seen as intermediaries between the

government bureaucracy and city residents, but rather as agents whose job it is to implement plans chosen from above without sufficient fund. In other words, the culture and system of top-down planning has remained more or less unaffected by the changes in the political system towards greater decentralization.

Given the insufficient attention to theoretical aspects and methods of preparing plans in Iran, which re basically limited to the master plans, together with the paucity of official strategic planning; have rendered those plans practically inflexible, unrealistic and infeasible. Because of the bureaucratic, top-down and uncoordinated structure of management and planning, with little regard for the role of citizens, NGOs participation and private sector contribution, Iran lacks a coherent and coordinated legislation system.

4.2.1. Urban development plans in Mashhad

In 1960s in Iran, attempts to formulate a comprehensive urban plan were made due to changes that had given rise to problems such as increased population, rural –urban migration, and urban sprawl development. Until now, three comprehensive plans in accordance with the special position of Mashhad have been proposed. They include: Khazeni plan, Mehrazán plan and metropolitan development plan (comprehensive) plan. Also, it was prepared prior to the termination of the last plan by Farnahad Consulting Engendering (2007-2027). On the other hand, there were not any plans for district development and urban contribution plan at the time of formulating the first & second plan. Thus, Khazeni & Mehrazán plans failed to provide a comprehensive and regional plan.

Khazeni comprehensive plan (1967- 1992): Given the current condition of the city, this plan was concerned with the horizontal development. However, the population growth has been greater than the city development. Therefore, it has focused on “city expansion" with a special emphasis on population density of 75 people in hectare.

Mehrazán comprehensive plan (1992- 2017): Given the proposed population density in former plan, here a compact approach was adopted. However, the population prediction was not realized and the city expanded horizontally. In 2007, Mashhad had a population of 2.247.000 people with a population density of 60 people in hectare. Despite the horizontal development and failure of the proposed population plan, the compact city influence came to the effect instead of Khazeni plan. Moreover, the second plan was more successful in reaching "sustainable development" strategies as a result of renovating old texture and maximum employment of vacant capacity to fuel the development.

Mashhad conurbation plan (2008): The centralized development plan of Mashhad have given rise to a plethora of physical, socioeconomic, social and environmental problems. These problems in turn have intensified issues such as imbalanced population distribution, services and consequently imbalance in natural capacity. As a result, the city has spread out of control. As such, one of the critical issues in district planning of Mashhad is to create a balance between environment and population. To this end, the strategies of a sustainable approach should be focused on achieving the balance in the studied area. Decentralization is another important research avenue and attempts should be made to prevent horizontal development and increase population density.

Farnahad development plan (using strategic planning approach) (2007-2027) aimed at overcoming the basic shortcomings of Mehrazán plan. Also, the population density was motivated by to the expansion of city boundaries, which was irrelevant to the proposed plan.

The overall goals of these plans were:

1. Creating a unique religious, historical and cultural identity in the world
2. Obtaining the principles of sustainable development through adopting the globalization approach
3. Enhancing the quality of urban environment
4. sustainable protection of the health and security of residents

To implement the development policy, achieving the concept of "compact city" was integral to the plan. The population density should reach 130 people per hectare in accordance to the compact viewpoint. the current boundary and the proposed boundary in Farnahad plan were 2027 were 30558 & 55502 hectare respectively. Thus, the issue of compactness was the focus of the above plan rather than Mehrazán plan.

4-7-2- Studying strategic planning experience in Mashhad

Experiences acquired in major cities of Iran in the past decade especially in metropolises such as Tehran, Mashhad, Shiraz, Tabriz, Isfahan, etc. with regard to little success of urban plans, proved to the people in charge of urban problems, the requirement of a new approach based on assessment and pathology of current methods and procedures while taking valuable global experiences into consideration. These approaches should use new knowledge, patterns and methods that are more consistent with Iran's local circumstances. In order to realize this idea due to previous experiences in Tehran and other metropolises it was decided to create new comprehensive and detailed plans with cooperation of all related decision providing, decision-making and executive organizations, by creating a local organization with a mission to produce, guide, pilot and revise the plan. In line with this process, and due to an agreement between the Islamic council, Mashhad municipality and the department of housing and urban affairs, the association of urban development planning and studies was established and commenced operating.

Now the comprehensive and detailed plan of Mashhad with a strategic approach is being produced under the supervision of the above mentioned association. In this plan, entire city of Mashhad has been divided into 7 areas of planning. In the new comprehensive and detailed plan, in an interactive process, in addition to presenting a vision, growth pattern and development of entire city, growth and development pattern of each area is being designed and planned. The process of a new comprehensive plan of Mashhad with the strategic tendency consists of 8 stages: presenting vision, future-oriented investigation and analysis, goal definition, assessment and selection of the best scenario, compilation of goals, compilation of strategies, compilation of the strategic plan, method and arrangement of implementation, supervision and revision.

Description of cooperation services of planning domain consultants consists of three sections: first, development pattern of planning of the areas; second, detailed plan; third, cooperation with urban management based on the previous section of plan-providing consultant services, in a continuous process will cooperate with municipalities of various regions. In Mashhad's experience, three levels of planning have been extracted from comprehensive plan and a planned process was formed in line with achievement of long term goals of plans and goals of the comprehensive plans. In this suggested structure, Mashhad planning has three levels: first, comprehensive level; second, level of planning areas; third, detailed plan level. These three planning levels are linked together and in an interactive process interact on each other. In this three level process, there are other factors that expose planning to constant changes and assessments.

According to the studies of the consultant of Mashhad's new development plan, the most strategic issues of the city are as follows: first, the method of confronting urban over-expansion; second, space-related inequalities of Mashhad metropolis, which have been based on basic ideas and principles in organizing city expansion

1- containing body over-expansion of the city with a dense city tendency in space-body expansion

2- Confronting socioeconomic inequalities (second problem)adoption of a new decentralized strategy and the possibility of capital, activity and population redistribution.

Accelerating the expansion of Mashhad city is still continuing. Imbalance and inequality between the western and Eastern section of the city with regard to facilities and urban services is totally obvious. According to the authorities around 700,000 people are currently living in 60 population nucleuses in outskirts of the city in problematic and ill-accommodated tissues in such a way that

all regions of Mashhad's are facing the challenge of inadequate accommodation. This is a fundamental challenge for Mashhad's urban development and its urban management at present and in the future. With such an image of Mashhad's basic issues and the fresh process of providing new urban development plans in this metropolis and based on author's interviews with experts and managers, the following subject-matters related to the process of creation of Mashhad's urban development plans are presented:

- Achievements and positive points of the process of plan creation

- Establishment of a local organization and agreed upon for plan creation, guidance and piloting;
- Strong participation between municipality and Islamic council of the city;
- Consultants' strong and continuous connection with executive body of district municipalities;
- Establishment of development councils for planning;
- Exchange of information between consultants of comprehensive plan and detailed plan;
- Establishment of an interactive three level planning system;
- Passing some decision-makings onto lower levels by comprehensive plan;
- Modification and completion of type 12 services with special attention to Mashhad's specifications;
- Taking qualitative subject-matters and urban strategic planning into consideration; and
- Establishment of an information bank reference bank.

Major weaknesses of plan creation

- Absence of public participation in the process of plan creation;
- Problems in cooperation between municipalities of areas and consultants;
- Lack of strong presence of effective and executive organizations in development;
- Lack of a mechanism for plan implementation during plan creation;
- Absence of required modifications in municipality for transformation and coordination in the new planning process;
- Insufficient coordination of opinions and methods among consultants who design the plan;
- Hanging authorities and occurrence of new problems despite previous mutual agreement in the process;
- Not paying enough attention to nonstructural subject matters;
- Absence of legal means for beneficiaries' appeal; and
- Absence of nongovernmental organizations, etc. as members of beneficiary groups.

Although investigation and assessment of Mashhad's comprehensive and detailed plan exceeds the sphere of this articles, it is noteworthy that the new planning approach of Mashhad because of shortages, theoretical and practical problems and legal inefficiencies has shaded utilization of strategic plan instead of comprehensive plan and this has resulted in that the final product distances from the enhanced structure of a new approach. However, presence of many strong points especially in delivering plan creation to a local organization and attracting local experts' and executives' participation into the process is considered a new revolution in the planning system of the country, in line with good governance and achieving sustainable development.

- **Government structure and urban management in Mashhad**

The government structure of the Mashhad and any city in Iran is almost the replicate of the whole Government structure of the Iran. Mashhad, beside the Governor General, Military and the Representative of Iran Leader, has 3 main executive organizational bodies in charge of city management and operation under the overall supervision and guidance of the Interior Ministry: Governor, City Council and Mayor.

Mashhad Governor, appointed by the Khorasan Razavi General Governor, is the focal representative of government with full executive power over all government offices and activities in the city, especially in the implementation national related projects. Considering Mashhad is the province capital, houses almost all of the Ministries representative office, called Ministerial Organization (Energy, IT, Housing, Health, Economy, etc.) which are responsible for executive or implementation of all related affairs in the province under the guidance the General Governor.

The Mashhad City Council is the legislative or parliamentary body, representing the city's citizen interest. The Council is composed of 15 members, elected every 4 years by the citizen of Mashhad. Even-though by the constitution, the council has the full responsibility over the city operation and management process; in reality the council is more engaged with the municipality operation.

Mashhad Mayor, who is elected by the City Council, is in full charge of the Mashhad Municipality and is fully responsible for all of the city affairs (urban development, building permits and control, transportation, etc.) and ground-level operation of the city. It should be noted that the due to the high importance of the "Imam Reza Shrine" in the city and its religious, political and strong economic influence on all city operation and development, the Shrine Authority play an important role in the city, especially during the pilgrimage periods: summer, new year, religious occasions, etc..

With respect to the Risk Management issues, the problem with the current governmental structural system is that they are many parallel organizations in charge which will cause problems in city development and disaster response. Although the municipality is the main official body in charge of the city's management; but in reality the county (prefecture), the provincial Governor's office and even the organizations in charge of infrastructure such as gas and water supply or electricity and the police and military bodies make changes in the approved city plans which will definitely cause problems in disaster management coordination as well.

4-8- **Disaster Management in Iran**

In the past twenty-five years, Iranian has developed a complex disaster management system with a strong hierarchical structure. The disaster management authorities have structured their agencies vertically distributed over central (Ministry of interior), provincial (Disaster Management Department), and municipal or county levels (Disaster Mitigation Bureau) and shaped a top-down administrative model with bureaucratic characteristics. Their main responsibilities for disaster management focus more on mitigation, preparedness, respond and recovery.

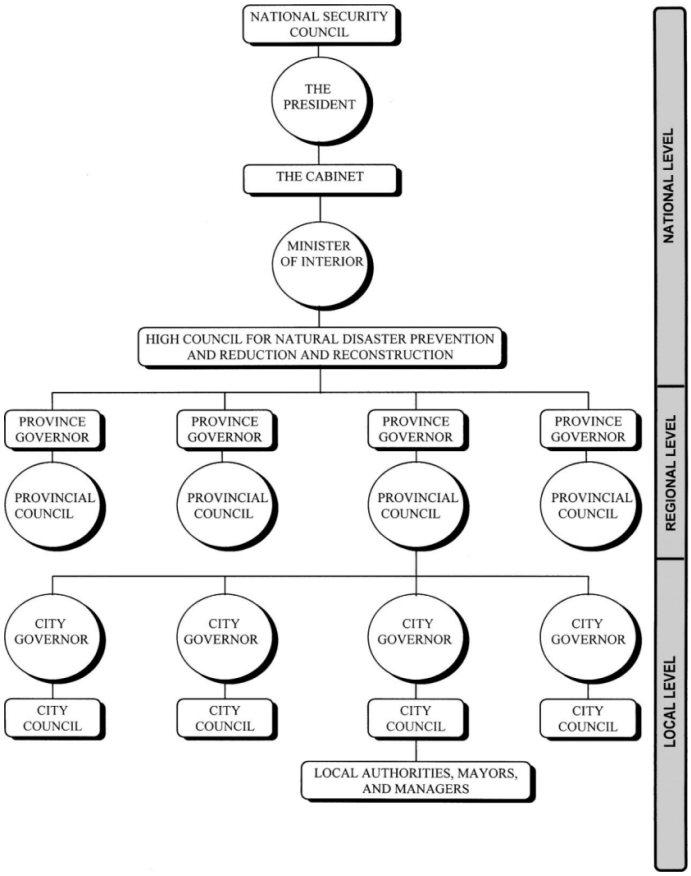


Figure 4-9 Existing disaster management hierarchy in Iran

4-8-1- Literature review of Disaster management in Iran

Before 1991 a special disaster task force under the supervision of the president office was responsible for dealing with natural disasters. (See Figure 4-10). By a budget act in 1991 the ministry of Interior formally assumed the responsibilities and functions for disasters. Figure1-2 shows the previous structure of national disaster management in Iran. .

In 1991, a National Committee for Natural Disaster Reduction (NCNDR) was established by the Islamic Consultative Assembly, the parliament of Iran, constituted. The details about the implementation of this law were further stipulated in a 12 April 2003 Council of Ministers' Decree in which nine specialized sub-committees supervised by the deputy ministers were established. It counts on provincial committees presided over by the General Governors and a coordination committee directed by the Minister of the Interior.

The sub-committee in charge of responding to the dangers of earthquakes and landslides, "i.e. earthquake and landslide specialist group", which was established in 1993 by the Ministry of Urban and Housing , is one of the most active branches of the NCNDR in the country.

To delegate its disaster management functions, the ministry established the Bureau for Studies and Coordination of Safety and Recovery Affairs (BSCSBA). The BSCSRA was missioned to cooperate with national and international centers to take advantage of their potentials with the aim of obtaining its mandate.

The ministry also formed a National Disaster Task Force (NDTE).As a coordinating inter-organizational organization; NDTF implements various activities at different stages of disasters. In the event of a disaster, NDTF acts as a coordinator to join the relief operations undertaken by technical ministries and relief institutions.

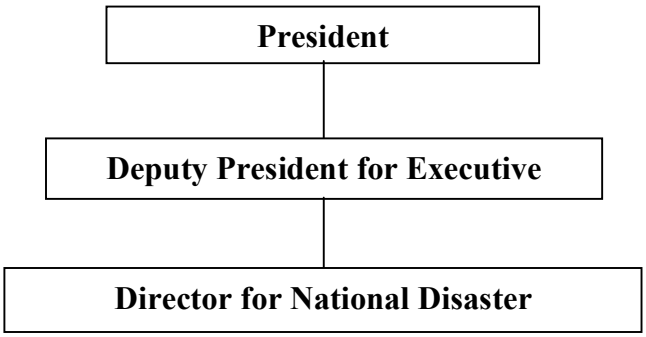


Figure 4-10: the previous structure of National disaster management in Iran before 1990

Enactment of the national assembly for mitigation of natural disasters act in 1991 established the role of the Ministry of Interior and designed this committee as a policy and decision making body with the mandate to research and explore practical management is shown in Figure 4-11.
A number of technical ministries and institutions are involved in disaster management in Iran. These include Ministry of Energy, Ministry of Housing and Urban Planning, Ministry of Agriculture Jihad, Ministry of Road and Urbanization, Ministry of Health, Management and Planning Organization, Red Crescent Society of I.R.IRAN, Mobilization of the Oppressed Organization known as the Basij. All these ministries and organizations are members of the NCRND and the NDTF.

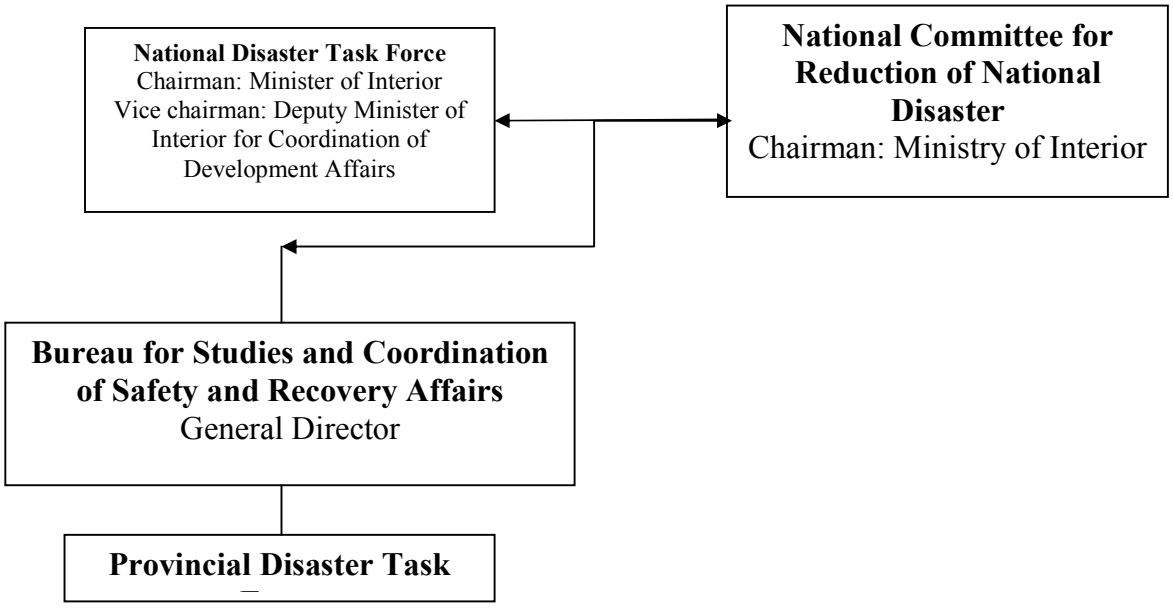


Figure 4-11: the existing structure of National Disaster Management in Iran since 1991

At local level, with the exception of some metropolises of Iran, the local government is integrated in the national system, relatively beyond the mainstream of the central disaster management system. In these cities the mayor is the official head of disaster management and the City Council acts as regulatory body, as long as their operations do not bypass and/or contradict national

stipulations. All activities concerning the mitigation and management of disaster in cities are managed by "Urban Disaster Mitigation and Management Centre (National Report of the Islamic Republic of Iran, 2005).
Disaster management authorities have been formed in a hierarchical system which possesses coordination mechanisms that function well during preparedness and response phase, but not in mitigation phase and daily operation. Unlike the strong vertical setting of disaster management institutions, the horizontal cooperation is rather weak at the urban regional level. The government-dominant model with a 'top-down' structure created some institutional deficiencies (Mohebifar et al., 2007).
As hazard mitigation issues involve the different interests of many stakeholders, it is especially important to harmonize the relationship among different organizations and the public. Moreover, earthquake hazard issues are spatially relevant, therefore the disaster management Bureau and the Urban Planning Bureau need to cooperate and coordinate their efforts. It is clear that the bottom-up institutional reform should be created a new study topic for disaster managers and urban planners in order to facilitate negotiation and cooperation among different organizations tackling the natural hazard mitigation problems in urban areas.
After the Bam earthquake (26 Dec. 2003) the view point of actions is changed from acting after disasters to prevention actions before disaster. This earthquake also shows many shortages in the current disaster management procedure. So the urgent strategy for improving current disaster management and a suitable program for risk management is needed.

- **The organization s and laws related to disaster management**

Dated 29 November 1958, according a law passed the civil defense institution in order to protect life and property from air attacks, natural disasters and unexpected events bureau was established in the Interior Ministry. 14 years after that based on amending the Act, civil defense institution was placed under the supervision of the Prime Minister. Because of non-optimal performance, the institution was again placed under the supervision of Interior Ministry in 1977.
After the Iranian Islamic revolution (the law relating to the integration of national preparedness organizations, 1980) and the mobilization of civilian civil defense organizations were merged under a single management called National Mobilization(Basij Melli)., With the approval of the Statute of the Iranian Revolutionary Guards, national mobilization was abolished in 1982. During 1982 t, 1990, the committee of natural disasters mitigation was established. Based on the law of second development plan, headquarters as disaster prevention, relief, rehabilitation and reconstruction of areas affected by disasters in the Interior Ministry was formed.
Approved a comprehensive rescue plan on 2004, the country entered a new phase of disaster management. The plan in cooperation with the Interior Ministry, Red Crescent Society and the General Staff of the Armed Forces of Iran was approved. In the same year, the plan was communicated to all the organizations and agencies of the executive and the Interior Ministry were placed in charge of it.
In 2008, using earthquake disaster experiences and knowledge of other disaster-prone countries in the world, the proposal of establishment Disaster Management Organization was sent the government by interior ministry. After that the government was immediately approved it and then sent the parliament. In the same year, Parliament passed the Act and therefore the first comprehensive law on disaster management in Iran was established after the 1979 revolution. The organization began operation on a trial basis for a period of 5 years. After this period, the effectiveness of the organization will be assessed. In 2013, the pilot implementation of the Disaster Management Act was ended and the evaluation results show that the weakness of the financial, management, information access and communication in the organization, projects, instructions and training courses implemented in the 5-year period, were halfway done.

4-8-2- Structure and Organization of Disaster Management in Iran

As have mentioned, various organizations and ministries contribute to the disaster management activities in Iran. Among these are 13 ministries that work under the cabinet of the Islamic Republic of Iran, as the highest body for inter sectoral coordination. The legislation of the cabinet is obligatory for governmental and nongovernmental organizations, but the law has assigned a coordinating role to the Ministry of Interior. Accordingly, all executive branches of the government and public agencies are required to follow the policies of this ministry on the issues of disaster mitigation and life and material loss reduction. To achieve this goal and to establish a qualified and unified body to handle any natural disaster at national level, the ministry established the Bureau for Research and Coordination of Safety and Rehabilitation activities (BRCSR). Inter sectoral coordination in executive affairs is carried out by this bureau, but inter sectoral coordination in research is carried out through the National Committee for Natural Disaster Reduction. This committee consists of nine subcommittees, each on a special subject, which is headed by the ministers and directors of the ad-hoc ministries and organizations. There is also a tenth subcommittee that is responsible for coordination purposes.

4-8-3- The Main shortcomings of Disaster Management System in Iran

The problems and shortcomings resulting from deficient legislation, procedures, and implementing practices, have been documented in many written or oral evaluations in the event of any disasters. In response, many laws, regulations, and directives were issued to resolve observed problems and conflicts. Thus far many efforts in Iran have been made as reactions to disaster experience; yet even the recent legislation fails to set out an integrated legislation framework in order for preventing disaster-related damages. The lack of an integrated approach for disasters in Iran is widely criticized. Although Iran is one of the high risk disaster countries, it has no national and local scale integrated approach disaster policy as a tool for disaster management. Here are the main shortcomings of the disaster management system which is derived from interviews.

(a) Lack of integrity

Review laws passed in the field of disaster management shows that they are addressed only in the context of rationalizing the authority and responsibilities among different institutions. Under the first heading, questions of administrative competencies and responsibilities among various state authorities involved in disaster prevention and management are discussed; and under the second heading, the direction of disaster management is mainly focused on post-disaster phase. Immediately after natural disasters occurred, the institutions and authorities have entered and done temporary and unstable measures. Sometimes the laws have been enacted to compensate disaster victims and casualties.

Study on Parliament rules and regulations of the Cabinet shows that political management has primarily entered in the areas of provide aid and cash grants to disaster survivors. However this approach has being changed. In recent years, investments have been made in the pre-disaster phase and some institutions have been established based on this change. In recent years, the emergence of research and educational institutions in disaster management field and experience gained from other countries has taught us that if we want to have lower losses and casualties, we need to invest more in mitigation and preparedness. In this context it is necessary to achieve an integrated approach which allocates equal value to all phases of disaster management cycle.

(b) Shortage in research and educational activities

Although positive signs of integrated disaster management can be seen, it should be know that a new management approach needs to have powerful research and educational pillars. Education, in general or special, is one of the important necessities of disaster mitigation plans. In recent years, ministry of education emphasized the importance of incorporating disaster management in the system of education in Iran. Moreover, the government of Iranian launched a set of nationwide disaster risk mitigation operations that took into account the larger dimensions of development to ensure the developmental gains.

One of such initiatives was including disaster management in the curriculum of school and higher education institutes as recommended to the Boards. Teaching the young generation about the preventive measures, the range of services required in the event of a disaster and the need for a humanistic approach are parts of this curriculum. Education, in general or special, is one of the important necessities of disaster mitigation plans. More efforts should be made in the coming years.

(c) Multiplicity of administration and decision-making

Many believe that disaster management in Iran is still ineffective and fragmented, despite the fact that new institutions has created in recent years. Despite having numerous state laws and institutions, governors are still in trouble in order to improve the Inter-sectoral collaboration. There are parallel institutions in times of disasters can be ordered from various sources. Due to the fact, we have observed the dispersion of aid to the victims in response phase or irresponsibility in post-disaster especially in recovery phase. Several organizations of executive and decision making, overlapping functions and responsibilities, the lack of a strong correlation between the stockholders, Separation between owners of financial resources and disaster managers, are Factors that lead to scatter in disaster management activities.

(d) Ignoring the role of social forces and NGOs

It should be noted modern approaches in disaster management takes into account the different social forces in the procedures. Although local governments have a very significant role in disaster management cycle, the importance of public participation and civil society cannot be ignored. In general, there are two schools in disaster management. The former emphasized on top-down approach. Like a military system with a precise and defined hierarchy and domination body causing such a system should have organization-wide organization with the broad. Such a system has been developed in governing body and also it will be extensive organizational structure.

The other school would be based on the cooperation and coordination of people and civil society in disaster management and a successful disaster management would be not ineffective without participating approach. Thus, disaster management should not be found in the organizations but should be institutionalized in whole society. The disaster management body has a nuclear center on the top and the other duties would be done by citizens in society. The mechanisms of civil society participation and activity have not been provided in our society. It should be noted that non government organizations (NGOs) do not have a powerful position in Iran. However, it would be a good move to delegate the responsibilities to local authorities and city councils which have been neglected so far.

4-9- Descriptive data

4-9-1- Evaluation of Spatial Planning System in Iran by SWOT Analysis

Challenges Identifying by Delphi Technique

Before addressing evaluation spatial planning and system **of** disaster management in Iran, It is essential that it is investigated the factors which have the most causing the two areas in Iran. To this end, we used Delphi technique which is utilized to refine collective opinions and replace the calculated consensus with an agreed-upon majority opinion. Therefore, first study investigates the most effective factors then categorizes and presents the most priorities in order to use SWOT analysis.

The Delphi method, as a structured technique of communication which was originally designed as a systematic, interactive predictive method, rests on a board of experts. They are asked to answer a questionnaire in two or more steps. After each step, an anonymous encapsulation of the **experts' predictions in the previous step along with their justifications is provided for judgment** by a facilitator. Therefore, experts are prompted to review their earlier answers in the view of the feedbacks taken from other members of the panel. It is expected that the range of answers be limited in this process and the group converge reach a consensus upon the "correct" answer. At

the end, the process is halted after a pre-defined termination criterion (e.g. certain number of rounds, reaching a consensus, and obtaining stable results) with the mean or median of scores determining the results of final rounds.

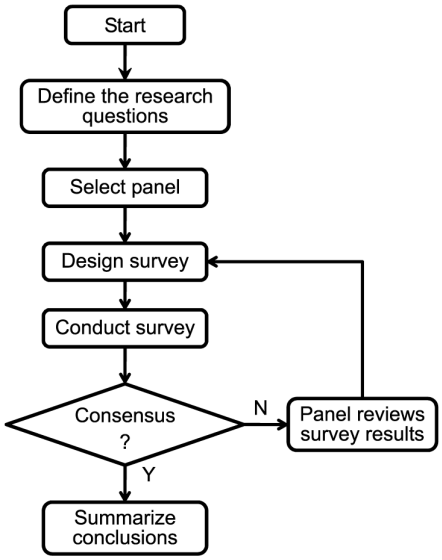


Figure 4-12: The procedure of Delphi Method

The expert board comprised of three groups from faculty members of Ferdowsi University of Mashhad (n= 6) and PhD students (n= 7) in urban planning, disaster management in urban settlement, urban management, surveying engineering, and urban development specialists and executive staff in the Ministry of Road and Urban Development of Iran (n= 7). Overall, the panel was composed of 20 professionals and experts of urban development and disaster management in Iran (N= 20).

Faculty members, PhD students and professional staff from the Ministry of Road and Urban Development were chosen relative to their expertise. The authors used a series of three-stage questionnaires. The first stage presented some open-ended questions: What are the most import challenges of achieving an integrated approach between spatial planning and disaster management in Iran? This item was employed to generate a range of answer categories upon which the items of the second stage were drafted. Responses were divided into a list of 27 characteristics. In the second stage, panel members rated each of the 27 characteristics identified in the first stage using a five-point Likert scale (1= Strongly Disagree, 2= Disagree, 3= Uncertain, 4= Agree, 5= Strongly Agree).

Based on the results of the second step and feedbacks received from respondents, a third step was presented, which separated and developed the list of 27 factors. The aim of the third step was to reach a consensus. In this step, panel members offered the individual and group results obtained from the second step, and asked whether they agreed or disagreed with each of the 27 statements. The authors specified an agreement level of 75%. The items failed to reach the agreement level were eliminated from the list of factors.

A review of the previous studies suggests that one could arrive at a consensus in Delphi method after three steps and, and oftentimes three steps were sufficient to achieve stability in the responses (Caldwell, 2005). At this step, a consensus on 22 factors was achieved, which eliminated the need for further steps. .To obtain more efficient results, 22 factors were grouped into four categories. The Delphi method was used to put items in a category with identical characteristics.

In the first step in which an open-ended question with a response rate of95% was asked, 27 factors were derived from the answers of 20 respondents (see Table4-9).

Table 4-9: Round one: Challenges of Integrating (n= 27).

Rank	Challenges	Responses
1	Failure to achieve a comprehensive law on the spatial planning system	18
2	Central systems in spatial planning, disaster management and decision making.	18
3	Cultural and traditional obstacles governing the urban regions.	17
4	Lack of unified building codes	15
5	Lack of accurate and actual recognition of urban communities, their needs	15
6	Low education levels of urban communities	14
7	Lack of awareness about high risk, medium risk and low risk areas	14
8	Lack of minimum standards for hazard mapping	14
9	Lack of a coherent strategy for sustainable urban development.	13
10	Lack of attention to urban development challenges by responsible departments.	12
11	Institutional and social capacity building in urban societies has not emphasized.	12
12	Weak spatial decision support system in order for decision making in disaster management	12
13	The heterogeneous and distributed resources of spatial data	12
14	Weak management of governmental structures and varied programs.	11
15	Limit access to knowledge and up-to-date science in informal settlement of urban region	11
16	Lack of an autonomous institution in urban development and disaster management	11
17	Lack of NGOs for support of informal education system in urban settlement	11
18	Lack of mitigation considerations in spatial plans' agenda	10
19	Congestion of population and buildings in some of the most vulnerable district	10
20	Absence of participation and team working among ordinary people	10
21	Insufficient government investment in reducing urban vulnerability	9
22	Lack of stable income for municipalities	9
23	Lack of coordinated programs in spatial planning (programming, implementation and control)	8
24	Limited accesses to up to date technology due to international sanctions Lack of National	8
25	Spatial Data Infrastructure (NSDI)	6
26	weakness in private sector participation in urban development activities	5
27	Uncoordinated urban development plans and policies with UN guidelines	3

In the second round, panel members were asked to rate each of the 27 characteristics identified in the first round using a five point Likert scale. In step two, 17 of the 20 panel members responded, which yielded a response rate of 85%. Table 4-8.shows the results of step two.

In light of the responses obtained in the second step, panel members were asked to specify their agreement or disagreement with each of the factors. Here, 17 of the 20 panel members responded, which showed a indicated a response rate of 85% for this step. As shown in Table 3, panel members found 22 challenges facing integrated approach in Iran. Most respondents agreed on these factors as the main challenges: Failure to achieve a comprehensive law on the spatial planning system, Lack of a coherent strategy for sustainable urban development, Cultural and traditional obstacles governing the urban regions.

Table 4-10 Round Two: Level of agreement with challenges of Integrating (n= 30).

Rank	Challenges	M	SD
1	Failure to achieve a comprehensive law on the spatial planning system	4.7	0.55
2	Central systems in spatial planning, disaster management and decision making.	4.6	071
3	Cultural and traditional obstacles governing the urban regions.	4.6	053
4	Lack of unified building codes	4.6	0.56
5	Lack of accurate and actual recognition of urban communities, their needs	4.5	0.63
6	Low education levels of urban communities	4.5	0.33
7	Lack of awareness about high risk, medium risk and low risk areas	4.4	0.92
8	Lack of minimum standards for hazard mapping	4.4	0.44
9	Lack of a coherent strategy for sustainable urban development.	4.4	0.65
10	Lack of attention to urban development challenges by responsible departments.	4.3	0.56
11	Institutional and social capacity building in urban societies has not emphasized.	4.3	0.63
12	Weak spatial decision support system for decision making in disaster management.	4.2	0.48
13	The heterogeneous and distributed resources of spatial data	4.2	0.73
14	Weak management of governmental structures and varied programs.	4.2	0.53
15	Limit access to knowledge and up-to-date science in informal settlement of urban region	4.1	0.64
16	Lack of an autonomous institution in urban development and disaster management	4.1	0.69
17	Lack of NGOs for support of informal education system in urban settlement	4.1	0.69
18	Lack of mitigation considerations in spatial plans' agenda	4.1	0.53
19	Congestion of population and buildings in some of the most vulnerable district	4.1	0.48
20	Absence of participation and team working among ordinary people	4.1	0.61
21	Insufficient government investment in reducing urban vulnerability	4.1	0.72
22	Lack of stable income for municipalities	4.0	0.62
23	Lack of coordinated programs in spatial planning (programming, implementation and control)	4.0	0.72
24	Limited accesses to up to date technology due to international sanctions Lack of National	4.0	0.94
25	Spatial Data Infrastructure (NSDI)	4.0	0.66
26	weakness in private sector participation in urban development activities	3.9	0.72
27	Uncoordinated urban development plans and policies with UN guidelines	3.9	0.86
		3.9	0.69
		3.8	0.66
		3.8	0.72
		3.8	0.44
		3.7	0.53
		3.7	0.72
		3.7	0.33

Almost all respondents agreed that centralized system in urban development planning and decision making as well as weakness in private sector participation in disaster management activities; lack of an autonomous establishment and supervisor institution in urban development; and legal limited to use of private sector and problems in public participating are the secondary challenges in urban development. The second goal of the study was to categorize the challenges of integrating urban planning and disaster management in order to use in SWOT analysis.

Table 4-11: Round Three: Level of Agreement with Challenges (n= 30).

Rank	Challenges	Agree (%)
1	Failure to achieve a comprehensive law on the spatial planning system	100.00
2	Central systems in spatial planning, disaster management and decision making.	100.00
3	Cultural and traditional obstacles governing the urban regions.	100.00
4	Lack of unified building codes	96.67
5	Lack of accurate recognition of urban communities, their needs and indigenous knowledge.	96.67
6	Low education levels of urban communities	96.67
7	Lack of awareness about high risk, medium risk and low risk areas	93.33
8	Lack of minimum standards for hazard mapping	93.33
9	Lack of attention to urban development challenges by responsible departments.	93.33
10	Institutional and social capacity building in urban societies have not emphasized.	93.33
11	Weak spatial decision support system in order for decision making in disaster management	86.67
12	The heterogeneous and distributed resources of spatial data	86.67
13	Weak management of governmental structures and varied programs.	86.67
14	Limit access to knowledge and up-to-date science in informal settlement of urban region	86.67
15	Lack of an autonomous institution in urban development and disaster management	80.00
16	Lack of NGOs for support of informal education system in urban settlement	80.00
17	Lack of mitigation considerations in spatial plans' agenda	80.00
18	Absence of participation and team working among ordinary people	80.00
19	Lack of coordinated programs in spatial planning (programming, implementation and control)	76.67
20	Limited accesses to up to date technology due to international sanctions Lack of National	76.67
21	Spatial Data Infrastructure (NSDI)	76.67
22	weakness in private sector participation in urban development activities	76.67
		73.33

Four categories were identified as the major factors facing integration two areas in Iran. As shown in Table 4-12, the challenges identified in step three were divided into Institutions & Organizations, Legal & Legislation, Information Support System, and Participation & Education.

Table 4-12 Categorized challenges of integrating in Iran.

Categories	Challenges
Institutions & Organizations	Central systems in spatial planning, disaster management and decision making Cultural and traditional obstacles governing the urban regions Lack of attention to urban development challenges by responsible departments. Lack of an autonomous institution in urban development and disaster management Lack of coordinated programs in urban development (programming, implementation and control)
Legal & Legislation	Failure to achieve a comprehensive law on the spatial planning system Lack of unified building codes Lack of mitigation considerations in spatial plans' agenda
Information & support system	Lack of minimum standards for hazard mapping Weak spatial decision support system in order for decision making in disaster management Limited accesses to up to date technology in disaster management due to international sanctions Lack of National Spatial Data Infrastructure (NSDI)
Participation & Education	Lack of accurate recognition of urban communities, their needs and indigenous knowledge. Low education level of urban communities Lack of awareness about high risk, medium risk and low risk areas Institutional and social capacity building in urban societies have not emphasized. Limit access to knowledge and up-to-date science in informal settlement of urban region Lack of NGOs for support of informal education system in urban settlement Absence of participation and team working among ordinary people weakness in private sector participation in urban development activities

SWOT Analysis Tables

The SWOT analysis was designed as a strategic tool for planning and decision making at multiple levels within an enterprise or public or private organizations. The father of the SWOT analysis was Albert Humphrey. Albert Humphrey and Robert Stewart developed the SWOT analysis in a team work with colleagues in the Stanford Research Institute during 1960s. The SWOT Analysis was initially developed for business management purposes, soon became a planning tool.

Four aspects of the SWOT analysis can be defined in several ways. In this study, the Iranian Spatial Planning System will be elaborated in the light of following criteria of the SWOT aspects:

- **Strengths**: As a simple definition, the strengths of the Iranian spatial planning system denote the positive results, achievements, and sustainable trends to the benefit of various stakeholders, such as institutions, organizations, media, business owners, and citizens. From a deeper perspective, strengths can be determined in terms of factors crucial to the effectiveness of the urban quality of life, namely general advantageous in comparison with other countries, geographical location, geo-political status, institutional capacities, resources, assets, experience and knowledge, innovations and technology used, finance and marketing items, cultural level(literacy, value judgments, attitudes) and awareness, administrative &and management process and procedures.
- **Weaknesses**: Weaknesses define exactly the opposite of strengths. However, in order to specify weaknesses of a spatial planning system, it is also possible to use similar criteria as for "strengths". For instance, while the vast human resources in Iran can be evaluated as strength, over population and/or misallocation of human resources may well be interpreted as weakness. To avoid confusion, different criteria are suggested for measuring strengths and weaknesses, respectively, to the extent possible. Thus, weaknesses of the spatial planning system may best be measured in terms of general disadvantageous,

adaptation and development capacities in general, institutional and legislative gaps, regional cohesion, shortage of resources, reliability of institutions, authorities, and other stakeholders in the spatial planning and management system.

- **Opportunities**: Although opportunities have some similarities with strengths; the main distinctive feature of opportunities can be determined as positives stemming from external effects. The criteria for assessing opportunities can be a peaceful and stable political atmosphere, positive global influences, new technologies and business sectors, new markets and export quotes, willingness of foreign partners in cooperation on various topics, such as information, city development strategies, UN and Word bank projects, funding, exchange programs, etc., innovations and international scientific studies.

- **Threats:** Similar to the relationship between opportunities and strengths, threats have some common features with weaknesses. Both threats and weaknesses refer to negatives yet, while threats refer to external negatives on the spatial planning system, weaknesses denote shortcomings in the system.

As discussed above, the issues of the spatial planning system in Iran can be divided into four groups:

Table 4-13 SWOT Analysis for spatial planning system in Iran

SWOT	Institutions & Organizations	Legal & Legislation	Information support system	Participation & Education
Strengths	• The development of physical capacity within the urban areas. • There is adequate capacity in the urban professionals and consultants. • There is a long experience and history of organizations • Specialized institutions on earthquakes • Developed capacity on disaster response and recovery activities • There is specific insurance company for earthquakes	• Enactment of National Disaster Management Organization statute • Enactment of Law on Building Inspection for earthquakes	• Experts awareness of the need to use of Information technology especially SDI • Presence of several seismic observatories and data collecting institutions	• In recent years, development of NGOs under pressure from international organizations • The relative improvement in Human Development Indicators for urban and rural areas, including the education, fertility reduction, improved social interaction. • Many universities designed their curricula and created new departments in accordance with needs in the field of disaster management
	• Municipalities and city councils are generally inefficient • Instability of institutional structures • Insufficient sustainability of	• Incoherent and fragmented legislation • Conflicts among various laws • There are contradictions, uncertainty, multiplicity	• No National Spatial Infrastructure System • Difficulties in sharing hazards data with the public • Insufficient	• The decision-making mechanism in spatial planning is from top to bottom, and do not properly include NGOs and citizen

Weaknesses	institutional programs and projects • Insufficient institutional awareness with respect to Mitigation activities • Insufficient attention to natural disasters except earthquakes • Inadequate organization and coordination among various institutions • The increasing expenditures of the municipalities do not correspond with their increase in income earning and the generation of newer revenue sources. • Urban organizations in charge of urban affairs generally have bureaucratic, top to bottom and non elected, inflexible structures. • Existence of parallel functions and responsibilities within different organizations and even inside one single organization involved in spatial planning. •	and discrepancy in the laws concerning spatial planning in Iran. • Absence of some basic concepts and approaches such as sustainable development • Spatial planning laws, rules and regulations are inefficient and are not integrated. • Ambiguity in laws and regulations • Due to absence of regional spatial planning law there is a tendency towards unbalanced growth of cities and villages. •	effort on implementing an earthquake threat model • Lack of standard for storing spatial data •	participation, except the election of city councils, which here again they are not elected in terms of localities and districts. They are elected for the whole cities. • The lack of adequate information about spatial plans for public • Urban plans are reduced to a set of technical documents not to be accessible to the ordinary people. • There is a knowledge division between the ones who prepare the spatial plans and the ones who implement them. • Lack of educational concepts related to disaster management in school Syllabi • The content and job description of the urban, regional and national plans do not properly consider the impact of social and economic factors upon development planning.
Opportunities	• Institutional initiatives on coordination in light of lessons learned of 1990 earthquakes • Various institutional innovations in terms of approaches and organizations	• Preparation of a draft law on integrated disaster management • Introduction of using risk assessment maps in plan-making process • Updates in building quality control system	• Awareness of necessity of a data collecting, sharing and processing center for hazards in local and national levels • Expanding use of Internet and IT for people	• Remarkable active and efficient roles of NGOs in response activities in the 2003 Bam earthquake • Assignment building inspection to construction engineering organization in all provinces
	• Competition among institutions related to disaster management for lead role • Perceiving other institutions as threats due to conflicting interests • Overlapping responsibilities of	• Disagreement of various institutions on integrated approaches and new responsibilities • Interference some laws with each other due to accumulation • Inconsistencies between spatial planning and disaster management	• Lack of precise data security issues • The lack of supportive laws in order to use of national spatial data infrastructure • Internet censorship and restrictions on	• Due to social and cultural factors spatial planning is not well accepted and received by citizens, causing difficulty in the smooth functioning of the system. • Due to some misinformation of Media, the willingness

Threats	various disaster management authorities • Insufficient coordination between disaster Management methods and tools of spatial planning • There are shortages of proper laws to create revenue sources for the implementation of the programmes at hand. •	laws • There is no proper hierarchy of national, regional and urban plans in law point of view. • Regional regulations of plans are not active, and if they are, they do not establish proper links with the national or local plans	Internet access in Iran • An integrated information system like spatial infrastructure system needed for planning is absent.	of citizens to support the disaster mitigation activities may reduce • The status of the spatial data is not quite clear within the hierarchy of laws in Iran. • Not enough attention is being paid to the environmental standards in the urban areas in different levels. It is need more public education

SOURCE: Own source

4-9-2- Evaluation of Disaster Management System by SWOT Analysis

Four aspects of the SWOT analysis can be defined in several ways. In this study, the Iranian Disaster Management System based on the interviews will be elaborated in the light of following criteria of the SWOT aspects.

Four aspects of the SWOT analysis can be defined in several ways. In this study, the Iranian Spatial Planning System based on the interviews will be elaborated in the light of following criteria of the SWOT aspects:

- **Strengths**: As a simple definition, the strengths of the Iranian spatial planning system denote the positive results, achievements, and sustainable trends to the benefit of various stakeholders, such as institutions, organizations, media, business owners, and citizens. From a deeper perspective, strengths can be determined in terms of factors crucial to the effectiveness of the mitigation system, namely general advantageous in comparison with other countries, geographical location, geo-political status, institutional coping capacities, resources, assets, experience & knowledge, innovations & technology used, finance & marketing items, cultural level(literacy, value judgments, attitudes) & awareness, administrative & management process and procedures.
- **Weaknesses**: Weaknesses define exactly the opposite of strengths. However, in order to specify weaknesses of a disaster management system, it is also possible to use similar criteria as for "strengths". For instance, while the vast human resources in Iran can be evaluated as strength, over population and/or misallocation of human resources may well be interpreted as weakness. To avoid confusion, different criteria are suggested for measuring strengths and weaknesses, respectively, to the extent possible. Thus, weaknesses of the disaster management system may best be measured in terms of general disadvantageous, adaptation and development capacities in general, institutional and legislative gaps, regional cohesion, shortage of resources, vulnerable items, frequency of disasters and time frames for preparedness and recovery, reliability of institutions, authorities, and other stake holders in the disaster management system.
- **Opportunities**: Although opportunities have some similarities with strengths; the main distinctive feature of opportunities can be determined as positives stemming from external effects. The criteria for assessing opportunities can be a peaceful and stable political atmosphere, positive global influences, new technologies and business sectors, new markets and export quotes, willingness of foreign partners in cooperation on various topics, such as information, disaster projects, funding, exchange programs, etc., innovations and international scientific studies.
- **Threats:** Similar to the relationship between opportunities and strengths, threats have some common features with weaknesses. Both threats and weaknesses refer to negatives yet, while threats refer to external negatives on the disaster mitigation system, weaknesses denote shortcomings in the system.

In the following tables (see also table 4-14), disaster management activities and programs in Iran are examined on the basis of the SWOT analysis. Disaster management activities and programs

are organized in according to interviews which have been held with experts and managers. However, it is useful to add two remarkable issues to the results of the following tables. As already mentioned, the first issue is lack of integrate policy and/or master plan for disasters in Iran. Although Iran is one of the high disaster risk countries, such topics as urban risk assessment, integrated disaster risk reduction, vulnerability reduction to achieve sustainable urban settlements are not mentioned at all in the recent Urban Development Plan.

The second issue is many failures of governmental organization in disaster response activities of previous hazards due to many shortcomings. These shortcomings are very similar to the various weaknesses underlined in below tables. Hence, resolution of weaknesses mentioned below will serve to a better disaster management process as well as an effective disaster response program in Iran.

Table 4-14: SWOT Analysis for Disaster Management system in Iran

SWOT	Institutions & Organizations	Legal & Legislation	Information support system	Participation & Education
Strengths	• There is a long experience and history of organizations • Specialized institutions on earthquakes • Developed capacity on disaster response and recovery activities • There is specific insurance company for earthquakes	• Enactment of National Disaster Management Organization statute • Enactment of Law on Building Inspection for earthquakes	• Experts awareness of the need to use of Information technology especially SDI • Presence of several seismic observatories and data collecting institutions	• In recent years, development of NGOs under pressure from international organizations • Increasing public belief in vulnerability • Many universities designed their curricula and created new departments in accordance with needs in the field of disaster management
Weaknesses	• Instability of institutional structures • Insufficient sustainability of institutional programs and projects • Insufficient institutional awareness with respect to Mitigation activities • Insufficient attention to natural disasters except earthquakes • Inadequate organization and coordination among various institutions • No common terminology among NGOs •	• Incoherent and fragmented legislation • Conflicts among various laws • The main focus in only on disaster response and recovery activities instead of preparedness and mitigation • Absence of some basic concepts and approaches such as risk assessment • The main focus in only on building permits instead of spatial planning regulations • Ambiguity in laws and regulations	• No National Spatial Infrastructure System • Difficulties in sharing hazards data with the public • Insufficient effort on implementing an earthquake threat model • Lack of standard for storing spatial data	• Concentration of NGOs in capital city • Less attention to the potential and huge role of traditional NGOs • Poor experience of the society regarding NGOs' activities and public participation • Lack of enough and close relationship with people • Insufficient transparency • Lack of educational concepts related to disaster management in school Syllabi • Discouragement of NGOs mainly due to the external problems

Opportunities	• Institutional initiatives on coordination in light of lessons learned of 1990 earthquakes • Various institutional innovations in terms of approaches and organizations	• Preparation of a draft law on integrated disaster management • Introduction of using risk assessment maps in plan-making process • Updates in building quality control system	• Awareness of necessity of a data collecting, sharing and processing center for hazards in local and national levels • Expanding use of Internet and IT for people	• Remarkable active and efficient roles of NGOs in response activities in the 2003 Bam earthquake • Assignment building inspection to construction engineering organization in all provinces
Threats	• Competition among institutions related to disaster management for lead role • Perceiving other institutions as threats due to conflicting interests • Overlapping responsibilities of various disaster management authorities • Insufficient coordination between disaster Management methods and tools of spatial planning • Shortage of funds and budgetary constraints	• Disagreement of various institutions on integrated approaches and new responsibilities • Interference some laws with each other due to accumulation • Inconsistencies between spatial planning and disaster management laws	• Lack of precise data security issues • The lack of supportive laws in order to use of national spatial data infrastructure • Internet censorship and restrictions on Internet access in Iran	• Shortage of professional staffs such as planners, architects, engineers whom have basic knowledge and experience on disasters • Due to some misinformation of Media, the willingness of citizens to support the disaster mitigation activities may reduce

SOURCE: Own source

As an overall evaluation of disaster management activities in Iran, some basic strengths can be acknowledged in terms of institutions, theoretical frame of legislation, spatial planning standards and building codes, technical staff, building inspection and insurance system. These strengths are, however, undermined by many shortcomings on specifics. For instance, Iran has several institutions specializing on disasters, but efficient operations of these institutions are curtailed by instable institutional structure, budgetary constraints, and inadequate organization and coordination.

On the other hand, previous hazard experiences gave rise to reviewing the entire disaster management system. Many initiatives and ongoing studies on laws and legislation, institutions and organizations, Information support system, and quality control look promising for disaster resilient settlements. Institutional cooperation, coordination, and organization are three key issues to be developed in Iran to sustain various initiatives. Experiences of Iran in former devastating 1990 and 2003 earthquakes show that inefficiencies in institutional organization, coordination and cooperation are main threats for a modern disaster management system. In this respect, after 1990 and 2003 earthquakes, an initiative for establishing a single disaster coordinator institution is a promising event. However, the process and procedures of organization of this authority is still continuing due to an introduction of new legislation and disagreement of relevant institutions.

Lessons learned from previous disasters also emphasized the necessity of building a Disaster Information System in Iran. Despite of the presence of several observatories and data collecting institutions related to disasters, there are many problems in data collecting and sharing. Thus, Iran needs a National Spatial Infrastructure System to provide modern services in observing and assessing hazard data especially seismic data as well as user friendly platform for data sharing and

updating. Education, training and public awareness are other weaknesses in such developing countries like Iran.

It is obvious that an effective disaster management system cannot be built on well designed institutional structures and legislation alone. It should also be supported by public awareness which requires public training and participating. Iran is capable of organizing disaster training programs for a broad public. According to outputs of the SWOT Analysis above, new curricula and approaches should be introduced in Iran. For instance, disaster training programs should not be limited to teaching survival techniques to the public in the course of disasters. Various training programs can be designed for different target groups such as local authorities, citizens, trainer for trainees, etc.

The ultimate issue of public awareness and training refers the training of Media on public information. According to the lessons learned of previous disasters, it is understood that citizens can reduce the willingness to comply with essential rules and procedures of disaster management activities when they are misinformed about some public services or when they are in a panic due to some inappropriate information of the media. As a consequence, lessons learned from previous disasters can provide guidance to design an integrated approach for urban areas. The results of the SWOT Analysis above share more hints of the disaster management capacity of a country prone to devastating earthquakes.

4-10- Analyzing the current state of spatial planning and disaster management in Mashhad

Analyzing the current state of both spatial planning and disaster management in Mashhad situation using the identified conceptual framework in chapter three indicates the gaps (as weaknesses) and linkages (as strengths) in an integrated approach in Mashhad.

4-10-1- Analyzing the current disaster management system in Mashhad

The Study on "seismic microzonation mapping of Mashhad Area" is the most important and comprehensive study of risk assessment in Mashhad. This study has provided a comprehensive seismic disaster evaluation (or vulnerability analysis) based on many types of physical, environmental and socioeconomic data items, including (refer to: Ghafory-Ashtiany , 2011):

- Earthquake catalogue,
- Active faults,
- Geology,
- Ground property,
- Topography,
- Census of buildings (building distribution and building density by type of structure, storey, and construction year),
- Census of population (population distribution and density),
- Urban facilities (distribution of fire fighting stations, police stations, traffic police stations, hospitals, public facilities, educational facilities, parks and public open spaces),
- Urban utilities (water network, gas network, electricity network, and telecommunication network),
- Road and metro network structures,
- Hazardous facilities (distribution of hazardous facilities).

Based on analyzing the above data items, some analytical information is provided as peak ground acceleration, seismic intensity, slope stability, building damage, human causality, utility damage, and structural damages. Using this analytic information, overall earthquake risk of Tehran was evaluated by physical and social indicators as (Ghafory-Ashtiany, 2011):

- Hazard and damage: seismic, intensity, building damage and casualties,
- Social conditions: population density, open space, and narrow road.

The final result of risk evaluation presents high-risk districts, medium-risk districts, and relatively low-risk districts of Mashhad. This risk assessment does not present a comprehensive and thorough picture required for considering the earthquake's risks in the spatial planning system of Mashhad. The main problems of this assessment could be explained as follows:

- At the urban scale of spatial planning, data analysis employed in administratively delineated city sub-districts, or some smaller units is frequent. In Mashhad, however, this study presents only concrete and detailed maps for Mashhad's 13 urban district boundaries which do not fit in with the suitable scale for urban/ metropolitan planning.
- Considering changing social and physical data (population and density, building distribution and density, urban utility networks and so on), there is no mechanism to update the data and provide reliable and up to date vulnerability-related information for urban planners.
- The study area consists of 13 urban districts of Mashhad, but the area beyond the city limits has not been considered in this study agenda: there is a paucity of information about the vulnerability aspects of the surrounding areas of Mashhad (i.e., Mashhad's urban region).

Although there are some other studies on Mashhad or parts of Mashhad that present some information or analysis about the vulnerability aspect, but since these studies have been done in diverse years (starting from 1998) and by distinct agencies, they have different study areas, basics and principles, methods and outcomes and thus, they cannot able to be integrated to be used in an attempt towards spatial planning.

4-10-2- Analyzing the current the spatial planning system in Mashhad

Urban planning documents system in Mashhad is mainly consisted of two parts: (a) Strategic-Structural Plan of Mashhad, and (b) detailed plans of Mashhad's 13 urban districts. This two were prepared in Research and Planning Center of Mashhad, an organization established to manage the collaboration of Mashhad municipality and Ministry of Roads and Urban Development in terms of preparing spatial plans of the city. Strategic-Structural Plan (2007) of Mashhad has been recognized the importance of earthquake risk of this city and developed objectives considering managing this risk like identifying vulnerable areas and developing planning and construction legislations appropriate to each area.

Subsidiary documents of this plan also has been mentioned the necessity of developing construction legislative due to the importance of buildings, their stories and vulnerability of their location, developing legislative regarding risk reduction of utility and transportation networks, developing legislative to restrict building's density and arrangement based on vulnerability-related information and so on. But these have not yet become legal statement, and their implementation mechanisms are not defined yet.

Detailed plan of each Mashhad's district is prepared based on an agenda which includes two main parts:

First, studying and analysis of characteristics and specifications of urban development related issues, which lead to assess the determinant factors and trends of changes, and find the problems in the following categories:

- Land use characteristics,
- Spatial structure characteristics,
- Transportation networks characteristics,
- Environmental characteristics,
- Demographic characteristics,
- Socio-economic characteristics,
- Housing characteristics,
- Financial characteristics

Second, formulation of optimal spatial structure elements, including:

- Vision and mission statements,
- Goals statement and spatial strategies,

- Land use structure,
- Transportation network structure,
- Rules and regulations of space use,
- Subject and action area projects and their general framework.

The above tow-part agenda shows that disaster management consideration (such as identification and analysis of threats caused by hazards) is not embedded in, so there is no specific obligatory framework to application of earthquake mitigation measures in the optimal spatial structure proposed by these plans.

The most important shortcomings of spatial planning response in terms of urban physical and activity sub systems in Mashhad in employing mitigation measures include (Ghafory-Ashtiany):

- Considerations of risk reduction were not observed in current location of public sector facilities and major infrastructure elements.
- Most parts of Mashhad water network are more than 30 years old and even in normal conditions are often crushed. Studies indicate that in times of earthquake, fractures of water network in Mashhad would disable the entire system.
- Mashhad electricity, gas, and communication networks suffer from lack of sufficient strength against earthquakes and complete cessation of these networked is possible.
- Mashhad's road and transportation network and traffic congestion in normal conditions shows that this network is also highly vulnerable to earthquake. Collapse of adjacent buildings and /or destroyed bridges will freeze the network and cause disorder in the rescue and relief operations and thus increase damages caused by the earthquake.

Population density in Mashhad does not compliance with vulnerability-related information and even some most vulnerable districts (including districts 3, 4, 5, and Samen) are the most densely populated ones.

Disaster Management Activities	**Strengths and Weaknesses in linkages of Spatial Planning and Disaster Management in Mashhad**	
	Strengths	**Weaknesses**
Risk Assessment	• Existence of a relatively comprehensive study on risk assessment of earthquake in Mashhad • Provision of the seismic data of Mashhad (such as earthquake catalogue, active fault, topography and so on).	• Absence of the up to date physical and social data to evaluate risk of earthquake in Mashhad • Lack of detailed vulnerability related information in scales required in spatial planning (such as sub-districts and building blocks). • Lack of any applicable study on risk assessment of earthquake in Mashhad area beyond the city with its 13 districts • Lack of a defined basis for doing studies on risk assessment so that they could be integrated and used in spatial planning
Mitigation/ Risk Reduction	• Increasing attention to the spatial planning role in mitigation strategies in Mashhad spatial plans	• Lack of mitigation consideration in Mashhad Detailed Plans' agenda • Lack of detailed and well-defined legislative to regulate the use of lands and spaces, building density, population density and so on • High vulnerability of Mashhad urban utility, urban facility, road and metro network to the earthquake • Congestion of population and buildings in some of the most vulnerable districts of Mashhad
Preparedness, Response, and Recovery	• Increasing Attention of Spatial Plans to the Spatial Planning Role in Response and Recovery Strategies	• Inefficient distribution of emergency stations • Lack of safe accessibility to the most vulnerable areas in times of earthquake

Table 4-14: Describing strengths and weaknesses of linkage between spatial planning and disaster management systems in Mashhad.
Source: writer (2014) after Ghafory-Ashtiany (2011) and International Institute of Earthquake Engineering and Seismology (2005)

To Integrate disaster management process with the spatial planning process, their interrelationships and interdependencies could be studied in three following main lines of activities (refer to Greiving and Fleischhauer, 2006: 111-115):
First, problem analysis: Problem analysis process starts with the identification of certain conditions in the real world that regarded as unsatisfactory or demanding urgent action. Prerequisite for this phase is planning goals developing which describe the desired future circumstances. Afterward, observation of the environment, surveying and description of the information can be done to identify the dependencies, interactions and interrelations between the current condition and influencing variables. One of these variables is vulnerability related information which could be provided by Mashhad disaster management system through the appropriate and necessary data and assessment methods (such as hazard maps, risk maps and so on) to develop a correct scientific foundation of the decision-making process. Nevertheless, this activity itself depends on preparation of physical data (such as building types, distribution and density) from spatial planning supporting system.
Second, evaluation of alternatives: In this stage, planning alternatives would be developed and later, they would be assessed to estimate their anticipated impacts through using necessary measures. Considering the impacts of these alternatives on the damage potential and coping capacity of Mashhad could be a significant contribution to the disaster management system, especially in mitigation activities.
Third, decision-making and implementation: Paying attention to the above considerations in evaluating the alternatives in the line with willing, proficiency, and power of Mashhad spatial planning to regard disaster management as an element of planning process leads to establishment of procedures and development of measures contributing to disaster management activities.
These three activities can be categorized in two main parts of (a) providing a scientific base, and (b) making decisions and implementation as shown in Figure 6-1.

4-11- **Natural hazard in Iran**

The Islamic Republic of Iran is situated in south-west Asia and covers an area of 1,648, 000 square kilometers. Located on the world dry belt, 60 percent of Iran is covered with mountains and the remaining part is desert and arid lands. Due to its location, Iran is a disaster prone country. Among the 40 different types of natural disasters observable in different parts of the world, 31 types have been identified in the Islamic Republic of Iran. Major natural disasters include frequent serious earthquakes, floods, droughts, landslides, desertification, deforestation, storms and the like. Earthquakes take a heavy toll. Iran is part of the Alp-Himalaya orogenic belt and is known as part of the youngest and last orogenic regions of the world. As a result, Iran suffers severe economic and social damages resulting from seismic activities within its territory. Earthquakes have killed more than 180 000 people during the last 90 years. Many cities including
Tehran, Tabriz, Rudbar, Manjil, Tabas, Lar, Qazvin, Zanjan. Hamedan. Kermanshah, and Fars have sustained substantial damages due to high magnitude earthquake activities. Review of the historical seismic data shows that almost all parts of the country are affected by the physical, social and economic problems associated with earthquakes. The most recent major earthquake measuring 5.6 on the Richter scale struck the historic and agricultural city of Bam in the south eastern Iranian province of Kerman killing more than 30000 people, leaving more than 10000 people injured and more than 100000 homeless. About 80 percent of the houses in the region were destroyed and serious devastation was inflicted on the urban and rural infrastructure, causing over 800 million US dollars worth of damages. It is feared that a major earthquake in Tehran, a megalopolis of over 10 million inhabitants, situated on a number of major faults, could well lead to considerable loss of life and substantial financial damages if appropriate mitigation measures are not introduced. It is worth mentioning that due to the political, social and economic stability of our country in the region, Iran has been the largest refugee host country for more than a decade and thus Iran regularly deals with complex human emergencies on top of all the natural disasters. The 31 types of natural disasters affecting the country are as follows:

1. Earthquake
2. Liquefaction
3. Tsunam
4. Ground surface upwelling
5. Mudflow
6. Landslides
7. Rock falls
8. Slumps
9. Soil erosion
10. Forest Fires
11. See Water level Fluctuation
12. Sedimentation
13. Coastal degradation
14. Marsh encroachment
15. Desertification
16. Cold and Frustration
17. Avalanche
18. Storms
19. Environmental and Water pollution
20. Vegetation infestation
21. Drought
22. Thunder
23. Geothermal hazards
24. Karstic subsidence
25. Ground subsidence due to mining and exploration
26. Underwater slumping
27. Under water slides
28. Swamp encroachment
29. Floods
30. Volcanoes

4-11-1- Earthquake Hazard: the Most Destructive Force of Nature in Iran

Among natural hazards, earthquakes bring about the greatest destruction. Oftentimes, the unpredictable nature of earthquakes makes them most frightening natural phenomenon, on average, two earthquakes of magnitude 8 hit the world each year. As shown in Figure 4-13, Iran is one of the leading seismic countries in the world. The cause of earthquakes in Iranian neighboring regions (e.g.,Turkey and Afghanistan) can be attributed to their position in the geologically active Alpine-HimalayanBelt. Many Iranian cities are susceptible to earthquake hazard due to their geologic setting (JICA, 2001).

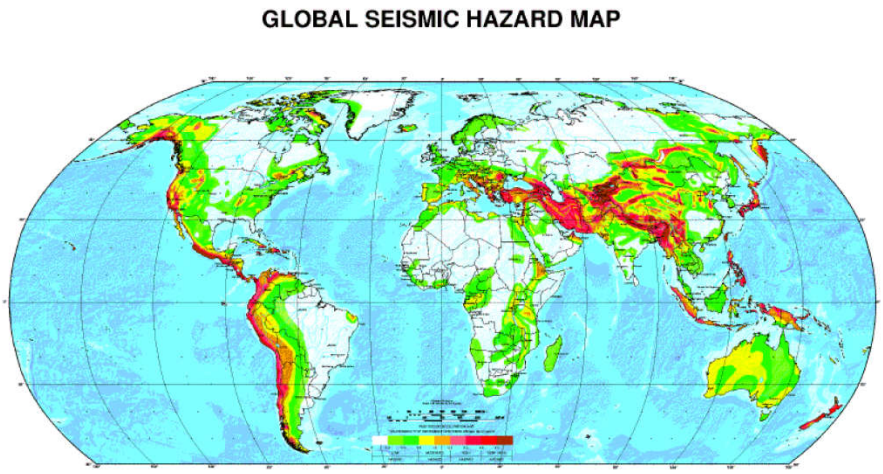


Figure 4-13 Global Seismic Hazard map
Map: UN Hazard Assessment Program

Historic records show that many Iranian cities have been impacted by earthquakes leaving many lives and economic looses. About 15,000 lost their life in 1978 as a result of Tabas earthquake in eastern Iran. In 1981, approximately 1000 people die in Kerman's earthquake. More than 40,000 people died in an earthquake of magnitude 7.2 in the northern province of Iran. . In 2002, an earthquake in Northwestern Iran left more than 1100 casualties.. The Bam earthquake in 2003 was estimated to have caused a heavy casualty of 30-50 thousand. The Bam earthquake is one of top 130 major earthquakes in the recorded history of Iran (Iranian Studies Group at MIT).

Disaster	Date	Killed
Earthquake	1-Jun-1990	40,000
Earthquake	26-Dec-2003	26,796
Earthquake	16-Sep-1978	25,000
Earthquake	Sep-1962	12,000
Earthquake	31-Aug-1968	10,000
Earthquake	10-Apr-1972	5,057
Earthquake	23-Jan-1909	5,000
Earthquake	1-May-1929	3,300
Earthquake	13-Dec-1957	3,000
Earthquake	6-May-1930	2,500

Table 4-15 Top 10 Earthquakes in Iran
Sorted by numbers of people killed

- **Iran Earthquake Hazard Mitigation Program**

Shortly after the introduction of International Decade for Natural Disaster Reduction (IDNDR) in 1990, the north of Iran underwent a destructive earthquake that took the life of 16,000 people and caused a loss of 2.5% in GNP. Because of its significant socio-economic effect, this event marked a milestone in earthquake hazard mitigation operations in Iran. Following the Manjil earthquake,

the government determined to undertake a multidisciplinary strategic research plan called "Iran Earthquake Hazard Mitigation Program" to achieve the following goals:

1. Gaining deeper knowledge necessary for earthquake hazard mitigation.
2. Reducing the failure risk of a wide range of constructions and building safer structures.
3. Raising public awareness about seismic hazards and encouraging a prevention-oriented culture in people.
4. Formulating plans of actions for rescue operations after the earthquakes.

Consistent with the above objectives, a detail program with six underlying elements was designed by IIEES and executed in collaboration with various institutions in Iran. An overview of the program and its achievements are shown in Table 1 and its main topics are shown in Table 4-16.

DESCRIPTION OF ACTIVITIES	Achievement %
Research on Seismic Zoning and Microzoning	83
Research on Seismic Safety of Structures	60
Building Code	55
Education and Training	75
Risk Assessment and Reduction	85
Public Awareness	70

Table 4-16 IRAN Earthquake Hazard Mitigation Program (IEHMP)
Recourse: (ibid)

The notable accomplishments of this phase were: Deeper insight about seismic hazard in Iran; expanded network of the seismic and strong motion monitoring; foundation of necessary geotechnical testing facilities and implementation of many geotechnical microzonation at the regional and local scale; enhanced earthquake engineering knowledge and the host of research on a seismic design, vulnerability analysis of vital structures and reinforcement of the vital ones; directing the academic education of structural engineering toward earthquake analysis, , increased public awareness and so on. Today, seismic safety is one of the burning issues of the country and structures are much safer than before, but there is still a long way to reach a seismically safe environment.

	Before IEHMP&IDNDR	End of IEHMP
Public Awareness	None	Good
Preparedness	None	Low
Engineering Practice	Very Poor	Average
Engineering Knowledge	Average	Good
Political Will	None	Acceptable
Application & Implementation	None	Low

Table 4-17: Iran's achievement during IEHMP
Recourse: (Ashtiany 1999)

In summary as represented by several indicators and comparisons in the Tables 4-16, this program marked a significant progress (but still inadequate) toward risk reduction in Iran, though the issues concerning its application in the society as well as its general uses still should be addressed. Today, the investment of public and private sectors in the design, construction and mitigation of seismic issues cannot be compared to the development investments (ibid).Thus, one may ask the question "Why there is a discrepancy between the technical and the know-how knowledge and the implementation process and why Iranian vulnerability to earthquake is still high?" This is due to the fact that existing buildings and infrastructures are not consistent with the level of seismic hazard and there is a paucity of practical knowledge in this regard. Further, the following barriers hamper the realization of a seismically safe environment

- High degree of seismic risks in Iran or other developing nation;
- The cost of reinforcing and retrofitting the existing system would be exorbitant, requiring rich economic and financial resources;

- Socio-economic issues and lack of a political determination at all the levels of governmental.

In light of the experience and lessons learned from the first phase of the program and the growing knowledge of Iranian experts, a new program known as "Doable Initiative and Momentum for Earthquake Hazard Reduction-DIMEHR" has been projected for Iran in the year 2020". The underlying goal of this plan is to reach a seismically safe Iran in the year 2020.

- **Land Use Planning and Seismic Micro Zoning in Iran**

Ground failures such as landslides, slope failures, liquefaction and rock-falls can be caused by earthquake vibrations, Different types of ground vibrate more severely in earthquakes and so cause higher damage levels to the buildings built on them (Ghafory-Ashtiany, June 2011). The identification of various ground conditions in terms of their earthquake hazard across an area at the scale of a city or conurbation is called the seismic micro zoning. It is an important tool for urban planning to incorporate earthquake protection through proper and prudent land use planning.

The seismic micro-zoning map, even if fairly coarsely defined, can be used as an additional information resource for urban planners to incorporate earthquake protection considerations into their normal land-use planning decisions. The map may define areas of likely ground motion amplification, potential slope failures, landslides or rock-falls and potential liquefaction.

The delineation of the city and its environs, particularly its potential areas of expansion, into areas of relative severity of ground motion shaking likely to be experienced in a future earthquake can help shape a safer city, through the actions such as:

- Avoiding building on some areas of potentially higher hazard altogether - a zone of very high hazard might be left as park areas
- Encouraging city expansion out in an opposite direction (through preferential provision of transportation routes, urban services, etc.).

By building on areas of potentially lower hazard, future earthquake damage can be reduced while reducing direct capital investment required bringing about increased safety. Even if indirect costs involved with the locational choice might increase-such as higher land prices in one area than another, or increases in transport costs or needs for additional infrastructure- in many cases the total cost to the community can be far less than those involved in the construction of stronger building stock. In case of limited choices of location, or there are other convincing arguments for locating in an area of higher seismic hazard, structures or infrastructure built in that location must be built to a higher standard of earthquake resistance. Engineering code requirements and building stock management must be matched with land use planning.

For moderate levels of earthquake shaking, location planning is less effective in reducing losses. On the other side, at higher intensities there is generally more difference between the performances of different ground types. Different types of ground affected by the same earthquake waves may vary in their severity of ground shaking and consequent destructiveness by one or more degrees of intensity. Stiffer soils or hard rock may be shaken with ground motion of intensity VIII while softer ground close by, like shallow alluvium, is shaking more severely, close to intensity IX.

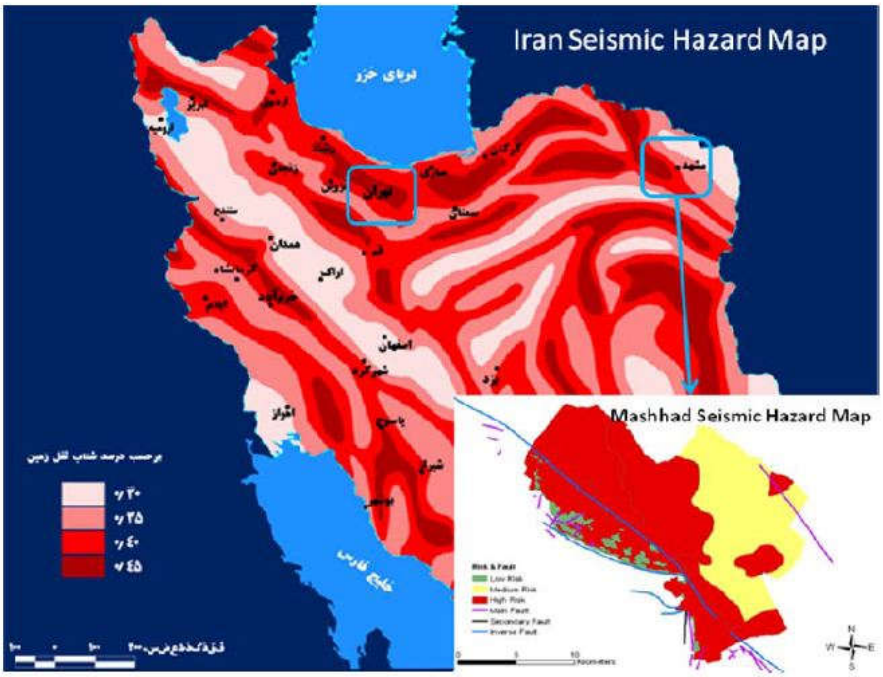
In one case, this would mean that around 75% of weak masonry buildings built on the soft ground could collapse, killing perhaps 14% of their occupants, whereas only 40% of the same building type built on the rock would collapse, killing less than 5% of their occupants. Where high intensities are possible, the micro zoning of a city or town can play an important part in earthquake protection (Ghafory-Ashtiany, 1999).

Certain building types are more vulnerable to different frequencies of ground motion vibration than others. Seismic micro zoning can show the frequency content of vibration due to different local ground conditions. It can be used to ensure that a match does not occur between buildings vulnerable to certain frequencies of vibration and ground conditions that are likely to vibrate in that frequency range and thus avoiding buildings being damaged by 'resonance effects' in zones

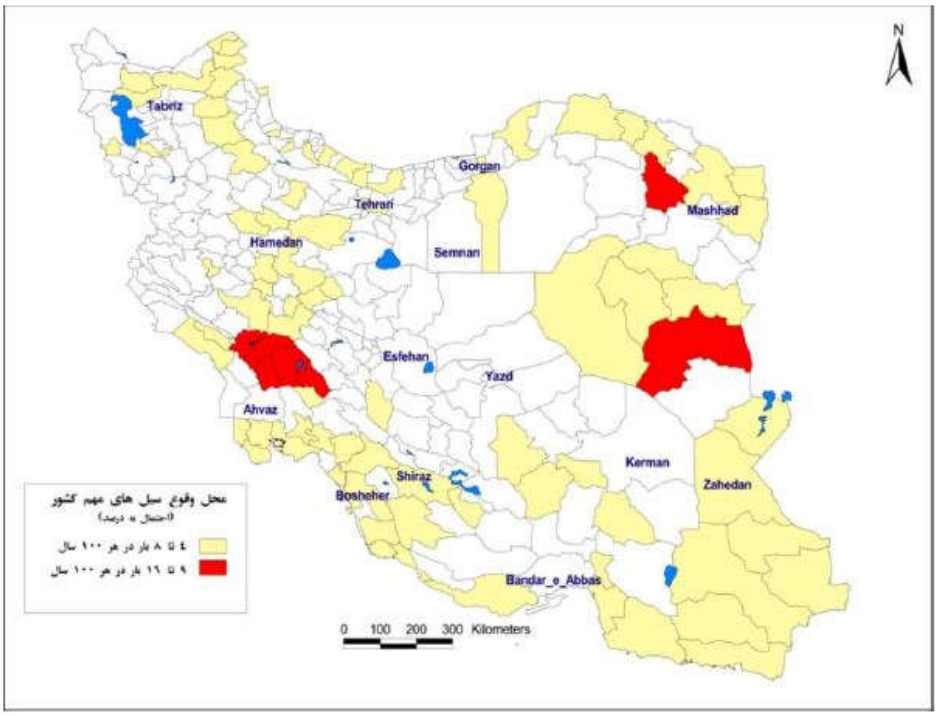
where the ground is likely to vibrate in certain frequency ranges. Buildings should be designed either to have frequencies of natural vibration well outside the critical range, or to be designed for the much higher seismic forces they are likely to experience. An example would be a zone where restrictions might be imposed on building structures of 10 storey's high, likely to have a natural period of about 1 second, because the zone consists of deep deposits of soft soil that are also likely to have natural periods of vibration of about 1 second.
Uncertainties about ground conditions and their likely performance in an earthquake may be too great for major decisions on location to be solely based on seismic safety considerations, but they can add useful information to help decision-making for protection.

4-11-2- Hazards and disaster management in Mashhad

Among natural hazards, Mashhad is mainly exposed to earthquake and flood and Figures 4-14 , 4-15 show their level of hazard with respect to other part of country. It can be seen that Mashhad, is not only the second important city of Iran after Tehran in terms of population, economy, industry, etc., but it can be considered as the seconds exposed city to risk of disasters.



Map 4-14: Seismic Hazard Map of Iran (1999) and Seismic Hazard Map of Mashhad (2007)



Map 4-15: 100-year Flood Hazard Map of Iran (2008). Mashhad is one of the regions with the highest number of flood

As it has mentioned in chapter four, the Parliament has established the "Disaster Management Organization-DMO" in July 2008 under the guidance of the high level council headed by the President and structurally within the Ministry of Interior which has central authority over the 31 Provinces in Iran, with objective of establishment of centralized and coordinated command in risk management process. Considering that the Disaster Task Force (DFT) in Ministry of Interior had been responsible to all functions related to disasters since 1991 (after Manjil earthquake and beginning of IDNDR), and that the new structure of DMO is under development, in practice the old system still is in operation. At province level, the national structure of the Ministry of Interior is mirrored and the Governor General has all of the authority of the Minister within the province DTF.

It should be noted for the City of Tehran, due to its importance and complexity and high level of hazard, independent Disaster Management and Prevention organization within the Tehran Municipality and coordination of DMO has been established in 1995. Due to the successful experience of Tehran DMPO, similar approach will be applied to cities of Mashhad, Shiraz, Isfahan and Tabriz. In other words, it is expected that these cities due to their technical capabilities and resources could manage the risk reduction and management process independently of the Central DMO, and DMO efforts and resources would focuses on the cities that lack the human and financial resources that are required for risk reduction activities.

One example is the initiative and investment of Mashhad Municipality toward the development of Earthquake Risk Model of Mashhad Assessment within the EMME-GEMWP5- City Scenarios project.

Based on this general strategy, the city's master development plan in Iran are prepared and developed by the consulting engineers appointed by the Province branch of Ministry of Housing and Urbanism based on the Iran Urban Development Strategy and regulations. The plan after its approval by the High Council of Architecture and Urbanism should be implemented, regulated, managed and controlled by the city's municipality. The new general (overall) master plan for whole city Mashhad has been developed and its detail for each city district (zone) is under development by the Mashhad Municipality, based on the following principal guidelines:

1. Natural hazard compatible land use planning and urban development that ensures the safety of living and working environment against natural disasters as well as reducing the risk of vulnerable area through the renovation and re urbanization program.

2. Urban development that ensures the safety and security of the city against man-made disasters and human activities. i.e. the transportation lifeline should be designed in such a way that the present rate of accidents should be decreased.

Land use plans provided in the urban development plan will be the criteria for classification and type of the building permission in the city. Each city district also has its own department of Architecture and Urbanism which will manage and control the land use issues in the related parts of the city. Notably, in recent years, the land use implementation has become more effective. Considering the importance of the13th districts-Thamen (heart of the city where the Holy Shrine is located) and high risk level of very old and highly vulnerable part of the city, their urban development plan has been completed and the re-urbanization and renovation based on the principal of preserving t he historical and religious identity of the area are in the process.

Chapter Five:

Spatial Planning Options for Disaster Risk Reduction in Mashhad

Chapter Five:
Spatial Planning Options for Disaster Risk Reduction in Mashhad

In Mashhad, integrating disaster management in spatial planning is a relatively new concept, both for the urban planners as well as for disaster managers. It therefore requires some fundamental changes in planning concepts and practices. Because the main emphasis in urban planning during the rapid urban growth since the 1980s was the building of houses and physical infrastructure, land use planning has been dominated by design, layout and location issues. Because of the continuing rapid urban development at present and in the near future, the facilitation by rising GDP levels and more attention for spatial quality, it is urgent to build up a kind of consensus about sustainable development and resilient urban among technical experts (i.e. urban planners, urban designer, civil engineer and disaster managers), officials, developers, property owners and citizens. Making use of the public concerns and opinions, a new approach to explore the problems, solutions and plan-making could be possible. In these plans a compromise between the aims and needs of economic and urban development and disaster management is beneficial to the risk reduction process as well as to urban development.

- Committees that entitled to decide protection against natural hazard

The Islamic Republic of Iran was one of the first countries to set up its national committee through the legislative Branch. In line with the International Decade For Natural Disaster Reduction (IDNDR), the Islamic Consultative Assembly approved the formation of the National Committee for Natural Disaster Reduction in 1991 headed by the Ministers of Energy, Agriculture, Health, Commerce, Jihad of Construction, Roads, and Transportation and Housing and Urban Development. The Directors of the Planning and Budget Organization, Environment Protection Organization, Meteorology Organization, Forestry and Rang lend Organization, Institute of Geophysics and the Red Crescent Society of Iran are also included. Army and Disciplinary Forces and any other organizations that the Chair of the committee deems appropriate are also able to participate in the Committee. The Committee was designed as a policy making body to provide for the exchange of information and to allow the government to have the authority to support and follow up the related activities. The National Committee has set up 9 specialized sub-committees presided by deputy ministers, 27 provincial Committees presided by General Governors and also a coordination committee presided by the Minister of Interior himself. The 9 specialized sub-Committees (SSC) of NCNDR are as follows:

1. SSC for earthquake and landslides.
2. SSC for vegetation infestation, vegetation diseases and cold.
3. SSC for rangeland revival and coping with drought.
4. SSC for flood prevention, sea level rise and river overflow.
5. SSC for reducing air pollution.
6. SSC for storm and hurricane hazards.
7. SSC for rescue and relief.
8. SSC for loss compensation.
9. SSC for health and medical care.

Proposals received from all the above mentioned SSC are studied and analyzed by the coordination committee to be presented with its final evaluation to NCNDR for decision making.

It is worth mentioning that by virtue of the act on formation of the Iranian NCNDR, it is envisaged that all the activities related to the committee will continue within the decade and beyond. So the elapse of the decade does not apply to the above act as far as the Iranian NCNDR is concerned.

5.1. Proposing framework for an integrated approach in Mashhad

According to weakness and strengthens of disaster management and spatial planning that was discussed in chapter 5, will be proposed integrated framework. Due to the specific features of risk management and assessment in chapter 2, the issues of disaster risk reduction are impossible to tackle in a small scale area in a short period of time. Consideration of medium- and long-term developments in a large-scale region needs integrated planning attention from the strategic level to the local action level. Based on the case studies in Mashhad and linkage between spatial planning system and disaster management which showed in Figure 5-1, an integrated spatial planning model that seeks to create a framework for such an approach is proposed in Figure 5-1.
The scientific basis provide both required spatial information for risk assessment and vulnerability-related information and classification of earthquake-prone areas which enable the spatial planning system to define land and space uses based on alerting about hazardous areas. Provision of this basis requires the following activities:

- Establishment of an information support system, including complete physical data (building type, building distribution, building age, building density, urban facility distribution, urban utility networks, road networks and so on), demographic data, and seismic data for building blocks of Mashhad,
- Designing a mechanism to update spatial data in the information support system,

Scientific base can also have a different role in raising awareness of Mashhad spatial planning officials and experts about disaster management by equip them with information which broadens their view of hazards and risks, since only those hazards and risks that are known can be managed. Moreover, the training of experts engaged in planning is also important in that they may act as multipliers and contribute to the raising of awareness to public. In this situation, the provision of any kind of information (including sources, existing actors and contacts, the cost and effectiveness of different measures, and, etc.) to introduce a disaster management process at the metropolitan level by means of a guideline or a handbook can be seen as a good solution.

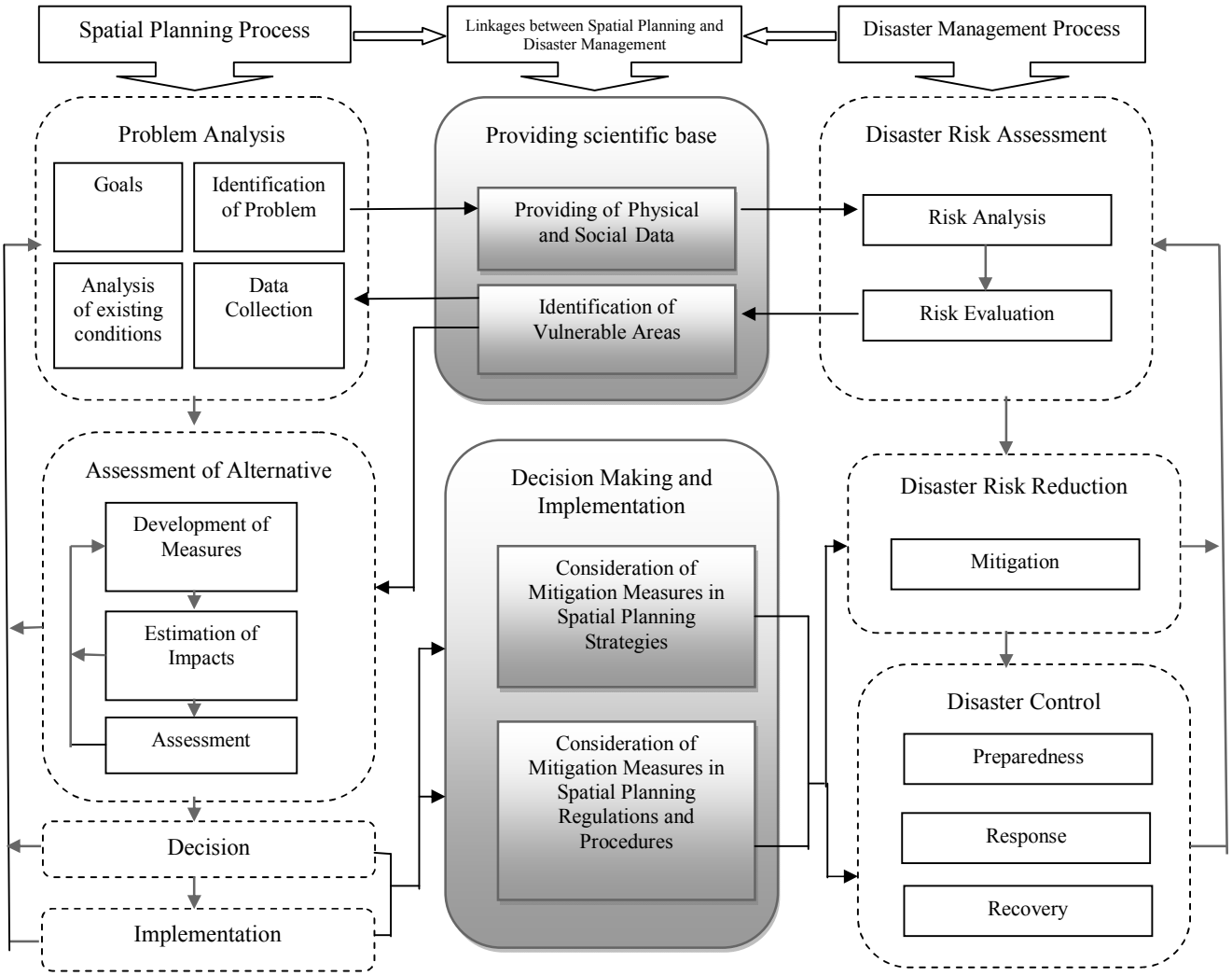


Figure 5-1: The linkage between spatial planning and disaster management in Mashhad Source: Writer (2014) based on Greiving and Fleischhauer, 2006

The guideline or handbook would fulfill these three main objectives:

- Guaranteeing the ability of all receivers of a risk message to understand its meaning,
- Influence receivers of such message to change attitudes towards the disaster and their manners,
- Offering the basis of a two-way communication process which increases public participation in the emergency decision-making.

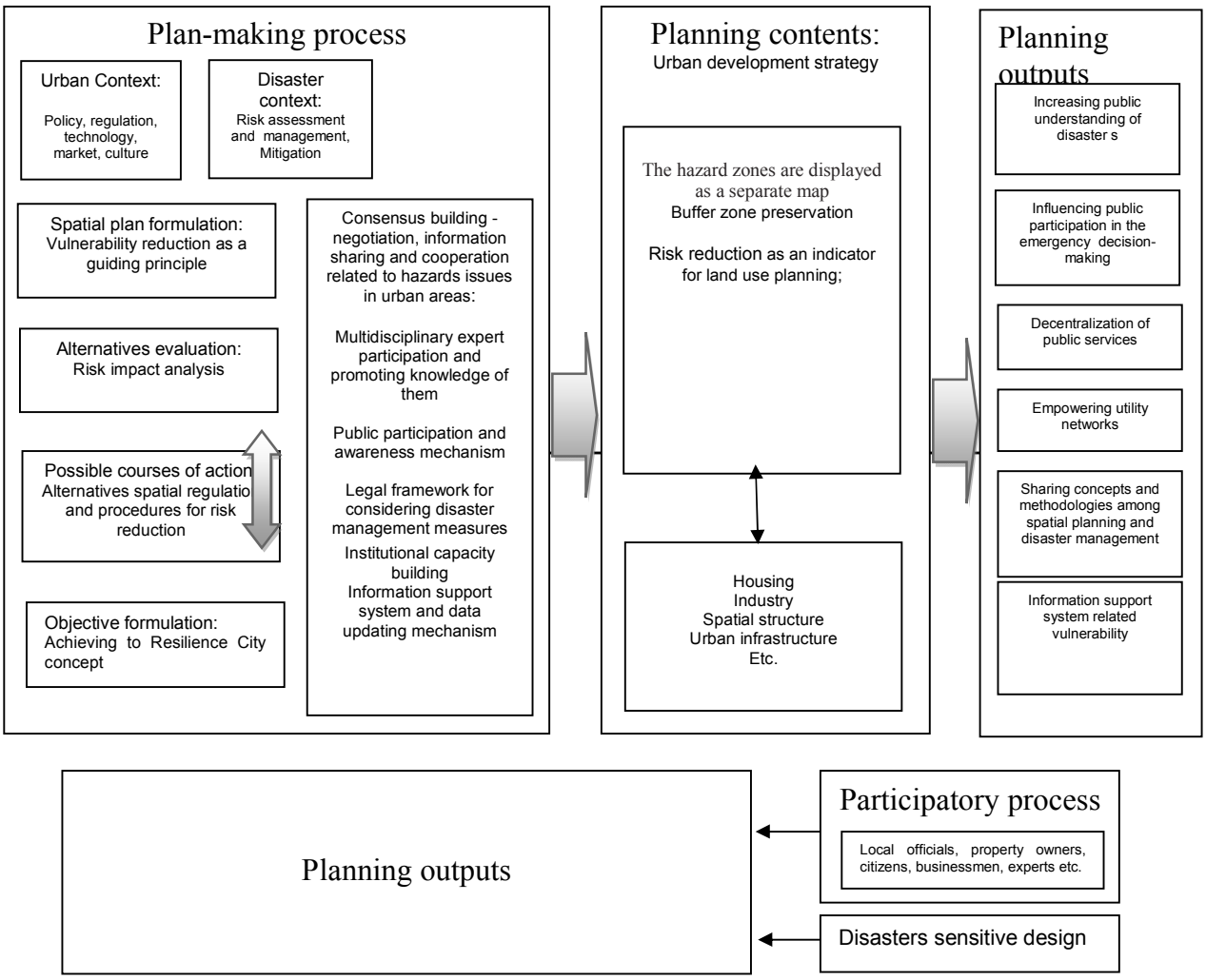


Figure 5-2 Proposed integrated spatial planning framework incorporating the disaster management

A legal framework to considerate disaster management measures in planning activities can be seen as the most important need procedurally and legally since it direct spatial planners to take into account earthquake risk while making decisions about urban change and development. Such a framework could include disaster management measures as follows in the spatial plans' agendas:

- Developing spatial construction standards /criteria in vulnerable areas,
- Prohibition and/or restrictions of future development of significant urban facilities and major infrastructure elements in highly prone areas,
- Relocation of hazardous facilities,
- Decentralization of public services,
- Empowering utility networks through the replacement of damaged parts and switching circular systems with radial ones.

In addition, considering disaster management strategies in spatial planning requires training planners who have skills of understanding seismic map or at least are capable to communicate with the disaster management sector. Cause the lack of shared concepts and methodologies to assess vulnerability may lead to pay little attention to vulnerability in Mashhad spatial planning

practice. Furthermore, these planners can inform the disaster management system about the real information spatial planning system needs to deal with earthquake in decision-making.
Integrated framework entails a comprehensive planning system which covers the key issues from the strategic to the local level and, as argued in the former chapters, is based on a multi-sector/multi-disciplinary approach to spatial planning and disaster management. It is also the reflection on and development of the conceptual model presented in chapter 3 (see Figure 3-10).

5-2- Spatial Planning Strategies to Be Used for Disaster Management Purposes in Proposing Framework

Based on proposing framework, we should decide between the strategic and local level when talking about disaster management related to spatial planning. Therefore, it must be clearly indicated which objectives, instruments, actions etc. can be applied on the strategic or local level.
Seen from the broader disaster management point of view, risk management consists of mitigation, preparedness, response and recovery. At the same time, planning responses at several planning levels can be attributed to the respective disaster management strategies, although spatial planning responses are concentrated mainly on non-structural approach such as legal and organizational approach.

5-2-1-At the strategic level

At the strategic level, it is important to achieve awareness and agreement about the problem definition and goals. Strategic development planning, comprehensive planning and related land use planning should involve disaster risk reduction (risk assessment, mitigation, etc) in the planning content and in the plan-making process. A conventional way of regarding earthquake just as a natural hazard should be replaced by a conceptualization of resilience cities, with greater emphasis on reducing vulnerability. This new concept and its spatial considerations should be part of the planning process and documents.
As the studies in chapter three showed, the concepts such as ‘provide awareness about high-risk areas’, ‘reduce building damage and casualties’ and ‘reduce vulnerability of public services’ and spatially ‘increase coping capacity’ all include clear goals at the strategic level so that it is relatively easy for the public to understand the benefits and the relevant regulations requirements. For the case of Mashhad, such concepts are still missing, both in urban planning and in disaster management. Until now only the building code regulations have become a common concept. As this study showed, the earthquake problems in urban areas do not only come from the buildings themselves but also come from how it has took into account the risks of earthquake by spatial planning system. The future spatial structure and land use planning need to link risk management, disaster risk reduction and risk assessment together as a combined system. The urban construction activities should be arranged in a way that they respect this combined system as a basic for resiliency. Therefore, urban spatial structure, location of residential and industrial land use, infrastructure (especially highway and road systems) and other facilities have to take disaster management as a whole system seriously into consideration.
In the meantime, successful management of disasters and decrease of urban vulnerability relies heavily on the thorough understanding and cooperation of the public. Multidisciplinary expert participation and public participation is necessary to reach a consensus which offers the foundation for the cooperation of different administrative departments. In the context of the Iranian urban and regional planning practice, public participation is still in its initial stages.
Given the fact that hazard problems concern a large region and many different interest groups, innovation is required. During the plan-making process, especially before the final decision is made, the participation and negotiation should be in the hands not only of the policy-makers and the expert groups, but also of representatives of citizens. Moreover, the expert group should include more multi-disciplinary interaction, in particular at the first stages of the plan-making process when the basic decisions for further strategic development are made.

Various instruments have been used in plan- making, such as vulnerability reduction options, spatial planning and land use planning a. A number of factors like the urban design and development, the positioning of infrastructure, important buildings and facilities as well as the physical development all can influence the repercussions of an earthquake.

- **Vulnerability reduction options in proposing framework**

- The mitigation activities include taking preventive measure, delegating the risk and responsibility, minimizing the risk and working on emergency responses.
- The practical preventive or protective measures should be adopted. The preventive measures may involve ensuring the adoption of new development plans and identification of potentially hazardous areas.
- Hampering development in hazardous areas. The spatial planner can use a seismic micro zonation to identify areas with seismic hazard and spatial plan can be formulated with respect to such areas including those prone to landslides, liquefaction and ground shaking. , Having identified the vulnerable locations and facilities, the necessary protective measured should be provided.
- Spreading the risk by expanding development at the regional level via decentralization of development. Encouraging development at small towns to avoid concentrated urban sprawl in metropolitans.
- Sharing responsibility in the community through public/private participation to reduce vulnerability and encouraging people to take actions.
- Disaster management planning. Earthquake vulnerability mitigation can be achieved by more efficient planning and disaster preparedness . Spatial planning should involve the development of necessary legal and institutional ground for disaster management. Enhanced preparedness can be accomplished through efficient institutional arrangement and improved training of emergency staff.
- Restricting location of human settlements and choosing suitable economic activities
- Understand the area of land actually available for development (considering development is not allowed in areas prone to natural hazards) and thus find options of how to meet the demand over time and accordingly set development goals and objectives.

- **Protecting urban infrastructures**

- Vulnerability analysis is required to create a robust system for important urban facilities. For example: Are fire station buildings t earthquake-resistant enough to remain serviceable after possible disasters when they are most needed? What would be the extent of electricity cabling failure around the city network? A Any potential weak links in the system should be detected and amended.

- One of the primary objectives of earthquake protection should be the decentralization of key. If this not operable, the critical components of the system must be protected with higher standards. If extra costs and reduced efficiency associated with setting up more than one specialist hospital or spreading the government administration is unjustifiable, the building of the only specialist hospital and the central government administration should be fortified to ensure their continued functioning after an earthquake.
- The road networks, pipe services, electrical cabling, communication liens, roads and railways that create the urban transportation network should also be accounted for in earthquake protection measures. Grid networks are more solid than radial networks because they contain the redundancy necessary for predicting worst case scenarios. That is, in case of the failure of one element, the same points can be still accessed by another route.
- Vulnerable points in road networks should be identified and strengthened and if further protection is not justifiable due to physical constraints, alternate routes should be considered. In case of emergency situations, it is highly important to have alternate routes for purposes such as rescue, evacuation and relief operations.

- **Deconcentration, reducing and limiting densities in urban settlements**

- Some controlling measures such as density limitation, height restrictions and plot development laws can all be used to hamper the concentrations of buildings. Obviously, changing the densities of current urban districts will be highly difficult, and it would be much easier to put density limits on future development areas.
- Moreover, the densities can be reduced by creating open spaces in the urban settlements, especially space inside the built-up areas. Such places also provide safe congregation areas for the public, away from potential injuries that may be caused by construction pieces falling from buildings. Also, in areas prone to fire risk, they provide a safety refuge in case of multiple fires.
- General plans to renovate squatter areas should involve density reduction, establishing access routes for fire trucks and other emergency services and inhibit settlement of hazardous slopes.

Decentralization is often coped with via measures such as developing 'satellite centers' (with local services in the suburbs) , developing necklace (suburban development on the far side of green belts), promoting a secondary town in the area, transferring ministries and other key state facilities to neighboring cities, or increasing relocation grants for industry and preferential services provision to diminish development pressures on an over-centralized city.

5-2-2- At the local level

Based on the guiding principles and the objectives decided on at the strategic level, specific land use control measures and instruments concerning risk assessment and management should be implemented by regulations or legislation. In the Mashhad case, vulnerability reduction concept and integrated disaster management are still quite new approaches for many urban planners and disaster managers and plays no role in spatial planning system especially in the process of issuing land use permits. The concepts of integrated disaster Management, strategic planning and participatory approach in planning which were described in previous chapters should be advocated, as a supplement to the present 'blue print' approach. Planners, designers, disaster managers and administrative officials are responsible to present urban areas with minimum risk concerning hazard issues for the public. Public participation should be encouraged during the planning process in order to achieve common awareness and support.

For the Mashhad situation, community organizations are basic local governmental entities and it is possible to involve the citizens in sharing the responsibilities for disaster risk reduction through their power at the local level. The key point is to achieve an agreement regarding the goals and action measures, and that is what spatial planners, disaster managers and officials need to pursue. A well supported agreement among the divergent interest groups of stakeholders (e.g. developers, residents, officials, building-users) on the design scheme and final action plan is helpful for a smooth implementation. These agreements should respect the principles and objectives decided on at the strategic level.

- **Vulnerability reduction options in proposing framework**

- Provide guidance in formulating suitable risk reduction policies and zoning regulations such as building codes.
- Provide guidance in adopting suitable risk reduction measures in the development projects in the area

Protecting urban Infrastructures

- The protection level of facilities can be prioritized of. Protecting the life of residents in a building can be one level of prioritization. . As such, buildings that accommodate a greater number of occupants should receive higher level of protection. In this regard, the duration of occupancy and the maximum numbers of occupants are important factors that should be taken into account. Buildings such as hospitals and nursing homes usually have permanent occupation.
- In Iran, given the concern of society about children protection, high protection level is usually considered in schools. Thus, in case of an emergency, -a temporary shelter can be sought in earthquake resistant schools. However, in many developing countries, given the lack of public spending for educational facilities, especially at the primary level, the above strategy would be inefficient. In such countries, the need to provide mass education for as many as possible works to the

detriment of quality in these facilities. In this case, school community – teachers, parents, students and other stakeholders- should raise public awareness on how to provide safer environment for education of children..

- Given the responsibility of spatial planners for the safety of urban space such as the streets, examining the street safety can be a protection measure. In public places, and main roads and sidewalks the any loose and unstable part or component of building façade, billboards, or street furniture can cause lethal damages during an earthquake. Identifying such threats is not difficult: unstable masonry, broken windows, loose street signs and any other dislodged item can be strengthened, bolted, strapped or eliminated to increase the safety of the street for the general public.

- **Deconcentration, reducing and limiting densities in urban settlements**

- As a result of market pressure, open spaces which were originally designed for green space and social venues have been transformed into commercial places, thereby exacerbating the neighborhood vulnerability due to the high density and absence of safe open spaces.
- Density control measures involve laying limitations on the height of buildings, restriction on the plot ratio of permitted development for any site, and limited access to fundamental services.
- In the vicinity of potentially vulnerable buildings (for example those made of masonry), there should be some restrictions on the height and closeness of buildings, particularly buildings on a slope, to prevent the collapse of one building onto another. One of the destructive effects of earthquakes is the 'domino' breakdown of buildings, particularly down a slope
- The road widths, especially those required for emergency access should be sufficiently wide so that the rubbles and relics of collapses structures cannot block it. .

Deconcentration is especially vital to mitigate the risk of fire spreading from one building to another in cities. The danger of earthquake-induced conflagrations is particularly serious in timber structures or buildings with combustible roofs. Under these conditions, deconcentration should be regarded as one of the major earthquake protection measures. Dividing urban regions into small sections by firebreaks limits such as wide roads, rivers and parks can reduce the chance of conflagration.

5-3- Suitable Legal and Institutional Development for Proposing Framework

As mentioned in chapter three, an integrated approach should be adopted by people in charge as they have necessary resources and authority to perform their tasks. Such directives are only effective if supported by instruments that lay the ground for their implementation. Disaster Mitigation or Prevention Programs and Emergency Response Systems are in need of funding mechanisms, which can only be achieved through legislative measures.

Disaster mitigation measures need to be backed by laws, regulations, standards, and even guidelines and protocols. These instruments offer the essential operating factors that direct the measures to reduce social damages or communal vulnerabilities to the destructive effects of hazards. They present the framework and criteria for utilizing resources during or before crises. Similarly, in most laws, penal sanctions against offenders have been predicted. As such, it presents a key component of any integrated approach essential to derive desired sets of actions from the various sectors of any society vulnerable to seismic impact. .

- **Legal Instruments**

Legal means that should be employed by Mashhad government to reinforce the drive to mitigate vulnerability to earthquakes may take the form of any or a combination of the following measures:

- Land Use and Zoning policies (selecting appropriate zone for each land use. it means land use shod be adapted their zone. for example residential zone should be safe rather than open space . also , should be designed green space or open space adequate in order to better organize in phenomena position .)
- Building rules
- Structure regulations
- Health and Occupational Safety Regulations
- Fire Rules
- Safety Standards

- Mutual Cooperation Agreements
- Standard Operating Process
- Response Plans and Emergency Preparedness
- Protocols
- Presidential Orders
- Executive Directives
- Resolutions
- Policies

In Mashhad which is prone to seismic hazards such as landslides, liquefaction and ground rupture, it is reasonable to declare appropriate land use and zoning policies that should be rendered into implementable directives. Also, the guidelines for designing such land use plans should be specified to inform construction methods and building types before ending up in a stage when with a plethora of structures whose regulation will be difficult and costly.. During last decade, the local government of Mashhad has revised their land use plans. This exercise offers a chance to incorporate such hazards into these plans with the aim of efficient regulation of developments. In the long term, it will save investors huge money or give them the cost-effective means to channel their resources into production rather than spending enormous funds to putting up with heavily-designed structures. .

The integration of proper building and structure principles, fire safety, and construction standards into land use guarantees the reduced vulnerability of many stakeholders. Developing a systems of construction permit and occupancy ensure adherence to rules and regulations. However, it also requires a strong determination to enforce such rules and an efficient mechanism for monitoring the compliance. Otherwise, under questionable implementation procedure, well-meaning laws and policies will be ineffective.

This is evident in recent earthquake disasters where in the absence of the above measures, there were widespread violations despite good codes. The goals of such regulations are undermined and unexpected damages are caused. Once again, one way to avoid this is to seek contributions of many involved stakeholders –building investors, trainers, engineers and planners, regulators and people This process needs to be kept on through generations to be institutionalized, and this is best achieved at the level of community. The permanent dissemination of information on law provisions is essential to develop a culture of acceptance in the citizens. Although this seems prescriptive and ideal, it should be acknowledged that many laws were enacted without remembering the above point.

- **Legal Framework**

One of the most elaborate, complex, and well-funded institutional structure and facilities for an integrated approach of the world is in place in The Tokyo Metropolitan Government (TMG). To developing countries, their disaster management system is an ambition so that there is no point in comparing their system with that of Iran, especially in the view of their economic advantage. Nevertheless, their institution and system provides a model that can be imitated at least at a limited scale. The main implication of their system for poor or developing countries is how to bring together all available resources with the aim of mitigating earthquake vulnerability, particularly at the level of community. Such a system can be established thanks to the legal framework which was designed to provide support based on the experiences derived from past adverse events to prevent the occurrence of similar events in the future..

In Iran, the disaster mitigation capacities should be enhanced by taking clue from the successful programs of other countries like United States' Federal Emergency Management Administration (FEMA). The key is to identify concepts and principles that are applicable to the local context, especially with respect to the financial means. In Iran, disaster management mechanisms have been patterned after the FEMA concept, with an emphasis on developing political administration at the level of community.

As mentioned in chapters 4 and 5, there is a National Disaster Management Organization (NDMO) in Iran in charge of offering necessary measures to ministries and municipalities to

mitigate the effect of disasters on the people by promoting emergency preparedness and response programs. The NDMO also gives consults to the in the event of calamities.
The municipal Disaster Management Bureau (DMB) is headed by their elected Mayors who introduce an agent for disaster matters. Under the Local Government Code, the City Administrators act as the Disaster Action Officers at the local government unit. In some cases, however, another person may be appointed considering the task load of the Administrators.
There should be a tendency towards building up the capacities of Local Government Units (LGUs) as well as disaster management in Iran. This is because LGUs spearhead emergency measures and disaster reduction. The Iranian Disaster Management Strategies should promote the concepts of "self-reliance" and "mutual assistance" as a result of these programs. According to these concepts, political administration at lower levels need to take advantage of all resources available in their districts before they put on a request for contribution from higher levels. Adjacent areas not influenced by hazards should be of assistance to the devastated.
Logically, prevention, preparedness and mitigation, measures should be the focus rather than the relief operations. Proactive programs have greater benefits compared to the reactive ones, especially given the exorbitant costs of the interventions occurred by damage and loss.
By and large, Legal frameworks and Institutions are supposed to present Earthquake Vulnerability Reduction programs whose successful outcomes have been tested several times, particularly regarding the wide coverage of such programs. Many sectors may be involved in a single application. This also presents a cogent argument for total compliance, considering the penal sanctions attached. However, as discussed earlier,the scope of enforcement should to be increased. Disaster control institutions and organizations can be reinforced with the support of sufficient legal framework. Given the trend toward devolution and decentralization, the empowerment of local governments can be a timely intervention.

5-4- Suitable Information Support System for Proposing Framework

As it has defined in chapter three, Planning Support System (PSS) is a subset of geotechnology-related tools that employ a series of components (theories, data, knowledge, approaches, instruments) that together support partial or total section of a planning task. PSS may aid the planning process by providing integrated environments often founded on multiple technologies and a shared interface. Klosterman (2001, p14) suggested that PSS 'should seeks to offer integrative, interactive , and participatory procedures for coping with non-routine, poorly structured decisions' and 'must also pay particular attention to long-term issues and strategic problems, as well as explicitly facilitate group interaction and discussion'. In this section, information support for integrated spatial planning for disaster management is discussed.
An essential prerequisite for integrated spatial planning is the availability of an information support system. Urban area is viewed as a complex system combining characteristics of uncertainty, diversity, multi-level and dynamic. The political decision-making regarding spatial problems is complex, highly interrelated and uncertain due to influence of factors beyond the direct control of the decision makers. This is especially true in the developing countries which are experiencing the most rapid urban growth.
Because integrated spatial planning is holistic in scope, strategic and scenario-oriented in content, and interactive and collaborative in nature, relevant information systems which support the activities of planning are important tools. They allow for knowledge creation to meet the needs mentioned in scientific base (Section 6.2). Therefore, the input, throughput and output of information to support planning and design are essential steps in providing interactive and participatory procedures.
As hazard issues in Mashhad often concern a large area, sometimes far beyond the municipal or even the provincial boundaries, it is hard to raise the consciousness of people for disasters occurring. However when disaster do become reality, it may be too late or at least costly to tackle them successfully. Proactive spatial measures are needed to deal with and prevent disaster problems. These also need enough information and knowledge during the decision-making process. Therefore, the information on vulnerability assessment is very useful. It supports

communication between urban planners and disaster managers and is also essential for public participation. Moreover new knowledge can be created and understood and mutual trust can be established by information sharing.

Information technology has been developing very fast in Iran and many organizations in cities, like Mashhad, are building up their information centers to manage data collection, construct digital databases, update data and perform spatial data analysis. However, many information gaps still exist due to problems with respect to data standardization, data exchange and data-sharing caused by sectoral bias and organizational segregation in the Iranian political and administrative systems. Duplication of data collection and database construction and obstacles in information-sharing have made it difficult to create useful information and knowledge to support communication and decision-making. During the fieldwork of this study, such information flaws in different departments made data collection difficult. Moreover, different data reference frameworks and the lack of unified spatial data classifications also hamper in depth analyses. The development of local spatial data infrastructures (SDI) is urgently needed. Related to the integrated spatial plan-making model for disaster management mentioned in the former section, the following steps should to be taken into consideration at the strategic level.

- Creating data standards, including a reference framework and data dictionary, standardized spatial units, open data formats and interoperability of different datasets and systems. Spatial planners and disaster managers need to cooperate to achieve such a situation.
- Developing a data-sharing policy to allow easy data access. This needs inter-agency and inter-governmental cooperation for data collection, management, and dissemination for the public and the private sectors.
- Encouraging spatial planners and disaster managers to work together to develop more information and knowledge through modeling and/or scenario construction, based on the shared use of databases. Such professional cooperation needs a useful and effective way to share data and create new information so as to apply new and better concepts for the future.
- Training of spatial planners with the knowledge and skills to truly master the new information technology is definitely necessary in Iran. The present education of spatial planners focuses mainly on architectural and blueprint planning skills. As a consequence, many spatial planners lack awareness and capabilities to understand the complexities of urban development in practical situations. Also, analytical expertise, such as the understanding and use of geographical information systems (GIS), is often limited. Such deficiencies hamper communication with disaster managers and other experts from different fields. Therefore spatial planners have to change their way of thinking and working. The integrated spatial planning for disaster management requires both spatial planners and disaster managers to adopt a cooperative working method, which is still quite new in Iran.

Chapter Six

Discussion and Conclusions

Chapter 6 Discussion and Conclusions

The aim of this research is to emphasize the role and importance of spatial planning in reducing urban vulnerability against natural hazard especially earthquake. The study covers theory and practice in order to develop a strategy to initiate and improve the cooperation between spatial planning and disaster management in urban areas. The focus is on urban planning in Iran, with a case study of Mashhad. This chapter summarizes the major findings for each of the research aim, objectives and questions presented in Chapter 1. Next, suggestions for future research are presented based on a discussion of limitations encountered in the research for this thesis.

6-1- Discussion

Spatial planning and disaster management have for a long time been developed in different disciplines and been practiced in different departments of national, regional and local governments. This study analyses the negative consequences of this situation for resilience and safe urban development and attempts to break the segmentation by developing a new conceptual approach and an accordingly designed new practice. However, such a 'clean break' is not easy to implement, especially in the context of the rapid social, economic and urban development as is witnessed in Iran.

Urban vulnerability reduction has always been regarded as less valuable than other spatial planning aims, so in land use planning as a heart of spatial planning converse land use to urban purpose usually gets priority above urban vulnerability mitigation purpose. To change this situation requires a context-sensitive approach, which is explored in this study. However, as is the case with all studies, this research also has its limitations. In this final section a number of these limitations will be discussed and directions for new research to overcome the limitations will be indicated:

6-1-1- Lack of data and data access for the Mashhad case study

The main source of data used in this research is the municipal land use surveys of the Mashhad Development and Planning Department. It is almost impossible to get these spatial data for the hazard-prone lands in city. One reason is that the hazard-prone lands are not easily delineated due to the rapid urbanization and informal settlement growth in Mashhad. Another reason is that the digital datasets of the disaster management bureau are difficult to access due to institutional compartmentalization and autonomy. Moreover, much of disasters-related data collected during the fieldwork was not properly geo-coded and therefore not suited for using in GIS.

The idea of using spatial disasters-related concepts in the disaster management authority is still quite new and the spatial units employed are different from those used in the planning field. These data limitations have restricted more extensive analysis on the impacts of land use changes on decreasing vulnerability through rearranging or restricting land uses in hazardous areas and scenario analysis for the future development. Progressing towards a combined municipal and regional spatial data infrastructure will greatly enhance research possibilities in this field.

The whole range of relevant stakeholders could not be interviewed. This study also relies on evidence from and the perspectives of a selected group of experts and managers because they have a relatively large impact on the actions in reality. Due to the complexity of issues related to integrated policy approaches and to time constraints, the selected interviewees are mainly senior experts and managers on spatial planning, disaster management, members of city council and relevant key policy officials. There is no investigation of the opinions of the public, relevant non-governmental organizations and property owners. Therefore this study lacks an analysis of the views of the wider 'users' of the disaster-related bodies. This aspect needs more study in the future.

6-1-2- Limitations with respect to the actual situation

At present the Iranian planning system is changing rapidly with new policies and new approaches coming out, like the new Urban Complex Plan in 2009 and the strategic urban Planning Act in 2011. These changes of the national policies and approaches are bringing or pushing a reform of the spatial planning system at the local level. In the meantime, the local policies in Mashhad have been laid out relentlessly in recent years. This PhD dissertation started in May 2011 and has been facing these radical changes in urban development and planning systems. Unavoidably, updating of data, document information, and survey information is needed for further research. In the meantime, disaster management at the urban level has undergone and is undergoing a radical institutional reform and the effects of such changes should be evaluated in the future.

Concerning concepts like resilience, multi-hazards mitigation, and integrated approach, disaster management in Iran has not truly realized its potential, let alone practical implementation, which is quite different from the situation in the western countries.

Nevertheless, it can be expected that the aforementioned efforts on planning reform and institutional changes are going to tackle the hazards, vulnerability, and risk issues in a more profound manner than is the practice today. The new strategic Planning approach is attempting to improve the quality of planning in substance, to increase the efficiency of plan-making and the approval processes, to enhance the implementation of plans, and also to encourage more public participation. The institutional reform in disaster management is attempting to tackle more hazards issues in an integrated way. From this point of view, it is now much more feasible to implement integrated spatial planning and disaster management. However, more research work needs to be done concerning this field:

First, in the particular social and political context, how to advocate and promote that planning should be regarded as a conscious human activity to create a workable, well informed and substantiated vision for future development.

Second, how to develop information support systems, in particular knowledge systems based on scenario analysis to link disaster management and spatial planning to provide a platform for effective negotiation and discussion.

As institutional reform and development is evolving rapidly in Iran, the monitoring and evaluation of their effectiveness and efficiency should be one of the key issues for the future study. This line of research should include theoretical reflections on necessary adaptations of spatial planning theory and theories of social change relevant for the situation in Iran. Spatial planning covers and links many related fields, and it is therefore essential to overcome the obstacles of institutional barriers to achieve the final goal of resilient cities and sustainable development.

A final observation is that more attention must be given to the issue and implications of resiliency on Mashhad's urban built environment. This issue has received only fleeting attention in this study but it does have numerous connections to both spatial planning and disaster management.

6-2- Conclusions

6-2-1- With regard to integration of disaster management and spatial planning

Research question 1: How does spatial planning system in Iran take into account the risks of earthquake as a natural disaster?

Spatial planning covers many different aspects in formulating policies that influence the future distribution of activities in space and time. Some findings of this research shows that building codes as a part of construction policy is common measures adopted in community structures subject to natural hazards especially earthquake. But it is not possible policy alone. It is clear that land use planning policies and regulations as heart of spatial planning could be a good strategy that mitigate earthquake vulnerability in urban areas. It should not be attempted except by emphasizing on integrating disaster management and spatial planning. Analysis of current state of disaster management and spatial planning systems in Iran indicates that the main shortages of disaster management system, in terms of its relationship with spatial planning process are lack of

maps with suitable scale for spatial planning, lack of mechanism to update vulnerability related information for spatial planners, and lack of vulnerability-related information for the area surrounding Mashhad. Additionally, there is no legal framework for taking into account the disaster management considerations in spatial planning practices, which leads to high risk of spatial structure and residents of cities like Mashhad in times of an earthquake

Research question 2: What kinds of new planning concepts can be used to integrate disaster management in spatial planning to create resilient urban space in Iran?

In the Government sector the disaster management mechanism is under the overall supervision of the Ministry of Interior. In 1991 the responsibilities and functions related to disasters were formally assigned to the Ministry by virtue of the Budget Act of the same year. The Ministry was mandated to deal with natural disasters which up to that time were discharged by a special disaster task force within the Office of the President. The Ministry was already responsible for the affairs of the non-Iranians residing in the country, including refugee affairs. The new mandate gave the Ministry a pivotal role in disaster management. The police force, gendarmerie and the revolutionary corps were united in the form of the Disciplinary Forces in 1992 and put under the command of the Ministry.

This research shows that urban planning and design needs to consider new spatial concepts and methods for reducing vulnerability in spatial planning. Examples are: mitigation Preventive or protective measures Prevent the development in hazard-prone areas, Spreading the responsibility, Protecting urban infrastructures, decentralization, reducing and limiting densities, emphasis on participatory planning and public participation, and so on and so forth. The integrated spatial planning should be more carefully considered both at strategic level and at local action level. On the other hand, local government have important role in reducing crisis position. So, planning in local level could be selected as new planning. Also, each district in Iran is headed by a governor who again has a number of sub-district governors reporting to him. The district-level DTFs play a key role in managing the immediate search and rescue operation. On the other hand , Local studies of active faults leading to earthquakes: as most fundamental, active and earthquake faults (particularly the underlying faults) are not identified properly, it is necessary to study them. In this case the important earthquake faults have to be studied with proper measurement under the coverage of tectonic and if necessary under the seismographic networks, in order to identify the activate nature of these faults and their spread around them. In the case of identifying underlying faults, it is necessary to carefully consider their morph technical study; Also, in new planning could be regard some action in order to improving the Safety Culture of the Society against Earthquakes .In this area the following actions have been carried out:

1. Providing expertise and public training in the form of films, books, paper, pamphlets, brochures, security warnings and television programs;
2. Producing expertise- training video films
3. Producing 20 short training films, each for 2 minutes;
5. Training programs for prevention of human activities which cause or intensify earthquakes;
6. Training plan for self-relief and cooperation to predict and deal with earthquakes and the loss caused by them;
7. Producing a training film about pictorial instructions for standard rural and urban masonry buildings;
8. Training with animations (Producing short films in the form of computerized animations);
9. Learn together (Making a 5 part film collection with training messages);
10. Providing training posters for unstructured items;
11. Providing street posters for preparing against earthquake;
12. Providing training programs for lightening the buildings;
13. Providing the syllabus for training-improving classes for rural people and performing some experimental classes;

14. Studying fires caused by the earthquakes in the world and providing guidelines for protecting buildings from fire and probable damage caused by earthquakes;
15. Making documentary film for rural people and public (human actions that cause earthquakes and the way to prevent them or minimize their effect);
16. Making documentary film for experts (human actions that cause landslides);
17. Training courses for the senior managers to decrease the dangers caused by earthquakes. These training courses are also available on film;
18. Making training film of earthquake and security for the state employees;
19. Providing training materials (labels) to place inside the public transportation systems;
20. Codification of public training in the factories;
21. Evaluation of social-economical effects of recent earthquakes in rural society;
22. A television serial about dealing with the dangers of earthquakes and reducing the destructive effects entitled "safety against earthquakes";
23. Training programs in the area of earthquake safety;
24. Providing training pamphlets "How to build our houses according to the standards and resistant to earthquakes?" for art schools;
25. Television serial about urban crisis management in the event of an earthquake;
26. Public training about urban crisis management against earthquakes for people who live in Mashhad;
27. Supporting the related scientific conferences;

Research question 3: How can be started (initiated) cooperation between spatial planning and disaster management in Iran?
In the Iranian context of rapid urbanization, the relationship between vulnerability reduction and urban development has been ignored to a large extent, as is reflected by the urbanization process of Mashhad. The mandates of the local urban planning authorities and the disaster management bureau in Mashhad currently prevent an adequate tackling of disaster problems. Institutional compartmentalization is the major obstacles for pursuing the goal of disaster risk reduction. As emphasized in this study, consideration of mitigation and vulnerability reduction as a component in spatial planning needs addressing reform of two aspects of planning. The first is related to planning content, meaning new planning knowledge, concepts, and aims leading to pursuing other spatial forms of urbanization. The second is the planning process itself, which includes acceptance of and support for disaster management policy and its implementation, as well as participation of stakeholders, the public and decision makers to raise awareness and organize commitment. Institutional segmentation has to be broken down to remove barriers for cooperation. Therefore, more efforts for practicing effective consultation and negotiation in the planning process have to be made.

Research question 4: How should be reformed the current spatial planning system in Iran in order to integrating disaster mitigation measures?
The negative impacts of urban land expansion on disaster risk reduction reflect the imperfections of spatial planning as demonstrated in the Mashhad case study. A main problem is that proactive approaches have not been taken into consideration. Relatively little knowledge has thus far been generated to fully understand the long term impacts of risks and disasters. Because the spatial planning and disaster management needs to be guided at a strategic level but operates at a local level, the implementation of an integrated spatial planning model as discussed in chapter 6 is useful for pursuing an innovative and effective approach to the four phases of disaster management especially mitigation.
Reforming tools in spatial planning system in Iran can be applied to hazard mitigation. Those tools including Building standards, Development regulations, Critical and public facilities policies, Land and property acquisition, Taxation and fiscal policies, Information dissemination, to use clear and authoritative maps of the hazard, Linking clear and realistic design guidelines to

the maps, ensuring that hazard-free land is available for development, and trying to rearrange or restrict land uses in hazardous areas can help to carry out hazard-mitigation plans. Better management will not be the case until such time as the essential roles of disaster risk reduction tools are recognized in urban spatial policy-making. Also, planning system in Iran needs reform and should be strengthened in detail level. For example Structure and lifeline infrastructures:

1. The buildings, whether rural or urban: A large amount of research has been carried out in this area. It is necessary that the related research leads to administrative procedures;
2. The lifeline infrastructures: It is necessary to do some applicable research concerning the importance of different infrastructures such as telephone, power, gas, water supply, wastewater and roads;
3. Emergency residences;
4. Temporary residences as a part of permanent residences. Special attention must be paid to this issue;
5. Permanent residence;
6. The important and particular structures: structures such as dams, bridges, power stations and public buildings like hospitals and security centers particularly the crisis room, are the other areas were a fixed procedure is required;
7. Providing fast evaluation methods for buildings security after earthquakes and classifying them;
8. Repairing methods: after natural disasters it is necessary to apply proper repairing methods for damaged buildings. It is also important to consider the material used, speed of work and the methods.

- Building Structures:

1. Development of advanced structural laboratory with shaking table for static, quasi-static and dynamic testing;
2. Increasing technical knowledge on vulnerability assessments;
3. Development of Seismic vulnerability functions for typical Iranian buildings;
4. Development of guidelines for vulnerability assessment of common building types (masonry, concrete and steel structures);
5. Performing pilot projects for various types of buildings such as: hospitals, fire stations, schools, housing apartments and office buildings to show the applicability of the vulnerability reduction;
6. Providing strengthening schemes for typical Iranian steel structures;
7. Study of the seismic vulnerability of the mega city of Mashhad;
8. Development of a joint plan with Iran's Cultural Heritage Organization for the protection of historical buildings against earthquakes;
9. Economical study on different aspects of earthquake resisting structures;
10. Upgrading the technical knowledge of engineers through training programs and publication on a seismic design and construction;
11. Helping authorities to develop a work plan for vulnerability analysis of their facilities;
12. Establishing an authority in this field in Iran.

Research question 5: To what extent can be implemented an integrated approach concept in studied area (Iran)? Also, how can be generalized the results?

Mashhad as a case study has shown that the integrated approach can be implemented. However, full implementation was not attained, as Mashhad has its own approach that was taking place during the course of this research. More importantly, it was beyond the scope of this dissertation to change the course of the spatial planning in the case study area. Nevertheless, an integrated approach that was developed in this research was admired by the planners, experts and managers and could be implemented in other locations with similar settings.

6-2-2- According to regarding to information for planning support

Research question 6: How can spatial information systems support suitable information provision for and sharing of the information by spatial planners and disaster managers in Iran?

The findings of this research show that the results of spatial data analysis, based on both qualitative and quantitative methods, were helpful for spatial planners and disaster managers to understand the spatial issues, problems and solutions concerning disasters and risks. In the Iranian context, major efforts for data standardization and data-sharing are necessary to create the conditions for spatial planners and disaster managers to work together successfully. Developing Spatial Data Infrastructures (SDIs) is a well worked-out approach to this end. Another necessary condition is raising awareness among both professional groups and acquiring new practices and skills by the members of these groups.

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Appendix: Interview questions

Part A: General questions

1. Conceptual and Practical aspects

(1) What are the major problems of disaster management and how it is related to urban planning in Iran?

(2) What are the main functions of disaster management in the Iranian spatial planning policy?

(3) How does disaster risk reduction insert as a primary principle in spatial planning at national, provincial and local levels?

(4) After 1999 the Manjil-Rudbar Earthquake, there is the renewed interrelationship among spatial planning and disaster management.

'National Building Cods' becomes a primary principle of Iranian regulation. Moreover, it implicates the creation of new urban planning bodies.

What kind of benefits has the new concept brought about on the relationship between urban development and hazard mitigation?

2. Procedure aspects

(1) During the planning authorized, what kind of process should spatial planning follow when involving 'earthquake hazard' issues in? Which organizations play the important role of the decision-making? How are conflicts between disaster management and land use (especially for urban development) resolved?

(2) Which organizations play the major role in the implementing the spatial planning policy concerning the hazard mitigation and to what extent can they play?

(3) What is the role of the various levels of government in managing the relationship between disaster management and spatial planning (national, provincial and local)? Are the roles and responsibilities clearly defined?

(4) How are conflicts between disaster management and spatial planning (especially for urban development) resolved during the plan-making procedure?

(5) What kinds of role do the disaster management plan and risk assessment play in spatial planning authorized? Which organizations play the important role for such decision-making?

(6) What is the role of the various levels of government in managing the relationship between disaster management and spatial planning (national, provincial, regional and municipal) especially in Mashhad? Are the roles and responsibilities clearly defined?

3. Information aspects

(1) Are the risk calculation models necessary for urban plans making for the cities in Iran?

(2) Is the development of spatial scenarios for disaster management an important instrument in Iran?

(3) What organizations have a leading role in the development of spatial scenarios and how is the participation of other organizations with complementary or conflicting mandates arranged?

(4) What are the current gaps in knowledge in relation to the interface between disaster management and urban planning that are now being addressed or should be addressed by research?

(5) How can a SDI be used for disaster management? What are the limitations of using that?

(6) What kinds of analysis tools, such as GIS systems, image processing and modeling, have used for spatial planning and policy making? What is the role of SDI for concept/idea sharing/vulnerability assessment in planning process?

4. About the organization:

(1) What kind of organization it belongs to, inter-governmental or non-governmental?

(2) Why is it necessary to organize this kind of united entity in this area?

(3) What are the relationship of Mashhad with National, provincial government, and with local governments?

(4) Which level of government offers its financial support?

(5) About the organization structure, are there any problems encountered in the operational stage at present?

(6) How to combine the opinions from different organizations to achieve the cohesion among of them? How to deal with the conflicts between each other?

(7) What is the main task of disaster management bureau and how to divide and share the responsibilities with municipal government?

(8) What scope is there for public participation in spatial planning process?

(9) How about the legal status of Mashhad's plans and what kind of procedures to implement them?

(10) What is the percentage and respective purpose of the financial support for the disaster management at national, provincial and local level? What is the effect in recent years?

5. Problems recognition

(1) Do disaster managers and spatial planners share the same concept of hazard mitigation in Mashhad? What kinds of conflict do there exist?

(2) Do regulations for disaster management contradict the regulations for urban development in Mashhad? Are there examples for that?

6. Planning issues

(1) What kinds of impact do the disaster management regulations bring to Mashhad (such as new approaches for strategic plan and land use plan ect.)? Are they positive or negative impacts from the local point of view?

(2) Are there some changes in the current strategic plan and detailed plan concerning to disaster management principle? What about them?

(3) What are the basic contents of urban disaster management master plan? What is the relationship between urban disaster management master plan, risk assessment and spatial planning?

(4) What kinds of criteria and key issues of earthquake hazard have been raised by disaster manager for spatial planning system in Mashhad? How can they transfer to the criteria for spatial planning?

(5) What are the situations of spatial development in this area, including key problems, expectation for the future, driving forces for the urban expansion?

(6) How does spatial policy deal with the conflicts between the requirements of space for urban development and the requirement of reducing for hazard, especially for earthquake?

(7) Is earthquake hazard a real problem in this area? What kinds of measures have been taken for that? And how is the effectiveness of these measures?

(8) Is safety regarded as the most important factor for the quality of living environment? If so, how to integrate it inside spatial planning?

(9) What organizations have a leading role in the development of spatial scenarios and how is the cooperation among municipality, academic entities and consultancy from safety point of view?

(10) What are the current gaps in knowledge in relation to the interface between disaster management and spatial planning that are now being addressed or should be addressed by research?

Part B: Specific questions

Specific questions for spatial planners

(1) What kinds of categories are the hazards in Mashhad classified based on planning standard?

(2) Which kinds of safety-problems are being faced by urban planning in recent years?

(3) What kind of work has urban planning department done to deal with the present safety-related problems?

(4) What is the role of urban planning regulations in reducing physical vulnerability?

(5) Has the research on land use effects of disaster risk reduction been done before?

(6) How is the process urban mitigation in disaster management cycle and
What are the roles of urban planners in it?

(7) How is the cooperation of urban planners and disaster managers to define 'definition', 'regulations' and 'policies' and what are the major obstacles for the implementation?

(8) What are the major responsibilities of urban planners to deal with hazards-related problems?

(9) How do the urban information systems support for the earthquake hazard-related problems analysis and what are the major achievement and barriers?

Specific questions for disaster managers

(1) What kind of work has disaster affair department done for tackling hazard-related problems?

(2) Has the research on land use effects of disaster risk reduction been done before?

(3) What is the role of disaster affair department in processing urban plans in Mashhad? What are the obstacles for implementation?

(4) How is the process of institutional reform in Mashhad and what are the effects of it?

(5) What are the comments and suggestions on the cooperation with urban planning department?

(6) How is the process of the construction of spatial information system on disaster management system? What are the achievement and obstacles for using it to support the analysis on water-related problems?

(7) What is the source of the financial support for the disaster management? What is the effect in recent years?