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Investigating city development strategy (CDS)

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***Abstract*—**These Rapid changes, increasing population, enormous development of caviling, poverty, unemployment, Marginalization ,etc. has had various consequences and problems in today's world especially in developing countries.Today ,These increasing problems that are originated from the lack of suitable designs and in efficiency of city management programs , has encountered many cities with a lot of problems and challenges in the absence of citizen and public partnership in order to provide the mentioned design and this is so for apart prom citizens demands and desires ,so ,according to the current problems of today's designs comprehensive design , comparative design ,….) the urge to use the new city designs which have a corresponding and bilateral procedure toward citizens is an essential necessity . In accordance with this aim, CDS :as a process to provide a long-term perspective of a city that the short term program would be planned on it ,can be the best choice to achieve a permanent and constant city development by focusing on promoting economical competing and decreasing poverty and also different aspects of city's environment ,city's spatial structures fundamental structures, social; and cultural aspects ,etc.

Since CDS has made it easy to know –present and future subjects and problems, it can be proposed as a new procedure of practical planning in today's city management planning to decrease poverty and increase the life quality and mutual cooperation and corporation of people and officials in city management of many cities around the world especial Iran.So this article at investing the mentioned process in order to create a suitable and sensible bass to cooperate, plan and make a sketch for making a common perspective in the following city's development that would be a reasonable frame for future planning and designs. The recent research is the practical type and its research method is descriptive analytical on the library document basis.

***Keywords*—**city development, city management strategy, cooperative planning, strategic planning.

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I. INTRODUCTION

City is considered a complex and dynamic phenomenon that experiences structured ,social. economical and political and cultured charges constantly by passing the time ,Such extensive charges are influenced by the great growth of population .the increase in the world's city population has mainly happened in developing areas. In 1800, only So million people of the whole world lived in small and big urban areas[1] .In 1975 ,this number increased to 106 billion people and in 2000 it got to 3 billion people around the world (m0stly in developing countries[2]. and united nation's predictions indicate that in 30 following years the majority of the world's increase in population will occur in urban areas with low or average income. according to this ,urban population of the world will increase more than 2billion people until 2030 that is about 94 percent of this number will happen in less developed areas[3] especial in African and Asian cities[4].

Being influenced by this population raise and migrating to un controllable development of urban areas. creating new dwellings decrease in human welfare[5], in planed building desire to living in suburbs and making great clangs in spatial structure of cities[6] specially in developing countries a lot of requests have been made for develop ping basic and main fundamentals[7] and it has provided a background for serious study among managers and urban planners and also politicians ,following the in erasing complexity of current affairs[8]. the complexity of these problems has made it inevitable to consider the dimensions and different aspects of the problem in order to salve them totally and constantly[9]. Besides the process of city development strategy as a content -method theory and as a new procedure in urban planning by the organization of city coalition in 1999 was propounded aiming at reducing poverty ,constant development and improving participation and creating a good urban governorship This new procedure is supposed to make a back governorship .This new procedure is supposed to make a background in order to solve the problems are available in cities which are originated from cities and thereby it tries to solve the problems instead of slurring over them[10]. studying and searching about city and its development is among difficult problems according to its extensive aspects .because there are various and complex relations which have to be take in to account for the festiveness of the study .and the subject has to be investigated Developing the urban systems is not an accidental matter in any country and controlling its future

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process needs an accurate planning The first step in doing so is recognizing this system and evaluating its characteristics and different aspects and knowing the factors which affect it that the Current study is following this subject for Iran urban system ,evaluating and describing this procedure purposes ,principles and process of providing it thereby ,we initially consider the topic of city development strategy and then we proceed to two basic and fundamental topics :city management and cooperation .

II. THEORETICAL PRINCIPLES

A) strategic urban planning

After the stock of Success in comprehensive City designs and Subsiding the expectation resulting from these design softer the second world war on one hand and systematic procedure design on the other hand in management and planning field ,a way was opened for planning new designs in cities[11].

Cities' in habitants and managers especially in developing countries are increasingly becoming aware that they need to promote the life quality for all the city inhabitants. The experiences of developed countries show that social and economical attempts of local governments would be more successful if they are directed by a strategic process containing the following elements:

A. Analyzing effective weak and strength points, opportunities and threats[12].

Table I
comparing the comprehensive - comparative planning paradigm with practical planning paradigm.

Paradigm/ feature	Comparative/comprehensive planning	Practical planning
Social and (mental) principles	Scientific intellectualism and Naturism and total ism government power and concentrated management	Weiss and Human experiences
		Relativism and flexibility democracy and cooperation
Enormous purposes	Economical improvement Structural reform Civic proficiency	Constant civic development Quality exaltation of living environment providing public welfare
The pattern of development designs	Complete and brusque design comprehensive and comparative	Designs variety Intervention Level Intervention criteria Intervention=subject
Being performed	The distinction between Deeding and performing The focus on central government Public and department management	

Sorce:[13].

So, strategic city planning can be considered as a reaction to structural and constant attitude toward urban complex problems. Which were presented by inefficiency of traditional patterns and were used in city designs of most developed countries? This procedure has been strengthened by proposing cooperative designs and using them and has turned into the main paradigm in recent decades .so strategic civic planning is a process provides the possibility of all the public and private innovations of urban painters in developing their home town[14].

In the other word ,strategic planning make a systematic form to charge cites and their future this planning will end in desirable results especially if it is accompanied with cooperation and open spaces for deciding which itself fix the united performance[15].

This procedure is distinguished from traditional procedure in city planning with four main differences.

1) Performance and creational behavior

2) considering a various and comprehensive collection of city groups.

3) Considering opportunities and outer threats and internal weakness and strength: considering potential and social competitors[16].

b) city development strategy

In today's difficult and unreliable situation .especially after all the rapid changes in internal and external factors of cities (especial in developing countries)

The common official; and external factors of cities (especially in developing countries)

Th e common official and economical structures of cities are not able to solve the problems and shortages they require to gradually change and promote their performance and competence. Among these ,city,s development strategy is going to promote city performance on a constant base and evaluate and investigate it based on factors like constant base and evaluate and investigate it based on factors like constant economical growth with promoting and developing living opportunities ,decreasing poverty ,promoting environmental conditions and developing living opportunities ,decreasing poverty ,promoting environmental conditions and public health care especially for casual residences and poor low – income people[17]. city coalition organization has propounded and promoted the city development strategy as an effective planning method that is the newest procedure in practical planning city envelopment strategy. new procedure which has a good perspective and focuses on public cooperation much .practical in city development and first started by city coalition organization in 2005 .Thee program of this organization were on answer to enhance the importance of cities and changes which accrued in theory and act ,simply put can say that to decrease the urban poverty level and provide a constant developments and help in fulfilling the

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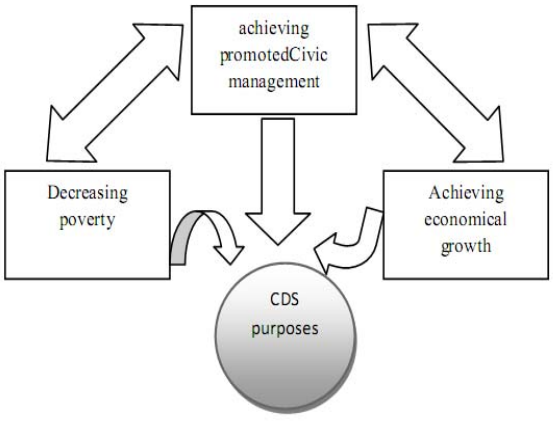
process of cooperative decision making especially in developing courtiers .city coalition organization has tried to apply the practical document of civic development as on effective means .city development strategy is a process of providing long-term perspective of a city which short –term programs are based on it .The focus of CDS is on promoting the competitive economy .but at the same time it also covers the environmental. Financial aspects substructures, urban structure and reducing poverty.

The greatest importance of this procedure is that as a comprehensive city. Strategy, it considers the city as the economical development machine and it has a direct effect on reducing poverty ,economical growth and promoting governorship .The real strategy of CDS is variable according to national and local conditions[18].

By the way most urban development strategies as a cooperative and primitive process. Follow three purposes to achieve including city management, economical growth and reducing poverty without paying any attention to local differences. In fact ,the purpose of CDS is the compound cooperation of all the effective elements of society to achieve a long –term perspective in the cities ,fixing the growth strategy and agreeing about priorities in office problems and recognizing short term operative designs[19]. CDS is a rather new strategy in city management, which is based on 2 important presuppositions: First defocusing on activities and second, increasing public cooperation and active use of nongovernmental organizations including CDS purposes.

Providing specialized and negative in all decisions relating civic problems which the most prominent ones can be shown according to the following figure. (Figur .1)

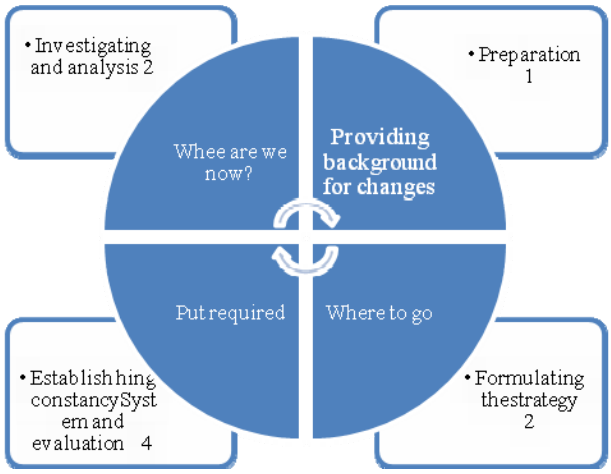


Figur 1: most important purposes for providing CDS

The members of City coalition are going to promote and develop the performance of city developments in developing countries .They have arranged their programs based on their own population prediction .According to this prediction, The organization of city coalition ,proposes CDS as a procedure to solve city problems[20]. So you Can claim that CDS is a rather new practice that is invented to promote the planning system and city management. And requires new understanding and recognition of problems by focusing on social and economic development to teal the City development on its sufficient and suitable bed, CDS is rapidly used in different countries around the world.

Apparently .To make a correct use of this practice different urban areas .it is important to copy it with the condition of each city.ohe of the main features of CDS is its high flexibility is resulted from applying it in different Cities in order to respond to the community facts.

Applying CDS and achieving its purposes require a special planning. (Figur.2)



Figur 2: How to planning and implementation cds

The degree of success and achieving development practical developers programs has a direct relationship with the degree cooperation and corporation among people.

Municipality and all the organization which influence on developing and managing cities ,since making and providing CDS is coop creative and its major stockholders are all part of civic societies. Finally it can be said that providing city development strategy for developing countries including Iran which are less familiar with decision making, planning and executive system s is really serious this process focuses on applying and not only providing the document of cooperative perspective strategy but also it is among major features which does n,t really have a long history in traditional system of civic planning for communities .There by .using and local zing Modern tools in City planning and management can be a positive step n order to promote the condition of cities Iran.

III. RESEARCH QUESTIONS

1. Is there a suitable interaction between people and city management aiming at achieving a suitable city development?

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IV. RESEARCH LITERATURE

The main purpose of Urbanization patterns was to end the complex problem in urban spaces and systematic development of cities it doesn't have a long history .it is true that at first and special around 1914 ,The purpose of Urbanization was supposed to architectural building in a longer criteria.but by passing the time it became necessary rot only to think more about this sub also to pay alteration to the effective factors in this process (on one hand ,political ,social ,economic and environmental factors related to citied and on other hard , ultra city factors like national and regional index, executive city development designs according to city conditions was taken into account. This new strategy was experienced in more than 200 cities ,and 40 different countries that among these, you can name Sofia in Bulgaria (2000) aiming at membership in European union ,Eden in Yemeni (2001) aiming at decreasing poverty and promoting life quality of citizens in Johannes's burg in south Africa (2002)aiming at human promotion ,fundamental affairs and services ,economical development etc[21]. while the city development strategy is being applied in three Cities in our country including Bandar Anzali ,Shahrood and Ghazvin by Cooperating world bank[22].

V. RESEARCH METHOD

The research method of the current study according to its nature, the information is gathered by following methods:

The document and library method So as to clarify theoretically (book and magazines and articles .thesis and researching relating to governmental reports and etc.) .

VI. THE CHARACTERISTICS OF CITY DEVELOPMENT STRATEGY

- An effective process in city development strategy CDS, contain the following outputs and features:
- All the Strategies are related and follow the same way and SWOT perspective and analysis.
- Civic development strategy has just a few strategies which are made among constant and reassemble Choices and none of them is as valuable as the other.
- The design of city development Strategy is quite Close to success.
- The design of city development strategy is realistic and at the same it challenging.
- Its achievement is measurable and they are measure by result-based powerful and economical criteria.
- Strategies depend on the type of available activities and institutes.
- The responsibility for performing each part is completely defined by the exact purposes and schedules.
- Encouragers and motivators are used in places which are supposed to speed up its performance and competence.
- The Strategy framework id flexible enough to cope with changing in situations and tactiques but the perspective usually stoys foxed in a period of time.
- In CDS priority and preference is based on budgeting in vesting strategies.

VII. REASONS FOR PROVIDING THE CITY DEVELOPMENT

- Analyzing weak and strength points, opportunities and threats are effective on the city.
- Coring majority opinion about purposes, priorities and operations.
- Forming organizational coalitions to perform operations and programs in order to achieve constant results.

VIII. A BRIEF INTRODUCTION OF CITY DEVELOPMENT PLAN IN IRAN

The urban system of Iran has some hierarchies when is influenced by special political and economical and economical condition of Iran. The designs of city development strategy involve the designs an national level it spatial programs on national and regional level." land processing designs all ,on country regions " national structural design ,"on urban area level ," complex urban designs " on city level ,"comprehensive ,comparative designs" and in Tehran ."practical and structural designs" .on quarters and smaller areas ,"the design of promoting quarters and worn out textures ,local and subjective designs are provided,[23]. It's now more than 3 decades (early 50th) that urban development designs especially comprehensive urban designs for developing the country are supplied to make a back ground for an organized and well proportional growth .These designs are made by spending a lot of energy and money Although they have had positive effects an reigning the areas and following structural rules and regulations ,but they have not been able to achieve all their purposes along with constant city development but just a few percent of its programs and designs have been verified. These situations exist because city polities and strategies to achieve a constant development are not obvious and per forming this task requires basic charges in current urban designs so as. The result of such an untimely change, city management has encountered a problem .because Of suitable strategic designs and lack of sources and sufficient time respond to in needs and citizens and solving this problem is only possible through new solution in accordance with a constant civic development

Here it can be said that providing CDS for cities is one of the most important new solutions.

Although CDS cannot substitute urban designs it car play a superior role in compiling city strategies as a complementary and supporter for these designs.

IX. THE NECESSITY OF PROVIDING CDS IN IRAN

The main discussion in designing civic development strategy is that strategic interventions of public assemblies and civil society in its suitable time and place would charge the way of developing cities.

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For predicting the countries' condition in future, they have provided a program called country's 20 year perspective document for Iran's development.

All the organizations, offices ,forces ,officials and people are obliged to act a way that the country would achieve the mentioned purposes till the next 20 years ,Thereby ,inter term programs land processing program All the national and regional designs and programs have compile their views perspectives ,strategies and executive plans in accordance with achieving the program of 20 year perspective document for country's development unfortunately, in most cases because of the nature of same planning designs, Stepping toward achieving 20 year perspective documents for Iran's develop mans seems difficult or even impossible ,one of the main reasons of this can be related to non-efficiency of the current designs. So the linking ring of national design to smaller one is either removed or is not used. City planning designs which are common in the country like comprehensive and comparative program are non-effective .weakness in current rules, has backed the entrance of strategic and efficient design to the country's planning system and it apparently doesn't urge any organization to follow these designs .In fact there is no legal and controlling frame to urge the inferior designs supposed to follow the superior designs.

X. The experience of providing CDS in Iran

In Iran and in early2001, after cooperating the organization of house and city making with the world bank, for providing the design of strengthening casual inhabitants in 3 cities Bandar Abbase, Zahedan and Kermanshah, they decided to begin the initial studies in one of these cities to provide the city development strategy and supply the preliminary to make the design. so ,Bandar Abbas was chosen and initial studies were done .but the preliminaries were never supplied The major reason was the lack of a legal bed for it ,as if there was no clear reference to approve the design legally ,or no one to execute or no office to control executing the design to the other word the city development strategy had no strong legal position in city management system .

XI. Problems of process long providing and applying CDS in Iran

Generality if we want to name the problems and weakness of processing providing ad applying CDS in our county based on pre-conditions of city development and experiences of different countries, we should mention two factors :

(1) Internal factors which depend on city's situations and contain

A. Lack of complete statistics and information about country's cities.

B. Weakness of municipality office as the design administrator.

C. Lack of the experience in group work.

D. Lack of expert and s kill in many city managers and planners.

E. lack of non-govern organizational

(2) the second ones are the factors which have a country aspect and are as:

A. financial of municipalities and their dependence to central government :

B. Intervention of different organization in urban functions which it causes a lot of problems in absolute managing and coordinating of the city.

C. Lack of a powerful city community which is now a day considered among the greatest social capitals in an urban community and as a result lack of trust among citizens toward city's managers

D. Lack of cooperation attitude in country

E. Lack of training and informing.

So ,to provide and achieve the CDS document and considering its efficiency ,city management system requires structural and financial reforms thereby municipalities as a local institute need to turn a powerful local government since they are the administrator of providing CDS document. . Whereas the domain of responsibility for municipalities and Islamic city councils should be expanded and strengthened.

XII. The Role and position of city management in providing and applying city development plan in county

City management is an efficient and poly sided process and it can practically decrease the degree and load of problems (different social civic problems and also the city's shortages and it can provide citizens with problems and also the city's shortage and can provide citizens with promoted public life and proportional welfare .Following such a social we can hope to achieve some purposes like providing

Dwelling for slims city sanitation city furniture parks and green land management education and employment nutrition security and free time social; joy ,hope for life law ism ,civilization growth and settling in cities and etc. people's social cooperation also a is kind of presenting local sovereignty. Active participation of citizens in different city function is kind of guarantee for proving city programs and polities citizens ideals manifestation of public desire and

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governorship and also creating a safe and healthy city atmosphere.

Although the theoretical process of providing city plans is still relied on the old model of design /evaluation /recognition ,but it has gradually turned into an efficient strategy in leading societies .and on one hand city planning tend to spatial planning and on the other hand it to act planning and structural and strategic designs substitute comprehensive designs .

Unfortunately, Iran's city management not only has had a passive role in providing city designs but also it hasn't benefited from public participation and surveys and a group of people who suppose then selves to be an expert and manager in city management apply all levels of deciding and making decisions without using local thoughts and taste (usually with no positive result) and so they will lose future perspective of city ,peoples life quality and local governorship that is resulted from misunderstanding the city problems ,capacities and different capabilities to strep logically to word real development.

City management system of Iran is focusive and is intensely dependent on the central government .This system has achieved its legality from the central government not people ,so one of difficulties in city development management in Iran is that the procedure of urban design is a partial procedure not perfected .effective institutes in city management specially public and non-profit institutes which is among the subject of Creating nonprofit institutes which is among work programs of planning system for many countries ,and interfere their office works (whose one part is city planning and developing) doesn't play an important role in Iran .And our city management specially in big cities is caught in difficulty .The provided city management special in big cities is Caught in difficulty .The provided city plans from plan maker institutes and counseling engineers is readily and certainly provided by users (people)and administrators (City management structure) and it is one of the main weak nesses resulting from providing city plans in iran .Lock of coordination in effective organizations lock of planning view Lack of experts inexpressiveness of council laws and the subject of arranging council relationship with effective organizations in managing cities is omony the main problems and difficulties in Iran's city management if the city management is going to deal with social Cultural and economical matters like tourism security ,industry,...Cultural and economical matters like tourism ,security .industry ,…. It should own on executive and powerful means ,while our country ,s city management doesn't dare to enter this area because of its current facilities and financial sources and executive power .and all the social ,economical ,cultural and industrial positions are occupied by governmental ministries so a country in which the government controls everything the desire to partitioning ill increase.

XIII. Discussion and result

Using the city development strategy accompanies weakness and threat in Iran .A simple evaluation shows that in current and threat in Iran .A simple evaluation shows that ,in current situation ,creating fundamental changes as specially in city management city economy and indexes of life quality for using a procedure in city development is essential.

Structural weakness of city management that has not have a sufficient capacity to apply a city management that has not have a sufficient capacity to apply a city development strategy requires a quick and Complete charge and reform .while in most cases, city atmosphere except in a few cites like Tehran, Isfahan …..) specially medium and small cities lake suitable communicating substructures and internet so Applying the procedure of city development to create residential cities is only possible by providing preliminaries which won't have a helpful outcome if these situations are not created .so strategy on one hand and confirmed need to apply these designs on the other hand ,requires a completed management ,for categorizing the current problems in cities ,we should mention the ultra-city problem besides internal problem in applying the designs of city planning .For example ,he weakness of land processing design is an external weakness of city in providing the efficient design of city development . Among these cases executive departments of country as administrators (providing and applying) of city plans ,are confined in their authorities (specially municipality).

In fact, intervention and is some cases, personal, has Caused a weak biddy for city planning system. Such atmosphere, causes the process of providing designs and approving them. To happen in a place, rather public place By the way, creating a form of CDS id among basic purposes of a good city governing procedure and citizens' participations.

Another problem is that in order to release from the shortcomings of defective design appliance ,for the first step ,we should get through localizing the designs and presenting a kind of local planning as a base for making decision. Achieving essential information city environment is only accessible and recognizable by exact evaluation.

Hidden legers of cities "social and cultural environment must be provided as a prerequisite and recognized and analyzed ,since they are base and foundation of many problems .this initial recognition ,the grourd will be provided bed for profiling the procedure based on problems and real needs .Beside it ,You should study and measure the design applicability .This type of studies creates a bass to make priorities for these acts and makes it possible to create a realistic planning based on CDS ,since it is a form of perspective making since the city will not move toward a defined perspective ,unless you consider these facilities

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restrictions .Today The main challenge of third world countries is city poverty. According to it, poverty and urban poor, has a special in city development strategy. So to charge the view of planning for poor into planning with poor ,is on essential need in city plans for Iran .because planning with hurt able groups of the city lead to a complete recognition of them that eases deciding and planning .

According to the investigation and studies providing ,proving and applying city development strategy should completely cope with studies about measuring possibility in cities and they should be studied based on 3 aspects : city management city economy and city lift quality .According to these researches ,in recent situations ,planning ,economical and city phangementy system is not capable of executing such designs.

XIV. Recommendations

In order to make the results of research applicable ,the most important procedures and recommend dations are presented as follow.

- Creating a constant city management system as ideal in city management system
- Localizing the designs imported from capitalized countries.
- Planning with city people to recognize their needs.
- Financial support from government to municipalities in order to prevent on illegal income from municipalities (Such as tense sellivg)
- Applying down to up procedure in management system aiming at employing local work force-making variety in facilities and services to achieve them easily – using the potential capacity and cultural interrelations in cities.
- Using theoretical subject about a good city cooperation and governor ship in practical process of providing city planning and designing.
- Profiting by the power of tourism in cities
- Emphasizing on the use city development procedure to a localized method and in accordance with situations.
- subtitling the partial procedure by the completed procedure in enormous management =system and city management

Profiling the completed city development strategy in accordance with solving the country's social problem.

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Therapeutic positioning applications using multi - criteria analysis method (Case study: Ardabil)

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Abstract
The growth of cities is one of the most important global phenomena, which is occurring under the influence of environmental factors on the human, economic and political, and giving services to citizens and the city are of the priorities of the urban planners and managers. To accomplish this, a variety of techniques have been used both classical and modern. Since the 1970s, the use of quantitative methods in problems locating utilities increased and each of these methods in addition to the advantages and disadvantages in this field is used to study how the spatial distribution centers in Ardabil has been studied as the case the system uses a multi -criteria analysis. In Ardabil total area of 5664 hectares allocated to different user -urban (excluding lands), an area devoted to the use of medication in the status quo 13/22 hectares and per capita 5 / 0 square feet for each resident in the comprehensive program of Ardebil has been taken . The total area of the space allocated should be over 67/25 acres. This represents a negative balance of the current area assigned to the application comparing required area (55/3). problems of imbalance in related clinical application in the city of Ardabil , when understandable that we also have pay attention to the uneven distribution of land and lack of commitment to the city charter to specify the location,. In this regard, due to the perceived need for techniques to analyze multi criteria in spatial-place organizing clinical application , in an attempt Ardabil city has been selected as a case study , and the capabilities of the Integrated Model of AHP and GIS in Analysis and prioritize suitable zones for therapeutic applications of location , will evaluated .

Keywords: location, health, urban planning, AHP, GIS, Ardabil

1 – Introduction

There is not a detailed definition of the term locating but by taking on the definitions of space planning and urban land use planning we can obtain the concept of locating. So space planning is the distribution and affiliate organization and human activities in the area of the land. (Ziyari , 34:1380). Land Planning, and division and space sciences for various uses which is taken to make effective use of land, location, spatial properly and efficiently (Pour Mohammadi , 3:1382). Thus, positioning is considered as spatial and urban planning component and seeks the best conditions and facilities for citizens (Khodabakhshi , 12:1385). Humans have several needs and health is the first human societies basic need, hence to supply and control it with the aim of improving the quality of life and health of the citizens are of the most important tasks of the Government.

Urban growth in recent decades in our country has been in such a way that urban infrastructure needs of cities are not equipped with it. . Ardabil city as center of Ardabil Province, as due to factors such as the migration of rural - urban , natural population growth , the excessive increase in population and physical growth of urban areas, faced with lack of planning.

While the in terms of optimal distribution of space and place a fair arbiter for usage of public services especially clinical and health services quick and on time access is important to them , a proper atmosphere has not been considered. Usually establishment of any urban element in the position space-skeletal a special case of the city subjects to principles of Technique over construction work is e special in the case of observing the position of the functional efficiency and that element will be determined in the same place and otherwise might have problems in public services units health and treatment . (Azizi and colleagues, 1384)

Meanwhile health services today are as one of the urban infrastructure in order to develop the areas and aimed at raising the level of health and increasing life-prolonging activity of individuals and forces and, finally prevention of disease outbreaks and timely treatment ..(Razavi, 1381: 150).

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In this regard, during the last two decades a lot of research to design optimal treatment centers, hospitals and clinics have been conducted (Faizollahi et al , 1388: 191). Therefore the main task of urban planners is to determine the optimum location of urban centers so that all residents have access to them easily.

The industrial revolution occurrence in Europe caused the growth of urban populations in the world and accelerating of this growth has continued to the extent since that many urban centers did not have a sudden influx of immigrants with their implementation, and as a result of this growing trend, the city began to spread as unbalanced and a several problems, including in the areas of health, education, housing, health and employment in cities and balance in human and social relations between the Residents of cities and towns were facing lack of services, so in addition to the quantitative aspects (lack of service), qualitative aspects of the topic, namely the lack of an appropriate spatial distribution and positioning of non-compliance, the severity of the problems became doubled (Azizi, 6: 1384)

Iranian Rapid growth in urbanization in recent decades have been done in such a way that the urban space and infrastructure needs of cities are not equipped , the most significant effect on the growth of cities has accelerated , mixed distribution system planning services and the failure of the distribution is generally which are seen in all cities . In this context, to assign the optimal location and movement of structural elements is one of the most important tasks of urban planning (Hosseinzadeh et al : 2).
Ardabil is also not excluded from this problem like the other cities of the country suffers lack of good access to utilities . In Ardebil situation of health services - health and relationship comparing the surrounding lands , access roads and population centers in the lattice size and the ease and peace of mind - health of the importance are existing. In addition, determining the functional radius of each sphere of influence - care centers can determine the optimal location for this type of application.
Locating health centers is under the influence of several factors and variables that taking all of these factors and variables in the form of a traditional method, system, is very difficult or impossible.
So given that the process of determining the desirability of a place - care centers needs considering multiple criteria, using multi -criteria analysis can be one of the manifestations of the models featured and Technology objectivity of the use of decision support systems in establishment of health – treatment centers. In the present study we have tried to select Ardabil as case study area , WLC model as one of the prominent multi criteria decision techniques (MCDM) to establishment of health – Care centers and suitable model of place prioritization schemes desirable are supposed to be tested.

2 - Purpose of Research

This paper utilizes multi criteria analysis to locate and track the optimal organization of health services - and especially health clinics in the city of Ardabil has been paid. In terms of developing health applications of Ardabil suffers the status of turmoil.The accumulation of application therapy in the Center and southwest of the city, as well as the immense health user rallying in the city center has caused the wings at Northwestern, southeastern and northeastern city suffer this shortage .

3 – Background of research
In numerous studies using multi -criteria analysis and Gis have been made such as : doctor Esfandiar Zebardast (2005) , Dr Alijani et al (2007) , and doctor Mohammad Rahim Rahnama et al (2008) noted with respect to issues associated with locating a user study of a treatment that have been done by several approaches and now can be taken :
Almas pour (2001) , in his master's thesis entitled , Application of GIS network analysis , spatial distribution and location of pharmacies (case study of Tehran 6th precinct) is discussed. Mohammadi (1382) , in his master 's thesis entitled , evaluated and located health care centers using GIS (case study of Tehran 5th precinct) to issues such as municipal standards , evaluation and analysis of health services - Therapeutic area and the finally, the optimal location for a new health center and offers some suggestions .
Ebrahim -Zadeh et al (1388) , in an article called spatial-place planning and organizing - where health care services using GIS (Zanjan Case Study sampling) and network analysis to determine the radius of action and distribution of hospitals and analysis of spatial data, concluded that the current location of most medical centers (hospitals) in Zanjan academic don't s match standards and requirements of this application don't s match . Current requirement with respect to per capita urban centers in Zanjan is At least 7 hospitals , that the city government can extract out of 11 points from the GIS which can be used to correct these deficiencies . During a research work Feizollahi et al studied the model which was designed in a single hospital and had the capability to implement in hospital and due to its importance, in a hospital is recommended.
Hosseinzadeh studied a research , named spatial analysis and spatial distribution of health centers - Health and Home Care Branch in the city of Chalous with statistics and information about hospitals and the

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capabilities of GIS, medical centers in accordance with the criteria and Early results showed that all the places with medical centers in the city are not appropriate, and they can be the considered for other services used.

4 - Materials and Methods

A: The materials used

To determine suitable areas for construction of health centers in Ardabil , a criterion A_i, the A_i, is required to act according to its location . Therefore in study the opinions of the expert group and use resources were investigated , and criteria for locating treatment centers were considered .

In the study of basic city map on the scale of the digital map user, has been the status quo in urban were used and digital map of land prices as the base material, and with information about any of the layers in the criteria of therapeutic spaces, positioning of the layer of digital maps, the information required in the process of analysis were prepared.

Furthermore, the necessity of using overlapping operations such as searching, spatial analysis , Geo-referencing , raster and scalar operations turned a point for the effective use of software ARCGIS 9.3 and IdrisiKlimanjaro provided in this study .

Comprehensive summary of the detailed design of Ardabil city in 2007, General Population and Housing Census in 2011 and the Municipal Information Archive of Other sources of information were used in this study .

One of the most common methods of evaluation criteria ¬ which has been used extensively in GIS , ¬ is weighted linear integration model . In this method a couple of different factors or methods are compared and weighed using CRITIC method ¬. Decision makers directly assign weighs of the relative importance to be to each attribute.

GIS-based weighted linear combination method comprises the following steps:

1. A set of evaluation criteria (layer of the map) and a set of possible options are specified.
2. Each layer of standard maps to be standardized.
3. We can determine the weights of criteria, ie we assign directly weighing the relative importance to each criterion map .
4. layer of the map to create a standardized weight are created. (by the standard map layers multiplied by corresponding weights to them)

we obtain total scores in connection with any item by collective Overlapping the on standardized weighted maps and classify the options in terms of total functional scores . The option with the highest score (rank) , and best known as the ¬ (Malchfsky , 1385 : 339). Officially, the decision rule is used to evaluate each item or sub ¬ relation to :

Formula (1) : $A_i = \sum_j w_j x_{ij}$

Where *Ai, xij*, representing the nth option score associated with alternative*, jth* and wj, containing a standardized weight , so that *Σ wj = 1* . Weights represent the relative importance of each attribute. Determining the maximum value

1i=)Aj highest priority is chosen, In this regard, like the regression fit is determined linearly . in this Research , operation, WLC in Idrisi Kilimanjaro using the MCE has been done.

As the model output of WLC, with a simple linear stretch (using the STREATCH) contour (255-0) have been standardized to facilitate comparing

Options scores with optimal situation .

5 – Introducing the study area

Ardabil in terms of absolute position of geographical features lies in 48 degrees and 17 minutes east and 38 degrees 15 minutes North latitude and is the center of Ardabil Province . It borders the provinces of East Azarbaijan Province in the West and the Zanjan province in , the South and Gilan in the East . The first official census population of the city of Ardabil that took place in 1956, was over 65 thousand people. The number in 1966 was 83 thousands , in 1976 increased to 148, in 1686 to 282 thousands , in 1996 to 340 thousands, in 2006 has grown to 412 thousand people . The city's population according to the last general population and housing census of 2010 amounted to 485 thousand people.

The results of the demographic growth in the city of Ardabil, indicates that Ardabil city since last year had 5/7 growth of population comparing year 1954 ,while the city relative to the physical development of primary census period has had ¾ times growth since 1954 equality. (provincial Governor of Ardabil, 2013) that this has doubled the optimum positioning which is an essential necessity for the user, especially health and therapy. Figure 1: map shows the position of the range.

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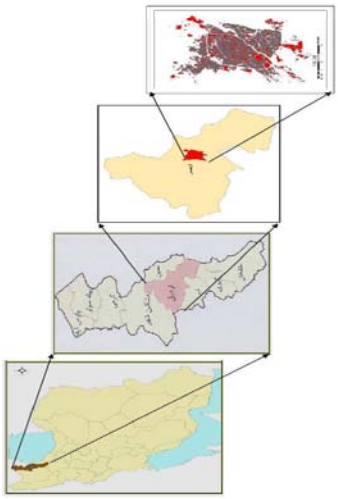
Figure 1: map of the position to be studied in the city of Ardabil



6 - criteria used in locating clinical centers
A: Table(1) Name of standard and justification

Name of criteria	justification
1 - distance from industrial centers. (Weight : 106 / .),	These application is mainly in the city outskirts and severe environmental and sound pollution is produced . Therefore, the distance between clinical centers is necessary .
2 - Proximity wit medical – health centers (Weight : 089 / .)	Quick access to health units for medical applications is essential .
3 - proximity to green space	(Weight : 109 / .) , Bordering of this application with clinical centyers can be effective in terms of air sanity , preventing pollution, creating landscapes for peace of mind and vision, in improving the urban environment .
4 - Distance from other medical centers (Weight : 139 / .)	Treatment areas should be separated from each other, somewhat not to interfere in each other's affairs .
5 - Proximity to residential complexes (Weight : 114 / .)	Therapeutic application are compatible with residential centers , are close in land are ideal.
6 –educational centers (weight : 129 / .).	Exercise and therapeutic centers are compatible with user training.
7 - Access to communication (Weight : 102 / .)	Since clinical centers are established regardless of how vulnerable will be created, it will be harmful not only for safety but also to the problems of urban issues such as traffic .

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8 - Population density (weight: 11 /.)	Locating clinical centers in places with high population density makes therapeutic areas close to the centers of gravity and can meet the clinical needs of population
9 - being close to major centers (Weight : 12 / .)	observing this criterion, in locating healthcare centers can makes better access to, better transport and reducing traffic and its consequences .

sources: Razavi (2002) , Ziyari (2002) , Pour-Mohammadi (2008 Cromley and Mclafferty, 2003), (Jordan, 2004)

B. Standard method of mapping

To analyze the compatibility of land use on the digital maps and map -related cost of land use , cultural , commercial, educational , rivers … and ARCGIS environment were extracted and following the extraction of the coordinates of the specified rectangular area of the map extract criteria in the IdrisiKlimanjaro, imported and saved as raster maps to fit the needs for the next step by using the Distance factor , rather than extracted maps of criteria which are listed .

C. The standardization method of data

The different scales of measure map don't allow you to perform arithmetic operations on them ,thus domain-based method was used to eliminate the effect of different scales and convert all of them to a scale between zero to a standard compactness,. In this practice, the following equations are used.(Malchevski 2006, pp. 212 and 213):

Formula (2) :

$$x'_{ij} = \frac{x_{ij} - x_j^{min}}{x_j^{max} - x_j^{min}}$$

$$x'_{ij} = \frac{x_j^{max} - x_{ij}}{x_j^{max} - x_j^{min}}$$

In tl zed score attribute ' ' of village ' ' ' indicates s the character raw ۴|j in the village ۴|j x_j^{max}, indicating maximum score in relation to the attribute x_j^{min} ۴|j; represents the least score for attribute and markers associated $x_j^{max} - x_j^{min}$. Indicates value amplitude of ۴|j .the Standardized scores value can be placed between 0 and 1 value .

6 – Research Findings

As mentioned above after obtaining the standard maps in relation to any proposed standards to measure place optimal level for the establishment of therapeutic applications , and applying appropriate weights , it was decided to use the MCE in linear combination of the standard weighted action plans .. Then by removing the zone map extracted from lakes and rivers , land suitability classification to assign the municipal treatment facilities was implemented. . As seen in Figure 2, the classification is comprised of 6 grades . lands with certificates of grades 1 , have the highest proportion of space to devote to health and land certificates with grades 2 to 6, respectively, are the next priority . Thus, in conditions of equality in the allocation of land for possible therapeutic applications, the priority of lands with certificate with higher grades is preferable.

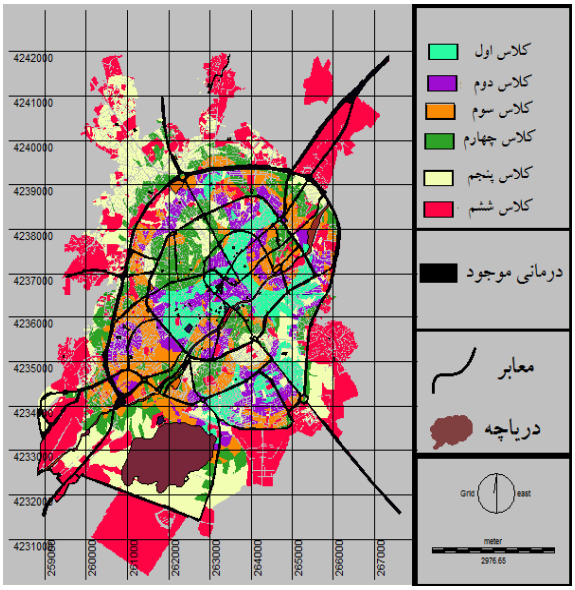

Figure 2: Map of classification of user therapy

It is clear that the local- spatial distribution of the therapeutic user space in neighborhood unit scale- a neighborhood scale, regional scale and the scale of the

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city should be considering the radius of influence of the services mentioned in each of the levels and population density but in each classification are shown in the map it can be helpful f in the decision of choosing the land to devote to health at any level. It should be noted that prioritization has been obtained to fit the criteria used and their weigh load . Accordingly if the area of the top-rated, in the status quo has been occupied by other users so, we should address the next priorities.

7 - Conclusion

The analysis of results show that the use of the analytic hierarchy process (AHP) with Arc Gis software can serve as a powerful tool to engage the different criteria for locating treatment centers.

In The present research due to the considered per capita, for user therapy according to a study plan at work is intended for the user land area comprehensive plan of Ardebil , the allocated land area to clinical sector in the present status was compared to the results of the comparison, and indicates the negative balance was 55/3 acres .

In addition to necessity of equipment and development of user therapy the pertinent comparison indicters a gap between the current area and the area required by user therapy, and the result indicates the importance of qualification of user therapeutic fitness for the allocating user therapy. In this regard, the amount allocated to land suitability for therapeutic use, was measured with a series of measures which were mentioned in the article

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Challenges and Strategies for Restoring Informal Settlements (Case study: Ghaleh Hassan Residential Area, Iran)

Hamid Jalalian and Ebrahim Amirkalaee

***Abstract*—**What is certain is that the range of informal settlements has become vulnerable and has lost its geographical, environmental and economic value due to physical exhaustion and the lack of proper utilities. High land prices and increased demand for construction of new housing units have increased citizen's expectations day by day for the creation of residential spaces that fulfill their needs and welfare. In this paper, information is collected using both archival and field methods. The statistical population of this study comprises the residents of Ghaleh Hassan residential area of Gorgan with a population of over 4,649 people. Finally, this study attempts to restore the settlements through social, economic and physical pathology and find strategies to accelerate the pace of renovation and improvement through direct and indirect intervention

***Keywords*—**Informal settlements, Ghaleh Hassan residential area, improvement, renovation, pathology

1. INTRODUCTION

Consistent with social, economic and cultural changes and new technologies, urban textures faced deformation and changes in foundation because the city, like other synthetic man-made phenomena, changes over time. The development process is dynamic and continuous by which the limits of the physique of the city and its physical spaces will change in terms of quality and dimension. If this process is fast and unmanaged, it will lead to an inappropriate spatial structure of urban areas.

Currently, there are more than 72 thousand acres of old texture and more than 40 thousand acres of informal settlements in Iran (The Iranian Information Center, 2012). The ratio of old texture to the whole surface of the area is 1:10. It should be noted that the renovation of worn-out textures requires hefty costs so that according to obtained estimates for the year 2008, the renovation of old textures requires 80 billion Rials per acre.

Urban textures are divided into three major categories:

A: textures with urban heritage

B: urban textures with no urban heritage

C: informal settlements (Jabbari and Hassanzadeh, 2008).

- History of urban renovation in Iran:

The first effective attempt for urbanization was conducted in the Ghazan Khan Era. Because of these reforms at that time, many cities became prosperous, land prices increased, house prices went ten-fold and, as claimed by Khwaja Rashid al-Din, more than ten thousand houses were being built annually.

The new stage in the field of large-scale intervention in the historic fabric of cities occurred in the early 1930's in the form of renovation and improvement of activities (Shamaei and Pourahmed, 2006). In 1931, the Hamadan plan was approved which itself required a law for the removal of buildings that occupied street paths. In the early sixties, the growth of large cities began faster and wider than before around the old context. Most ancient cities in Iran had three parts - a primary core, the old texture and the new texture - in this period (Habibi et al., 2007).

Two major measures and notable developments that occurred in 1968 include:

1 – Approving the Law of Urban Renovation in 1968

2 – Finding the roots and inclusiveness of comprehensive plans (developing a comprehensive plan for 16 other cities) (Habibi et al., 2007).

After the Islamic Revolution the Iranian Planning and Legislation Council faced problems in various sectors including urban development because of the outbreak of war. As a result of uncontrolled urban development on the one hand and the lack of municipal control programs on the other, the restoration and improvement of worn-out textures was

. This work was supported in part by the Management of Development and Housing Company of Golestan Province

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neglected by officials (Shamaei and Pourahma, 2006).

Paying attention to the restoration of the historic fabric of the city began with life-giving schemes after the Islamic Revolution. One of the major issues in the life-giving plan was the creation of harmony between old textures or to-be old textures and lively, active textures of the city (Gholami, 2008). The aim of these projects was to modify crossings for the passage of vehicles with an emphasis on preserving the neighborhood's governing body, spirit and values (Rahnamaei and Shah-Hosseini, 2004). The number of cities and towns in Iran grew from 492 in 1986 to 612 in 1996. In this case, the country has witnessed the growth of cities with over a million residents; the growth of medium-sized cities and the increase of small towns.

2. INTRODUCING THE STUDY AREA

In terms of geographical location, Ghaleh Hassan area is located in the south of Gorgan. The neighborhood is connected to Naharkhoran road on the south, to Golshahr Neighborhood on the west,

and to lands owned by the Relief and Finance Committee on the south. Ghaleh Hassan area is one of informal settlements of the city and is in the priority of the first empowerment measure. Figure 1 presents the study area as located in Gorgan.

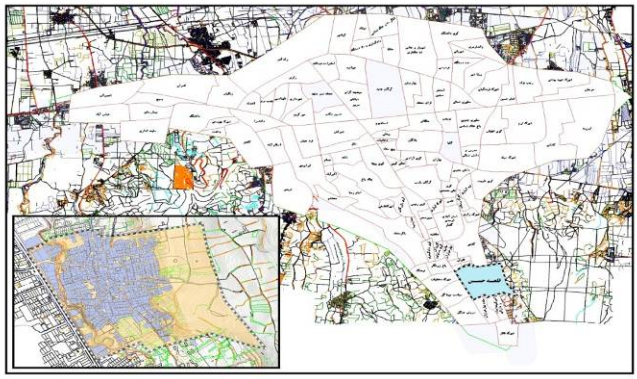

Figure (1) : Study area

2-1. The population of Ghaleh Hassan area of Gorgan:

The total population of the neighborhood is 4,649. A total of 2,327 are male and 2,322 are female. The ratio of male and female population to the total population in Gorgan in 2006 was 50.3 and 49.7, respectively.

3. PHYSICAL PROPERTIES

Physical properties in both housing and land use are examined.

3-1 – Analysis of the status of housing:

Papers presented to the conference must not be less than 20 pages and more than 7 pages.

3-1-1 - Gross population density and net residential density:

The scope of Ghaleh Hassan neighborhood (direct intervention range) encompasses an area of about 59.66 acres from which 26.03% is allocated to residential areas.

Based on field interpretations and predictions, the population of Ghaleh Hassan neighborhood was 4,649 in 2009 who had settled in the direct intervention area. Accordingly, the gross population density in the neighborhood was 77.89 persons per acre. On the other hand, with respect to a housing area of 15.54, the net residential density of the neighborhood was 299.16 individuals per acre.

The comparison shows the indices of gross population density and net residential density of Ghaleh Hassan neighborhood and Gorgan as well as the density of fine-grained units (below 100 m).

Table 1 shows the gross density of population and net residential density of Ghaleh Hassan neighborhood and Gorgan. The density of fine-grained units in some parts of the neighborhood is more than other parts of the neighborhood. Therefore, the first priority in planning is for community outreach and improving environmental conditions in these sectors.

Table (1) : Gross population density and net residential density

Factor / Area	Total area (acres)	Residential area (acres)	Population	gross population density (person per acre)	net residential density(person per acre)
Ghaleh Hassan neighborhood	59.69	15.54	4649	77.89	299.16
Gorgan	4356.03	1323.8	272838	61.11	206.1

3-2-1 Population growth, seasonal changes and its impact on the demand for housing and urban environment:

The increasing number of informal neighborhood cities is mainly due to the migration of rural population of the cities of Golestan province and other urban neighborhoods to informal communities because of the idea of finding a job and

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education services in the city; low costs of land, housing prices and rents in the neighborhood; and, the lack of supervision to the construction of informal urban areas. It is evident that some portion of population growth is connected to the natural growth of population and regeneration as well as the decrease of mortality because of the structural characteristics of the neighborhood.

Population growth in these localities will have positive or negative effects on the social, economic and physical structure of the city. Among the positive effects is cheap labor supply - if the city has a suitable economic structure. In contrast, the increase of social and cultural anomalies, unemployment and informal employment growth, poor and ephemeral construction, increase of housing demands, and environmental pollution due to the lack of proper infrastructure are among the negative impacts of informal settlements, on the migration destination. In this section, population growth and its possible impacts on the demand for housing and urban environment are studied. Finally, an estimate of the housing needs of families in Ghaleh Hassan neighborhood is performed and compared with the existing situation.

The population of Ghaleh Hassan neighborhood in 1996 was 2,827 which, over a decade, grew to 4,038 in 2006with a growth of 3.63%. Population growth over the past three years, 2006-2009 was 4.81 percent which was higher than that of the period from 1996 to 2006. Population growth pattern indicates that despite the use of family planning considerations in upper patterns, the population of the neighborhood had a considerable growth during recent years for reasons such as increased urban and rural migrations. With the increase in population during the last decade, housing need has been one of the most basic needs of the families. In such circumstances, due to poverty of many families (despite the abundance of open and barren land area), the number of residential units with a population of more than one household has increased. Distribution of households in the residential area of Ghaleh Hassan indicates that 19.2 percent of the residential units in the neighborhood were accommodating more than one household. With regard to the fact that part of the residents are rural migrants, most seasonal population changes at the neighborhood level is because of population movements of this group. This population group increases the extent of local population and the demand for housing with seasonal migration from rural to urban areas (at the time when agricultural work in the village is finished). However, what is certain is that these population changes have not been so vast and far-reaching and have generally had no impact on the demand for housing at the neighborhood level. Table 2 shows population growth in Ghaleh Hassan neighborhood.

Table (2) : Population growth in Ghaleh Hassan neighborhood 1996-2009

Population growth (%)	Population	Year
-	2,827	1996
3.63	4,038	2006
4.81	4,649	2009

In order to assess housing demand, the number of repairable or destructible units and the average household density were considered. Based on field data, the average household density in Ghaleh Hassan residential area was 1.24. Given the number of households living in the neighborhood (1,409 households), 262 residential units must be built at the neighborhood level. The examination of the quality of housing units also shows that about 11 percent of the residential units are repairable or destructible. Therefore, in order to meet the housing demand of residents in the neighborhood, the maintenance, improvement and renovation of non-residential buildings are necessary in addition to creating new housing units.

3.1.3 - Attitudes towards quality of life in the neighborhood:

According to respondents, best indicators of quality of life are the climate (54.5%), the status of comfort and relaxation (44.7%) and the status of noise in the neighborhood (37.4%).

The weakest quality of life indices as rated by respondents are access to recreational and leisure facilities (51.1%), relief services (50.5%) and seismic resistance (49.4%). Table (4) presents the attitudes of respondents towards quality of life.

4. SPATIAL PATHOLOGY

No doubt, the physical status of human residence is a reflection of the prevailing economic and social conditions. The body of the city reflects the socioeconomic status of its inhabitants.

4-1 – Major renovation problems in Ghaleh Hassan:

According to respondents, the major problems of renovation in Ghaleh Hassan include the inability of people to renovate Ghaleh Hassan (56.1%), neglect and lack of seriousness by the municipality (54%) and distrust of people to relevant agencies (47.7%). Figure (2) shows the main problems in the renovation of Ghaleh Hassan neighborhood.

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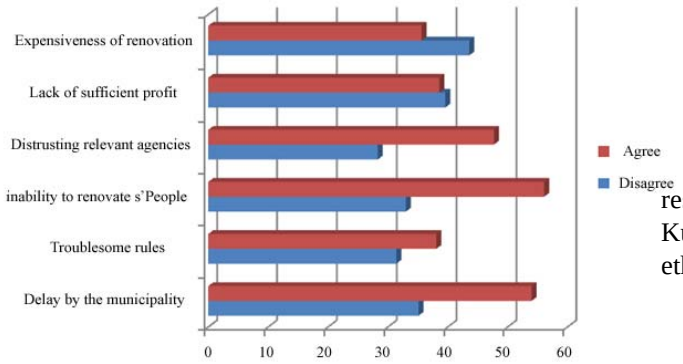

Figure (2) : Major renovation problems in Ghaleh Hassan

5. SOCIAL CHARACTERISTICS:

5-1 - Ethnicity and Language:

According to what is shown in Table (3), ethnicity of respondents is as follows: 94.8%, Persian, 1.6% Azeri, 0.2% Kurd, 0.4%, 0.1 Turkmen, 0.4 Baloch and 2.5% are other ethnicities.

Table (3) : Ethnicity of respondents

Ethnicity	Cumulative frequency	Percent	Abundance
Kurd	0.2	0.2	2
Baloch	0.6	0.4	3
Fares	95.4	94.8	781
Turkoman	95.5	0.1	1
Turkish	97.1	1.6	13
Other	99.6	2.5	21
Unknown	100	0.4	3
Total	-	100	824

5.2 - Duration of residence in the neighborhood:

The mean duration of residence is 31.2 years with a minimum of 1 year and a maximum of 85 years. The mean duration of employment was 13 years with a minimum of 2 years and a maximum of 51 years.

Table (4) : Attitudes towards quality of life

	Total	Unanswered	Average	Average	Weak	Indices
	Percent	Number	Number	Number	Percent	Number
Access to educational and cultural opportunities	100	824	25	25	25.6	211
Access to health facilities	100	824	21	21	32.3	266
Access to sports facilities	100	824	24	24	26.8	221
Access to recreation and leisure	100	824	23	23	34.6	285
Access to daily necessities shopping centers	100	824	25	25	39	321
Parking Situation	100	824	29	29	39.6	326
Resistance and aid in natural disasters such as earthquakes	100	824	38	38	30	247
Relief services in accidents such as fire	100	824	35	35	26.3	217
Passageways for ambulances and emergency services	100	824	28	28	31.4	259
Status of alleys and passageways	100	824	32	32	36.3	299
Status of public transportation	100	824	30	30	36.4	300
Status of noise in the neighborhood	100	824	34	34	37.4	308
Status of weather in the neighborhood	100	824	30	30	54.5	449
Status of comfort and peace in life	100	824	30	30	44.7	368
Status of local people who do not have good relationships with each other	100	824	40	40	38.7	319

5-3 – Level of education:

As shown in Table (5), 22.5% of respondents are illiterate, 37.5% can read or write, 28.6% have degrees below high school diploma, 8.3% have a high school diploma, 0.8% have an associate degree, 1.5% have a BA, 0.4% have an MA, and 0.2% have a seminary education.

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Table (5) : respondents' level of education

Level of education	Cumulative percentage	Percent	Frequency
Illiterate	22.5	22.5	185
Read or write	60	37.5	309
Below high school diploma	88.6	28.6	236
High school diploma	96.9	8.3	68
Sssociate degree	97.7	0.8	7
BA	99.2	1.5	12
MA	99.6	0.4	3
Seminary education	99.8	0.2	2
Unknown	100	0.2	2
Total	-	100	824

5-4 - Marital Status:

Table (6) shows that 90.2% of the respondents are married, 1% single, 0.8% divorced and 7.9% lost their spouses.

Table (6) : Marital status of respondents

Marital Status	Cumulative frequency	Percent	Frequency
Married	90.2	90.2	743
Single	91.2	1.0	8
Ivorced	92	0.8	7
Lost their spouses	99.9	7.9	65
Unknown	100	0.1	1
Total	-	100	824

5.5 – The manner and time of using public and leisure spaces in Ghaleh Hassan neighborhood:

There are inefficient leisure spaces in Ghaleh Hassan except Ghaleh Hassan Martyrs Gym. It should be noted that this area severely suffers from the lack of leisure spaces such as parks and children's playgrounds. This results in the apparent bustle and noise caused by children playing in the area. The religious use of public spaces at certain times of the year such as mourning for Imam Hussein the Martyr, Ramadan, Shabanie feasts and so on is planned spontaneously by people in the form of ceremonies divided into male and female. It should also be noted that also most of the rallies and gatherings by the citizens take place in Ghaleh Hassan Mosque and by prior notification.

5.6 - Unprotected spaces and social crimes in Ghaleh Hassan quarters under study:

Among unprotected spaces and places prone to social crime is the newly built area called the Hill Street, at the most eastern part of the land owned by Mr. Hassannejad. It is the site for continuous illegal constructions conducted without license. With regard to field observations, this section of the area under study lacks facilities such as electricity, gas, waste disposal system and sewage treatment. Its residents are mostly poor and working families who have settled in this area from different parts of the neighborhood and from different families and are usually confronted with social problems such as addiction. On the other hand, based on the comments of residents, there is a high level of clash and controversy between residents of this area. In the other two parts of the study area, there are no unprotected spaces or social crimes, the main reason of which is pursuing drug dealers and shunning drug addicts by local residents. Despite all this, few houses are the resort of addicts.

5-7 - Social problems:

Table (7) shows that greatest social problems in Ghaleh Hassan area include overcrowding (33.1%), addiction (31.3%) and insecurity (24.4%). The smallest social problems include harassment by vagrants (46.8%), theft and robbery (45.4%) and drug sales (45%).

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Table (7) : Greatest social problems in Ghaleh Hassan area

Indices	Total		Unanswered		High		To some extent		Low	
	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number
Theft and Burglary	100	824	18.4	152	22.2	183	14	85	45.5	374
Addiction	100	824	15.8	130	31.3	258	17.4	143	35.5	293
Drug sales	100	824	26	214	17.1	141	11.9	98	45	371
Harassment by vagrants	100	824	23.3	192	19.1	157	10.8	89	46.8	368
Violence and conflict	100	824	17.5	144	24.4	201	14	115	44.2	364
Overcrowding and bustle	100	824	15.5	128	33.1	273	14.2	117	37.1	306
Insecurity especially at night	100	824	24.9	205	15.4	127	9.3	77	50.4	415
Other	100	824	98.9	815	0.4	0.3	0.2	2	0.5	4

According to criteria based on Table 7, we have analyzed neighborhood problems. The results indicate that 44.8% of respondents have rated problems as high, 31.2% as moderate and 21.7% as low.

5-8 - Social belonging to the neighborhood:

As can be seen in Table 8, 53.2% stated they were forced to reside in the neighborhood, 47.2 wanted to go to other neighborhoods while 51.7% of the residents preferred to stay in Ghaleh Hassan and 51.2% liked it there.

5-9 - Religion:

98.3% of the respondents, from Ghaleh Hassan residential area, believe in Shiite Muslims, 2% are Sunni Muslims, and 2% are unknown.

Table (8) : Status of social belonging to the neighborhood:

	Total		Unanswered		Disagree		Indifferent		Agree	
Perspectives on neighborhood	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency
I like it here.	100	824	1.5	12	51.2	422	8.9	73	38.5	317
I prefer to live here.	100	824	1.3	11	51.7	426	6.1	50	40.9	337
It does not matter where I live.	100	824	2.1	17	38.8	320	11.4	94	47.7	393
I am forced to live here.	100	824	1.9	16	37.6	310	7.3	60	53.2	438
I want go to a better neighborhood.	100	824	2.4	20	42.8	353	7.5	62	47.2	389

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6. ECONOMIC CHARACTERISTICS:

6-1 - Type of employment:

The results, as presented in Table (9), shows that 29.4 percent of respondents have service jobs, 9.2% sales, 5% non-industrial production, 3.6% of them are under training. 3.2% are in the therapeutic sector, 16.5% maintenance, 4.1% agriculture and 9.2% is transportation. 9.4 percent are in other sectors.

6-2- Status of Residence:

As can be seen in Table (10) and Figure (3), 86.2% of respondents are owners, 9.3% of respondents live in their parents' house, and 3.5% are tenants.

Table (9) : Type of employment of respondents

Type of property	Cumulative percentage	Percent	Frequency
partitioned	39.6	39.6	326
condominium	40.3	0.7	6
prelimsinary agreement	93.6	53.3	439
client ownership	94.3	0.7	6
dedicated ownership	95.3	1	8
possession	-	-	-
other types (inherited property etc.)	96.1	0.8	7
unknown	100	3.9	26
total		100	824

Table (10) : Status of Residence

Cumulative percentage	Percent	Frequency	Disposition of property
86.2	86.2	710	Owner
95.5	9.3	77	Paternal property
99	3.5	29	Tenant
100	1	7	Unknown
	100	824	Total

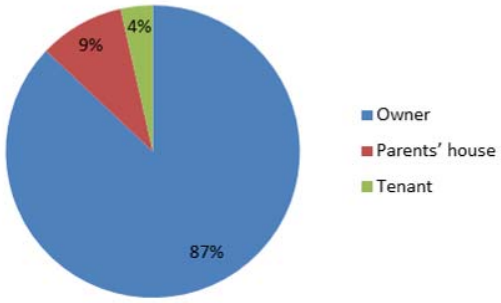

Figure (3) : Status of residence

6-3- Type of property:

Obtained results show that the ownership of 39.6% of properties is partitioned, 0.7% condominium, 53.3% preliminary agreement, and 1% dedicated. No client ownership or possession of properties has been observed. 0.8% of properties form other types of real property (including inherited property).

Table (11) : Description of property

Type of employment	Cumulative percentage	Percent	Frequency
Services	29.4	29.4	243
Sales	38.6	9.2	76
Non industrial produced	43.6	5	42
Education	47.2	3.6	30
Therapeutic	50.4	3.2	27
Maintenance	66.9	16.5	136
Agriculture	71	4.1	34
Transport	80.2	9.2	76
Other	89.6	9.4	78
Unknown	100	10.4	82
Total		100	824

7. STRATEGIES FOR SUPPORTING POPULAR RENOVATION:

- Granting an incentive density class
-Exemption from payment of residential units' building license
- Exemption from payment of renovation tax
- Free divestiture of removed passageways
- Mitigating taxes on non-residential land use
- Granting banking facilities
- Maintaining the patents of existing facilities
- Accelerating registration processes

7.1 - A few more suggestions for encouraging people to participate in renovation:

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-Providing incentive and motivation for development
-Funding for public and service uses
-Funding for designing, supervising and researching
-Increasing the levels of banking facilities with low interest rates
-Developing a rewarding, cooperative, and preferential system
-Considering and resolving the problems of owners during project implementation
-Funding for housing security
-Funding for business place security deposit
-Providing pension for those who rent their homes for a living
-Implementing commercial projects in the last stage
-Considering some public spaces for business in this texture

8. Recommendations

Before presenting our recommendations, the researchers claim that the suggestions presented in this study have several features:

- These suggestions come from the actual results of this study.
- They also respond to appropriate intervention strategies for the renovation of old textures through public participation approach.
- Suggestions provided in this section are applicable.
- Determining policies for dealing with residents and owners and rights holders of Ghaleh Hassan texture, Gorgan
- Prioritizing the implementation of projects in terms of texture
- The type and texture of suitable projects
- Establishment structure of renovation offices of the neighborhood, procedures and work processes
- Ways to engage and inform people
- Modes of public participation and funding of resources for the projects
- Types of interference patterns in old textures and informal settlements
- legal foundations for encouraging owners and residents to participate (incentive package)

9. Conclusions

Collaborative work, not for people but, with people for the renovation of old and worn-out fabrics cannot be achieved merely in theory. To this end, it is necessary to have a strong belief in true partnership of the public and internalize such participation. First, we need to do something so that texture renovation turns into a public movement. To accomplish this important matter, administrative structure should be considered both in terms of objectives and in terms of implementation, investment uptake, and public groups. However, intervention in worn-out textures in the form of pattern, aggregate and embedding designs is in need of organization which cannot be afforded by the present structure of municipalities and housing organizations.

Setting up renovation offices in the neighborhood by the private sector is the solution. To this end, we recommend that those who are involved take the following issues into consideration: organizational structure, appropriate staffing, goals, work procedures, processes and refining proposed tasks, methods of engaging and informing the public, various methods of public participation in the renovation, as well as aggregation methods such as multi-block aggregation or aggregation pattern projects and its positive effects.

10. Acknowledgments

We wish to sincerely give thanks to the Management of Development and Housing Company of Golestan Province, land owners, residents of Ghaleh Hassan residential area .

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Studying of spatial characteristics of groundwater quality by using the factor analysis method and GIS (Case Study: Coastal Plain aquifer Surrey - Neka)

M. Moradi Farahabadi, Adineh F.

Abstract—Ground water in coastal areas is the main source of water for domestic and agriculture use. Water resources in these areas where are fertility and populated are faced by many biological challenges so understanding different effective on ground water quality factors can help to have a optimal management of the aquifer. The aim of this study is to have a spatial investigate in the qualitative properties of Sari, Neka aquifer. In this study, a combination of the two methods, factor analysis and geostatic was used to spatial analysis of groundwater quality. The results of factor analysis revealed three factors. Cl, Na, SAR, EC which represent the salinity in first factor, bicarbonate, magnesium, calcium and TH indicate water hardness in the second factor and potassium and PH reflect the impact of the geological factors and increasing in use of fertilizers and in the third factor. Finally, with the scores obtained from factor analysis we planned the spatial distribution of groundwater quality by kriging model. The first factor increases in some parts of coastal line and southern parts, the second factor increases in southern and the third factor increases in parts of central and coastal areas. According to the results, the effective factors on the quality of the aquifer can be agricultural land use and management, development of residential areas, salty water intrusion into aquifers and geological factors.

Keywords—water quality, factor analysis, ordinary kriging, spatial distribution.

I - INTRODUCTION

The quality and availability of fresh water is one of the most important environmental issues. Quality of groundwater is depending on geological environment, human activities and exploiting (Senthikumar et al 2008)[21]. Also using cases involving anions and cations, the biological characteristics is determined. The quality of the ground water due to different variables and simultaneous analysis of these variables and in order to obtain relationships between relevant data collection, multiple analysis is used (Machado et al 2008)[10].the basic concept of the application of multivariate analysis to achieve a high efficiency data compression data from original data source and obtain some useful information in interpreting geochemical environment [5]-[23].

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To spatial analysis of ground water quality we used factor analysis method. The application of multivariate statistical techniques such as factor analysis provides better understand the quality of groundwater for interpreting complex data set [2]-[17]. Factor analysis is a statistical method that can be used to analyze the interaction between the variables. In this method, parameters are grouped by according to some of their same factors. This method reduces the data into smaller sets without loss important information from main data [12]-[21].
The final step to establish the spatial distribution of groundwater quality are using with geostatistical techniques. Applications of geostatical method in different studies indicate that kriging is appropriate method [18]-[21]-[22].

Mahmoud lou and Nasseri (2008) have been studied to verify the quality and quantity of the sari's grounwater based on the correlation matrix and cluster Analysis. this study has shown that the highest correlation is between sodium and chloride ions. Combined diagram is drawn that shows the linear trend between these ions. nes in 2009 evaluated the spatial distribution of groundwater in kenya turkey with kriging. the results showed that chloride and sulfate concentrations and electrical conductivity are high and total harness centralization is in the northern part of the region. This method can estimate the spatial distribution. Effective parameters in quality were analyzed. Nas and Berktay (2010) to provide an overview of groundwater quality in Konya, turkey and distribution of ground water with geostatical method and kriging. Final map specified different qualities in several point of city. Sayyed Juned & Bhosel Arjun (2011) studies the quality of the groundwater in Nando, India. The parameters were studied based on the areas where ground water are used for domestic and agricultural purpose. Amount of Cl, Na, K indicates that agricultural activity, geological information and local environmental condition control groundwater quality. Meena et al (2012) are believed that total hardness of the groundwater is most important in the quality of aquifer. Important sources of hardness water are dissolving the

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composer. He believes that water dissolving is the main reason of total hardness. Moyo (2013) has studied the quality of the groundwater in the three basins at Zimbaveh. Results indicated that high nitrate is in the agricultural areas. Also the geological information plays an important role in groundwater quality. The aim of this study was to investigate the spatial characteristics of hydrochemicals of the aquifer in sari-neka. This area has a coastal aquifer. Sari – neka plain is located in Mazandaran province and between tajan and neka two important rivers of this area where has coastal aquifer affected by these rivers (fig 1).

Fig.1 Location of study area

The 622271 square kilometers unconfined aquifer covers the 58% of the plains. It is widespread to the north and consist of clay, sand and gravel. Due to geology the studied area is located in the central parts of Alborz zone and structural sedimentary gorgan-rasht zone. Coast of caspian sea is in the north of the Alborz foult that is covered by quaternary sediments.

II – MATERIAL & METHOD

In this study, we applied some qualitative parameters include the anions SO4, Cl, HCO3 and cations k, Na, Mg, Ca and chemical properties of water such as EC, TDS, TH, PH. To study the quality of groundwater resources in the study area, data obtained from 46 Piezometer wells were used. And we used factor analysis and ordinary kriging to study the chemical characteristics of the groundwater.

A. Factor Analysis:

To understand the main variable of a phenomenon or to summarize a set of data, factor analysis method is used. Preliminary data is for factor analysis of the correlation matrix between the variables.

In The main component analysis we analysis variance of all observed variables and the diameter of measured variables correlation matrix is (1). The principal components analysis all of variables are supposed to be equal. Unlike the multiple regression variables, In this method, variables are not divided into two independent and dependent variables group. But each main component explains some of the total variance. So first principals component contain so more information, and have the highest variance and last components have the lowest variance [24] in factor analysis Rotation of factors is a techniques to achieve better results. In this study we use Varimax rotation method that has more efficiently [1]. To analysis the factor by using spatial data classification forms in the first stage, the correlation matrix between variables has been done. To obtain the appropriate operating model variables must have relation. If the correlation is low, they may have no common factors.to choice the using parameters in a model several methods have been suggested. In the first method, we consider and study the factors that their specified value is just greater than one. Specified value is called equation root characters and reflects the importance of values which classify every variable [15]. And the second method is matrix table of data. In this method first column is number of variables and second column is for extracted amount and you can see their scores amount. The scores are the standardized regression coefficients in multiple regression studies. In Bargooyehs main variables are as dependent variables and factors are as independent variables. Bargooyehs tell the specific contribution of each factor and show correlations between factors and variables. Factor rotation Phase changes the initial matrix into a matrix that is easy to interpret. Varimax is one of the rotation methods that tries to compact and minimize the number of variables that have high levels scores. This method increases the factors interpret ability[3]. Coefficients of rotated factor matrix which are greater than 0.75 have a very strong, which are between 0.56-0.75have average and which ere between0.3-0.5 have weak relationship[9].

B. Kriging:

Statistical analysis is a process in which value of a quantity in a special place is obtained from using its own quantity in other place special place with a special coordinates. Kriging is a geostatistical interpolation method. Actually, this method is a linear weight averaging method. Variogram is The main tools for geostatistical analysis. Variogram can find predicted half-square of variance between random couple functions separated by the direction and distance vector. The Important characters of the variogram are sill, nugget and range variogram function is as follows:

$$\gamma(h,x) = \frac{1}{2m(h)} \sum_{i=1}^{m(h)} [Z(x_i) - Z(x_i + h)] \quad (1)$$

Where the $m(h)$ is number of paired observations , $Z(x_i)$is the zoon variables in xi positions for typical variograms that are a function of the h variables. model for exponential, spherical, Gaussian, linear Variograms can be obtained by using mathematical models. Each of these models may be appropriate for the variogram.

$$\hat{Z}(x_0) = \sum_{i=1}^{n} \lambda_i Z(x_i) \quad (2)$$

$$\sum_{i=1}^{n} \lambda_i = 1 \quad (3)$$

And model coefficients can be used for the optimal weights interpolation. $\hat{Z}(x_0)$ Are estimated values of x_0 values are estimated [8]-[11]-[14]-[18]-[22].

III - RESULT

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by According to current statistics in 88-1378water year , to identify and determine the chemical quality of groundwater and changing process are all over the Sari- Neka Plain and to map the spatial distribution of groundwater quality we used factor analysis and kriging respectively. By using factor analysis, we study the understanding and effectiveness of relationships between variables (chemical parameters of water) which are shown by samples from some places on the groundwater structure. Table I shows the statistical description of samples. SO4, Cl, HCO3 Anions are in a range from 0.60 to 4.74, from 1.1 to 8.5 and from 2.32 to 8.5 mg/l, respectively. Also minimum and maximum of K, Na, Mg, Ca cations are from0.01to 0.12, from 1.1 to 7.9, from 2.8 to 6.1and from 3.6 to 9.6 mg/ L, respectively. The amount of soluble salts and water hardness are fluctuated from 7.9 to 1482 and from 320 to 785 mg/l, respectively. Minimum of Salinity is 874 and its maximum is 2400m mouse / cm.

Table I. Statistical description of the chemical parameter of Groundwater

parameter	maximum	minimum	mean	Standard deviation
SO4	4.70	0.60	1.2630	0.737
Cl	8.5	1.1	2.7043	1.76
HCO3	11.20	2.30	6.3935	1.238
K	0.12	0.01	0.0915	0.016
Na	7.90	1.1	2.6804	1.69
Mg	6.10	2.8	3.3152	0.571
Ca	9.6	3.60	4.7630	1.27
PH	7.8	7.60	7.6978	1.071
TDS	1482	7.9	661.11	213.90
TH	785	320	403.91	88.95
SAR	3.69	0.63	1.3578	0.733
EC	2400	874	1093.2	302.2

Table II. Correlation coefficient matrix for chemical parameter of Groundwater quality

	SO4	Cl	HCO3	K	Na	Mg	Ca	PH	TDS	TH	SAR	EC
SO4	1											
Cl	0.757**	1										
HCO3	0.510**	0.275	1									
K	0.166	0.384**	0.086	1								
Na	0.792**	0.**992****	0.338*	0.39**	1							
Mg	0.826**	0.671**	0.68**	0.16	0.71**	1						
Ca	0.669**	0.440**	0.56**	0.069	0.47**	0.**84****	1					
PH	-0.145	-0.189	-0.106	-04.2	-0.17	-0.179	-0.204	1				
TDS	0.**803****	0.766**	0.535**	0.231	0.**8****	0.75**	0.598**	-0.23	1			
TH	0.437**	0.530**	0.624**	0.101	0.56**	0.**924****	0.**985****	-0.20	0.67**	1		
SAR	0.676**	0.**98****	0.198	0.43**	0.**997****	0.584**	0.294*	0.14	0.71**	0.38**	1	
EC	0.**914****	0.**89****	0.60**	0.30*	0.**92****	0.**87****	0.66**	-0.15	0.78**	0.75**	0.82**	1

* Level 0.05
** Level 0.02

Pearson correlation matrix of water quality parameters are given in Table II. Investigation on TDS or dissolved solute concentrations shows that this parameter is correlated with sulfate, sodium, chloride and magnesium, respectively. Increase in sulfate can be resulted from agricultural activities and rural and urban sewage infiltration into the aquifer in this region. The concentration of calcium and magnesium ions is correlated with water hardness or TH and rising in the

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quantity of these ions cause increasing in water hardness. Sodium adsorption ratio or SAR parameter shows a high correlation with Na, Cl, respectively. Respectively, sulfate ions,
sodium, chloride and magnesium ion are parameters that have influence in electrical conductivity. And an increase in
their concentrations cause increase in the electrical conductivity of groundwater. The two highest observed correlations among the studied ions were respectively between chlorine and sodium and then calcium and magnesium.
Factor analysis of chemical parameters of aquifer based on eigenvalues greater than one shows three factors. These factors totally show 85.5% of the total variation. The first factor which explains about 38.9% of the total variance includes parameters such as sodium, chloride, sodium absorption ratio (SAR), electrical conductivity (EC), total dissolved solids (TDS) .cholera ion and sodium together can indicate the sea water intrusion into the aquifer. It's another source can be dissolving of deposits of the plain when underground water passes under. the electrical conductivity has a positive relationship by these ions. This means that the higher amount of these ions in the water, the higher electrical conductivity it has. Also the increase in TDS and Cl may be due to the urban and home sewerage. The second factor which explains 36.3% of the total variance includes parameters such as bicarbonate, magnesium, calcium, and water hardness (TH). Total hardness is one of the most important indicators of water quality which is on the basis of carbonate, calcium and magnesium ions. Increasing in These ions can Cause increasing in the hardness of water. Increasing in the calcium and magnesium ions can be due to dissolution of minerals that have been dissolved by the rains and have passed a way into the aquifer. The third factor which explains 10.2% of the total variance includes Potassium ion and PH. Potassium has a negative relationship with PH. Thus, the higher value of these ions in water the lower PH levels will be in. the existence of K+ in ground water can have a geological reason and be due to dissolution of the ions from minerals. Increase in the potash fertilizer usage in agriculture and urban development can increase these ions (Table III).

Factor score	The best fitted model	Range	Sill	Nugget	$\frac{C}{(C_0+C)}$	RSS	r^2
Factor 1	linear	24492.3	.21543 0	.12649 0	0.413	0.0195	.87 0
Factor 2	linear	32259.5	14802 0.	14802 0.	0	.00066 0	.57 0
Factor 3	linear	.02 24349	.34457 0	20176 0.	0.414	0.05	.56 0

Table III. Factor Analysis for ground water quality in sari- neka plain

parameter	Factor 1	Factor 2	Factor 3
SO4	0.651	0.645	-0.013
Cl	**0.934**	0.275	0.129
HCO3	0.154	**0.772**	0.024
K	0.444	-0.121	**0.606**
Na	**0.932**	0.321	0.114
Mg	0.458	**0.848**	0.048
Ca	0.172	**0.911**	0.087
PH	0.230	-0.195	**-0.886**
TDS	**0.669**	0.574	0.110
TH	0.270	**0.923**	0.078
SAR	**0.970**	0.121	0.122
EC	**0.776**	0.609	0.049
Eigen valued	4.676	4.358	1.229
Variance %	38.968	36.319	10.240
Cumulative %	38.968	75.286	85.526

For each chemical parameter in each factor some points has been calculated which determine the factor distribution of the aquifer at the end of water quality evaluation. To create the spatial distribution of water quality parameters ordinary kriging and to select the most suitable model Vayvgram were used. The piece influence Coefficients ,the effective radius and threshold were determined. The best model based on RSS and c/c0+c values as a parameter for spatial dependence of groundwater chemical parameters were choiced. If the variable ratio was less than 0.25, between 0.25 to 0.75 and more than 0.75 there will be high spatial dependence, medium spatial dependent and weak spatial dependence ,respectively . Thus the best models were selected linearly (Table IV).

Table IV. Characters of Variogram model for scores obtained by chemical parameter

fig 2 shows the spatial distribution of points scored by The factor analysis for the first factor. first factor consist of parameters such as sodium, chloride, SAR, EC. These factors indicate the salinity in the aquifer. The highest concentrations are in the southern areas and parts of coasts and its amount is reduced from the eastern and central to the western parts of the Plains. Also the second factor is t maximum in the southern and decreases toward the central and Northern parts. This factor includes parameters such as bicarbonate, magnesium, calcium and total hardness that is related to grand water hardness (Fig.3). The third factor which consists of potassium cations and PH parameter is concentrated in the northeast and decreases towards the southwest area (Fig.4).

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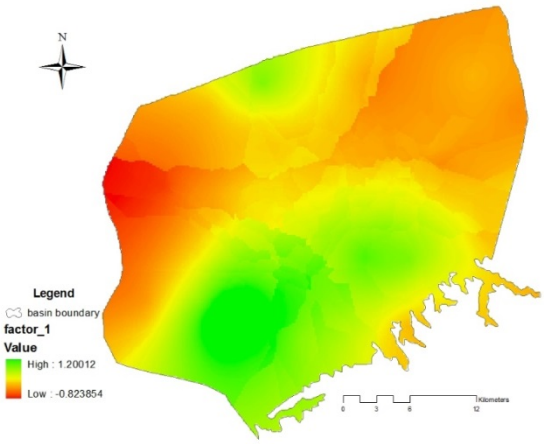

Fig.2 spatial distribution map of points scored by the factor analysis for the first factor

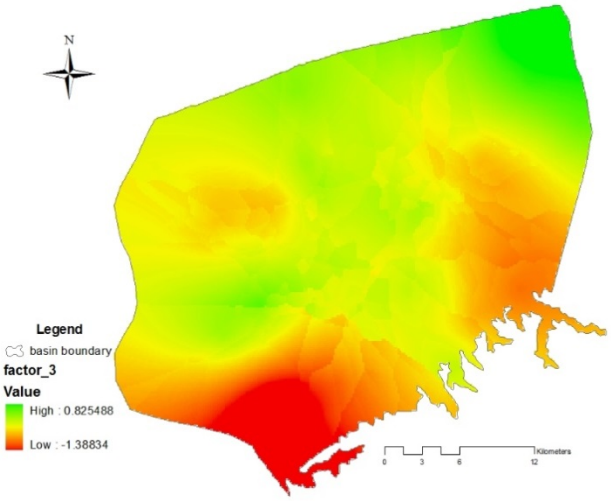

Fig.3 spatial distribution map of points scored by the factor analysis for the second factor

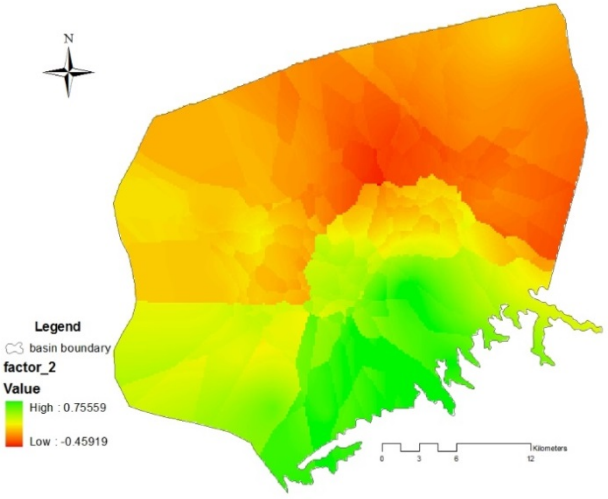

Fig.4 spatial distribution map of points scored by the factor analysis for the third factor

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IV – CONCLUSIONS

This study was planned in Sari – Neka aquifer, by using the factor analysis. And we attempt to map the spatial distribution of derived factor by using kriging method. Chloride, bicarbonate, sulfates Anions and sodium, calcium, magnesium, potassium cations and parameters PH, TDS, SAR, and EC have been studied in this paper. Understanding the relationships among variables and their influences were performed by factor analysis. The factor analysis revealed three factors. Cholera, sodium, SAR, EC in the first factor shows the salinity. The existence of these materials can be due to dissolving sediment materials under the plain when water passes away. Also it can be due to the seawater intrusion into the aquifer that is corresponded by Kara Mahmoud Lu and N. R (1387).

Existence of the Bicarbonate, magnesium, calcium and TH in the second factor indicates the grand water hardness that in Mina et al(2012) ,s idea it can be a limitation to drink and harmful to use in industries and agriculture. Third factor which shows increasing in chemical fertilizer using and urban and rural development at the coast consists of the potassium and PH. It is corresponded With Arjune and jond (2011) and at the end spatial distribution of grand water quality has been planned by using ordinary kriging model. Ness and Brktay (2010) with this method studied different quality of groundwater in different parts of the Konya.by using the kriging model In this study it has been shown that first, second and third factors increase in some parts of coast southern area, some parts of southern area and at last in some parts of coast and central area, respectively.

According to the results, we can conclude that land use, agriculture, urban and rural development, water intrusion into aquifers and geological factors are effective factors on aquifer quality.

It is better to use Multi variable technique as complement methods beside other ones. Combining statistic ground and factors scores creates a suitable plan to estimate aquifer quality. Understanding the various effective factors on ground water quality can play an important role in its optimal management thus help to improve the ground water quality.

V - REFERENCE

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Using Inversion Hierarchical Weight Process "IHWP" Analysis to Identify Security Levels in Kerman Neighborhoods Based on Physical Indices

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***Abstract*—** Security in Kerman was studied from the viewpoint of physical factors that underlie crime. This article analyzes security levels in some neighborhoods of Kerman by considering physical indices underlying crime. The descriptive-analytic method was used and most of the information and data was obtained through on-the-ground observation and understanding of the situation in the neighborhoods. The six indices of openness of the space, compactness of texture, vegetation, lighting of the streets, urban furniture, and quality of the streets were used to analyze security levels. The modified model based on entropy weight was then employed to calculate the influence coefficient of each parameter of security and the technique of inverse hierarchical analysis was used to determine the actual and the ideal levels of quality of each neighborhood. It was found that the indices of lighting and quality of the streets enjoyed the highest influence coefficient and the index of the openness of space the lowest. Moreover, of the 13 studied neighborhoods, the Imam-e-Jom-e neighborhood enjoyed the highest, while the Allahabad and Taherabad neighborhoods, that were developed in the unstoppable urban sprawl, were mostly located on the outskirts of the city, and were the places where mainly people of low-income levels and non-natives lived, had the lowest quality.

***Keywords*—** Security, physical indices underlying crime, the Inversion Hierarchical Weight Process..

I. INTRODUCTION

Populations of cities around the world grow at an average annual rate of two percent. At the start of the year 2000, about half of the world's population lived in cities, and it is expected this will rise to 61 percent in 2030[1].This increasing and uncontrolled growth has created many problems for urban populations. The rise in crime rates and in levels of insecurity originates from non-standard growth and from the lack of identity of cities. Internationally, very extensive studies have been conducted in recent decades on the relationship between fighting factors engendering crime and balanced organizing and designing and equitable distribution of land use. In Iran too, the crime rate on the outskirts of cities is very high. Obviously, location, time, and motivation of criminals are the main factors in the development of criminal behavior. Addressing these factors can greatly influence the selection of policies for preventing crime, and it seems that among these factors, the factor of place (environment) plays a decisive role. The science of urban planning and design is thus called on to guide the manner of urban growth and to organize physical, social, and economical environments for improving living conditions, reducing anomies and eventually, for achieving the welfare and prosperity of society.

Kerman is one of the touristic sites of Iran, because of its historical background and due to its geographical location, and receives permanent and temporary migrants at various intervals during the year. Therefore, the need is strongly felt for studying and analyzing the security dimensions of the city, and for upgrading the quality of designing its growth to reduce the underlying factors of crime.

Determining security levels in some neighborhoods of Kerman, identifying physical indices that are effective in the perpetration of crimes, and calculating the influence coefficient of each index in relation to the overall security of the neighborhoods are addressed in this article. Based on our on-the-ground understanding of the situation in each neighborhood, scores were given to indices, which have been introduced in various sources. To achieve these goals, the modified model based on entropy weight and the method of multi-criteria inverse hierarchical analysis were used. Therefore, the hypothesis of the research can be stated in this way: newly formed neighborhoods of Kerman, mostly located on the outskirts of the city in the unstoppable wave of urban sprawl, and mainly developed without considering the criteria of urban development, have lower levels of security.

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II. THEORETICAL BASES OF THE RESEARCH

A. The Stress Recovery Theory

Ulrich believes that natural sights can help reduce stress while artificial urban environments not only do not reduce stress but they themselves create it [2]. Nowadays, most city designers and landscape architects are aware of the importance of this issue. However, it should be taken into consideration that most of the natural elements they introduce are only visible during the day and at night they either appear ghostly because they are in the dark or the lighting is poor or do not serve the purpose because of inept and excessive lighting and due to the glare and the resulting light pollution. Therefore, the lighting of natural elements in urban locations must be in a way that plants, rivers, etc. somehow enhance a feeling of peace in the atmosphere. Excessive use of light and color in the stimulants of the night environment will, in itself, cause stress and mental and psychological disturbances in people. Therefore, colors should be used in an informed and purposeful way, according to the basic criteria and principles related to, and with consideration of, their psychological effects [3].

B. The theory of Crime Prevention Through Environmental Design (CPTED)

This theory was developed under the influence of ideas presented by Geoffrey (1971) and Jacobs (1061) and deals with the very physical form of the city and with the relationship of this form with urban crimes. The National American Crime Prevention Institute defines CPTED as, "Suitable design of built environment that can reduce fear and dread of crime and improve the quality of life" [4]. Based on this theory, city designers and planners, in carrying out their duties, use their knowledge and experience, and take into consideration the capacity of the environment for development, in order to decrease fear of crimes and reduce potentials for criminal offences.

Jane Jacobs thinks the streets are the most important element in providing urban security: "If city streets are safe from savagery and fear, the city will be safe from savagery and fear" [5]. She believes that factors, such as well-lighted and frequented places which have watchful eyes and where there is a high level of public participation and where the sidewalks are wide and large enough, will be effective in the shaping of secure urban areas; and she proposes varied land use for city streets [6].

Habermas also criticizes modern architecture and thinks, "Residential blocks faced the streets in the past, and there were gardens and yards in the back. Today, this old architectural style has been disrupted because of the changes that have taken place in the streets and squares. In the new style of architecture, there is no room for the private area for people and no extensive areas have been set aside for social contacts and public meetings" [7].

Newman has offered ideas regarding the physical design of neighborhoods in ways that prevent crime. He believes that in most cases it is the physical and the social factors that gain importance. The physical factor includes, "the set size" and "the number of households" that share the entrance to the building, and the greater the extent of cooperation is, the higher the rate of crime will be. The social factor involves "the income levels of the households" and "the ratio of adolescents to adults." In his opinion, the size of the building has the following major effects on the fear of crimes and on the stability of the society:

- The way public spaces in the residential complex are used
- Social relationships with neighbors
- Intensity of the feeling of having control over the internal and external public areas of the complex [8].

C. The theory of the relationship between the physical characteristics of the environment and the feeling of security

Some urban areas have characteristics (such as insufficient lighting in the streets; the homeless people and the addicts who sleep on the sidewalks; and the lack of sidewalks on highways) that underlie greater fear. Based on Newman's theory, spaces with greater possibility of seeing and of being seen and offer fewer possibilities of escape provide fewer chances for criminal activities, while signs suggesting that people monitor the neighborhood can increase the feeling of security.

In this theoretical framework, the theory of broken window is famous too. James Q. Wilson and George Kelling, who introduced this theory, believe that neighborhoods in which there are signs of neglect and ruin such as garbage heaps and buildings with inharmonious facades and broken windows (in other words, places criminals can break into) suggest that their residents have greater feelings of vulnerability. It must be noted that this theory is also known as the Theory of Civilization. In fact, obscenities on the walls, abandoned buildings, and factors like these are considered as signs of lack of security [9]. Dark alleys, uncrowded spaces or very crowded ones filled with misfits, and those where special events may take place are among spaces that create feelings of insecurity. In general, women have greater fear, compared to men, of becoming victims of crime, although this difference decreases when they become older [10].

III. PREVIOUS RESEARCH .

The American theoretician Jane Jacobs, who published the book "Life and Death of Big American Cities" in the 1960s is considered the first theorist in the area of security. In one part of her book, she deals with issues such as the need for safe

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places in cities, the segregation and recognition of public and private places, and various and mixed land uses [5]. After Jacobs, Oscar Newman introduced the theory of defensible space in his book "People and Design in Very Violent Cities" and proposed that city structure change in such a way that the society is defended not only by the police but also by people engaged in special fields. He divided factors increasing crime into the three classes of foreignness, lack of supervision, and availability of ways of escape [11]. In this same connection, the results of a review Southworth conducted on 70 urban planning programs of 40 cities in the United States may be referred to [12]. A study John Punter and Mathew Carmona carried out on the quality of urban design in various scales on 73 Development Plans of England in 2002 can also be pointed out, in which they used the "content analysis" method [13]. Iranmanesh investigated the use of the principles of prevention of crime through environmental design in Iran [4]. Moradi, in an article entitled "Security Indices in Urban Spaces" was able to express these indices in brief, but the extent of their effects and their importance in the overall security of the city were not studied [8]. Kalantari, in his PhD thesis, dealt with the geographical distribution of crime in Tehran in 2001[6]. Using analytical approaches, Lotfi, Farabi, and Mollaei , and Adibi and Azimi, in separate articles studied and analyzed levels of security and their effects on the presence of tourists in the Iranian coastal cities such as Babolsar[14],[15].

IV. METHODOLOGY

The descriptive-analytic method and the survey framework were used in this research on Kerman. First, considering previous research, the following six physical indices that are effective in the security of environments were studied and scored:

- Openness of space
- Compactness of texture
- Vegetation
- Street lighting
- Urban furniture
- Quality of streets

Then, the modified model of entropy weight was used to calculate the influence coefficient of each parameter in the quality of the security of the neighborhood, and employed the Inversion hierarchical weight process (IHWP) to determine the actual and the ideal quality levels of each neighborhood. Therefore, the inputs in this method were the numerical values of the indices that assess the quality of each parameter in the studied region and neighborhoods. The outputs were the tables and diagrams that, according to obtained results, classified and gave values to the quality and desirability of each neighborhood, while taking into consideration the indices that underlie crime. The analysis was performed following these steps:

First, the weight of each index was determined by using the modified model of entropy weight. Relation (1) was used to calculate the value of n for each i and j:

$$n_{ij} = \frac{r_{ij}}{\sum_{i=1}^{m} r_{ij}}; \forall j \quad (1)$$

The value of the symbol E_j was obtained by putting the related values in relation (2):

$$E_j = -\frac{1}{\ln m}\sum_{i=1}^{m}(n_{ij}\ln n_{ij}) \quad (2)$$

Relation (3) was used to calculate the degree of deviation of the information of the jth variable shown by d_j .

$$d_j = 1 - E_j \quad (3)$$

The weights for all j values were calculated by using the available indices in relation (4):

$$w_j = \frac{d_j}{\sum_{j=1}^{n} d_j} \quad (4)$$

Finally, relation (5) was used to apply the coefficient for correcting weights to obtained results. This coefficient was determined by considering expert views or coefficients proposed in previous studies.

$$w_j' = \frac{\lambda_j w_j}{\sum_{j=1}^{n} \lambda_j w_j} \quad (5)$$

At this stage, each neighborhood was studied based on the mentioned indices and, taking the total score given to it by the modified entropy model and, finally, by the inverse hierarchical analysis into consideration, it was placed in one of the six desirability classes. The initial score of each index was calculated by using relation (6), and the scores for the different classes of each index were calculated using relation (7).

Finally, each neighborhood received a score from each index and the sum of these scores determined its qualitative value and desirability.

N = the number of classes in each index

j = the score received for the different classes in each index

i = the numbers allocated for the various classes in each index

$$x = w'j / N \quad (6)$$

$$J = w_j' - (N - i)x \quad (7)$$

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V. INDICES AND VARIABLES OF THE RESEARCH

A. Physical characteristics (location) affecting the security of public spaces

Man gives functions and importance to spaces and forms through social-cultural relationships, and organizing spaces, in turn, leads to changes in the shapes of these relationships. Therefore, the design and building of urban spaces affect the process of social life and must be physically and psychologically efficient for citizens. Paying attention to sidewalks, as public spaces in which city life flows, and taking into consideration a combination of areas, will, altogether, cause the establishment of better relationships with the environment and more responsible supervision over spaces [16]. For example, specialists on the appearance of the city consider symbols, signs, and signals as factors in recognizing the different parts of the city and, therefore, people (especially people foreign to the environment and new arrivals) feel secure through connecting with them and find the places they want to go.

1) The quality of the streets

The quality of the network of streets, and their pavement for pedestrians and drivers, is one of the factors that upgrade physical and psychological security. Sidewalks are what all citizens share and where they participate in their public lives. Sidewalks, besides connecting people and taking them where they want to go, are safe and comfortable places for social contacts, strolls, sightseeing, etc. Visibility of sidewalks during the day and at night, removing activities from them that are bothersome to pedestrians, suitable designs on them, and use of pavements free of defects, have led to pedestrians using sidewalks with greater safety. Use of a variety of colors, together with various and harmonious designs and patterns and lines for pedestrians, plays a significant role in the safety of sidewalks besides creating spatial variety.

2) Urban furniture

Suitable urban furniture is one of the factors that increase the presence of pedestrians in the city (leading to greater contacts between people and their environment) and in the society and provide mental health and peace of mind for people. Urban furniture includes equipment such as light poles, benches, gardens, pavements, drinking fountains, trash cans, and recreational facilities in parks, each of which has a specific function. What is important is fort this equipment to be put at proper places.

3) Lighting

Lighting in the city is important because it increases safety on the streets, especially at busy centers, guides people in finding directions at intersections, crossroads and bridges, and helps them recognize identities and locations of neighborhoods. Night sights may affect citizens differently from day sights. Suitable lighting can satisfy the needs of individuals, relatively control places, and increase the feeling of presence in the places and social deliberations [17]. Excessive or insufficient lighting can create sensory tension, increase anxiety, and play a significant role in the development of physical problems resulting from such lighting. On the other hand, suitable and logical lighting can help create a peaceful and attractive environment. Darkness, insufficient light, and inappropriate distribution of the lighting system dominate the environment and increase the probability of not being seen and of committing crime, and are the most important conditions conducive to commit delinquencies and crime at night. However, paying attention to conditions that lead to having a suitable view from inside the buildings, or providing better lighting, can effectively increase natural guarding of passages, streets, and of the areas surrounding houses and buildings decreasing the rate of crime.

4) Vegetation

Urban green space, because it is alive and enjoys various shapes and colors, may constantly change in place and time, and. due to its essence and dynamism, plays an important role. Plants give freshness and vitality to the environment, and preserving the natural beauty and variety of green spaces in public places can be effective in the degree of security of places. It is better for passages and spaces where pedestrians pass to be covered by small trees because tall trees shade the sidewalks and reduce security. Concerning the mental fatigue of people, stresses that urban areas cause more mental fatigue, compared to natural environments, due to the fact that people pay direct attention to urban areas, and suggests a reduction in the complexity and in the presence of numerous stimulants in urban sights [8]. If lighting of natural elements in urban spaces is desirable and enjoys sufficient intensity and coherence, natural environmental stimulants are used properly and correctly and, in all, people will not have to pay too much attention to grasp the environment around them.

5) Texture compactness

In areas of numerous land uses, security fluctuates depending on the types of land uses. Compact textures with interference between different land uses increase the security of the environment if land uses are of the same kind based on correspondence in forms and performances. Nowadays, correspondence between the forms in the environment and the physical environment is important in creating security in public spaces; and city designers believe prevention of crime and social anomies can be effective through using environmental design too.

6) Open and closed spaces

The degree of security of an environment depends on its penetrability. Enclosure of a space is defined based on the ratio of its width to its height. Decreases or increases in this ratio creates the feeling that the space is open or closed [19]. The more people enter an environment, the less its security will be. Closed public spaces such as cinemas, amusement parks, etc., where there are certain conditions and rules for entrance such as entrance fees, are more secure than open spaces.

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B. Functional and performance indices effective in the security of public spaces

Maintenance (preservation) is one of the most important factors in the creation of successful public spaces, and it leads to easy access to, and increased desirability of, these spaces. The proper combination of land uses in public spaces, depending on the types of performances of these land uses, can be effective in the degree of security of people using these public spaces.

1) Cultural-social functions

The atmosphere of cultural poverty in cities lowers the cultural and social indices and gives rise to huge urban dilemmas such as heavy and extensive traffic, unemployment, high housing costs, spread of crimes, and environmental and cultural pollution, and increases the feeling of distrust.

2) Economic-social functions

Zoning and separating land uses and activities are the main reason for the death of urban areas. Combining land uses creates secure and dynamic environments in the streets and in individual buildings, and the reason for the appeal of combining land uses and for its role in increasing public security is that it can attract different people at different times for different purposes [20]. Jacobs believes neighborhoods with various land uses (such as business, office, and recreational uses) are more secure compared to those where there is a single land use [5].

3) Recreational-sporting functions

Adding recreational-sporting functions to public spaces creates vital environments that reduce crime. The existence of these public spaces increases the possibility of establishing covert social surveillance and of providing security.

C. Social (mental) indices effective in the security of public spaces

The environment plays an important role in the occurrence of social anomies in public places. Urban environmental characteristics are among factors involved in increasing social damages in the environment. Dissatisfaction of citizens with the environment they live in can entail various reactions.

1) Controlling anomies and social supervision

The first thing needed for achieving this goal is for the related space to be in view. Presence of people is one of the strongest factors in supervision. Therefore, facilities should be provided for residents of neighborhoods to be present in local streets. Presence of people for supervision at night is of greater necessity. Therefore, in order to arrange for night activities in local streets, activities that take place at night should be introduced to these streets so that citizens are encouraged to be present in their neighborhoods at night [21].

2) Population density

Traditionally, there has been a definite and linear relationship between population and security, and increased population has provided individual, societal, familial, and national security. That population is a factor in creating security that is educated, ethical, cultured, and dutiful. Modern cities have gradually distanced themselves from indices of peace and security in urban areas because of their high population densities. Rates of crime climb along with increases in urban populations .

VI. RECOGNITION AND ANALYSIS OF THE STUDIED REGION

A. Situations and locations of the studied neighborhoods

In this research, 13 selected neighborhoods scattered all over Kerman were studied. These neighborhoods, which made up one-third of the population of the city, were Shahrak Iranmanesh, Shahrak Jamaran, Salsabeel, Shahrak Motahhari, Shahrak Bahonar, Imam Jom-e, Pansad Dastgah, Shahrak Allah Abad, Taherabad, Shahrak Alghadir, Mahdoodeh Baft-e Ghadeem, Mahdieh, and Modireyat -e Mahallati (Figure 1).

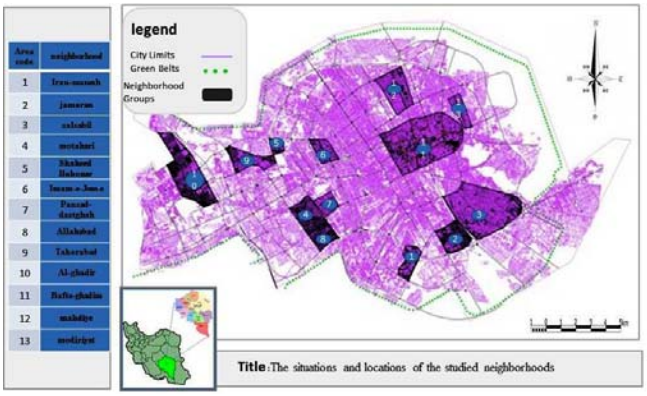

Fig 1: The situations and locations of the studied neighborhoods

VII. FINDINGS

Tables 1 to 6 present studied indices and the method of their weighting and valuation. The scores given were from 1 to 5, with 5 the most ideal type of urban design that minimizes the inclination of committing crime; in other words, the physical conditions of the environment that encourage crime are reduced to the lowest possible level (or are completely eliminated).

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Table 1: Range of the scores given to the index of the quality of the network of streets

Index	Description	Interval of scores obtained
Quality of streets	Harmony, compatibility, complete visibility	4.01-5
	Relative visibility and predictable routes	3.01-4
	Disharmony and relative visibility	2.01-3
	Disharmony, land uses bothersome to pedestrians	1.01-2
	Disharmony, land uses bothersome to pedestrians, too many intersections	0-1

Table 2: Range of scores given to the index of urban furniture

Index	Description	Interval of scores obtained
Urban furniture	Suitable urban furniture	3.26-5
	Limited and defective urban furniture	1.66-3.26
	No urban furniture	0-1.66

Table 3: Range of scores given to the index of street lighting

Index	Description	Interval of scores obtained
Lighting	Beautiful and suitable lighting	3.75-5
	Sufficient and suitable lighting	2.5-3.75
	Scattered and irregular lighting	1.25-2.5
	Dark defenseless spaces	0-1.25

Table 4: Range of scores given to the index of vegetation

Index	Description	Interval of scores obtained
Vegetation	Regular vegetation	4.01-5
	Open or short vegetation	3.01-4
	Semi-dense vegetation	2.01-3
	No vegetation	1.01-2
	Dense and irregular vegetation	0-1

Table 5: Range of scores given to the index of compactness of texture

Index	Description	Interval of scores obtained
Compactness of texture	Regular texture with a wide view	4.01-5
	Regular texture with an average view	3.01-4
	Irregular texture with an average view	2.01-3
	Irregular and unpredictable texture	1.01-2
	Compact and irregular texture with intensive shading	0-1

Table 6: Range of scores given to the index of the openness of spaces

Index	Description	Interval of scores obtained
Openness of spaces	Open and free space	3.32-5
	Semi-open and average view	1.66-3.32
	Closed space with no view	0-1.66

Each index studied in this research had a special range of importance in the studied neighborhood that was determined based on conducted field studies. Table 7 lists results of scores obtained by each neighborhood for each index in the conducted field studies.

Table 7: Results of scores each neighborhood obtained for each index

Area code	neighborhood	Quality of streets	Urban furniture	Lighting	Vegetation	Compactness of texture	Openness of spaces
1	Iran-manesh	2.986	1.86	2.016	2.96	2.065	1.591
2	jamaran	1.01	1.236	0.128	1.149	1.863	1.863
3	salsabil	1.896	1.485	1.086	1.189	1.265	1.086
4	motahari	3.12	1.68	2.861	1.659	3.96	2.121
5	Shaheed Bahonar	4.124	2.268	2.842	4.112	4.126	2.064

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6	Imam-e-Jom-e	4.327	2.489	3.869	3.86	4.186	1.073
7	Pansad-dastghah	2.12	1.436	1.269	1.069	3.89	2.43
8	Allahabad	0.89	0.321	0.116	1.026	1.089	0.841
9	Taherabad	1.01	0.421	0.986	1.011	1.126	0.965
10	Al-ghadir	3.986	1.263	1.896	1.689	3.48	1.68
11	Bafte-ghadim	0.85	0.98	1.089	1.593	0.861	0.671
12	mahdiye	1.523	1.265	1.326	1.865	2.469	1.246
13	modiriyat	2.08	1.866	1.063	1.898	2.589	1.896
total scores		29.922	18.57	20.547	25.08	32.969	19.527
The average		2.30169	1.42846	1.58053	1.92923	2.53561	1.50207

A. Weighting and examination of the studied indices in the neighborhoods

Table 8 presents calculations related to weighting indices taking into consideration scores given to each neighborhood and to each index in the conducted field studies.

Table 8: Results of weighting calculations in the entropy model

Quality of streets	Urban furniture	Lighting	Vegetation	Compactness of texture	Openness of spaces	relation
29.922	18.57	20.547	25.08	32.969	19.527	$\sum_{i=1}^{m} n_{ij}$
0.3898	0.3898	0.3898	0.3898	0.3898	0.3898	$k = -\frac{1}{\ln m}$
2.4191	2.4603	2.3282	2.44109	2.4447	2.4978	$\sum_{i=1}^{m} (n_{ij} \ln n_{ij})$
0.919258	0.934914	0.884716	0.95154076	0.95294406	0.97364244	$E_j = -\frac{1}{\ln m} \sum_{i=1}^{m} (n_{ij} \ln n_{ij})$
0.080742	0.065086	0.115284	0.04845922	0.04705594	0.02635756	$d_j = 1 - E_j$
0.210823032	0.169944116	0.30101462	0.126530426	0.122866364	0.06882144	$w_j = \frac{d_j}{\sum_{j=1}^{n} d_j}$

Based on the results listed in Table 8, the results of the research Michael Southworth conducted on 70 urban designs related to 40 cities in the United States were reviewed. The research John Punter and Mathew Carmona carried out on the quality of urban design in 73 urban development plans in England in 2002 was also reviewed in which they used the "content analysis" method. The results obtained in these two studies are presented in Table 9[13]. For example, in the study that was conducted on 40 American cities, it was found that ideal and completely suitable urban furniture could provide 20% of the security of the cities that is influenced by the physical environment [22].

Table 9: Results of studies in London and in the United States on weights of indices

Openness of spaces	Compactness of texture	Vegetation	Lighting	Urban furniture	Quality of streets	Index / place
7%	21%	22%	13%	18%	19%	London
8%	24%	12%	15%	20%	21%	United States

The means of the results of these studies were used as the correction coefficients and were applied to the results of entropy weighting in our case study on some neighborhoods in Kerman (Table 10).

Table 10: Applying correction coefficients and the results of the modified entropy model

Quality of streets	Urban furniture	Lighting	Vegetation	Compactness of texture	Openness of spaces	relation
.2467≅0.245	0.1889≅0.19	0.2465≅0.25	.1258≅0.125	0.1617≅0.16	0.0302≅0.03	$w_j^{'} = \frac{\lambda_j w_j}{\sum_{j=1}^{n} \lambda_j w_j}$

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Now that the degree of influence of each parameter (the weight index) had been determined, the inverse hierarchical analysis for each index was completed taking into consideration the following tables.

Table 11: Scores obtained from the IHWP analysis for the index of the quality of the network of the streets

index	Grade (i)	w'_j	(x) $x = w'j / N$	(j_1) $J=w'_j-(N-i)x$
Quality of streets	(5)A	(0.24)	(0.048)	0.24
	(4)B			0.192
	(3)C			0.144
	(2)D			0.096
	(1)E			0.048

Table 12: Scores obtained from the IHWP technique for the index of urban furniture

index	Grade (i)	w'_j	(x) $x = w'j / N$	(j_2) $J=w'_j-(N-i)x$
Urban furniture	(3)A	(0.19)	(0.063)	0.19
	(2)B			0.127
	(1)C			0.063

Table 13: Scores obtained from the IHWP technique for the index of lighting

index	Grade (i)	w'_j	(x) $x = w'j / N$	(j_3) $J=w'_j-(N-i)x$
Lighting	(4)A	(0.25)	(0.0625)	0.25
	(3)B			0.1875
	(2)C			0.125
	(1)D			0.0625

Table 14: Scores obtained from the IHWP technique for the index of vegetation

index	Grade (i)	w'_j	(x) $x = w'j / N$	(j_4) $J=w'_j-(N-i)x$
Vegetation	(5)A	(0.125)	(0.025)	0.125
	(4)B			0.1
	(3)C			0.075
	(2)D			0.05
	(1)E			0.025

Table 15: Scores obtained from the IHWP analysis for the index of texture compactness

index	Grade (i)	w'_j	(x) $x = w'j / N$	(j_5) $J=w'_j-(N-i)x$
Compactness of texture	(5)A	(0.16)	(0.032)	0.16
	(4)B			0.128
	(3)C			0.096
	(2)D			0.064
	(1)E			0.032

Table 16: Scores obtained from the IHWP technique for the index of openness of spaces

index	Grade (i)	w'_j	(x) $x = w'j / N$	(j_6) $J=w'_j-(N-i)x$
Openness of spaces	(3)A	(0.03)	(0.01)	0.03
	(2)B			0.02
	(1)C			0.01

A. Weighting and examination of the studied indices in the neighborhoods

Taking the scores listed in Table 7 into consideration, and comparing them with the classes of scores in Tables 11 to 16, the score grade and the total score for each index of each neighborhood were calculated and presented in Table 17.

Table 17: Score grades of each index for the neighborhoods and the total scores

neighborhoods	Quality of streets	Urban furniture	Lighting	Vegetation	Compactness of texture	Openness of spaces	total scores
Iran-manesh	C	B	B	C	C	B	0.837
	0.144	0.127	0.375	0.075	0.096	0.02	
jamaran	D	B	D	D	D	B	0.4195
	0.096	0.127	0.0625	0.05	0.064	0.02	
salsabil	D	B	C	D	D	B	0.482
	0.096	0.127	0.125	0.05	0.064	0.02	
motahari	B	B	B	D	B	A	0.7145
	0.192	0.127	0.1875	0.05	0.128	0.03	
Shaheed Bahonar	A	A	B	A	A	A	0.9325
	0.24	0.19	0.1875	0.125	0.16	0.03	
Imam-e-Jom-e	A	A	A	B	A	B	0.96
	0.24	0.19	0.25	0.1	0.16	0.02	
Pansad-	C	B	C	D	B	A	0.604

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dastghah	0.144	0.127	0.125	0.05	0.128	0.03	
Allahabad	E	C	D	D	D	C	0.2975
	0.048	0.063	0.0625	0.05	0.064	0.01	
Taherabad	D	C	D	D	D	C	0.3455
	0.096	0.063	0.0625	0.05	0.064	0.01	
Al-ghadir	B	B	C	D	B	B	0.642
	0.192	0.127	0.125	0.05	0.128	0.02	
Bafte-ghadim	E	C	C	D	E	C	0.328
	0.048	0.063	0.125	0.05	0.032	0.01	
mahdiye	D	B	C	D	C	B	0.514
	0.096	0.127	0.125	0.05	0.096	0.02	
modiriyat	C	B	C	D	C	B	0.562
	0.144	0.127	0.125	0.05	0.096	0.02	

Given the results of the inverse hierarchical analysis and the scores of each index, it can be seen that the worst security condition was that of a neighborhood with a score of 0.24 and the best (ideal) security condition that of the neighborhood with the highest score of one. Table 18 shows the classification of the scores, and of the quality, of the neighborhoods:

Table 18: Classification range of the scores of the neighborhoods and of their desirability

0.24-0.36	0.361-0.48	0.481-0.60	0.601-0.72	0.721-0.84	0.841-1	Classification range
Extremely poor	Unacceptable.	Poor environment	Provide environment	A nice environment	Excellent environment	quality, of the neighborhoods

I. ANALYZING THE RESULTS OF THE STUDIED NEIGHBORHOODS

Comparison of Tables 17 and 18 shows that neighborhoods such as Mahdoodeh Baft Ghadeem, Shahrak Allahabad, and Taherabad are very unsuitable with respect to physical security and that their conditions are very ripe for generating physical conditions with respect to physical indices and are fertile grounds for crime. The hierarchy of security in the neighborhoods from the viewpoint of physical indices is presented in Figure 3.

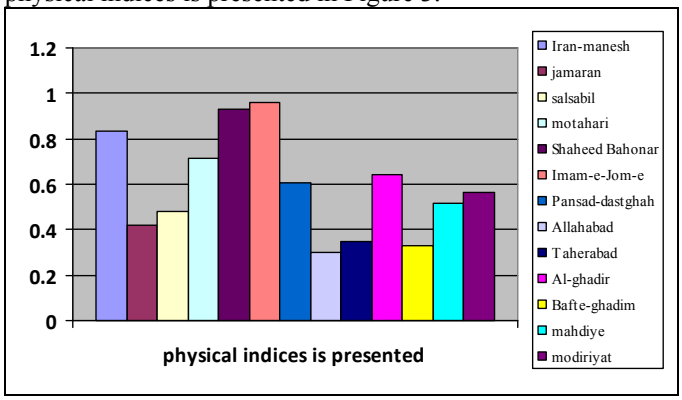

Fig 3: The security hierarchy of the neighborhoods from the point of view of physical indices

Moreover, careful study of Table 10 indicates that indices such as the quality of the network of streets, lighting, and urban furniture have greater influence on the quality and on crime. This comparison also reveals that the two neighborhoods of Imam jom-e and Shahrak Shaheed Bahonar have excellent

the upgrading of security, and that the goal of upgrading security of the spaces by strengthening them can be achieved.

I. SUMMING- UP

There is a significant correlation between upgrading the quality level of public spaces and the feeling of security; i.e., it is possible to upgrade the quality level of public spaces and thus increase the extent these spaces are used (which will increase security in urban spaces) by improving the physical elements of the urban environment.

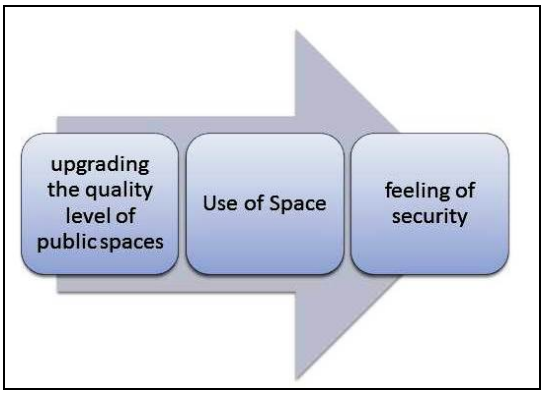

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Fig 4: Correlation between upgrading the quality level of public spaces and the feeling of security

The result obtained from our research is that improving physical elements will upgrade the quality of public spaces and that this enhanced quality will result in their greater use, which will entail a feeling of security in urban spaces. Based on our evaluation of the physical indices effective in creating a feeling of security in urban spaces, the following suggestions are made:

- Physical spaces be created with the purpose of enhancing social interactions and of preventing strangers from entering these spaces
- The hierarchy of streets be maintained with the purpose of preserving the spatial skeletons of the neighborhoods
- Suitable plant species be utilized and the way these species are planted should be compatible with the environment with the purpose of increasing visual supervision and of expanding green spaces
- Building construction in human scale be utilized for the purpose of increasing the ability of people to see and read the identifying signs in the neighborhoods
- Visual supervision be utilized in some of the studied neighborhoods for the purpose of reducing the number of corners that are out of view
- Lighting be utilized for the purpose of increasing the feeling of being seen

Moreover, it is proposed that in future studies the results of this research be compared with data regarding crime and delinquency in the studied regions. Furthermore, other analytic methods such as multi-index fuzzy methods or AHP analysis can be used to control the results of our study.

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