

Analyzing the Impacts of Spatial Factors on Livability of Peri-Urban Villages

Mohammadamin Khorasani¹ · Moslem Zarghamfard¹

Accepted: 28 December 2016 / Published online: 10 January 2017
© Springer Science+Business Media Dordrecht 2017

Abstract Although definitions of livability are vary from one community to another one but livability as a concept can be defined according to the context in which it is to be very wide or narrow. More livable settlements creates a greater sense of community and ownership and migration rates are lower in such settlements. Peri-urban villages due to the special position of proximity to urban areas has a set of spatial features. This feature makes them different and exceptional from other rural areas and suburbs. In this study, we have chosen the villages that are located on the periphery of large cities with big population size. Each village have different distance from Tehran metropolitan. For this reason they have various effects from Tehran metropolis and the dynamics and transformations of Tehran has a great impact on them. The main purpose of this work is analysis and explanation of spatial factors in local and regional scales on livability of peri urban villages in Varamin County. The results showed that there are significant relationship between spatial factors and livability indicators in selected villages.

Keywords Livability · Peri-urban villages · Spatial factors · Varamin County

1 Introduction

Livability is increasingly important due to the increased awareness of the impermanence of life and consumption patterns that are not healthy and not sustainable and in the long term reduce environmental resources to support the population of the Earth. New research suggests that the prevalence of health problems derived from pollution. The reason for this is that cities are hotspots of pollution in water, soil and air that this issue raised from long

✉ Mohammadamin Khorasani
khorasani_ma@ut.ac.ir

¹ Department of Human Geography, Faculty of Geography, University of Tehran, Azin Alley, Ghods Street, Enghelab Street, Enghelab Square, Tehran, Iran

history of industrialization and heavy reliance on cars. Additionally, big cities have an important contribution in the huge consumer of ecosystem resources such as water, forests and aquatic ecosystems.

More livable settlements creates a greater sense of community and ownership and migration rates are lower in such settlements. Whereas some residents may consider livability as a means of improving real estate values. But the majority of the residents in each settlements consider livability as a factor for improving the conditions of places to live, shop, relaxation, child development, and create communities of friends and family. But should be noted that a positive attitude about a community does not necessarily mean that this community is a good position in terms of livability. The reason for this is that people who are dissatisfied with their situation, they could have a positive attitude about your community. Because they are not aware of the real deficiencies that exist in their communities and facilities that can exist in the communities (Evans 2002).

Peri-urban villages have numerous and diverse problems. However, all the issues simultaneously are not of equal importance, but it is clear that all of them affect the quality of life and livability in rural areas. Factors such as diversity of economic activity, rising land prices in urban centers and urban boundaries, expansion of communication networks, development of public transportation, widespread use of private car and car ownership, shortage of land or ban the use of land within urban areas in order to locating the large industrial and service units are important factors that led to uneven development of cities. These factors at the stage of development of cities, cause that great part of the population and activities locate at the fringe of cities and cause the discontinuously deployed peri urban villages, especially on the periphery of main roads.

Growing urbanization mean that more people and equipment are concentrated and exposed to risks associated such as hurricane, drought, ice storm, or heat wave. Urban infrastructures are already strained beyond their capacities to meet growing demands of peri urban areas for services. The aging of infrastructure, further undermines the reliability of service provision under normal conditions (Ruth and Franklin 2014, p. 2) Livability is affected by physical location and condition of public facilities (Faiz et al. 2012, p. 5). Evans (2002) stated that rapid urbanization has imposed a challenge to livability as the cities expand, resulting in urban sprawls that invade into sensitive peri urban and rural areas. Urban densities are centers of consumption, waste generation, increased pollution and energy use. The rise of megacities enlarges already incompatible ecological footprint (Chivot 2011). Together, these conditions affect the livability of villages. Livability is an overall concept that have close linkage with number of concepts and terms such as sustainability, quality of life and quality of place and healthy communities (Norris and Pittman 2000; Blassingame 1998). Peri urban villages are scene for the formation of social networks and economic opportunities and the villages allow its inhabitants and newcomers to enter a process of slow socio-economic upgrading. The socio-economic opportunities in peri urban village emerge from a set of spatial, legal and socio cultural and economic conditions that distinguish the peri urban villages from city and other villages (van Oostrum 2013, p. 8).

Population spatial arrangement of Varamin county villages affected by Tehran metropolitan. In other words, from West to South of Tehran, the number of populated villages increase and facilities are greater. These villages are mostly have dormitory function and have more similarity to urban-village in terms of the physical condition. In economic terms, the villages is dominated by the services and industry and agriculture sector is not flourishing. Some of the residents seasonally migrate to theses villages. City of Varamin in Tehran Province is a city that attracts large body of immigrants and has been

open to large numbers of immigrants during the past two decades. Generally, adequate income and jobs, access to appropriate quality of life and access to relative welfare are the main goals of migrants. Also in the south plain of Tehran, which includes the city of Varamin and selected villages for this research, inequality in the distribution of facilities and activities can be observed. This situation shows that spatial factors including human and natural and physical characteristics of these villages can affect on livability of them. The main purpose of this work is analysis and explanation of spatial factors in local and regional scales on livability of peri urban villages in Varamin County.

2 Livability

Generally, definitions of Livability and livable communities includes a variety of different subjects that expressed by some guiding principles: access, equity and participation. That the concept of livability forms based on such principles.

Livability is an overall concept that is associated with a number of concepts and terms such as sustainability, quality of life and quality of place, and healthy communities (Norris and Pittman 2000; Blassingame 1998). Livability as a concept can be defined with respect to the context in which it can be extensive or limited. However, in any place quality of life located at the center of this concept and includes a wide range of measurable indicators (Perogordo Madrid 2007). People and places, are two sides of the Livability concept but livability mainly considers only the location and territory. There is not criterion that can offer a complete picture of Livability. Additionally, sole reliance on the data obtained from people or places can lead astray and away from the target (Larice 2005).

Many of livability data are spatial in nature. They consider relationships between places (such as the relationship between home and school, city and region) and issues related to space (such as the percentage of open spaces) and the relationship between space and time (such as time required to respond in an emergency). The criteria are very different, but there is a balance between economic, social and environmental (National Research Council 2002). Livability should be defined in such a way that allows its components and factors defined and evaluated for particular community.

Often levels of “social well-being” are a function of distribution and allocation of economic resources. Therefore, if the indicators of economic growth are strong, qualitative aspects of the economy are effective in shaping the quality of life and create more livable areas. Aspects of employment encompass the working hours, wages, health and unemployment insurance, proximity to convenient transportation, child care options, and job security (National Research Council 2002).

Livability refers to a sub-set of sustainability results that have some effects on human lives (FHWA 2011; FHWA & FTA 2010; VTPI 2010). Interactions between social and environmental dynamics can play an important role in livability concept. (Congreve 2012; Helleman and Wassenberg 2003; Hillier et al. 1987). changes in the social and environmental conditions affect access to goods and services, including those services that help maintain public health and safety, and thus influence migration decisions, morbidity and mortality rates of the urban population, as well as other demographic outcomes (de Hollander and Staatsen 2003; Pranav et al. 2011; Ruth et al. 2006). While some have attempted to devise comprehensive measures of livability, others have more narrowly interpreted livability perspectives (Shamsuddin et al. 2012).

A livable community suggests a variety of accessible, affordable housing options so that older adults have a place to live. On the other hand, livable community has features that promote access to the community, including: safe and walkable neighborhoods, transportation options, safe driving conditions, and emergency preparedness. A livable community provides a wide range of supports and services, and opportunities to participate in community life: Health care, Supportive services, General retail and service, Healthy food, Social integration (The MetLife Mature Market Institute & Stanford Center on Longevity 2013).

Livability is not just inherent in environmental characteristics. Rather, it is a function of the relationship between the environment and the social life it sustains (Hankins and Powers 2009; Pacione 1990). This suggests that livability have a social dimension, concerning how people interact within local environments (Wheeler 2003). Put simply, livability means different things to different people (Balsas 2004). This subjective dimension may partly explain the lack of an agreed definition of livability in the literature. Ultimately, we must say that livability is an increasingly important topic in social sciences (Zanella et al. 2015).

3 Definition, Features and Criteria for Identification of Peri-Urban Villages

In this section, we deal with reviewing internal and foreign body of literature which have identified methods and reference points for recognizing suburban areas.

Sheikhi (2002) argues that villages that are suitable for immigration and those in suburban areas in Iran must pass three stages:

- Preliminary formation: in this stage, those who work in industries build a shelter for themselves by providing a small land and also with the help of others. In this stage, required infrastructures for residence like public services, water, electricity, telephone, etc. have not been prepared fully. High population growth and settlements are in complete functional relation with central metropolis. However, inhabitants follow rural socio-cultural perspectives and features.
- Transition: In this stage, there is rapid growth as a result of large influx of population from metropolitan region and especially from outer metropolitan districts and sometimes from other provinces to settlements. In this stage, while there is high occupational dependence on the metropolis, service jobs increase within settlement. Socio-cultural features are not different from previous stage and the presence of urban elements fade away affected by rural physical face.
- Continuity, solidarity and relative stability: In this stage, the explosive growth of population becomes slow and comes to a halt finally and the period of sending emigrants begins together with proliferation in rival surrounding settlements.

The Department for International Development in UK implemented a research program entitled 'Natural Resources Systems Program' between years 1995–2005 in areas that were being urbanized. The subject of natural resources caused this program to focus on rural aspect of the issue. But this program suggests a conscious strategy to gain a new understanding of the mobility of changes and awareness of urbanization involvements for natural resources and environment. This program defines intended areas like this:

Contrast of cities and villages due to strong urban effects, easy access to markets, services and other institutions, ready workforce, but it is the relative scarcity of land and also dangers of pollution and urban growth (Phillips et al. 1999). In view of Phillips, this area can be divided into two parts:

- The region of direct influence which is experiencing the effects of demand for land because of urban growth, pollution and the like on an average scale.
- The extensive region of market effect which is identified by means of market-oriented productions in agriculture and natural resources (Phillips et al. 1999).

In the project of urban governance and planning approaches in Manchester region, the following settlements were identified as suburban areas: (1) towns and rural and agricultural areas that have been located in the proximity of Manchester metropolis, (2) villages near the towns and cities of the region, (3) farther and secluded villages and farmlands located in metropolitan region (Ravetz 2008).

According to NEWRUR's (2005) work which was carried out for planning suburban areas and villages in 5 European countries like Greece, Germany, Britain, France and Spain under the supervision of European Union between the years 2003–2005, the following criteria were used for choosing and classifying suburban villages:

But for classifying villages, the following factor have been used: land use, the level of accepting immigrants among the youth and burghers, housing, access to daily services, participation of workforce, economical activities, agriculture, tourism, environment, population changes, social changes, patterns for organizing the area, lifestyles, life conditions, number of immigrants and emigrants, distance from city, population density, population growth, economical relation, institutional relations, service relations, the number of employed people from outside the villages. The method in this plan is based on the focus on the indexes of intensity of rural–urban relations. The first proposed criterion in this plan is proximity from geographical point of view. It is assumed that the intensity of relations between cities and villages is determined on the basis of their geographical locations: villages near to cities have more intense relations with cities compared to villages far from cities.

4 Spatial Attributes of Peri Urban Villages and Livability

A livable settlement in the sense of “fit to live in” has two elements to be: One of these concerns the characteristics of the population that demands services. From this viewpoint, livability is judged through the lens of the needs and wants of who live in cities (Midgley and Livermore 1998; Waste 1998). Second element of livability comprises physical and biological characteristics of the built infrastructures and ecosystems which lives and livelihoods depend. The biophysical environment establishes constraints that affect the capacity of populations to thrive by the pressures that populations impose to infrastructures and ecosystems (Ruth and Coelho 2007).

The concept of peri-urban first time was used by Anglo-Saxon and American geographers in the 1940s and 1950s. By the time this concept was used as an arena where suburban development took place and rural land uses was used as mixed. Finally, the peri-urban concept was referred to transition areas between urban and rural (Saeedi 2004). In the late 1960s, Pryor (1968) attempted to classify the complex and varied concept used in expressing changes caused by “interaction of suburbs” based on the analysis of different phases of way land use is integrated. He also used the concept to express the distinction of

suburban areas and rural–urban areas. This difference is based on the premise that suburban areas have higher residential, commercial and industrial densities and also higher population growth rates, growing process in land use change and fluid patterns of mass communication and transportation between home address and occupation place compared to average rural and urban areas.

In a related matter in the 1970s, broad theoretical-conceptual discussions about these concepts emerged and new terms introduced. Some attempted to distinguish between the city and its suburbs. Others tried to distinguish between the peri-urban and rural–urban fringe and even some ones introduced non-farm rural areas and agricultural rural areas in order to explain the differences of peri-urban realms.

Peri Urban villages are created when agricultural land is used for urban goals and the built-up component of village remains constant, in order to avoid costly relocation plans. These urban villages form distinctive spaces as they are spatially enclosed by developed urban built-up areas which are designed for urban uses. Then, massive amount of migrants who are excluded from the formal urban economy and urban housing market, rush to affordable and accessible housing units in these villages (Zhang et al. 2003).

Because cities are growing, the governments are inevitable to rely on the transformation of rural spaces to urban use, in order to provide enough space for urban extension. In this time, many villages have been surrounded by newly developed urban setting. Due to the loss of farmland and weakness of subsistence farming, the traditional way of life with agriculture is abandoned. Landless farmers, thus need other business and their housing areas provides an opportunity. Extensions are made to existing houses and new houses rented to newcomers and migrant workers (Hao 2012, p. 2).

Ecosystems in these areas are affected by natural biogeochemical processes. Chemical changes due to the development of industries, food processing and urban development lead to the emission of heavy metals and organic compounds into atmosphere, water and soil organisms which may harm living organisms when they are in high concentrations. Most inhabitants in these areas encounter high levels of local pollution (ibid., p. 23). The most significant environmental consequences caused by land use change in these areas are as follows:

- Urban development imposes high environmental costs because replacing vegetables and soil with human facilities and directing rainwater in created channels, influences natural hydrological networks. Urban development is able to reduce the pressure on lands in rural areas which are accepting high population density and provide better health services and facilities due to its advantage in terms of scale. Of course, uncontrolled urban development has many harmful effects such as, high costs of building infrastructures, lower efficiency in using ground resources and the increase of air pollution.
- The increase of pressure on biophysical elements of ecosystem leads to decrease in their ability to perform their ecological functions like absorption of pollutants. Because of price and the amount of land needed, access to natural resources and security considerations, suburban areas are often chosen for developing infrastructures like airports, reservoirs and dams, power plants, water and sewage treatment stations, landfills and military sites each of which has many environmental effects.
- Weakening traditional systems of resource management and the changes in patterns of agricultural activities has led to the weakening of agricultural lands and more use of pesticides. Producing vegetables has led to dependence on the proximity to transportation networks and urban markets. Although tendency towards high quality

products may be considered as an opportunity for farmers in suburban areas, this can drive away those smallholders who lack required resources (ibid., pp. 35–36).

Peri urban villages are providing affordable housing for rural migrants. These villages are developed by the indigenous population in an unauthorized style. Consequently, peri urban villages are characterized by rapid physical development (Hao et al. 2012, p 1). Migrants are thus forced to seek accommodation in peri urban villages depend on their economic accessibility (Zhang et al. 2003). In spite of rapid and uneven changes in their social composition, these areas frequently include the housing of low-income groups which range from employed groups in urban occupations living in informal settlements of suburbs to smallholders who have been influenced by dynamic processes of land use and changes in land market. The poor in these areas are vulnerable people affected by inadvertencies of their neighboring rural and urban areas (ibid., pp. 30–31).

5 Rural and Peri Urban livability Experiences

The last two decades have witnessed a surge of interest in enhancing the livability of communities, and a growing commitment by governments to provide the framework, tools and data to plan and build livable communities (Harvey et al. 2013). But so far very few studies with a comprehensive view on the livability of rural settlements—especially peri urban villages—is done. Because rural communities are not uniform, successful approaches to livability will vary based on context. Some of the variables cause difference between rural communities include geography, economic situation and design (Smith 2012). Livability, though interpreted differently in different continents, still areas to be same as quality of life, wellbeing and life satisfaction (Pandey et al. 2010).

Major studies in the United States investigated the effect of rural transport on improving rural livability and livability is assumed to appropriate access to services. Case studies in other countries have followed different procedures according to the nature of the concept of livability, not too far-fetched and strange.

5.1 “Livable Communities Initiatives” in the USA

Livable Communities initiative addresses a wide range of noneconomic issues associated with development and life quality in rural areas. Two of these issues are very for American rural development: preservation of natural amenities and control of sprawl-related problems.

The preservation of natural amenities which stated that natural resources must be preserved for rural and local development to be sustained, since much of the growth and development in villages in recent years derives from the attraction of natural landscapes in rural areas. Although many rural areas have natural assets, these are often located in more remote rural areas.

In contrast, sprawl mitigation tends to be in peri urban rural areas and metropolitan villages. Attracted by the mixture of job opportunities in metropolitan regions, low land prices, and rural asset, many people are choosing to reside in the vicinity of metropolitan regions. While this may be beneficial to the development and quality of life in some villages, the sprawling form of development along major arteries roads creates great problems for rural areas, including congested roads, overcrowded schools, and exhausted water and waste systems (Reeder 2011).

5.2 “Livability and Ecological Land Use” in Sweden

In this research which managed by Petra Vergunst., livability is understood to be made up by (the interactions between) five variables: local inhabitants, community life, service level, local economy and physical place (Vergunst 2003). With regard to the local inhabitants, their number, demographic (age and sex) structure and lifestyle are of importance. Community life refers to the social interaction among the village inhabitants and facilitates both community spirit and mutual help. Services, such as communications, a school, a home for elderly and a shop, are important for the practical act of living in rural villages. The heading local economy incorporates the necessity of local sources of income and employment. A small-scale economic structure is envisioned in which there is space for both formal and informal economic activity. The term physical place denotes the landscape and the buildings in this landscape. In short, the physical place has primarily impact on the variables local inhabitants and local economy. An attractive landscape turned out to be one of the reasons for people to remain living in, or to move to, a certain locality. Base on the balance between permanent inhabitants and summer guests, and on whether permanent inhabitants are territorially or functionally integrated, the variables community life and service level are affected. The relationship between the physical place and the local economy is most obvious. Whereas in the past this linkage was built on agricultural production (Vergunst 2003).

5.3 “Evaluation Index System of Livable Rural Areas” in China

This Model are presented by Wang (2010) and in the International Conference on Agriculture and Food Security risks. The experimental model implemented in China’s Henan Province.

Zhangmao (2009) discussed the rural livable indexes divided into five sections. The first is material. The material is a main index to measure people’s living standards. The material can bring good life quality and living conditions for people. Education is second index. Education is a measure of educational level in a rural area. The third index is to measure the living conditions, mainly including peoples’ living standards. Medical service and health status in rural areas is next that mainly show the ease of access to medical treatment. The fifth index is to measure the social security and in villages.

5.4 “Extended Urban Metabolism” in Australia

In the Australian context, the livability of low-density single land use outer suburban growth areas is a key concern. Many of these areas are experiencing rapid population growth and the provision of local employment and essential infrastructure and services is often delayed or insufficient to meet growing demand (Victorian Government Outer Suburban/Interface Services and Development Committee 2012).

The concept of urban metabolism was introduced by Wolman (1965), and later expanded by Newman 1999, 2001, 2004) in Australia. Wolman (1965) viewed the urban environment as an ecosystem and began measuring the ‘metabolic’ activities. These planners look at the city as a system, related to the biological and human system that takes in resources, process them and finally produce goods and sends out wastes. Thus, the process taking place in the city can produce two outcomes; first, a positive outcome when system produce good outcome for the urbanites-hence the livability parts; second, a

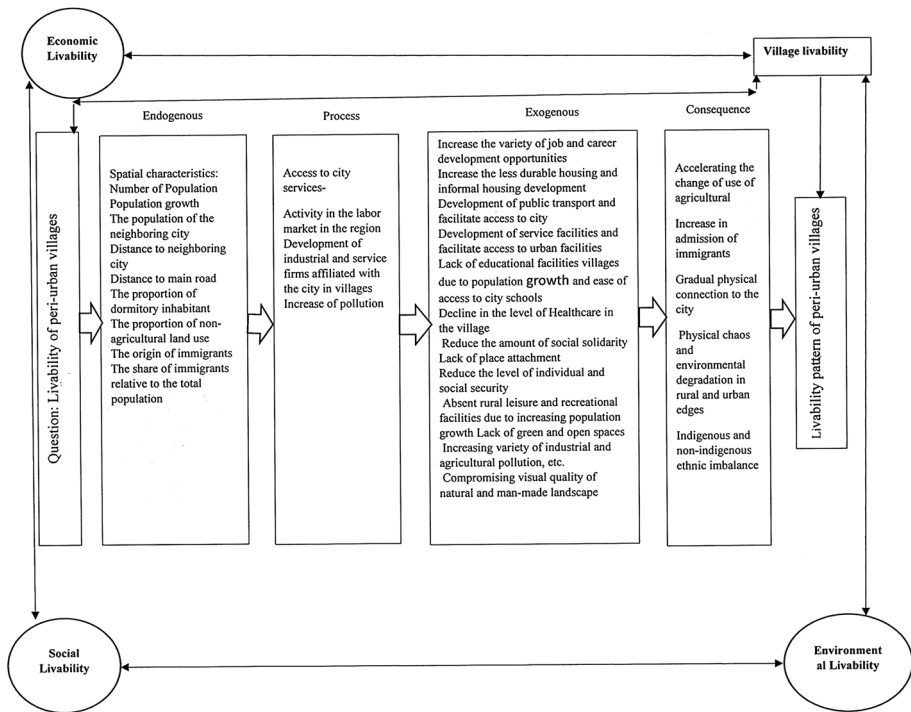


Fig. 1 Experimental model of livability in peri urban villages

negative outcome when produce stress and problems-hence the idea of ‘vulnerability’ (Shaharudin et al. 2008).

Modern cities depend on spatial relationships with their hinterland and also global resource webs (Baccini 1997; Kennedy et al. 2007). Outputs such as products and waste are often exported to peri urban areas. Megacities have no any boundary, instead they are in multilayered networks of local, regional, national and global relations and linkages (Swyngedouw and Heynen 2003).

Based on Theoretical Framework and experiences. Conceptual model of research is presented in Fig. 1.

6 Methodology

The fundamental objective of this research consists of two basic steps:

1. The first step includes the design and selection of dimensions and indicators to assess the livability of peri-urban villages.
2. Secondly, use of selection criteria for assessing the livability of peri-urban villages also set out report about research and presentation of results in suitable way and preparation of good strategies to maintain and increase the livability of the villages.

Then proceeded to extract the livability indicators and sub-indicators in urban and rural settlements and in the next step, these indicators and sub-indicators have adapted to peri-

urban villages conditions. Thus, using content analysis studies, relevant indicators were extracted from global researches and literatures. Finally, appropriate indicators with validity and reliability were used in the final questionnaire. In order to reach the final indicators, we used above mentioned table resources. After selecting indicators, initial questionnaires was designed. In the next step the initial questionnaires was distributed among 20 experts. Sub-index in the questionnaires were weighted in two stages using the Delphi method by experts. The initial questionnaires containing 103 items which at the end of Delphi phases, 77 items/questions remained. These items/questions formed the final questionnaires.

But the second category of indicators that have been considered in this study, are spatial factors. One goal of this study was to investigate the role of spatial factors in shaping the livability of city of peri urban villages in Varamin County. In this section we introduce the desired indicators as spatial factors that affecting the livability of peri-urban villages. The main purpose of this research is identifying the effective factors on livability of peri-urban villages. Therefore, two categories of factors have been considered and analyzed. The first category is endogenous factors. In fact, this category represents features of the village. The second category are the internal factors which affect the quality of life in these villages. In this study, selected villages has a spatial dimension. Therefore, these factors have been studied as spatial factors. Hence we studied these villages seamlessly.

Considering the importance this study we used both survey and field methods. With respect to research process, one or both of these methods were used. On the whole, documentary and survey methods used to collect data. Scientific resources such as books, research papers, students' dissertations, research projects, various documents, Statistical Center of Iran Website were investigated in compiling literature related issues. To collect data on selected villages, documents, maps, statistics and reports from internal and external organizations have been used and other data collected and produced through direct observation and questionnaire survey method. With regard to nature of work and lack of information and statistics about the villages, information and research data have been prepared by experts using the questionnaire during survey operations and its deficits will be resolved through interviews and observations. Data analysis is performed using statistical techniques. Quantitative and qualitative analysis of the data was performed using SPSS software. According to the nature of livability and major influencing and being influenced factors, research population are village households.

According to the estimated variance and the accuracy of the probability of selection, sample size for family heads will be as follows:

$$\begin{aligned} \text{The sample size for variable} &= \frac{N(t \times s)^2}{Nd^2 + (t \times s)^2} = \frac{11518(1.96 \times 0/537)^2}{11518 \times 0.054^2 + (1.96 \times 0/537)^2} \\ &= 379 \end{aligned}$$

After calculating sample volume Qarchak, Varamin, Pishva and Javad Abad cities were selected and questionnaires were distributed between the selected peripheral villages. Data from questionnaires were analyzed using SPSS 18 and Lisrel 8.80 software and reliability analysis process of research was conducted. Cronbach's alpha was used to assess validity. Cronbach's alpha obtained in this study was equal to 0.995 which represents that reliability of the questionnaire is very strong (Table 1).

In current research we select three indicator for measuring the livability. In fact economic, social and environmental indicators extracted from different resources. Here we state wide variety of resources that helped us in process of indicator selection (Table 2).

Table 1 Adjective used to estimate the population variance. *Source* Research Findings 2015

Standard error	Standard deviation	Mean	Adjectives
/054	/53	2/81	Livability

Table 2 Indicator references

Indicator	References
Economic (job opportunities, housing, transportation, facilities and infrastructures)	Pacione (2003)/Omuta (1988)/Lau Leby and Hashim (2010)/National Association of Regional Councils (2010)/Mitchell (2005)/Howley et al. (2009)/Vergunst (2003)/National Research Council (2002)/Cox et al. (2000)/Doi et al. (2008)/Hashimoto and Kodama (1997)/Hogg et al. (2000)/Tyler (1998)/Stimson et al. (2006)/Foreign Policy Magazine (2010)/Wilkinson and Pickett (2009)/Australian Bureau of Statistics (2006)/Visser et al. (2005)/American Institute of Architects (2005)/Heylen (2006)/National Association of Area Agencies on Aging (2007)/Metro Government of Nashville (2009)/Wheeler (2003)/Brittne and Guengerich (2009)/West and Badham (2008)/Dodson and Sipe (2008)/Mercer (2011)/Vinson (2007)/WHO (2007)/National Trust for Historic Preservation (2003)/Newman (2006)/Cicerchia (1999)/Green Building Council of Australia (2011)/Henderson-Wilson (2010)/Partners for Livable Communities (2011)/van Gent et al. (2009)/Walton et al. (2008)/Field (2000)/Porta and Renne (2005)/Balsas (2004)/AARP (2005)/Ottawa County Planning Commission (2004)/Pierson et al. (2010)/STPP (2006)/AARP (2005)/Vancouver Municipality (2004)/Miles (2006)/VicHealth (2012)/Lennard (1997)/Throsby (2005)/VTPI (2010)/Townsand and Davies (1999)/ http://www.socialreport.msd.govt.nz/2004/conclusionofindicators (2004)/EIU (2011)/Van Zerr and Seskin (2011)
Social (public education, sanitation, participation, belonging to place, social and individual security, leisure and free time)	Pacione (2003)/National Research Council (2002)/Wheeler (2003)/Lau Leby and Hashim (2010)/Pierson et al. (2010)/(Throsby 2005)/Vergunst (2003)/Brittne and Guengerich (2009)/Vancouver Municipality (2004)/National Trust for Historic Preservation (2003)/Parkes et al. (2002)/Florida (2002)/Gill (2011)/National Research Council (2002)/Ackaert and Van Craen (2006)/Balsas (2004)/VTPI (2010)/Metro Government of Nashville (2009)/AARP (2005)/Litman and Burwell (2006)/Mitchell (2005)/Findlay et al. (1988)/Partners for Livable Communities (2007)/WHO (2011)/Holt-Jensen (2001)/American Institute of Architects (2005)/(Heylen (2006)/National Association of Area Agencies on Aging (2007)/Ottawa County Planning Commission (2004)/Townsand and Davies (1999)/ http://www.socialreport.msd.govt.nz/2004/conclusionofindicators (2004)/Townsand and Davies (1999)/Omuta (1988)/Howley et al. (2009)/Townsand and Davies (1999)/conclusionofindicators (2004)/EIU (2011)/San Francisco Department of Public Health (2010)/Honey-Ray and Enns (2009)/WHO (2007)/Boyer and Savageau (1989)/National Research Council (2002)/Van Zerr and Seskin (2011)
Environmental (greenspace, pollution, landscape)	Blom et al. (2002)/Pacione (2003)/Wheeler (2003)/American Institute of Architects (2005)/VTPI 2010/Lau Leby and Hashim (2010)/Litman (2004)/Pierson et al. (2010)/Throsby (2005)/Brittne and Guengerich (2009)/Vancouver Municipality (2004)/Holt-Jensen (2001)/Balsas (2004)/Townsand and Davies (1999)/EIU (2011)/Van Zerr and Seskin (2011)

6.1 Process of Village Identification and Selection

Rural areas in the South East, South and West of Tehran are used more as an arena for sewage and waste disposal and workers and civil servants residence. These areas are also used for the construction industry (especially disturb and polluting factories). On the other hand, development of communication networks and some municipal facilities and equipment has taken place in these regions. The formation of these functions in rural areas has led to widespread changes in demographic, social, economic and physical in such areas. In this regard, physical development and population growth of these villages is very high and has taken place great migration in this villages (Rezvani 2002).

Overall, the expansion of residential functions of rural areas in the southeast, South and South West of Tehran caused profound changes in social, economic and physical dimension. If we have a problem-oriented approach to these changes, we can see different problems. Agricultural land use change, environmental pollution, increase the price of land and housing and create problems for local villagers, stagnation of agricultural and livestock activities and social and cultural contradictions in the villages are the negative consequences of such transformation (Rezvani 2002; Pal and Kumar 2005).

Evaluation of criteria for determining the edge of city and peri urban villages, reflects the diversity and plurality of this criterion. What prompted the researchers to choose between limited criteria was compliance of criteria with the conditions of the study area. Exclusive criteria and the criteria that distinguish the peri urban villages from other villages in the study area have always been considered.

- Positive population growth rate during two decades 1996–1986 and 1986–2006

One of the features of city vicinity villages is immigration and continuing positive growth rate of the population that it has been pointed out in terms of available resources. Therefore, it would be to show the character of an area and peri-urban villages.

- Being in urban boundaries

According to literature, boundaries is considered as the area around the city that have minimum distance and maximum interaction with the city and is strongly influenced by city. Legislator respected to independence of these villages in terms of identity and management and recognized it. But this does not mean that land use changes in urban boundaries does not effect on existing land use of peri-urban villages. The study area is located in boundaries. Therefore, for each rural areas locating at (urban boundaries) is an indicator that by such indicator villages ranged and determined as peri-urban village.

- Supply of daily necessities from nearby city

In the study area, affiliation and interaction with nearby city in order to provide daily necessities is considered as the last indicator to determine the peri-urban villages. This information extracted from 2006 General Census of Population and Housing and basis on factor “Where to buy necessities” we collected information about daily necessities. Accordingly, we studied all villages in County level (Varamin), then villages that have all three indicators, were selected as peri-urban villages. Finally we start our research on selected villages (Fig. 2).

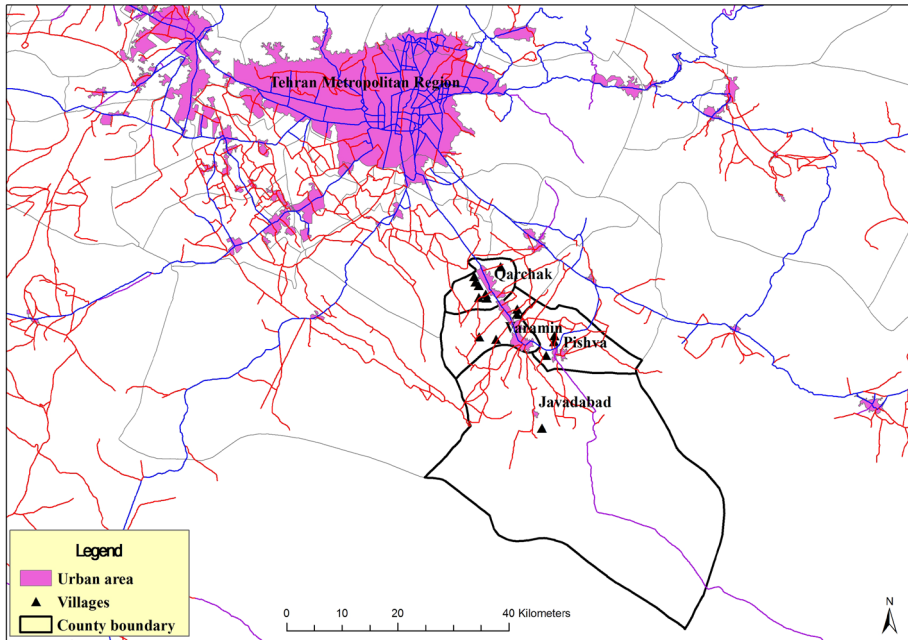


Fig. 2 Distribution of selected villages in the Varamin County and their position attributed to Tehran

6.2 Spatial Characteristics of Selected Villages

Peri urban villages due to the special position of proximity to city has a set of spatial features. This features not only distinguish the villages from other rural areas, but also distinguish such villages from urban suburbs. On the other hand, they have very different distance from Tehran metropolitan and they affected from urban dynamics and developments at different scales. However, taking into account the impact of spatial characteristics of selected villages and the effect on the livability is essential and inevitable. Thus, spatial characteristics of selected villages are: Number of Population, Population growth, The population of the neighboring city, Distance to neighboring city, Distance to Tehran, Distance to main road, The proportion of dormitory inhabitant, The proportion of non-agricultural land use, The origin of immigrants, The share of immigrants relative to the total population.

7 Findings

7.1 Spatial Factors Review

To obtain descriptive results of research items, questionnaire data were entered into SPSS. After carrying out appropriate statistical analyzes, the following table is obtained:

In this section we review the scores obtained from the indicators and dimensions of livability. For this purpose, the average score for each indicator are specified in each village. Then, based on indicators scores, the scores of each dimension is determined in

Table 3 Mean and standard deviation of livability in the selected villages in terms of three livability dimensions

Indicator	Mean	Standard deviation
Economic	2/64	1/13
Social	2/45	1/24
Environmental	1/65	1/14

each village. Ultimately, for the average score of each dimensions and the average score of livability in each village is determined, see Table 3.

And see Table 4 which shows the status of villages in terms of spatial factors.

Structural equation modeling was used to determine relationship between spatial factors and livability indicators. Structural equation modeling, is a very general, chiefly linear, chiefly cross-sectional statistical modeling technique. Factor analysis, path analysis and regression all represent special cases of SEM. LISREL or structural equation modeling is a technique that used to analysis the set of multi-variable regression. These techniques allow researchers to combine factor analysis and regression in the form of various connections and simultaneously examine them. The single most important feature of the LISREL program is its facility to deal with a wide variety of models for the analysis of latent variables. Since the apparent and hidden variables can also be defined as independent and dependent variables, in this research livability considered as dependent variable and the independent variable is the spatial factors features. There sophisticated multivariable models in geographical studies (which includes the simultaneous analysis independent variables K and the dependent variable n) makes the need for simultaneous factor analysis and path analysis to be met. On the other hand, structural equation modeling is used to safeguard the integrity of the research model. The basic model was designed through structural equation modeling in LISREL software and not significant parameters were omitted. This part of the model that defines the relationship between latent and measurable variables called measurement model (Pugesek and Tomer 2003). Data analysis was performed out in two phases. In the first phase reliability was carried out to evaluate the stability and compatibility of preferred options. Assessing the degree of likelihood took place in the second phase and fitness was performed to structural equation modeling and hypothetical routes test.

In order to testing research hypotheses and implementation of conceptual model, structural equation modeling software (LISREL) was used. Model interpretation consists of two parts: the first part was to interpret test the hypothesis, if significant coefficients are not be in the interval (96/1–96/1), the hypothesis is confirmed. In the second part (for all models implemented) model fitness interpretation has been dealt with by the relevant index.

7.2 Model Fitness Indices

When model are analogous features we have ability to test and evaluate the model. There are several Indices to evaluate the model which are presented in three categories: absolute, relative and adjusted (see Table 5).

Standardized regression coefficient (β) are estimations that measured independent from other variables. The standardized coefficients allows researchers to directly compare the relationship between independent and dependent variables. Given the significant values (t -

Table 4 Spatial features of selected villages. *Source* Research Findings 2015

Village	Spatial factor										
	Share of immigrants relative to the total population	Origin of immigrants	Proportion of non-agricultural land use	Proportion of dormitory inhabitant	Distance to main road	Distance to Tehran city	Distance to neighboring city	The population of the neighboring city	Population growth	Number of population	
1	83.42	7.15	96.97	33.40	1.50	42	2	20,996	7.01	2493	
2	36.49	32.36	37.77	29	1	40	3	208,996	8.86	3858	
3	92.70	69.91	92.7	42.86	3	40	3	208,996	3.72	2178	
4	36.49	32.36	36.49	29	1	40	3	208,996	8.86	3858	
5	95.26	70	95.26	35.90	2	20	2	174,006	7.62	3663	
6	47.14	66.67	47.14	33.34	2	20	2	174,006	6.96	1182	
7	96.97	71.43	100	61.91	4	40	4	174,006	11.01	5044	
8	100	71.06	99.44	42.11	2	20	2	174,006	4.61	7435	
9	88.09	70.22	88.9	34.4	2	20	2	174,006	7.9	7346	
10	92.08	84	99.08	60	1	20	1	174,006	8.53	3156	
11	98.02	82.98	99.02	57.50	2	20	2	174,006	6.69	6923	
12	97.04	20	97.4	29.17	0.50	42	0.50	41,880	8.25	3333	
13	83.42	7.15	83.42	33.40	1.5	42	2	41,880	4.85	818	
14	95.30	56.25	95.3	20	0	42	1	41,880	5.75	544	
15	66.92	15.39	66.92	0	2	55	2	4824	1.85	706	

Table 5 Absolute, relative and adjusted

Adjusted index	Relative index	Absolute index
PGFI	NFI	Chi square test
PNFI	NNFI	X^2/df
–	IFI	Average squared residuals
–	CFI	GFI
–	–	AGFI

value) which have not been in the intervals (between $1/96$ and $-1/96$), it can be said spatial factors affect the viability of the peri-urban villages. According to LISREL output, which is presented in the above table, the amount $df/2x$ calculated $14/2$, and $df/2x$ is smaller than 3 which indicates the appropriate fitness of model. The mean square error of approximation must be less than $0/08$ that this model is equivalent to $0/01$. GFI, AGFI, NFI and CFI must be greater than $0/9$ that in our model are $0/98$ and $0/96$ and $0/97$ and $0/94$, respectively. RMR should be smaller than $0/05$ that in the model under consideration is equal to $0/025$. According to the index and outputs of LISREL we can say that the model have appropriate fitness (Fig. 3).

In standard mode, iboutt becomes clear whether our models have ability to implement or not? As you see, this model have ability to run properly.

According to Fig. 4, we can understand relationship between each of spatial factors and livability. By examining the relationship between spatial factors and livability, we learn that the significance test (for all) are larger 2 and smaller than -2 [2, -2]. Therefore, a significant relationship was observed between all of spatial factors and livability. Only two factors *Distance to Tehran* and *share of immigrants relative to the total population* has a

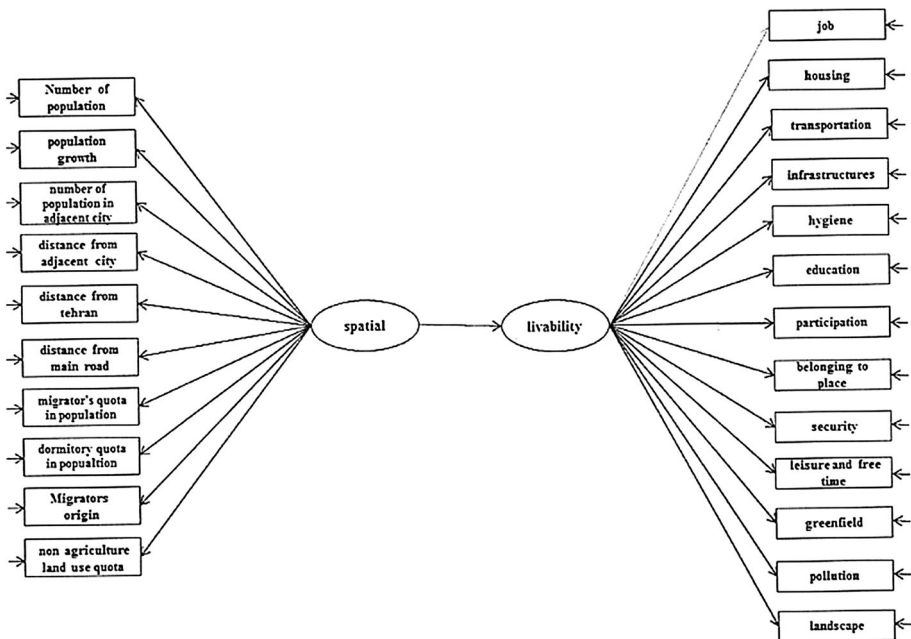


Fig. 3 Model of spatial factors effects on livability of villages

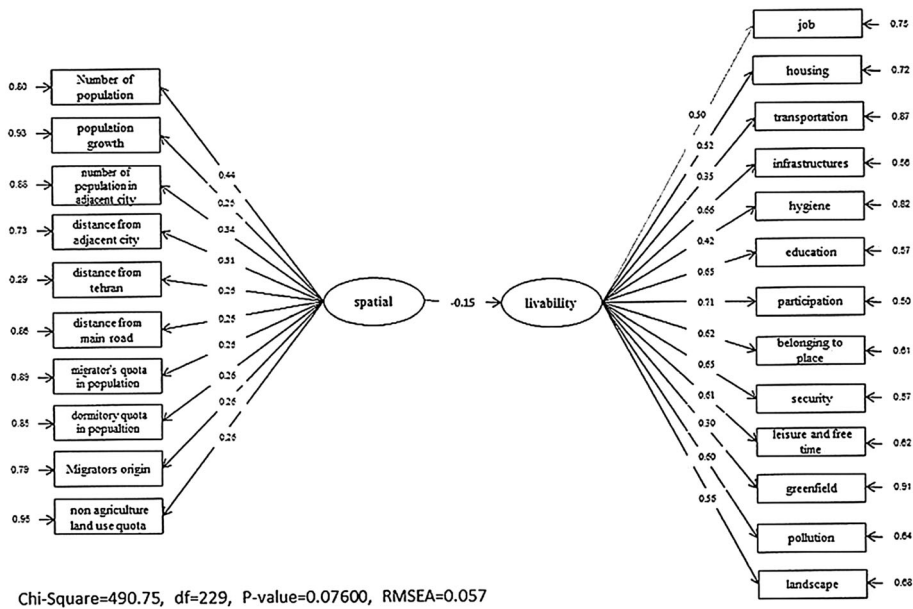


Fig. 4 LISREL output in standard mode in association with causal relationship between spatial factors and livability

negative effects on livability. Meaning that increase of these two factors reduces the level of livability. Its reason is very strong effect of Tehran metropolitan in the economic indicators. Proximity to Tehran causes increase in job opportunities and earnings. Also the heterogeneity derived from presence of immigrants in the villages, causes decrease in peri urban livability (Table 6).

One of the features that can affect the livability is the population of a rural residence. For various reasons population can affect the livability of rural areas. But in recent years, more villages in Iran for various reasons, such as the country’s economic dependence on oil revenues, deprivation and rural poverty, high net growth rate of population and lack of occupational diversity resulting in high dependence on agriculture, has been a negative growth rate and continuously experienced migration to other regions. In the meantime peri urban villages have been able to provide big opportunities for residents in terms of social and economic dimensions. This issue has provided favorable conditions for the acceptance of migrants and positive population growth. Also the number of population of any city has an effect on the enjoyment of facilities and various services. Hence, the proximity to cities with a different population scale, can have different impacts on the livability of peri-urban villages. In other words, settlements influenced each other through the distance factor.

Table 6 The results of the structural model between the spatial factors and livability

Research hypothesis	Standard coefficient (β)	t-value	Result
Spatial factors livability	-0/15	-4/23	Significant

$\chi^2 = 75.490$, $df = 229$, $RMSEA = 0.057$, $GFI = 0.57$, $AGFI = 0.96$, $CFI = 0.97$, $NFI = 0.94$, $RMR = 0.025$

Tehran as the largest metropolitan of Iran, has a broad and profound impact on their surrounding urban and rural settlements.

One of the opportunities that are available to peri-urban villages, is proximity to main roads. The main roads link the cities with their immediate area. These roads also connects the towns and cities to each other.

Peri-urban villages have many attractions to workforces, who that migrates for find work in greater market. The share of these migrants (in the total population of villages) determine the dormitory function of villages. Also Peri-urban village experience growing fast rate of change in land use pattern, so that the agricultural land is converted to non-agricultural. On the one hand, this issue leads to diversity in the villages' economy and increase employment opportunities in non-agricultural sectors. On the other hand, this issue leads to some consequences such as sudden rise in land prices and rising levels of pollution (caused by industrial establishment). Therefore, evaluating its role in livability of such villages is very important.

Knowing the origin of immigrants is an important issue. Because it has an effect on interaction and intensity of their relationship with the origin and also a great impact on how they interact with indigenous people and other ethnic groups living in the village. Hence, could have significant impact on the livability of these villages.

Finally, peri urban villages receive large numbers of immigrants who have migrated from far and near to it. Ethnic, religious, cultural and racial mixing provides a good platform for the formation of human disagreements and conflicts. In contrast, creates a network of human relations between people have the same geographical and ethnicity origin, which can bring them together and is effective from various aspects.

The study area from the years after the Islamic Revolution of Iran in 1979 was the destination of many immigrants. Their goal is to earn more money or find a more suitable job. Lack of financial resources for residence in Tehran, Tendency to network immigration and living along with other fellow citizens are factors that has caused migrants to settle in surrounding villages. As result, they settled in villages around the city that were closer to the city and had good facilities and more appropriate access. In the past, migrated to other areas has been done from these villages. This feature is true to all villages of Iran but because of the proper position in the vicinity of Tehran and also problems related to housing in Tehran, these villages function as settlements (dormitory) for migrants. In other words, during the past 30 years, this villages has become home for immigrants who migrate to Tehran. However, due to poor economic base, they can only dwell in villages and towns around the Tehran.

Number of population is one of spatial factors that influence on rural livability via the number and variety of jobs, the number of public transport vehicles, the quantity and quality of services and infrastructure, participation and development of associations and the amount of waste resulting from consumption in the village. Also population growth can affect the livability of the villages located on the fringes of cities, multiplicity and diversity of employment opportunities, need for housing, the number of public transport vehicles, infrastructure facilities and services to rural areas, need for educational facilities, need for sanitary facilities, need for recreational facilities, need for open and green spaces are reasons that can affect livability of villages. The population of the neighboring city can effect on livability by Greater access to employment opportunities in the city, need for housing market for residents of the village, traffic volume between the village and the neighboring city, easier access to health facilities in the city, increasing city ecological footprint in the neighboring villages, and destruction of natural landscape as a result of land use change. Distance to

neighboring city has potential impact on the livability of peri urban villages include: Greater access to employment opportunities in the city, housing prices in the village, access to city facilities and infrastructure services, easier access to educational facilities of city, health facilities of city, city security Agencies, recreational and leisure facilities of city and close to the landfill and municipal waste. In Reorganization-Managerial Plans of Tehran, The entire province is considered as a sphere of influence and has a deeper ties with Tehran. Proximity and distance to Tehran can affect the livability of villages in different forms. These forms include: Greater access to employment opportunities in Tehran, the price of housing in the village, access to facilities and infrastructure services in Tehran, easier access to educational, sanitary, recreational and leisure facilities in Tehran, changes in natural and agriculture landscape, distance to the main road can be described as one of the most important factors affecting the livability of villages and by the following factors can affect the village's livability: The development of service jobs on the periphery of the main road, easy access to vehicles passing, main road safety for crossing the native pedestrians and motorists, noise and air pollution caused by vehicles. Dormitory function of villages will have several consequences. These consequences include the following: lack of a sense of place, unwillingness to investment in village and so on. Hence, settlement function of these villages (as one of the most important features) have a great impact on their livability. These potential impacts include: employment development ratio in villages, public transport development, willingness to participate in the affairs of village, the sense of belonging to life in the village. The potential impacts of proportion of non-agricultural land use on livability of peri-urban villages include: diversification of village employment, development of residential uses and share of open spaces in villages, pollution of residential and industrial uses, abuses and undermining the natural landscape. The origin of immigrants can impact on livability of peri-urban villages include: desire for partnership and solidarity, the sense of belonging to a place and tend to durability and formation of security, social and cultural contexts. The potential impact of the share of immigrants relative to the total population on livability of peri-urban villages include: desire for partnership and solidarity, sense of belonging to a place and tend toward the mundane, the conflict between indigenous and non-indigenous people.

8 Conclusion

In this study, we tried to have a comprehensive and deep understanding about the role of endogenous and exogenous triggers in forming the current conditions.

Many areas in the south plain of Tehran competes with other regions of Tehran, in terms of climate, vegetation, history and identity. Even in aspects such as air pollution avoidance and away from the noise and congestion are better for live. But these areas is not considered by middle and upper classes. This is due to the "access" factor because in the South, access is inappropriate. Upper and middle class jobs are concentrated in Tehran. Communication channels to the plains of south passes through crowded neighborhoods and also industrial southern edge of Tehran located in this route. Furthermore, due to interference with the performance of industrial applications roads, regional roads network performance was not enough and commute (traffic) is slow, unsafe, boring and uncomfortable. Although the jobs dispersed across the Tehran but income distribution is unbalanced. Company offices and administrative centers and service centers and major commercial centers (which more profitable jobs are related to them) are concentrated in Tehran. Development of transport system will transfer many profitable activities to plains

of south Tehran. Currently, spatial distribution of income groups in the southern plain is unbalanced. In general, residents of the area are low income groups.

Peri-urban villages that located at the periphery of cities are faced with many problems that are new aspects for the Iranian villages and rural and regional planners have faced with some challenges in the planning process. The totality of these circumstances, has been established a special position in terms of livability in these villages. It is generally assumed that the villages due to the special geographical location, can be prepare more desirable and appropriate levels of livability for residents. But the results showed that the situation of peri-urban villages are largely different.

The results showed that locating in the adjacent of urban areas and access to facilities of cities cannot guarantee the formation of livable rural settlements. Especially, peri-urban villages that are adjacent or near to metropolitan areas—because of embracing the many stranded migrants or expelled from the city—are experienced many different problems and difficulties that this issue have undeniable impact on their quality of life. Accordingly, Investigation of factors affecting livability of peri urban villages can be of great importance. On the other hand, livability should be considered as a critical issues by specialists and planners as well as rural and regional planning professionals. Due to the proximity of cities, peri-urban villages has a set of spatial features that make them distinct and different from other villages. Villages in current study, located on the periphery of cities with large population size. For this reason selected villages influenced by conditions of Tehran. On the other hand, selected villages have very different distance from Tehran metropolitan region and at different scales affected by dynamics and evolution of Tehran. According to our research, taking into account the impact of spatial characteristics of the village and their impact on the livability is essential and inevitable. As can be seen, these factors have shown in the form of “Exogenous agents” that have significant impact on the livability of villages. The most important consequence of this pattern include the following: Accelerating the agricultural use change, increasing in immigration, gradual connection of villages to city in terms of physical form, physical chaos and environmental degradation in rural and indigenous and non-indigenous ethnic imbalance.

The experimental model of peri-urban village’s livability that have been achieved from this study are shown as in Fig. 5. The purpose of this model is representation of formation process of livability in peri-urban villages and as well as indicates the spatial factors that have influence on livability.

Livability consist of accessibility, the allocation and public space design, opportunities for social participation and recreation, and the overall health and economic welfare of settlement residents (Goldman and Gorham 2006). In other words, rural Livability related to the number, demographic structure and village inhabitants lifestyle, community life, service level, local economy and physical place and have interrelationships between such matters (Vergunst 2003). With an overview we can find that peri urban communities encountered with different challenges. In fact, livability in such communities encountered with some problems that related to human systems. Challenges such as urban sprawl, climate change, fiscal challenges, water shortages/drought, regional hot spots of rapid and chaotic growth strongly affects the livability. Furthermore, spatial configuration and retail dispersion in the urban area is important for understanding accessibility of the different populations in the peri urban area and its livability (Rotem-Mindali 2012). The Physical environment of the community should exist in such a way as to support conviviality and to provide an environment that creates a healthy livable place (Shafer et al. 2000). As we mentioned, livability in villages—especially in peri urban villages—have strong relations with society. Note that by human activities livability link to the physical place (Vergunst

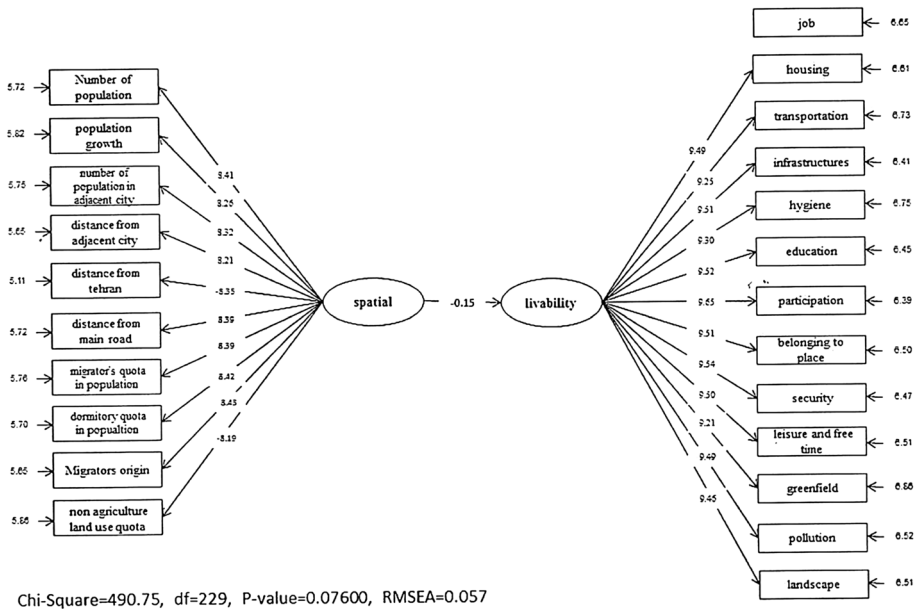


Fig. 5 LISREL output in significant mode in association with causal relationship between spatial factors and livability

2003). Generally, public policy and planning decisions strongly affects the livability and also physical location and condition of public facilities plays important roles in peri urban livability (Faiz et al. 2012; Yan Chi 2013).

References

- AARP. (2005). *Livable communities: An evaluation guide*. Washington: Public Policy Institute.
- Ackaert, J., & Van Craen, M. (2006). *Livability, insecurity, social capital and trust in local government*. Paper to be presented at the XVI ISA World Congress of Sociology. Durban, South-Africa, 23–29 July 2006.
- American Institute of Architects (AIA). (2005). What makes a community livable? No 101, pp. 10–11.
- Australian Bureau of Statistics. (2006). *Census—Household form*. Canberra: Australian Bureau of Statistics.
- Baccini, P. (1997). A city's metabolism: Towards the sustainable development of urban systems. *Journal of Urban Ecology*, 4(2), 27–39.
- Balsas, C. (2004). Measuring the livability of an urban centre: An exploratory study of key performance indicators. *Planning Practice & Research*, 19(1), 101–110.
- Blassingame, L. (1998). Sustainable cities: Oxymoron, utopia, or inevitability? *Social Science Journal*, 35, 1–13.
- Blom, D., Craig, P., & Malanay, P. (2002). *The quality of life in rural Asia*. Mandaluyong: Asian Development Bank.
- Boyer, R., & Savageau, D. (1989). *Place related almanac: Your guide to finding the best places to live in America*. New York: Prentice Hall.
- Brittne, N., & Guengerich, T. (2009). *Going from good to great: A livable Communities Survey in Westchester County in New York*. Washington: AARP.
- Chivot, E. (2011). *Livability and sustainability in large urban regions*. The Hague Centre for Strategic STUDIES (HCSS) and TNO.
- Cicerchia, A. (1999). Measures of optimal centrality: Indicators of city effect and urban overloading. *Social Indicators Research*, 46(3), 273.

- Congreve, A. (2012). Sustainable communities. In *International encyclopedia of housing and home*.
- Cox, J., Thurstain-Goodwin, M., & Tomalin, C. (2000). *Town Centre vitality & viability: A review of the health check methodology, pilot study*. London: Centre for Advanced Spatial Analysis, University College London.
- De Hollander, A. E. M., & Staatsen, B. A. M. (2003). Health, environment and quality of life: an epidemiological perspective on urban development. *Landscape and Urban Planning*, 65, 53–62.
- Dodson, J., & Sipe, N. (2008). *Unsettling suburbia: The new landscape of oil and mortgage vulnerability in Australian cities*. Urban Research Program, Research Paper No. 17. Brisbane, QLD: Griffith University.
- Doi, K., Kii, M., & Nakanishi, H. (2008). An integrated evaluation method of accessibility, quality of life, and social interaction. *Environment and Planning B: Planning and Design*, 35(6), 1098–1116.
- Economist Intelligence Unit (EIU). (2011). *Liveability ranking report*. London: Economist Intelligence Unit.
- Evans, P. (2002). *Liveable cities: Urban struggles for livelihood and sustainability*. Berkeley: University of California Press.
- Faiz*, A., Faiz, A., Wang, W., & Bennett, C. (2012). Sustainable rural roads for livelihoods and livability, SIV—5th International Congress—Sustainability of Road Infrastructures. *Procedia—Social and Behavioral Sciences*, 53, 1–8.
- FHWA. (2011). *Liveability initiative. Office of planning, environment and realty*. Federal Highway Administration, Washington, DC. <http://www.fhwa.dot.gov/livability/>. Accessed April 18, 2012.
- FHWA & FTA. (2010). *Liveability in transportation guidebook—planning approaches that promote livability*. Report No. FHWA-HEP-10-028. Federal Highway Administration and Federal Transit Administration, Washington, DC.
- Field, K. (2000). Measuring the need for primary health care: An index of relative disadvantage. *Applied Geography*, 20(4), 305–332.
- Findlay, A., Morris, A., & Rogerson, R. (1988). Where to live in Britain in 1988: Quality of life in British cities. *Cities*, 5(3), 268–276.
- Florida, R. (2002). *The rise of the creative class*. New York: Basic Books.
- Foreign Policy Magazine. (2010). *Global Cities Index methodology*. http://www.foreignpolicy.com/articles/2010/08/18/global_cities_index_methodology. Accessed June 25, 2011.
- Gill, T. (2011). *Children and nature: A quasi-systematic review of the empirical evidence*. London: London Sustainable Development Commission.
- Goldman, T., & Gorham, R. (2006). Sustainable urban transport: Four innovative directions. *Technology in Society*, 28, 261–273.
- Green Building Council of Australia. (2011). *Green star communities, summary of draft pilot credits*. Sydney: Green Building Council of Australia.
- Hankins, K. B., & Powers, E. M. (2009). The disappearance of the state from ‘livable’ urban spaces. *Antipode*, 41(5), 845–866.
- Hao, P. (2012). *Spatial evolution of urban villages in Shenzhen*. Ph.D. Dissertation in Geography, under Supervision of Dr. P. Hooimeijer, Utrecht University.
- Hao, P., Geertman, S., Hooimeijer, P., & Sliuzas, R. (2012). Measuring the development patterns of urban villages in Shenzhen. In *AGILE 2011*, 18–22 April.
- Harvey, J. M. A., Witlox, F., & Tribby, C. P. (2013). Developing context-sensitive livability indicators for transportation planning: A measurement framework. *Journal of Transport Geography*, 26, 51–64.
- Hashimoto, A., & Kodama, M. (1997). Has livability of Japan gotten better for 1956–1990? A DEA approach. *Social Indicators Research*, 40(3), 359–373.
- Helleman, G., & Wassenberg, F. (2003). The renewal of what was tomorrow’s idealistic city. Amsterdam’s Bijlmermeer highrise. *Cities*, 21(1), 3–17.
- Henderson-Wilson, C. (2010). *Sustainable high-rise developments: Factors impacting on residents’ health and well-being*, in *Environment, health, and sustainable development*. In A. Abdel-Hadi, M. Tolba & S. Soliman (Eds.), (pp. 59–72). Hogrefe Publishing: Cambridge, MA.
- Heylen, K. (2006). Liveability in social housing: Three case-studies in Flanders. Paper presented at the ENHR conference “Housing in an expanding Europe: Theory, policy, participation and implementation”, Government Malaysia (2006), 2–5 July 2006, Ljubljana, Slovenia. http://enhr2006-ljubljana.urs.si/publish/W18_Heylen.pdf. Accessed June 12, 2008.
- Hillier, B., Burdett, R., Peponis, J., & Penn, A. (1987). Creating life: Or, does architecture determine anything? *Architecture and Comfort/Architecture and Behavior*, 3(3), 233–250.
- Hogg, S., Medway, D., & Harvey, J. (2000). Measuring the effectiveness of town centre management. *Town and Country Planning*, 69(4), 117–119.

- Holt-Jensen, A. (2001). *Individual relational space in deprived urban neighborhoods*. Paper presented at ENHR conference, 25–29 June 2001, Pultusk, Poland. <http://www.nhh.no/geo/NEHOM/publications/ENHR%20Warsawa%202001.pdf>. Accessed July 5, 2006.
- Honey-Ray, L., & Enns, C. (2009). *Child and youth friendly Abbotsford: Community strategy*. Abbotsford: City of Abbotsford and Union of British Columbia Municipalities.
- Howley, P., Scott, M., & Redmond, D. (2009). Sustainability versus liveability: An investigation of neighbourhood satisfaction. *Journal of Environmental Planning and Management*, 52(6), 847–864. <http://www.socialreport.msd.govt.nz/2004/conclusionofindicators>. Accessed February 10, 2010.
- Kennedy, C., Cuddihy, J., & Engel-Yan, J. (2007). The changing metabolism of cities. *Journal of Industrial Ecology*, 11(2), 43–59.
- Larice, M. Z. (2005). *Great neighborhoods: The livability and morphology of high density neighborhoods in urban North America*. Ph.D. thesis in University of California, Berkeley.
- Lau Leby, J., & Hashim, A. H. (2010). Liveability dimensions and attributes: Their relative importance in the eyes of neighbourhood residents. *Journal of Construction in Developing Countries*, 15(1), 67–91.
- Lennard, S. H. (1997). *Principles for the liveable city*. Carmel: Gondolier Press.
- Litman, T. (2004). Economic value of walkability. *World Transport Policy & Practice*, 10(1), 20–31.
- Litman, T., & Burwell, D. (2006). Issues in sustainable transportation. *International Journal of Global Environmental Issues*, 6(4), 331–347.
- Mercer, M. (2011). *Quality of living survey highlights—Defining 'quality of living'*. <http://www.mercer.com/articles/quality-of-living-definition-1436405>. Accessed April 17, 2012.
- Metro Government of Nashville. (2009). *Creating a livable community for all ages: The Nashville Livability Project*, September, p. 9.
- Midgley, J., & Livermore, M. (1998). United States of America. In J. Dixon & D. Macarov (Eds.), *Poverty: A persistent global reality* (pp. 229–247). London: Routledge.
- Miles, R. (2006). Neighborhood disorder and smoking: Findings of a European urban survey. *Social Science and Medicine*, 63(9), 2464–2475.
- Mitchell, G. (2005). *Components that contribute to quality of life*. Leeds: Environment Centre, University of Leeds.
- National Association of Area Agencies on Aging (n4a). (2007). *A blueprint for action: Developing a livable community for all ages*. Partners for Livable Communities (MetLife Foundation), p. 8.
- National Association of Regional Councils. (2010). *Rural benefits of The Livable Communities Act*. www.narc.com.
- National Research Council. (2002). *Community and quality of life: Data needs for informed decision making*. Washington: National Academy Press.
- National Trust for Historic Preservation, National Main Street trends survey. (2003). *National Trust for Historic Preservation*. Washington, DC.
- Newman, P. (1999). Sustainability and cities: Extending the metabolism model. *Landscape and Urban Planning*, 44(1), 219–226.
- Newman, P. (2001). *Australia: State of the Environment 2001*. State of the Environment Advisory Council.
- Newman, P. (2004). Sustainability and cities: Extending the metabolism model. *Landscape and Urban Planning*, 44, 219–226.
- Newman, P. (2006). The environmental impact of cities. *Environment and Urbanization*, 18(2), 275–295.
- NEWUR. (2005). *urban prEssure on RURal areas. Work Package number 2: Introduction to a method for detecting and classifying periurban areas*, NEWUR.
- Norris, T., & Pittman, M. (2000). The healthy communities movement and the coalition for healthier cities and communities. *Public Health Reports*, 115(2–3), 118–124.
- Omuta, G. E. D. (1988). The quality of urban life and the perception of livability: A case study of neighborhoods in Benin City, Nigeria. *Social Indicators Research*, 20(4), 417–440.
- Ottawa County Planning Commission. (2004). *Ottawa County Urban Smart Growth*. Planning and Grants Department.
- Pacione, M. (1990). Urban liveability: A review. *Urban Geography*, 11(1), 1–30.
- Pacione, M. (2003). Urban environmental quality and human wellbeing—A social geographical perspective. *Landscape and Urban Planning*, 65(2), 19–30.
- Pal, A. K., & Kumar, U. C. (2005). Quality of life concept for the evaluation of societal development of rural community in West Bengal, India. *Rural Development*, xv(2), 83–93.
- Pandey, R. U., Garg, Y. K., & Bharat, A. (2010). A framework for evaluating residential built environment performance for livability. *India Journal*, 7(4), 12–20.
- Parkes, A., Kearns, A., & Atkinson, R. (2002). What makes people dissatisfied with their neighborhoods? *Urban Studies*, 39(13), 2413–2438.

- Partners for Livable Communities. (2011). *Community empowerment manual*. Washington, DC: Partners for Livable Communities.
- Perogordo Madrid, D. (2007). *The Silesia Megapolis*. European Spatial Planning.
- Phillips, D., Williams, K., Andrews, G., Clarke, J., Carter, M., Kinsman, P., et al. (1999). *Literature review on peri-urban natural resource conceptualization and management approaches*. Final Technical Report, DFID Natural Resources Systems Program (NSRP), University of Nottingham and University of Liverpool.
- Pierson, J., Cavanaugh, H., & Pierson, M. (2010). *Arts and livability: The road to better metrics*. A Report from the June 7, 2010 NEA Research Forum, National Endowment for the Arts.
- Porta, S., & Renne, J. (2005). Linking urban design to sustainability: Formal indicators of social urban sustainability field research in Perth, Western Australia. *Urban Design International*, 10(1), 51–64.
- Pranav, V., Blohm, A., & Ruth, M. (2011). Temperature-mortality relationships in urban areas: Methods and applications to Boston, Massachusetts and Baltimore, Maryland, USA. In S. P. Saikia (Ed.), *Climatic change* (Chap. 14). Derhadun: International Book Distributors.
- Pryor, R. (1968). Defining the rural–urban fringe. *Social Forces*, 47(2), 202–215.
- Pugesek, B., & Tomer, A. (2003). *Structural equation modeling*. Cambridge: Cambridge University Press.
- Ravetz, J. (2008). *Peri-urban land use relationships—Strategies and sustainability assessment tools for urban–rural linkages, the city-region in time and space: Analysis of regional spatial planning and decision-making strategies, and their impact on land use in the urban fringe Governance & planning strategies, Module No. 3*, PLUREL.
- Reeder, R. (2011). Recent changes advance new markets and livability initiatives. *Rural Conditions and Trends*, 11(1), 48–53.
- Rezvani, M. (2002). The relation between urban and rural patterns in rural areas around Tehran. *Geographical Journal*, (43), 81–94.
- Rotem-Mindali, O. (2012). Retail fragmentation vs. urban livability: Alying ecological methods in urban geography research. *Applied Geography*, 35, 292–299.
- Ruth, M., Amato, A., & Kirshen, P. (2006). Impacts of changing temperatures on heat-related mortality in urban areas: The issues and a case study from Metropolitan Boston. In M. Ruth (Ed.), *Smart growth and climate change* (pp. 364–392). Cheltenham: Edward Elgar Publishers.
- Ruth, M., & Coelho, D. (2007). Understanding and managing the complexity of urban systems under climate change. *Climate Policy*, 7, 317–336.
- Ruth, M., & Franklin, R. (2014). Livability for all? Conceptual limits and practical implications. *Applied Geography*, 49, 18–23.
- Saeedi, A. (2004). Rural–urban relationships and rural–urban linkages; A perceptual study. *Journal of Iranian Geographical Association*, 1(1), 73–92.
- San Francisco Department of Public Health. (2010). *Healthy development measurement tool development checklist, Version 3.02*. San Francisco, CA: San Francisco Department of Public Health.
- Shafer, S. C., Bong Koo, L., & Turner, S. (2000). A tale of three greenway trails: User perceptions related to quality of life. *Landscape and Urban Planning*, 49, 163–178.
- Shaharudin, I., Hadi, A. S., Harman Shah, A. H., & Mohamed, A. F. (2008). *Spatial urban metabolism for livable city*. Blueprints for Sustainable Infrastructure Conference, 9–12 December 2008 Auckland, NZ.
- Shamsuddin, S., Hassan, N. R. A., & Bilyamin, S. F. I. (2012). Walkable environment in increasing the liveability of a city. *Procedia Social and Behavioral Sciences*, 50, 167–178.
- Sheikhi, M. (2002). *Explanation of formation and change process of spontaneous settlements in Tehran metropolitan region; Case study: Eslamshahr, Nasimshahr and Golestan*. Ph.D. Thesis in Sociology, University of Tehran.
- Smith, C. S. (2012). *Rural public transportation strategies for responding to the livable and sustainable communities initiative*. National Cooperative Highway Research Program.
- Stimson, R., et al. (2006). Deriving spatial metropolitan wide patterns of quality of life dimensions from survey data: The case of the Brisbane-South East Queensland region. In *Proceedings of the 46th Congress of the European Regional Science Association*. Volos, Greece.
- Surface Transportation Policy Partnership (STPP). (2006). *From the margins to mainstream: A guide to transportation opportunities in your community* (final ed.).
- Swyngedouw, E., & Heynen, N. C. (2003). *Urban political ecology, justice and the politics of scale*. Oxford: Oxford University.
- The MetLife Mature Market Institute. (2013). *Livable community indicators for sustainable aging in place*. Stanford Center on Longevity.
- Throsby, D. (2005). *Cultural heritage as financial asset in strategies for urban development and poverty alleviation*. Paper for International Conference for Integrating Urban Knowledge & Practice, Gothenburg, Sweden, 29 May–3 June, 2005.

- Townsend, I. J., & Davies, W. K. (1999). Identifying the elements of community character: A case study of community dimensionality in old age residential areas. *Research in Community Sociology*, 9, 219–251.
- Tyler, N., & Pittman, M. (1998). *Evaluating the health of downtowns: A study of Michigan small cities*. Madison, WI: Centre for Community Economic Development, University of Wisconsin—Cooperative Extension.
- Vancouver Municipality. (2004). *City of Vancouver Community Assessment Survey*. Executive Summary.
- Van Gent, W., Musterd, S., & Ostendorf, W. (2009). Bridging the social divide? Reflections on current Dutch neighborhood policy. *Journal of Housing and the Built Environment*, 24(3), 357–368.
- Van Oostrum, M. (2013). *The cultivation of urban villages; Integration of informal development in the formal planning process of Shenzhen, China*. M.Sc. Thesis in Urbanism, Under Supervision of Dr. V. Balz, Delft University of Technology.
- Van Zerr, M., & Seskin, S. (2011). *Recommendations memo 2 livability and quality of life indicators*. Least cost planning working group.
- Vergunst, P. (2003). *Liveability and ecological land use the challenge of localization*. Ph.D. Dissertation in Department of Rural Development Studies, Swedish University of Agricultural Sciences, Uppsala.
- Victorian Government Outer Suburban/Interface Services and Development Committee. (2012). *Inquiry into liveability options in outer suburban Melbourne*. Melbourne, VIC: Parliament of Victoria.
- Victorian Health (VicHealth). (2012). *VicHealth indicators survey: Selected findings*. Melbourne, VIC: Promotion Foundation.
- Vinson, T. (2007). *Dropping off the edge: The distribution of disadvantage in Australia 2007*. Jesuit Social Services and Catholic Social Services Australia.
- Visser, P., van Dam, F., & Hooimeijer, P. (2005). *The influence of neighbourhood characteristics on geographical differences in house prices in the Netherlands*. Paper presented at European Network for Housing Research (ENHR) International Housing Conference, 29 June–3 July 2005, Reykjavik, Iceland. <http://www.borg.hi.is/enhr2005iceland/index.php?Option=content&task=view&id=14&Itemid=37>. Accessed September 2, 2006.
- VTPI. (2010). *Community livability: Helping to create attractive, safe, cohesive communities*. TDM encyclopedia. Victoria: Transport Policy Institute.
- Walton, D., Murray, S. J., & Thomas, J. A. (2008). Relationships between population density and the perceived quality of neighborhood. *Social Indicators Research*, 89(3), 405–420.
- Wang, X. (2010). The research on the evaluation index system of livable of rural areas in China—By the case of rural areas in Henan Province. *Agriculture and Agricultural Science Procedia*, 1(1), 456–461.
- Waste, R. (1998). *Independent cities*. Oxford: Oxford University Press.
- West, S., & Badham, M. (2008). *A strategic framework for creating livable new communities*. Final report, Melbourne, VIC: Victorian Growth Areas Authority.
- Wheeler, S. (2003). Planning sustainable and livable cities. In R. LeGates & F. Stout (Eds.), *The city reader*. London and New York: Routledge.
- Wilkinson, R., & Pickett, K. (2009). *The spirit level: Why more equal societies almost always do better*. London: Penguin Books.
- Wolman, A. (1965). The metabolism of the city. *Scientific American*, 213, 179–190.
- World Health Organization (WHO). (2007). *Checklist of essential features of age-friendly cities*. Geneva: World Health Organization.
- World Health Organization (WHO). (2011). *Urban health: Healthy city checklist*. <http://www.euro.who.int/en/what-we-do/health-topics/environment-and-health/urban-health/activities/healthy-cities/who-european-healthy-cities-network/what-is-a-healthy-city/healthy-city-checklist>. Accessed January 25, 2012.
- Yan Chi, J. (2013). Projecting sustainable living environment for an ageing society: The case of Hong Kong. *Procedia Environmental Sciences*, 17, 675–684.
- Zanella, A. S., Camanho, T., & Dias, G. (2015). The assessment of cities' livability integrating human wellbeing and environmental impact. *Annals of Operations Research*, 226, 695–726.
- Zhang, L., Zhao, S. X. B., & Tian, J. P. (2003). Self-help in housing and chengzhongcun in China's urbanization. *International Journal of Urban and Regional Research*, 27(4), 912–937.
- Zhangmao. (2009). The study on the evaluation index system for rural living standards. *Science Development*, 7, 56–63.