Indian Journal of Science and Technology, *Vol 9(20), DOI: 10.17485/ijst/2016/v9i20/84697, May 2016*
ISSN (Print) : 0974-6846
ISSN (Online) : 0974-5645

Analyzing Associations between the Price of Urban Properties and Population Size with City Development Index in a Selected Cities of Iran (Esfahan, Tabriz, Qazvin, Zanjan and Ilam)

Amin Khakpour* and Reza Asadi

Urban planning, Tehran University, Tehran, Iran; aminkhakpour@ut.ac.ir, Reza.asadi@ut.ac.ir

Abstract

Urban development is defined as the process of quality of life improvement of all the citizens. To reach to this aim, it is required to consider and respect some pertinent principals, rules and norms. In order to begin planning for urban development process, the first step is to evaluate the status of the cities and their development level. Hence, the need for evaluating the development level of cities led to propose an indicator named City Development Index (CDI) by the second UN-HABITAT conference held in Istanbul in 1996. In this study, to determine the effective factors on CDI, we examined associations between the price of urban properties and population size with the CDI. Descriptive and analytical methods are used to analyze the data. Pierson Correlation Coefficient and Regression analysis in SPSS software were used to examine the associations between the study variables. A review study of the available data in internet and libraries were used as the study data. The results for the selected cities in our study show that there was no significant relationship exists between the price of urban properties neither with the CDI nor with the population size. However, a significant association was found between the population size and the CDI ($p<0.01$). Therefore, considering conditions of the selected cities in Iran, it can conclude that the CDI increased along with increasing the size of population.

Keywords: City, City Development Index (CDI), Price of Urban Properties, Size of Urban Population

1. Introduction

The problem of unstructured and unplanned growth in large cities (city sprawl), occurred in the recent century, as well as increased urbanization in the world and in Iran provoked researchers to propose the subject of planned and aforethought city development. The term of 'development' in urban planning dictionary defined as 'the process of improvement of quality of life of all people' (Saifoldini[16], 2008: 103). According to this definition, 'urban development' can define as 'the process of improvement of quality of life of all inhabitants in a city'. To reach to this aim, it is required to consider and respects some pertinent principals, rules and norms. In order to beginning planning for urban development process, the first step is to evaluate the status of the cities and their development level. Cities have a main role in economic development of communities. Future of development in developing countries would depend on city development. Extensive research has conducted on urban development, its indicators and urban strategic planning in some of the metropolises including London, Toronto, Melbourne, Istanbul and large American cities due to the importance of this subject and the need for research on this topic (Elkin[25], 1994). Hence, the need for evaluating the development level of cities led to propose an indicator named City Development Index (CDI) by the second UN-HABITAT conference held in Istanbul in 1996.

**Author for correspondence*

In this study, to determine the effective factors on CDI, we examined relationships between the price of urban properties and the size of urban population with the CDI. We hypothesized that there is a direct relationship between the price of urban properties and the CDI, so that in cities with a high CDI, the price of properties would also be high. The next hypothesis was that there is a direct relationship between population size and the CDI and the last hypothesis was that there is a direct relationship between population size and the price of properties in a city.

2. Research Methods

Descriptive and analytical methods used to analyze the data. After sample selection, we measured CDI in all the samples and then examined the associations between the price of urban properties and population size with the CDI sing SPSS 17 software. Pierson Correlation Coefficient and Regression analysis used to examine the associations between the study variables. Study data collected through a review of the available data in internet and libraries.

2.1 Sampling Criteria

In order to provide higher generalizability of the results of this study to whole country, we tried to select cities from various geographical areas of Iran. We selected central city of provinces, as we suppose they are the most developed cities in the provinces and may represent main advantages and disadvantages of all the cities placed in the same provinces. Cities with different population sizes selected to again provide higher generalizability for the results of this study.

2.2 Sampling Method

Due to different characteristics of Iranian cities in terms of their population size, width, area and so on, initially all the cities were divided to three clusters in terms of their population size: 1) Cities with more than one million population, 2) Cities with 500,000-1000,000 population and 3) Cities with 200,000-500,000 population. Then, random sampling method used to select samples from cities placed in each cluster. The capital city of Tehran excluded from sampling due to its very different characteristics including its very high population size.

Using random sampling method, the cities of Mashad, Esfahan, Shiraz and Tabriz were selected from the first cluster, the cities of Oromiye, Kerman, Ardabil and Qazvin from the second cluster and the cities of Zanjan, Shahr-Kord, Bousheher and Ilam from the third cluster. However, there was no accessibility to the required data in Mashad, Kerman, Shahr-Kord and Boushehr, thus they were also excluded from the study. Finally, the cities of Esfahan, Tabriz, Qazvin, Zanjan and Ilam selected as samples of this study.

2.3 Measurement Method for the CDI

The CDI calculated using the following table. Infrastructure, waste, health, education and product of the city are sub-indicators used to calculate the CDI. After measuring each of the sub-indicators, their proportion calculated by multiplying each in a predetermined number. The predetermined numbers are calculated using Principal Components Analysis method. Then, the mean of these sub-indicators used to calculate the CDI. The formula used in this study for calculation of the CDI based on the formula suggested by the UN (1999) and reported in its human development report (www.un.org).

As the mentioned sub-indicators are highly correlated to each other, the various methods to calculate the CDI usually reach to similar numbers.

Table 1 Measurement method of the CDI

Index	Formula
Infrastructure	25 * Water connections + 25 * Sewerage + 25 * Electricity + 25 * Telephone
Waste	Wastewater treated *50 + Formal solid waste disposal * 50
Health	(Life expectancy - 25) * 50/60 + (32 - Child mortality) * 50/31.92
Education	Literacy * 25 + Combined enrolment *25
Product	(log City Product - 4.61) *100/5.99
City Development	(Infrastructure index + Waste index + Education index + Health index +City Product index)/5

Ref: www.un.org

3. Discussion

The increasing attention of urban management system to the urban development project was originated from the three main emergent happening phenomena; "increasing urbanisation growth (city sprawl)", "increasing trends toward urbanism" and "complexities in urban community system". Therefore, urban development project is counted as the basis for economic, social, political, cultural and ethical restructuring in cities, aimed to improve living conditions, participation of the citizens, settling economics of the city and cultural, social and political empowerment of the city.

Objectives of urban development project are as follows: 1) To satisfy the economic requirements of the citizens (occupation and appropriate city services); 2) To satisfy the social and cultural requirements of the citizens (social and cultural facilities); 3) To satisfy the bio-environmental requirements of the citizens (sustainable and healthy environment); 4) To satisfy the political requirements of the citizens (providing possibilities for political participation of citizens). According to these objectives, urban development project, thus, is a collective activity (Mohseni Tabrizi and Agha Mohseni[21], 2010: 152).

The main three aspects of development are: 1) Improvement of living conditions of citizen, 2) Providing conditions to improve self-esteem among citizens, 3) Increasing freedom of people for selection (Seifoldini[16], 2008: 103). Development index is a variable that evaluates various aspects of life including economic, social, cultural and political aspects and then directs these aspects toward the latest objectives of the development. Therefore, this indicator should be a good representative of the level of people's ability for satisfying social and individual needs of themselves, so that this indicator can evaluate improvement level of living conditions of people (Bemanian and Mahmoudi Nejad[3], 2008: 90).

The history of discussions on the price of urban properties and its variations backs to Rikardo, Marks, Marshal and Phon Newman. The earliest theories including the theory of Wingo, Moth and Mils mainly focused on the structure of price of urban properties (Samadi and Moini[18], 2012: 85).

Extensive research has been conducted on determining area differences and ranking areas based on development indicators. The study of Kilisly and Valeri (2000) on poverty level in Middle East and South African countries is an example. Additionally, Nourbakhsh[29] (2003) examined area differences in India and determined the convergence and divergence among these differences. Talani[30] (2003) also examined the development level of rural areas in Saveh city. Khan and Islam[27] (1990) in another study examined the origins of area differences in Spain using a series of socio-economic indicators and Taxonomy method. Yasuri[23] (2000) also ranked the cities of Khorasan province in terms of their developmental level using numerical taxonomy method. Hekmati[6] (2003) also examined inequalities in the cities of East Azarbayjan province, ranked and grouped those cities in terms of their development level. Hosseini and Eskandari[5] (2000) also ranked the provinces of Iran in terms of their development indexes and infrastructural facilities using Taxonomy analysis. Yasuri[24] (2001) examined the suitability of the distribution of funds for agricultural areas and their agricultural capacities in Khorasan province. Kiani[20] (2003) also examined the developmental level in the cities of Kordestn province using numerical taxonomy method. Nourbakhsh[28] (2002) examined the inequalities among Iranian provinces and suggested a model to limit these inequalities. Feyzan[26] (2000) studied various aspects of urban development in Istanbul and proposed an appropriate strategy for management of metropolitans.

Many studies conducted in other countries including India, Philippine, Turkey, Ukraine and Pakistan. Most of these studies examined variations among different areas of these countries in terms of their development level. These studies used various indexes to determine differences in development level of areas. To determine the development level, Principal Component Analysis, HDI index and Morris methods used. The results of these studies mainly indicated a high variation in development level among different areas of the countries. The most important factors used to determine the development level in these studies were employment, education, industry, facilities, health, agriculture and economic status.

There are studies including thesis and national reports, conducted in Iran, to determine and rank the development level of Iranian provinces, cities and villages, listed below:

- A book written by Bemanian and Mahmoudi Nejad[3] (1999) and published by the national organization of urbanities and rural-assisting entitled "welfare-oriented urban development for quality of life improvement".

- An MSc thesis in district and urban planning subject written by Musavi S. A. (2006) from Tarbiat Modarres University entitled "planning for neighborhood development based on social capital".
- A paper published by Ziari K[8]. entitled "evaluation of cultural development level of provinces of Iran" published in Iranian Social Science Journal, N 16.
- A thesis written by Esmaili R. entitled "examining and ranking social development indexes in cities of Esfahan province".
- A book written by Safavi B. (2005) entitled "multivariable analysis and its implication in ranking the provinces of Iran" published by the Institution of Business Research and Studies.

Given extensive research conducted in this research area worldwide, frequent indicators in different aspects including cultural, social, political, economic, bio-environmental, technology and tourism aspects were proposed and studied in some of the large cities in the world.

3.1 Political Indicators

Various political indicators such as those listed below can be used in evaluation of urban development (Razmi et al[7]. 2008: 8): number of organizations involved in management and development of city; the existence of long-term and short-term planning for urban development; subsides and price control policies.

3.2 Socio-Cultural Indicators

Among the extensive research was conducted to evaluate socio-cultural development of cities in the world, the following indicators were the most important ones (Feyzan[26], 2000: 371-377): Population density in different districts of city; education level and proportion of experts in the city; poverty growth rate; unemployment growth rate; crime growth rate; number of religious centers; number of religious groups

3.3 Economic Indicators

The followings are the most important economic indicators to measure urban development level (Kazemi Mohammadi M., 2001; Shakoee, 2000; Feyzan[26], 2000): Urban management budget; distribution of income among different social classes of a community; per capita income of citizens; inflation growth rate; investment rate and attracting foreign capital (resources); Gross Domestic Product (GNP); number of ongoing, completed and pending infrastructural projects; variation of economic activities by type (social service, industrial and commercial activities); status of property distribution in city (proportion of green fields, sport areas, and educational, official, residential, medical, industrial, commercial and religious areas in a city).

3.4 Technological Indicators

In developing countries, application of Informational Technology (IT) in urban development management is relatively new. One of the main problems of urban development management and planning is the production, processing and distribution of information. This is because most resources are wasted for gathering unorganised, scattered and less-accessible data. In decision-making process, the essential data on properties, land, infrastructures and bio-environmental information of city must be accessible (Ghadimi[19], 2000: 37). The most important technological indicators used in measurement of urban development are as follows (Razmi et al[7]. 2008:12): Application of GIS in decision-making centers of city; application of informational technology in administrating centers of city; number of electronic websites to improve public awareness about city issues; application of E-Government in administrating city.

3.5 Bio-Environmental Indicators

Understanding relationships between environment and urban development and also the effects of development on environment is complicated. National environmental resources are important for city development and may affect negatively or positively on the development. The original shape of a city is primarily determined by natural resources, agriculture, fishing, climate and mines. The following indicators may be used to evaluate bio-environmental development of a city (Paranak[4], 2001; Bashirzadegan[2], 1998; Bahraini[1], 2001; Sadoogh[17], 2001): Average rate of water, air and soil pollution in a year; efficiency of sewage system of city; number of citizens who have access to sanitary water and sewage system; investment rate for waste recycling and treatment (Elkin[25], 1994); proportion of lands allocated for green fields and

their distribution in the city; investment in preservation (maintenance) of natural resources; supervision of industrial waste treatment; locations of industrial factories in a city; number of informational centers about environment and their relationship with other organizations.

Given the popularity and clarity of the CDI method and its high acceptability in the world and the inclusion of a limited number but main and measurable factors in the CDI compared to other methods, we chose this method to evaluate the development level of the sample cities in this study.

4. City Development Index (CDI): (www.un.org, 1996)

Many concepts and ideas are associated with urban development. However, none of these multidimensional concepts can be included in a single indicator. Therefore, a number of sub-indicators should use to cover all the aspects associated with the urban development. Two of the most used indicators that confirmed so far are the GDP and the City Development Index (CDI).

The CDI proposed by the second UN-HABITAT conference held in Istanbul in 1996 in order to measuring the development level of cities and then ranking the cities based on this indicator. The CDI included five sub-indicators including infrastructure, waste, health, education and production. The CDI is a useful indicator that provides a relatively fast overview on the development status of cities.

Measurement technique for the CDI is similar to the technique used to measure Human Development Index (HDI) by the UNDP. Five sub-indicators, as mentioned above, is combined to make the synthetic indicator of the CDI ranged 0-100 to rank the development status of the cities.

The CDI versus the HDI: The CDI is a high correlation with the HDI. However, as the CDI measures the development status of different areas of the country rather than measuring the general development of the whole country, as do the HDI, the CDI is a more useful and more representative indicator. The CDI, particularly its health, education and infrastructure variables appropriately evaluates poverty of the cities. The other sun-indicators including infrastructure, waste and production are key variables to measure effectiveness of urban management.

5. Analyses

5.1 Descriptive Findings

The descriptive data, shown in the following descriptive tables, gathered based on the information available in Statistical Yearbooks and website of the Statistical Centre of Iran. Due to the lack of data, life expectancy at birth for all the cities was taken as the same as that for whole country at 73.4 years (mean of life expectancy at birth for men and women in the country). The property price shown in Table 2 is the mean price of one squire meter of a dilapidated building in sample cities and its unit is 1 Thousand Rial (in Iranian currency). Child mortality column indicates the rate of 1-year-old child mortality.

According to the descriptive findings and based on the formula presented in Table 1, the sub-indicators of the CDI for all the selected cities in Iran were calculated. The result reported in Table 3 is as below:

Due to the incomparability of the numbers in the form presented in Table 3, these numbers changed to the

Table 2. Descriptive information of the sample cities

cities	population	price of lot	infrastructure				waste	
			water connections	sewerage connection	electricity	telephone	waste water treated	formal solid disposal
Esfahan	2174172	5167	423926	353043	865789	974652	1	0
Tabriz	1695094	3701	558005	319422	652565	721104	2	0
Qazvin	566773	4226	116436	59908	226528	195991	1	0
Zanjan	486495	2878	16906	15777	157615	191361	1	0
Ilam	213579	2528	49705	32523	66362	66999	1	0

Table 2. (Continued)

cities	health		education		product	
	life expectancy	child mortality	literacy	combined enrolment	city product	log city product
Esfahan	73.40	672	1645390	0	236108	5.37
Tabriz	73.40	572	1328701	0	163684	5.21
Qazvin	73.40	157	437724	0	62094	4.79
Zanjan	73.40	77	753785	0	35419	4.55
Ilam	73.40	63	142828	0	49555	4.70

Ref: authors

Table 4. Calculation of the CDI

cities	infrastructure	waste	health	education	product	cdi
Esfahan	43.16	16.67	49.05	38.19	48.47	39.11
Tabriz	37.12	33.33	41.07	30.84	38.36	36.14
Qazvin	9.87	16.67	7.93	10.16	11.63	11.25
Zanjan	6.29	16.67	1.54	17.50	-3.86	7.63
Ilam	3.55	16.67	0.42	3.32	5.40	5.87

Ref: authors

proportional numbers using the method described earlier in the calculation of the CDI. Then, these numbers multiplied to 100 and placed in a range of 0-100 to make them easily comparable. Finally, by calculating the mean of the sub-indicators for each city, the CDI calculated for the cities. The results are reported in Table 4.

According to Table 4, it can be concluded that the Esfahan city obtained the highest CDI score, thus was the most developed city among the cities studied in this research. Tabriz also had a high CDI score and was the second most developed city. Qazvin gained a moderate score and Zanjan and Ilam had a relatively low CDI scores, thus, had rather poor development.

5.2 Analytical Findings

After calculation of the CDI shown in Table 5, study hypotheses were tested using correlation analysis and regression analysis in SPSS software.

Hypotheses 1: There is a direct relationship between the price of properties and the CDI, so that in cities with higher CDI, properties would be more expensive.

The result of the correlation between the two variables (price and CDI) is shown in Table 6. As shown in the Table, no significant correlation was found between the two variables; therefore, the first hypothesis was rejected.

Hypothesis 2: There is a direct relationship between population size in the city and the CDI, so that in the cities with higher CDI, number of population would be higher.

The result of the correlation analysis between population size and the CDI is shown in Table 7. As shown in the Table, there is a significant correlation between the two variables ($p<0.01$); therefore the second hypothesis was supported by the results.

Hypothesis 3: There is a direct relationship between population size of city and the price of properties, so that in more populated cities, properties would also be more expensive.

Table 8 indicates the result of correlation between population size and the price of properties. As shown in the table, no significant correlation is found between the two variables; therefore, the third hypothesis was rejected.

Based on the results of the correlation analyses reported above, a linear regression analysis was also performed to examine associations between population size and the CDI, as these two variables showed a significant correlation with each other (Table 7). The result of the regression analysis is shown in Table 9 and further depicted in Figure 1.

The result of the regression analysis also confirmed a significant association between population size and the

CDI. Figure 1 show that with increasing population size the CDI also was increased.

Table 5. Study variables

cities	price of lot	population	cdi
Esfahan	5167	2174172	39.11
Tabriz	3701	1695094	36.14
Qazvin	4226	566773	11.25
Zanjan	2878	486495	7.63
Ilam	2528	213579	5.87

Ref: Authors

Table 6. Correlation between the CDI and the price of properties

	Correlations	cdi	price
cdi	Pearson Correlation	1	.730
	Sig. (2-tailed)		.161
	N	5	5
price	Pearson Correlation	.730	1
	Sig. (2-tailed)	.161	
	N	5	5

Table 7. Correlation between population size and the CDI

	Correlations	cdi	price
cdi	Pearson Correlation	1	.988**
	Sig. (2-tailed)		.002
	N	5	5
price	Pearson Correlation	.988**	1
	Sig. (2-tailed)	.002	
	N	5	5

The result of regression analysis in associations between the CDI and population size Coefficients

6. Conclusion

The developmental status of a city (CDI) is not associated with the price of properties. In other words, higher property price in a city does not necessarily indicate that city is more developed. Additionally, study findings did not show an association between price of urban properties and population size in cities. Consequently, this indicates that in central cities of provinces (samples), usually cit-

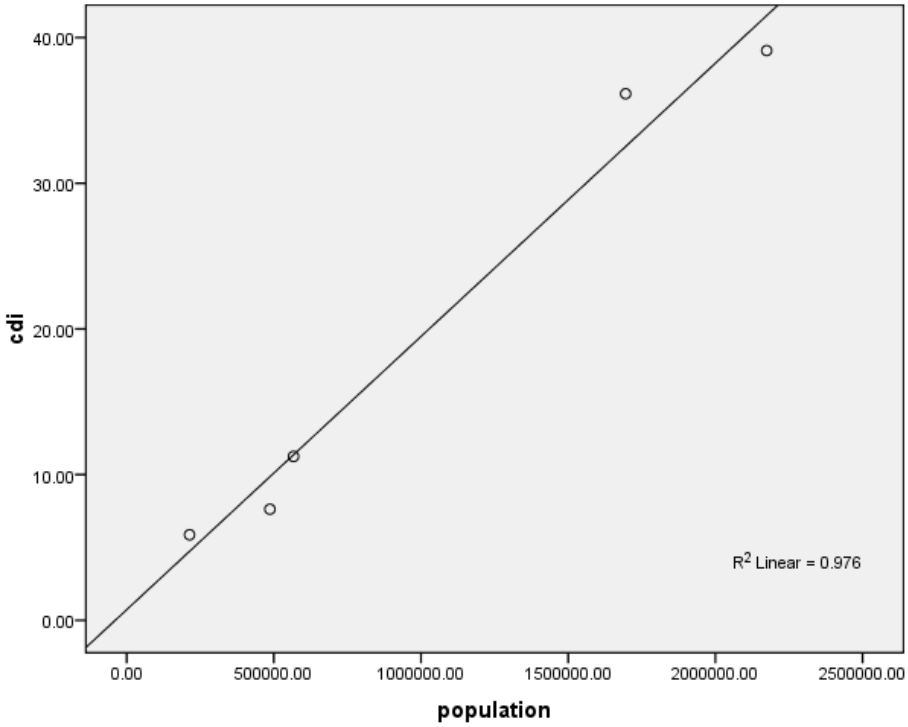

Figure 1. Regression line of associations between population size and the CDI.

ies with more expensive properties, population number is not necessarily high. However, the study findings confirmed that the population size and the CDI in a city are associated with each other. Therefore, it can be concluded that in central cities of provinces selected for this study, with increasing population number, we can expect for having a more developed city (higher CDI).

Table 8. Correlation between population size and price

	Correlations	cdi	price
cdi	Pearson Correlation	1	.784
	Sig. (2-tailed)		.116
	N	5	5
price	Pearson Correlation	.784	1
	Sig. (2-tailed)	.116	
	N	5	5

Table 9. The result of regression analysis in associations between the CDI and population size

co-efficientsa						
Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.735	2.167		.339	.757
	population	1.875E-5	.000	.988	11.084	.002
a. Dependent Variable: CDI						

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