Investigating and Analyzing the Development Level of Townships of Kermanshah Province in Iran Based on Housing Indexes

Hamid Reza Varesi
Associate Professor of Geography and Urban Planning, University of Isfahan, Iran
E-mail: H.Varesi@geo.ui.ac.ir

Aboozar Bakhshi *
PhD Student of Geography and Urban Planning, University of Isfahan, Iran
E-mail: Aboozar.Bakhshi@gmail.com

Morteza Soleimani Shiri
PhD Student of Geography and Urban Planning, University of Isfahan, Iran
E-mail: M_Soleimanishiri@yahoo.com

Abstract
Housing, beside two factors of food and clothing are fundamental needs of human communities, which most planners emphasize the optimal access to its different dimensions. This issue is more representative in Iran because in Iranian constitution, it has been emphasized. Development in dimensions and indexes of housing can represent the development level of societies as well. The present study is a descriptive-analytical one conducted with the objective of investigating the level of development in the townships of Kermanshah Province in housing indexes. The data collection method is document analysis and field study. To obtain the main objective of the study, 21 indexes related to housing were used. Further, for weighting indexes of the research, the questionnaires distributed among 30 individuals of authorities and experts of Housing Foundation and Road Constructionand Urban Development Office as well as university professors experienced in housing field were used. To determine the development of the township of the Kermanshah Province, TOPSIS and AHP techniques, Cluster Analysis and GIS were used. The findings of the research indicated that among 14 townships of the province, three townships of Kangavar, Sahneh and Harsin respectively with priority coefficients 0.636, 0.554, and 0.521 enjoyed the highest level of development and three townships of Salas-e Babajani, Paveh and Dalahou respectively

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∗ Corresponding author. Tel. : +98 913 729 8477

with priority coefficients of 0.116, 0.242 and 0.242 have the lowest level of development. In addition, about 29 percent of the townships of the province (22.77 percent of the area of the province) are at very high and high levels of development, 14 percent (31.1 percent of the area of the province) at the moderate level, and 57 percent of the townships (46.14 percent of the area of the province) are at deprived or very deprived levels. Finally, the development situation of eastern townships of the province is more favorable than the western half it in terms of housing indexes.

Key words: Housing, Housing indexes, Development, TOPSIS, Cluster Analysis, Kermanshah

Introduction

Development is a process during which societies can change from the primary underdeveloped conditions to developed ones by passing more or less same evolutionary stagesand enduring qualitative and quantitative transformations (Nasiri, 2000). In the idea of experts of development, there are different interpretations for the word development, among which one can refer to the increase in production, the increase in productivity, the promotion of quantitative and qualitative levels of life, the promotion of healthcare levels, eliminating problems, unemployment and inflation, the supply of economic and social needs. Enjoying education, cultural and active participation in different domains, and etc (Todaro, 1999).

Doubtlessly, development is considered a dynamic and ever-changing process which is based on social and economic conditions of the societies and is an evolutionary process for enabling human being and caring his residence in a fair path for protecting the rights of all generations. Hut, it is not based on historical processes and land capacities and realities of the degree of influencing developmentalprocessesin different dimensions, domains and the type of participation of all players and on the other hand, the quiddity and degree of the benefits of shareholders from the results of developmental measures per the same temporal and spatial conditions; therefore, the indexes can be considered a the starting point and the main instrument for monitoring policies, executive measures and controlling the consequences of development for proper monitoring of rural development (Qadirimasoum & Akbarpoor, 2011). Housing indexes, as the main foundation of a comprehensive plan and a necessary instrument for stating different economic, social, cultural, environmental and physical dimensions of housing, enjoys a specific status in the issue of housing planning (Farakhlou, Shabanifar, & Hussain, 2009).

Housing, during different periods of human life has been represented in different forms. This phenomenon made by humans, is one of the representations of human civilization which during many years has been dependent on facilities and conditions present in the natural environment of human communities. Housing is among the most fundamental and sensitive parts in economic and social development planning (Azizi, 2004). Housing is something more than a merely physical shelter and includes all required general services and facilities for a better life for human beings and it should provide the long term and safe lien for the user (Napp, 1982). In many cases, the most important factors affecting the degree of individuals' satisfaction with the residence in a neighborhood, housing and its environmental conditions (Westaway, 2006). However housing is the main factor of individuals' socialization in the world and is main goods in the social organization, it is space which has a determining role in shaping personal identity, social relations and collective objectives (Short, 2006).

Regarding the development level of regions and also regarding housing and its indexes, there have been multiple studies in Iran and the world which some of them are presented as follows:

Mousavi (2009), in an analysis of the state of rural housing in Iran in 2006, obtained these results that investigating the qualitative and quantitative states of rural housing by the use of the estimations of Statistical Center of Iran and the results of Population and Housing Census comparing it with the published state in Population and Housing Census of 1996 and before that indicate relative improvement in qualitative state of housing units in terms ofmore resistible building materials such assteel and concrete structures on the one hand, and the reduction in using weakness materials such as wood and mud brick in building residential units. These processes indicate the relative improvement of the degree of the resistance of rural residential units against destructive natural forces such as earthquakes (Mousavi, 2009).

Bahrami (2010), in his research with the objective of analyzing the state of rural housing of Kermanshah Province and creating solutions for strengthening rural housing, introduced housing as the most important need of human beings. The findings of the research indicated that rural regions of Kermanshah in 2006 were lacking in 17779 residential units and in terms of strength, 43.8% of rural housings were strong, 33.9% were weak and 22.2% of them wereflimsy (Bahrami, 2010).

Bahrami (2011), in his research, investigated the identification of the state of housing indexes in rural regions of Kermanshah Province. He pursue to answer this question what is the state of constructing rural housing in Kermanshah Province in terms of qualitative and quantitative standards? The results obtained from the study indicated that only 43.8 percent of rural housings are strong and more than 74 percent of them have less than a 100 meter infrastructure area and 25 percent of them are more than 25 years old (Bahrami, 2011).

Seydaee et al. (2011), in their research titled as "leveling and analyzing the indexes of rural housing in Isfahan Province using factor analysis and cluster analysis", indicated that among 5 factors of infrastructure, welfare, ownership, facilities and strength, the infrastructure factor explained 33.235 percent of the variance and was consider as the most influential factor in their study. In addition, the results indicated that rural areas of the province were divided into 7 homogeneous groups based on which rural areas of Isfahan Township was at the highest level (Seydaee, Hedayati, & Fathi, 2011).

Momeni and Saber (2011), in a research titled as "determining the development of Naein City in Isfahan Province using Numerical Taxonomy Model" concluded thatthe concentration facilities and services is in the center of the province and the majority of cities in the province are developing areas (Momeni & Saber, 2011).

Mohammadi et al. (2012), investigated the development level of the townships of Lorestan Province separated by sections of housing, welfare-infrastructural services, agriculture and industry. The results of their study indicated that inequality among the townships of the province during the investigated time period (2003-2008) in the sections of housing and welfare-infrastructural services increases and in the sections of agriculture and industry decreases (Mohammadi, Abdoli, & Fathi, 2012).

Egu (1994), investigated housing quality in Nigeria. The results of his study indicated that one of the basic problems of housing in rural areas of Nigeria is low housing quality. In addition, the inattention to rural housing compared to urban housing is considered as an issue to which policymakers and planners should pay serious attention (Ogu, 1994).

The development level or access to facilities and services of social welfare and well as fair distribution of them in provinces and townships is considered very important and valuable. In Kermanshah, as most of the provinces of developing countries is developing in economic and social dimensions, one or two townships or finally some regions have the main responsibility regarding creating income, production, public services and consequently social-economic flourishing. These issues cause the underdevelopment of other regions. In other words, the townships of Kermanshah Province, in terms of enjoying different development indexes have very differences and housing indexes as dimensions of development suffer from heterogamous geographical distribution among the townships of this province. In this line, the objective of the present study is to investigate the development level of the townships of Kermanshah Province in terms of housing indexes. In addition, using different statistical methods, it tries to answer this question that how is the state of development of the townships of Kermanshah Province in terms of housing indexes?

Introducing the studied scope

Kermanshah Province is in Iran and is located at longitude 33 degrees 40 minutes, 35 degrees 18 minutes East and latitude45 degrees 24 minutes to 48 degrees 7 minutes north. This province with 25038 Km2 area, has a population of 1945227 individuals in 2011. The rate of urbanization and rural population of this province is 69.66% and 30.15% respectively (Population and Housing Census of Kermanshah, 2011). In table 1, the spatial location of the province separated by its townships in Iran is illustrated.
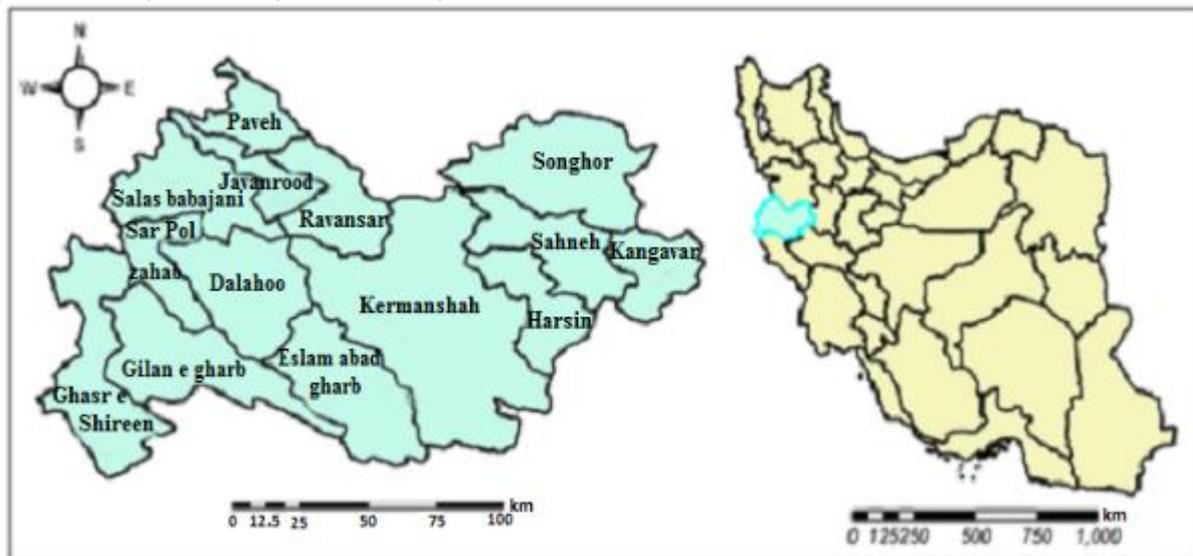

Figure 1: the geographical location of Kermanshah in Iran

Research methodology

By emphasizing the systemic attitude, in the present study a descriptive-analytical method was employed; in such a way that firstly, required data and statistics related to housing of the townships of Kermanshah Province were collected, then using TOPSIS model, the townships of the province were prioritized based on housing indexes.

To determine the weight of research indexes, using AHP and via pairedComparisons Analysisthe degree of their importance were identified. For paired comparisonsof indexes, the questionnaire of Decision Matrix Inventory were distributed among some of the authorities and experts of Housing Foundation and Road Construction and Urban

Development Office as well as university professors experienced in housing field. Then, the tables were completed ranging from 1-9 based on Dr. Sa'ati's 9 quantities table. Afterwards, to investigate the townships of the province in homogenous groups, the final results of TOPSIS technique were entered SPSS and using Cluster Analysis, the townships were classified into five groups of highly bestowed, bestowed, relatively bestowed (moderate level), deprived, and very deprived in terms of housing indexes. At last, to illustrate spatially the state of development of the townships in housing indexes, the results of cluster analysis were entered GIS software program and the townships were illustrated on the map based on the five mentioned groups.

Investigated indexes in the research

To determine the state of development of the townships of Kermanshah Province in terms of housing indexes, used the 21 indexes:

X1: the percentage of enjoymentof electricity; **X2:** the percentage of enjoyment oftelephone; **X3**: the percentage of enjoyment ofsanitarywater; **X4:** the percentage of enjoyment ofgas; **X5:** the percentage of enjoyment ofkitchen; **X6**: the percentage of enjoyment ofbathroom; **X7:** the percentage of enjoyment ofWC; **X8:** the percentage of enjoyment ratio from estate housing of lands and building; **X9**: the percentage of enjoyment ratio from estate housing of lands; **X10:** The proportion of households using natural gas for cooking; **X11:** The proportion of households using natural gas for heating; **X12:** The proportion of households using natural gas for supplying hot water; **X13**: the proportion of metal housing units to all housings; **X14:** the proportion of concrete housing units to all housings; **X15:** the percentage of 101-150 m2 housing units; **X16:** the percentage of 151-200 m2 housing units; **X17:** the percentage of 201 m2 and bigger housing units; **X18:** per capita of housing units (per a household); **X19:** per capita of housing units (per anindividual); **X20:** per capital of rooms (per a household); **X21**: per capital of rooms (per an individual).

Research findings

1. TOPSIS technique

Prioritizing the townships of Kermanshah Province in terms of housing indexes was conducted regarding 8-staged TOPSIS technique as follows:

The first stage: constructing data matrix (Aij) based on m alternatives and n indexes (table 1):

$$A_{ij} = \begin{bmatrix} a_{11} & \cdots & a_{1n} \\ \vdots & \ddots & \vdots \\ a_{m1} & \cdots & a_{mn} \end{bmatrix}$$

The second stage: de-scaling data and constructing standards data (R) whose results are illustrated in table 2.

$$r_{ij} = \frac{a_{ij}}{\sqrt{\sum_{k=1}^{m} a_{kj}^2}} \qquad \rightarrow \qquad R_{ij} = \begin{bmatrix} r_{11} & \cdots & r_{1n} \\ \vdots & \ddots & \vdots \\ r_{m1} & \cdots & r_{mn} \end{bmatrix}$$

Table 1: Matrix (Aij)

Indexes of Towns	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	X17	X18	X19	X20	X21

hips																					
Eslamabad-e gharb	9/99	31/73	6/93	22/0	71/83	82/81	87/99	44/58	8/4	02/0	0	26/0	83/9	08/4	35/31	4/7	73/2	85/0	19/0	88/2	65/0
Paveh	35/99	92/85	65/96	08/0	2/92	14/95	71/99	4/68	01/2	08/0	0	08/0	1/2	88/1	18/27	5/4	81/0	99/0	25/0	88/2	73/0
Salas-e babajani	57/95	3/31	1/71	0	5/80	66/78	4/93	96/79	34/0	0	0	0	81/38	46/1	84/5	44/0	22/0	98/0	2/0	37/2	48/0
Javanrood	49/99	47/59	66/94	62/2	46/87	58/90	57/99	14/66	96/0	55/2	4/2	67/2	56/25	7/1	31/16	26/2	62/0	94/0	2/0	7/2	59/0
Dalahoo	61/99	8/39	56/88	0	47/67	85/65	96/99	08/79	69/0	0	0	0	41/3	46/0	57/19	67/8	94/3	1	23/0	7/2	61/0
Ravansar	63/99	51/55	37/91	89/23	16/90	03/90	94/98	17/76	9/0	04/26	07/26	01/26	9/5	35/0	81/21	45/3	29/1	91/0	2/0	8/2	62/0
Sarpol-e zahab	52/98	5/66	09/94	36/0	88/91	19/88	73/98	97/68	63/0	3/0	25/0	38/0	98/3	25/9	72/36	45/5	14/1	86/0	19/0	55/2	55/0
Songhor	67/99	04/64	21/76	35/50	03/78	55/69	100	63/76	05/2	99/56	96/56	98/56	15/7	82/1	23	87/8	28/3	88/0	22/0	72/2	67/0
Sahneh	79/	38/	07/	82/	5/	57/	98/	34/	42	48/	48/	51/	18/	38/	76/	02	12	88	22	78	69

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	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	X17	X18	X19	X20	X21
	99	60	94	47	81	69	99	75	/1	54	54	54	12	11	25	/7	/2	/0	/0	/2	/0
Ghasr-e shireen	74/99	95/69	05/97	0	51/96	85/92	84/99	39/52	32/22	0	0	0	23/17	46/7	9/31	65/10	4/5	87/0	19/0	85/2	63/0
Kermanshah	71/99	02/83	42/93	27/76	93/89	62/88	95/99	44/58	8/4	0	0	0	69/17	16/3	24/25	17/10	86/4	87/0	21/0	69/2	66/0
Kangavar	8/99	04/75	62/95	47/76	56/89	52/78	98/99	27/70	87/2	92/86	88/86	88/68	81/10	39/1	27/26	99/9	39/3	88/0	22/0	61/2	64/0
Gilan-e gharb	72/99	79/62	75/83	0	23/89	21/71	32/99	88/84	53/0	0	0	0	01/2	98/5	22/65	6/10	32/2	52/0	11/0	52/1	33/0
Harsin	46/99	02/71	17/96	15/66	82/72	81/67	100	77/71	78/0	11/66	96/65	06/66	86/5	44/1	27/21	97/6	67/4	1	23/0	64/2	6/0

Resource: research findings

Table 2: Matrix (R) of de-scaling data

Indexes of Townships	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	X17	X18	X19	X20	X21
Eslamabad-e gharb	269/0	299/0	276/0	002/0	262/0	269/0	269/0	220/0	560/0	0	0	002/0	221/0	218/0	281/0	261/0	236/0	254/0	246/0	291/0	284/0
Paveh	267	350	285	001	288	313	269	257	234	001	0	001	047	101	243	159	070	296	323	291	319

	/0	/0	/0	/0	/0	/0	/0	/0	/0	/0		/0	/0	/0	/0	/0	/0	/0	/0	/0	/0
Salas-e babajani	257/0	128/0	209/0	0	252/0	259/0	252/0	301/0	040/0	0	0	0	086/0	078/0	052/0	016/0	019/0	293/0	259/0	240/0	210/0
Javanrood	268/0	243/0	279/0	018/0	274/0	298/0	268/0	249/0	112/0	019/0	018/0	019/0	575/0	091/0	146/0	080/0	054/0	281/0	259/0	273/0	258/0
Dalahoo	268/0	162/0	261/0	0	211/0	217/0	269/0	297/0	080/0	0	0	0	077/0	025/0	175/0	306/0	341/0	299/0	297/0	273/0	267/0
Ravansar	268/0	226/0	269/0	163/0	282/0	296/0	266/0	287/0	105/0	190/0	190/0	190/0	133/0	019/0	195/0	122/0	112/0	272/0	259/0	283/0	0.271
Sarpol-e zahab	265/0	271/0	277/0	002/0	287/0	290/0	266/0	259/0	073/0	002/0	002/0	003/0	315/0	495/0	329/0	192/0	099/0	257/0	246/0	258/0	241/0
Songhor	268/0	249/0	224/0	344/0	244/0	229/0	269/0	288/0	239/0	415/0	415/0	415/0	161/0	097/0	206/0	313/0	284/0	263/0	284/0	275/0	293/0
Sahneh	269/0	246/0	277/0	327/0	255/0	229/0	269/0	283/0	166/0	397/0	397/0	397/0	274/0	609/0	231/0	248/0	183/0	263/0	284/0	281/0	302/0
Ghasr-e shireen	268/0	285/0	286/0	0	302/0	306/0	269/0	197/0	270/0	0	0	0	388/0	399/0	286/0	376/0	467/0	260/0	246/0	288/0	276/0
Kerma	268	339	275	521	281	292	269	220	560	0	0	0	398	169	226	359	420	260	272	272	289

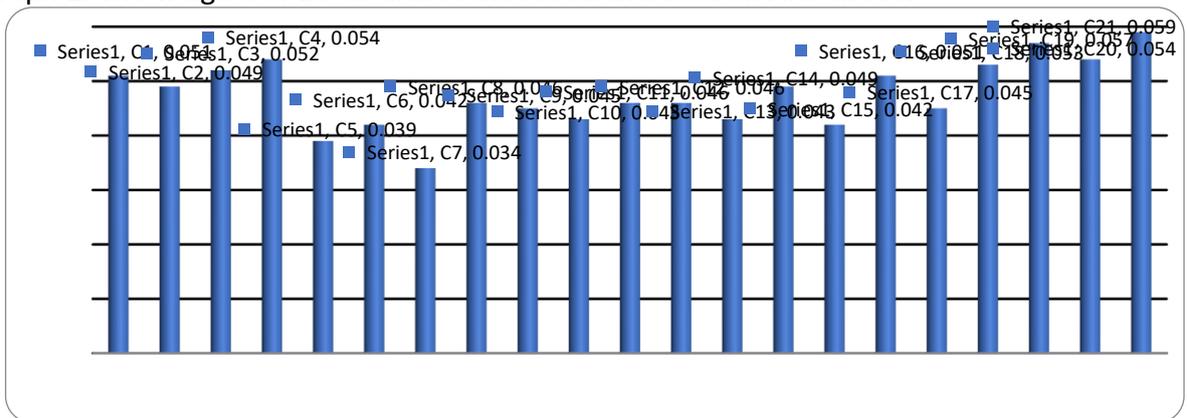|	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20	C21
nsh ah	/0	/0	/0	/0	/0	/0	/0	/0	/0				/0	/0	/0	/0	/0	/0	/0	/0	/0
Kan gav ar	269/0	306/0	282/0	522/0	280/0	258/0	269/0	264/0	335/0	633/0	6334/0	633/0	243/0	074/0	235/0	353/0	293/0	263/0	284/0	264/0	280/0
Gila n-e gha rb	268/0	356/0	247/0	0	279/0	234/0	267/0	319/0	062/0	0	0	0	045/0	320/0	584/0	374/0	201/0	155/0	142/0	154/0	144/0
Har sin	268/0	290/0	283/0	452/0	228/0	223/0	269/0	270/0	091/0	482/0	481/0	482/0	132/0	077/0	190/0	246/0	404/0	299/0	297/0	267/0	262/0

Resource: research findings

The third stage: determining the weight of each index (wi) based on the following equation:

$$\sum_{i=1}^{n} W_i = 1 \qquad \rightarrow \qquad V_{ij} = \begin{bmatrix} w_1 r_{11} & \cdots & w_n r_{1n} \\ \vdots & \ddots & \vdots \\ w_1 r_{m1} & \cdots & w_n r_{mn} \end{bmatrix}$$

To calculate the weight of each index, different methods such as Delphi technique, AHP, PCA, entropy Shannon, and etc. are available. In the present study, AHP technique was used for weighting research indexes. In graph 1, the weight of each index based on AHP is illustrated.

Graph 1: The weights of 18 criteria of the research based on AHP model

Series1, C1, 0.053; Series1, C2, 0.049; Series1, C3, 0.052; Series1, C4, 0.054; Series1, C5, 0.039; Series1, C6, 0.042; Series1, C7, 0.034; Series1, C8, 0.046; Series1, C9, 0.045; Series1, C10, 0.048; Series1, C11, 0.046; Series1, C12, 0.046; Series1, C13, 0.043; Series1, C14, 0.049; Series1, C15, 0.042; Series1, C16, 0.051; Series1, C17, 0.045; Series1, C18, 0.053; Series1, C19, 0.057; Series1, C20, 0.054; Series1, C21, 0.059

Resource: research findings

The above graph indicates that among 21 indexes, the index of per capita of rooms with the weight of 0.059 has the highest importance and the index the percentage of enjoyment of WC with 0.034 has the least importance according to the ideas of the experts related to housing field. After calculating the weight of each indexes, matrix V was constructed (table 3). In fact, matrix V is the result of multiplying standard values of each index by its related weight (i.e. Matrix R multiplied by the weight if each index).

The fourth and fifth stages: determining the distance of i alternative from ideal alternative (the highest performance of each index (A^*)) and determining the distance of i alternative from the minimum ideal alternative (the lowest performance of each index (A^-)) based on the following equation illustrated in table 3:

$$A^* = \{(maxv_{ij}|j \in J),(minv_{ij}|j \in j)\} \qquad \rightarrow \qquad A^*\{v_1^*, v_2^*, \dots, v_n^*\}$$
$$A^- = \{(minv_{ij}|j \in J),(maxv_{ij}|j \in j)\} \qquad \rightarrow \qquad A^-\{v_1^-, v_2^-, \dots, v_n^-\}$$

Table 3: De-scaled weighted matrix (matrix V)

3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	
9	0/028	6/715	6/411	7/910	4/779	12/436	0/003	0	0/041	5/144	4/455	6/684	5/122	5/24
2	0/010	7/396	7/454	7/897	5/593	5/208	0/014	0	0/013	1/099	2/053	5/795	3/114	1/55
5	0	6/457	6/163	7/398	6/539	0/881	0	0	0	1/994	1/594	1/245	0/305	0/42
9	0/331	7/016	7/097	7/889	5/408	2/487	0/432	0/381	0/423	13/375	1/856	3/477	1/564	1/19
4	0	5/412	5/159	7/917	6/467	1/788	0	0	0	1/784	0/502	4/172	6/001	7/57
3	3/021	7/232	7/054	7/836	6/229	2/332	4/414	4/134	4/122	3/087	0/382	4/650	2/388	2/47
7	0/046	7/370	6/910	7/820	5/640	1/632	0/051	0/040	0/060	7/315	10/100	7/829	3/772	2/19
5	6/368	6/259	5/449	7/920	6/266	5/311	9/659	9/032	9/031	3/741	1/987	4/904	6/139	6/30
6	6/048	6/538	5/451	7/919	6/161	3/679	9/234	8/638	8/639	6/373	12/426	5/492	4/859	4/07
5	0	7/742	7/275	7/908	4/284	6/011	0	0	0	9/016	8/146	6/801	7/371	10/3
9	9/646	7/214	6/944	7/916	4/779	12/436	0	0	0	9/256	3/450	5/381	7/039	9/33
4	9/671	7/184	6/152	7/919	5/746	7/436	14/732	13/776	13/770	5/656	1/518	5/601	6/914	6/51
2	0	7/158	5/579	7/866	6/941	1/373	0	0	0	1/052	6/530	13/905	7/336	4/45
5	8/366	5/841	5/313	7/920	5/869	2/021	11/205	10/459	10/470	3/066	1/572	4/535	4/824	8/97
5	9/671	7/742	7/454	7/920	6/941	12/436	14/732	13/776	13/770	13/375	12/426	13/905	7/371	10/3
5	0	5/412	5/159	7/398	4/284	0/881	0	0	0	1/052	0/382	1/245	0/305	0/42

Resource: research findings

The sixth stage: determining the distance criterion for ideal alternative (Si *) and the minimum alternative (S_i^-) which separately were calculated for the townships of the province as follows:

$$S_i^* = \sqrt{\sum_{j=1}^{n}(v_{ij} - v_j^*)^2} \quad S_i^- = \sqrt{\sum_{j=1}^{n}(v_{ij} - v_j^-)^2}$$

Table 4: Determining the distance criterion for positive ideal alternative and negative ideal alternative

Township	S+	S-	Township	S+	S-
Eslam abad-e gharb	30.230	16.716	Songhor	21.138	21/010
Paveh	34.105	10.850	Sahneh	18.715	23.242
Salas-e babajani	37.575	4.919	Ghasr-e shireen	28.824	19.260
Javanrood	33.125	14.068	Kermanshah	27.836	22.185
Dalahoo	34.804	11.133	Kangavar	17.133	29.945
Ravansar	29.534	11.170	Gilan-e gharb	32.784	16.792
Sarpol-e zahab	31.144	15.010	Harsin	21.841	23.765

Resource: research findings

The seventh and eighth stages: in these stage, firstly, via the equation $c_i^* = \frac{s_i^-}{s_i^- + s_i^*}$, the coefficient c_i^* was calculated for each township. Then, townships were ranked based on the value of c_i^* (table 5). The value c_i^* is ranging from 0 to 1. In this line, $c_i^* = 1$ indicates the highest rank and $c_i^* = 0$ indicates the lowest rank.

Table 5: priority coefficient and rank of the townships of Kermanshah Province based on the results of TOPSIS

Township	priority coefficient c_i^*	rank	Township	priority coefficient c_i^*	rank
Eslam abad-e gharb	0.365	7	Songhor	0.498	4
Paveh	0.241	13	Sahneh	0.554	2
Salas-e babajani	0.116	14	Ghasr-e shireen	0.401	6
Javanrood	0.298	10	Kermanshah	0.444	5
Dalahoo	0.242	12	Kangavar	0.636	1
Ravansar	0.274	11	Gilan-e gharb	0.339	8
Sarpol-e zahab	0.325	9	Harsin	0.521	3

Resource: research findings

The results of the above table indicate that among the townships of Kermanshah Province, three townships of Kangavar, Sahneh and Harsin respectively with priority coefficients 0.636, 0.554, and 0.521 enjoyed the highest level of development and three townships of Salas-eBabajani, Paveh and Dalahou respectively with priority coefficients of 0.116, 0.242 and 0.242 have the lowest level of development. To clarify the results of TOPSIS in prioritizing townships in terms of enjoying from housing indexes, the final results the above technique are illustrated in graph 2.

Graph 2: Prioritizing townships in terms of enjoying from housing indexes based on TOPSIS model
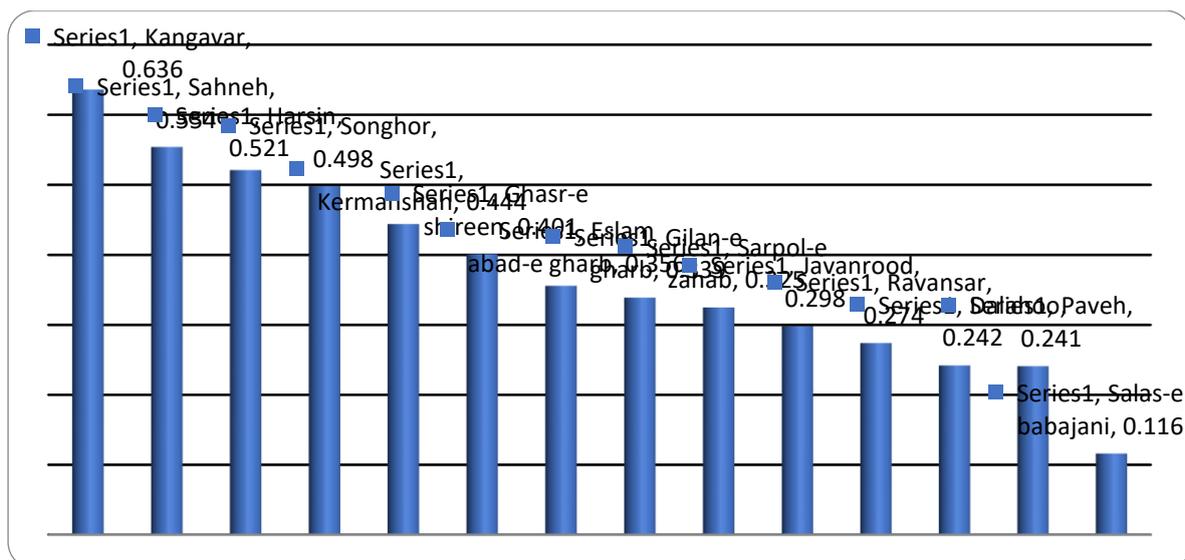
Resource: research findings

The results of the above graph indicate the gap and inequality in the townships of Kermanshah Province in terms of enjoying from housing indexes because the priority coefficient of the most bestowed township (Kangavar) was about 5.5 times more than the most deprived one (Salas-eBabajani).

2. Cluster analysis technique

After conducting the stages of TOPSIS technique and calculating the total scores of each township and determining their status in terms of enjoying from housing indexes, ranking the townships of the province was conducted. To do so, the hierarchical clustering methods, due to its more applicability in geographical studies was used. Accordingly, regarding the objective the research and the statistical data, Average Linkage Method, as one of cluster aggregation methods in AHP was used. Cluster analysis technique classifies the townships which has the most similarity in terms of obtained scores in a cluster. Accordingly, cluster analysis classified the townships of the province in term of their scores obtained from TOPSIS into 5 homogeneous clusters which they were named regarding the state of each cluster, in such a way that the townships were classified into five levels of highly bestowed, bestowed, relatively bestowed (moderate level), deprived and very deprived in terms of enjoying housing indexes (graph 3).
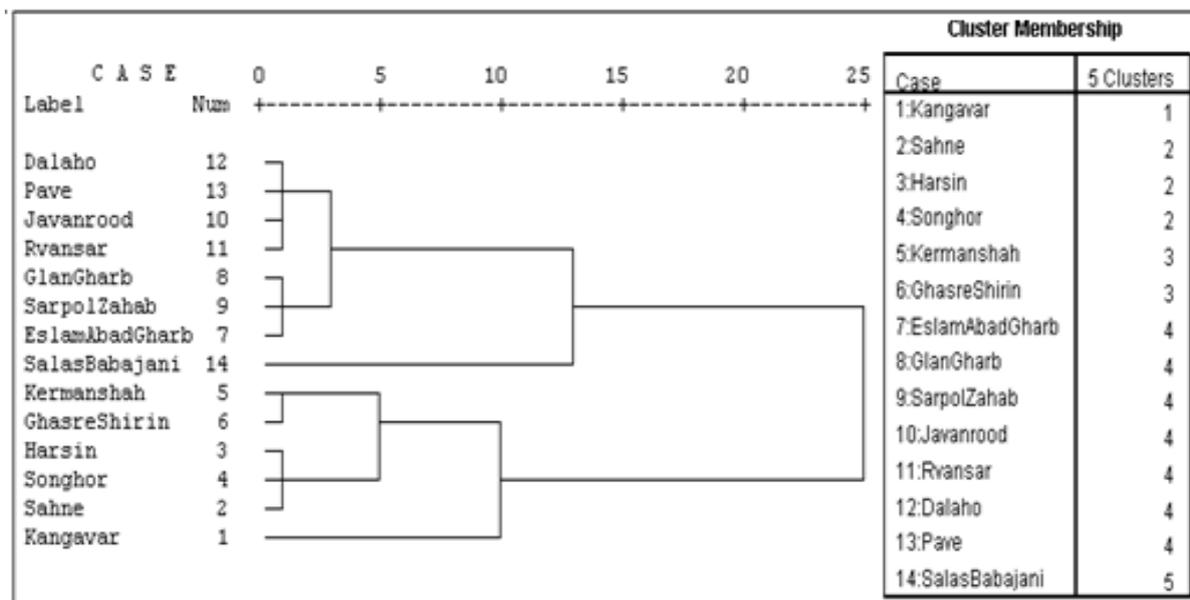
Graph 3: The enjoyment level of the townships of Kermanshah Province based on the cluster analysis technique

The comparing of the results of the above graph with those of TOPSIS technique indicates that the townships of Kermanshah Province were classified into five homogenous clusters in terms of enjoying housing indexes:

The first level; highly bestowed townships: only Kangavar is in this level. The place of this township in this level indicates the priority of it over other townships in enjoying most of housing indexes.

The second level; bestowed townships: in this level, three townships of Sahneh, Harsin and Songhor are present. In fact, these three townships have better conditions than 71 percent of the townships of the province do in terms of development in housing indexes.

The third level; relatively bestowed townships (moderate level): two townships of Kermanshah and GhasrShirin, by being placed in the moderate development level in terms of enjoying housing indexes, have poorer conditions than about 27 percent of the townships of the province do and have better conditions than about 57 percent of the townships do.

The fourth level; deprived townships: in this level, there are 50 percent of the townships of Kermanshah Province. In fact, the place of the seven townships ofEslamabad-e Gharb, Gilan-e Gharb, Sarpol-e Zahab, Javanrud,Ravansar, Dalahu and Paveh at the deprived level indicates unfavorable conditions of most of the townships in the province in terms of enjoying housing indexes.

The fifth level; highly deprived townships: at the highly deprived level only the township of Salas-e Babajani is placed. In fact, the place of this township at this level indicate its very poor rank of these townships compared to other ones in terms of enjoying housing indexes.

In general, the results obtained from the cluster analysis indicated that about 7 percent of the townships are at the highly bestowed level, 21 percent at the bestowed level, 14 percent at the relatively bestowed level, 50 percent at the deprived level, and 7 percent are at the highly deprived level in terms of the development in tourist infrastructures.

3. GIS software

To illustrate the development level of the townships of Kermanshah Province, the results obtained from cluster analysis were entered GIS (fig. 2).
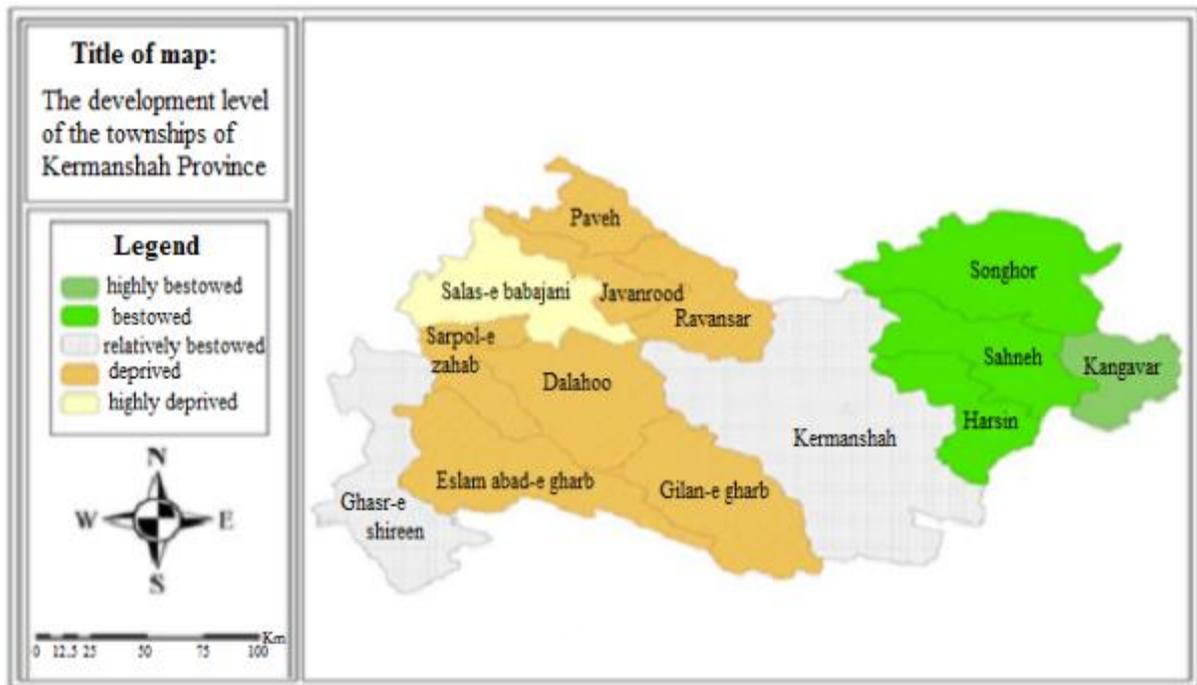
Figure 2: Illustrating the development level of the townships of Kermanshah Province based on housing indexes

At the first view, the fig. 2 indicates the development space dominant over Kermanshah province in terms of development in housing indexes, moderate and moderate-to-low development levels. Further, if Kermanshah Province can be divided into two western and eastern half, the state of development in housing indexes in the eastern part of the province is relatively better that those of the western part. Among the main reasons of the poor housing indexes in the western half of the province, one can refer to the farness from Iran's development poles, being located in border, conditions due to the war, unfavorable natural conditions (topography) and etc.

In general, in terms of development in housing indexes in Kermanshah province, 3.56 percent of the area of the province are at the highly bestowed level, 19.21 percent at the bestowed level, 31.1 percent at the moderate level, 39.46 at the deprived level, and 6.68 percent are at the highly deprived level.

Conclusion

Favorable housing is one of the most important needs of human beings, and is considered as one of the determiners of the development of todays' societies in such a way that it is one of the challenges in today's societies, particularly in developing ones. The results of the present study conducted with the aim of investigating the development level in housing indexes for the case of the townships of Kermanshah Province in Iran indicated that:

- Among 21 investigated indexes, the index of the per capita of rooms with the weight of 0.059 had the highest importance and the index of the percentage of enjoyment of housings from WC with the weight of 0.034 had the lowest importance from the perspectives of the experts related to housing issues. Therefore, most of the experts believed that the above-mentioned indexes, totally are proper for evaluating housing development. However, most of them believed that the index of the per capita of rooms indicated both individuals' welfare and convenience level in a house and better

economic state as well as less household dimension. Therefore, from the perspective of the experts, the mentioned index has the most weight and the index of the enjoyment of WC, in spite of the importance coefficient 0.034, had the least weight among the investigated 21 indexes.

- Three townships of Kangavar, Sahneh and Harsin respectively with priority coefficients 0.636, 0.554, and 0.521 enjoyed the highest level of development and three townships of Salas-e Babajani, Paveh and Dalahu respectively with priority coefficients of 0.116, 0.242 and 0.242 have the lowest level of development.
- the gap and inequality in the townships of Kermanshah Province in terms of enjoying from housing indexes indicated the priority coefficient of the most bestowed township (Kangavar) about 5.5 times more than the most deprived one (Salas-e Babajani).
- About 29 percent of the townships of the province (22.77 percent of the area of the province) are at very high and high levels of development, 14 percent (31.1 percent of the area of the province) at the moderate level, and 57 percent of the townships (46.14 percent of the area of the province) are at deprived or very deprived levels.
- The state of the development of the eastern townships in the province in terms of housing indexes is more favorable than those in the western half.

In general, among the townships of Kermanshah Province, in terms of enjoyment of housing indexes, there are gaps and inequality which can be indicated in terms of gap between the western and eastern regions of the province. Among the main reasons of this phenomenon on can refer to natural conditions and rugged topography, and consequently the lack of feasible access to the western half of the province, the farness from Iran's development poles, being located in border which can be one of the most important reasons of the investment of private and public sectors in these townships, the conditions due to Iran-Iraq war, poor balanced regional planning by the planners of the province and etc.

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