Identification And Prioritization of Integrated Metropolitan Area Management Indicatorscase Study: Mashhad Metropolitan Area

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ABSTRACT

The management of metropolitan areas requires correction. Special organizational structures or arrangements must be created and stabilized for metropolitan area management. In such areas, the managerial domain of the metropolis must be a correlated complex of singular and separated units, so that harmonious regional policy-making will become possible. This article has been carried out to identify and rank the indicators of the integrated management of metropolitan areas. Considering the practical objective and the procedure, the research method for this article is of the survey type. Questionnaires have been used in two stages in this article. The experts of urban area management have been chosen as the statistical population. The sampling method is purposive. SWARA method has been applied for analyzing. SWARA is one of the multiple attribute decision making (MADM) methods. Results of summarizing theoretical topics, show that 9 criteria such as planning integration, institutional and organizational integration, decentralization of resources and authority, assignment of affairs to lower ranks, legality of policies, law enforcement methods, collaboration networks, presence of a council and the operational and executive authority of managers are effective in achieving integrated management of metropolitan areas. These 9 criteria include 17 indicators. Furthermore, between the identified indicators, four items, namely the presence of a coordinating organization for various managerial domains, with final weight (0.67) the existence of a common protocol and outlook, With final weight (0.204), policy-making on a metropolitan scale and the municipalities' With final weight (0.07), independent budget from the central government, With final weight (0.029), have the highest importance, respectively.

Keywords: Integrated management, Metropolitan area, Neo regionalism, SWARA

1. Introduction

Metropolitan areas in underdeveloped countries suffer from issues such as social, economic and spatial inequality, an unbalanced residential system, plummet in natural environment grade, domination of activities and purposes of property developers on predetermined decisions of the public sectors, etc [1]. Policy makers have been searching for the best method of metropolitan area management for a long time. It has also been a subject for academic discussions [2]. Management and planning on a metropolitan scale cannot be limited to the borders and domain of the city [3]. Metropolitan areas should manage diverse territories [4].

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Their management goes beyond local management and areas of government territories, such as urban and suburban societies and surrounding cities exist within them [4], [5], [6]. Metropolitan government includes a wide range of organizational forms, monitoring approaches and governmental projects [7]. In fact, in can be claimed that the economic and social future of metropolitan areas and their suburbs are interlinked; meaning that the occurrence of any phenomena in these areas, affects others as well [8].

If preparations for confronting the issues of metropolises aren't foreseen, problems such as destruction of fertile lands and nonrenewable resources, increase in fuel and energy usage, and the increasing air and water pollution, which cause and aggregate the urban and sustainability crisis, will emerge [9]. The root of many of the issues that metropolises face exists outside of their political and managerial borders and the domain within their territory. Most of these issues happen on a higher level and therefore, the absence of a specific trustee to tend to them, intensifies these problems [8]. Hence, it can be said that these issues are largely caused by the absence of accordance and harmony in their economic, social and functional features with their managerial systems on the main and surrounding city scales. Upgrading the population centers surrounding metropolises to independent cities which, despite having functional integration, are accompanied by political-organizational dispersion and fragmentation (management and planning), is considered the main challenge of planning and managing metropolitan areas [10]; because in the absence of this matter, adaptation of many conceptual themes in fields such as transportation, urban sprawl, strategic planning, protection of the environment and similar items will not be possible [11]. Therefore, if the metropolitan management does not change in relevance to the social and economic alterations within it, the capability to withstand their issues will not improve and the problems will increase [12].

The need to correct the system that governs the management of metropolitan areas increases daily. Correction of metropolitan area government means to create and stabilize special organizational structure or arrangements for managing metropolitan areas. . In such areas, the managerial domain of the metropolis area must be a correlated complex of singular and separated units, so that harmonious regional policy-making will become possible. In other words, adaptation of the functional territory (metropolitan area) and organizational territory (local government structure) is sought. The method of metropolitan area management in Iran is separated on main city and surrounding residents (urban and rural regions) scales [13], and no organization has been appointed as the trustee for creating harmony between various organizations and municipalities. Management of these areas have only been planned and show no executive guarantee.

Due to managerial fragmentation on a regional scale, infrastructure system disarray, disorganization in activity sites, expansion of environmental pollution, disorder in communication networks, destruction of resources and developmental features can be seen in the metropolitan area of Mashhad. Meanwhile, many spaces and features for industrial, service and residential developments have been left unemployed within this area. Hence, the collaboration between cities and their surrounding areas (urban and rural) is proposed as an obligatory matter for reduction of problems and also the balanced development of metropolitan areas. This article has proceeded with the goal to reach a suitable paradigm for integrated management of the metropolitan area of Mashhad in accordance with sustainable development approach, and seeks to answer the question: What is a suitable paradigm for integrated management of the metropolitan area of Mashhad, according to sustainable development principles?

2. Literature Review
The meaning of neo regionalism
The term "*Neo Regionalism*" emerged as a new political process in the early 90s in many states in Europe and USA; it is the description of new forms of regional government as a public and private participation [14]. Neo regionalism is defined as a new movement that identifies a specific region and seeks to provide a specific role for it in the economic, political, security or cultural spheres. Schoederboom states that neo regionalism is characterized by multidimensionality, complexity, fluidity, and inconsistency. It also includes a range of governmental and non governmental actors to come together in informal multi actor alliances

[15] .The term neo regionalism emerged as a new policy approach; Which describes new forms of regional governance as a public-private partnership [16].

The essence of neo regionalism states the evolutionary process of regionalism, away from the strictly state-centered approaches. This approach confirms that the governments' conventional policies are insufficient against many challenges and it is required to link governmental and nongovernmental activists in the planning process between local to international scales. Moreover, in this approach, local communities and metropolises must heed beyond their own borders, meaning that they should seek to create collaborative chains with other places. Therefore, it can be said that governance has a special position in the neo regionalism approach [8].

Metropolitan Areas

" Metropolitan Areas" is a region that is economically and socially influenced or dominated by a central city (metropolitan) This area may have several cities, the surrounding cities with the central city are integrated and interconnected. Therefore, the size of metropolitan areas can be defined as the extent to which daily movement takes place [9]. This area consists of the densely populated urban core and surrounding areas, which are less populated and are interconnected in industry, infrastructure and housing [10] .

Integrated Management of Metropolitan Areas

In order to define management on a metropolitan level, two areas can be segregated: 1- regional development management system, and 2- managerial system of developmental plans [15]. McGill recognizes three key aspects as constructing components of urban management. These three aspects that help in perceiving urban management as a holistic approach, include: integration of urban planning, integrating infrastructure provision and integrating institution and organization. According to McGill, integration in metropolitan area requires the creation of an organizational framework or structure. This integration has a horizontal and a vertical variety, and therefore includes the subsystems of the necessity of activity in decision making framework of upstream levels and heeds to the strategical and operational aspects of planning towards a cohesive urban management. McGill

perceives integration as a requirement on a metropolitan area scale whose accomplishment, in spite of abundant hardships, will lead to benefits caused by association [16].

Amin and Thrift (1995), identify and define four main elements as institutional integration; the first element is the presence of a powerful institution that involves many actors such as companies, financial foundations, chambers of commerce, the local authorities of development agencies, innovation centers, unions, organizations of marketing services and volunteer organizations, some of which can offer community representation and or material services. The second element considers a high level of interaction between collaboration foundations in order to facilitate and exchange information. These interactions are often shaped as social norms. The third condition is the domination of a central government to minimize the regionalism of centers and decrease inappropriate behaviors. Fourth, is the emergence of a cognitive map which is understood by the developmental actors as a common protocol [17].

Practically speaking, for the most part, two elements of legality and its enforcement method cause the metropolitan governments' defeat. Legality is planned based on political, psychological and social factors during an era. Legitimacy of a metropolitan government faces pressure from local states, advocacy groups and citizens. If the people aren't made aware of the structures and mechanisms correlated with it, it will be hard to agree with government decisions [18]. On the other hand, the greatest obstacle for reaching a harmonious policy is a phenomenon which he has dubbed as "common decision trap". This also applies to neo regionalism. The elements vital for preventing common decision trap in negotiations, are as follows:

- Positive attitude and cooperation throughout negotiation;
- Construction of suitable encouragement structures by higher-ranked organizations;
- Strong political leadership [19].

One of the trends in managing the affairs of communities, which causes the formation of local governance, is decentralization. In decentralization, communication between local levels with higher ranks is made possible through several routes which include constitution and law frameworks, financial connections and common political

responsibilities in plan execution [20]. With decentralization, upstream levels in metropolises have assigned metropolitan affairs to managers of related metropolises and is only a supervisor [21].

3.Materials and Methods

The objective of this article is to identify and prioritize the integrated metropolitan area management indicators which can be achieved through a descriptive-analytical method. Data collection methods used in this article are library and survey methods. Library information have been applied to recognize the indicators and criteria. Moreover, a questionnaire has been provided for experts to prioritize the indicators.

The statistical community is experts in the field of urban management who work in areas related to urban management such as universities, road and urban development organizations and municipalities. Purposeful sampling method was used to select them. Muller (1996), In (MADM), uses the sample volume ratio for the free parameter to estimate the sample size. He has set a minimum ratio of 5 to 1 [41]. Therefore, considering the existence of 17 indicators, 85 sample volumes are sufficient. The validity of the questionnaire was confirmed based on the views and opinions of experts in the field of urban management. Reliability was also assessed as good with Cronbach's alpha confirmation (0.871).

SWARA, one of the methods of Multiple Attribute Decision Making (MADM) which ranks indicators, has been applied to analyze the data from questionnaires and grade the indicators.

Table 1: Integrated metropolitan area management criteria and indicators.

Criteria	Indicator	Code	Source
Integrated planning	common outlook and protocol	I1	[19], [25], [18], [26]
Institutional and organizational integration	operational activity contracts between municipalities	I2	[27], [28], [29]
	a small body in organizational structure with an operational arm made up of dependent service companies	I3	[24], [29], [30]
	presence of a coordinative organization of several managerial territories	I4	[18], [19], [25], [31]
Decentralization of resources and authorities	municipalities' independent budget from the central government	I5	[24], [29]
	central state dependent institutions involved in management	I6	[18], [19], [24]
Assignment of affairs to lower ranks	policy making on a metropolitan scale	I7	[32], [33]
	offering urban services by service companies	I8	[24], [29]
Legality of policies	lack of conflict between different organizations' policies	I9	[24], [34], [35], [36]
	number of policy corrections in coordination with urban transformation	I10	[24], [37], [38]
Law enforcement methods	supervision on good duty performance by a specific institution	I11	[25], [27]
	number of facilitative and supportive organizations	I12	[31]
	reporting the municipality's performance to stakeholder groups	I13	[27], [39]

Criteria	Indicator	Code	Source
Collaboration networks	presence of an institution related to the civil sector in official structure	I14	[18], [22], [24], [31], [40]
Presence of a council	presence of a council on different levels	I15	[10], [11], [24]
Managers' operational and executive authority	the mayor's political legitimacy through people's direct selection	I16	[10], [32]
	the right to decide the method of providing financial resources	I17	[10], [24]

SWARA Method Steps

After determining the indicators found in Table 1, the following steps are taken to determine their priority using SWARA method:

- First step, arranging the indicators: at first, the decision makers' desired indicators will be selected and arranged as definitive indicators and based on their significance. Accordingly, the most significant indicators will be of the first priorities and less important ones will be last in priority.
- Second step, determining the relative significance of each indicator (Sj): in this stage, each indicator will be recognized compared to the previous, more significant indicator. Their significance must be determined starting from the second ranked indicator; this is to specify just how much more significant the cj indicator is, compared to the cj + 1 indicator.
- Third step, calculating the kj coefficient: this coefficient is a function of relative importance for each indicator and is calculated using the following equation:

$$Kj = Sj + 1$$

Equation 1: Calculation of kj coefficient.

- Fourth step, calculating the initial weight of each indicator: the initial weight of indicators can be calculated using Equation 2. It must be noted that in this equation, the weight of the first indicator, the most significant one, equals 1.

$$q_j = \frac{q_j - 1}{k_j}$$

Equation 2: Calculation of relative weight.

- Fifth step, definitive normal weight: calculating the weight of indicators so that their summation would equal 1, can be achieved by using Equation 3:

$$w_j = \frac{q_j}{\sum_{k=1}^{m} q_j}$$

Equation 3: Calculation of definitive normal weight.

Case study

The metropolitan area of Mashhad, with an area of about 11319 km², makes up around 10 percent of Khorasan's surface. Based on the Population and Housing Census of 2016, its population reaches 3,633,338. Concerning political divisions of the country in 2018, the metropolitan area of Mashhad consists of Mashhad, Chenaran and Fariman County, plus the entirety of Binaloud County. Metropolitan area limits of Mashhad and its political divisions have been presented in Figure 1.
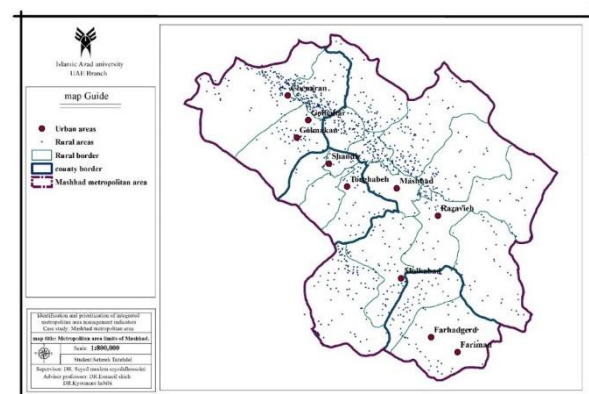

Figure 1: Metropolitan area limits of Mashhad. Source: Farnhad Consultant,2011

4.Results and Discussion

Indicator Ranking by Experts

Utilizing questionnaires, 10 experts have been asked to rank the integrated metropolitan area management indicators based on their importance. So that for each index to consider the rank of 1 to 17

Integration of Views and Definitive Ranking of Indicators

In this step of experts' rankings, a geometric mean is considered for each indicator. The rank for each indicator is then determined based on the obtained value. In Table 2, the indicators are arranged by their ranks.

Table 2: Arithmetic mean of the indicators' ranks.

Indicator	I 4	I 1	I 7	I 9	I 11	I 3	I 2	I 5	I 8	I 12	I 10	I 6	I 17	I 14	I 15	I 16	I 13
mean of ranks	3.75	4.36	6.5	6.55	7.52	7.93	8.25	8.27	8.5	9.57	10	10.64	10.82	10.91	12.11	12.91	14.23

Calculating the Relative Significance of the Indicators

After determining the indicators' ranks, a questionnaire has been provided for the experts to assess the relative significance of the indicators in SWARA technique. The first indicator does not require assessment and the next is assesses in relation to the previous indicator. The relative significance of each indicator compared to the previous, more significant indicator, based on experts' views. The relative weight of indicators (S_j) is mentioned in Table 3.

Calculating the Definitive Weight of Indicators

In this step, k_j (initial weight), indicators (q_j) and the definitive weight of each indicator (w_j) is obtained and presented in Table 4.

According to the final results in Table 4, presence of a coordinative organization of several managerial territories (I4), with a weight of 0.67, earns the first, existence of a common outlook and protocol (I1), with a definitive weight of 0.204, earns the second, policy making on a metropolitan scale (I7), with a weight of 0.07, earns the third and municipality's independent budget from the central government (I5), with a weight of 0.029, earns the fourth rank.

Table 3: The relative weight of indicators (S_j).

Indicator	I 4	I 1	I 7	I 5	I 9	I 11	I 2	I 17	I 3	I 14	I 15	I 6	I 16	I 8	I 12	I 10	I 13
Sj	-	2.28	1.86	1.47	0.96	2.28	1.83	1.53	1.38	1.35	1.47	0.87	1.29	1.56	1.89	1.2	1.2

Table 4: Final calculations of SWARA method results for weighting and prioritizing the indicators.

criteria	Sj	kj=Sj+1	Wj=(xj-1)/Kj	qj=wj/Sumwj
I4	0	1.00	1.00	0.67232728
I1	2.28	3.28	0.30	0.20497783
I7	1.86	2.86	0.11	0.07167057
I5	1.47	2.47	0.04	0.02901643
I9	0.96	1.96	0.02	0.01480430
I11	2.28	3.28	0.01	0.00451351
I2	1.83	2.83	0.00	0.00159488
I17	1.53	2.53	0.00	0.00063039
I3	1.38	2.38	0.00	0.00026487
I14	1.35	2.35	0.00	0.00011271
I15	1.47	2.47	0.00	0.00004563
I6	0.87	1.87	0.00	0.00002440
I16	1.29	2.29	0.00	0.00001066
I8	1.56	2.56	0.00	0.00000416
I12	1.89	2.89	0.00	0.00000144
I10	1.2	2.20	0.00	0.00000065
I13	1.2	2.20	0.00	0.00000030

5.Conclusions

This project has been carried out in order to identify and prioritize the indicators affecting the integrated management of the metropolitan area of Mashhad. According to Table 1 Said indicators include integration of planning, institutional and organizational integration, decentralization of resources and authorities, assignment of affairs to lower ranks, legality of policies, law enforcement method, collaboration networks, presence of a council and operational and executive authority of the managers. In addition to the obtained criteria, 17 indicators that were classified under these criteria were identified.

Considering that the management of the metropolitan areas requires correct actions, decisions and policies; But some decisions are in priority or even its observance is in contradiction with other factors. Therefore, it is necessary to prioritize the indicators of achieving integrated management of the metropolitan area from the perspective of experts to identify key decisions and priority actions. So, prioritization was done by SWARA method. SWARA is one of the Multiple Attribute Decision Making methods using experts' views. Based on the results of this model, it can be perceived that the four indicators, namely the presence of a coordinative organization of several managerial territories with final weight (0.67), existence of a common outlook and protocol with final weight (0.204), policy making on a metropolitan scale with final weight (0.07) and municipality's independent budget from the central government with final weight (0.029), have the highest significance, respectively. Therefore, these four indicators can be recognized as main indicators for integrated metropolitan area management; indicators which the policy makers of urban and regional management will pay special attention to and prioritize as the first step towards achieving integrated management, in order to identify its condition.

In this study, in addition to paying attention to various indicators and dimensions introduced by various scientists and thinkers regarding the integrated management of the metropolitan area, an attempt has been made to provide comprehensive and complete indicators; that to be able to measure the integrated management of the metropolitan area in different dimensions and fields. In other words, the main difference between the indicators introduced in this study compared to other indicators in the literature of regionalism is to pay attention to all aspects of integration. However, in the researches that have been done in this field so far, this comprehensiveness is not observed and often the indicators introduced by them emphasize specific aspects of measuring regionalism. So that Sarrafi and Nejati [8], Akhoondi and et al [11], Sharifzadegan and Koushki [43], Basirat [44] in their research only on governance and participation of groups as an indicator for integrated management Emphasize and do not pay attention to other indicators. Also, Aliakbari [26], Biswas [37] Nouri Hampa and et al. [38] Azizi and et al. [36] have examined the achievement of integrated management from the perspective of laws, regulations and urban development plans. Other indicators do not pay attention.

This article has been prepared to identify and prioritize the integrated management indicators, but since a managerial structure has not been defined on the scale of Mashhad metropolitan area, research suggestions for compiling an integrated management paradigm in the metropolitan area of Mashhad will be beneficial in order to operationalize the criteria and indicators.

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