

Meta-Analysis of Studies on Metropolitan Regions in Iran*

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ABSTRACT

Nowadays, Metropolitan regions, as powerful economic, political, and social centers of gravity, as well as the dominant urbanization pattern, particularly in developing countries, play an important role in regional, national, and even global economic growth and development. Therefore, it is essential to recognize this concept and enrich studies on this field. Hence, the extant study aims to carry out a meta-analysis on scientific-research papers that have focused on Metropolitan regions over the last decade and a half in Iran. According to the findings, studies on this field have decreased since 2015, and the nature of studies, in terms of the distribution of research fields, implies the priority of physical-spatial studies(49%), followed by Management (19%), and economic (16%) studies. The analysis of the findings on the nature of studies indicate that these studies are consistent with the prevailing global trend and the changes in these studies stem from variation in the quiddity of these regions, and alteration in the dominant research paradigm (from macro to meta-macro notions). The content of the reviewed research indicate that studies on livability, quality of life, and sustainable development have been insufficiently considered. On the other hand, there has been a content gap in the key areas of spatial structure and regional development. The Why questions in this field have been mainly examined superficially, and the investigation of How questions has been just limited to solutions recommended at the end of papers or the use of some models for anticipations. Investigating the theoretical dimension of studies indicates the shifts in theoretical approaches, especially in physical-spatial and economic studies, also the weakness of theoretical foundations, particularly in environmental and socio-demographic studies. Regarding the methodological dimension, most studies have been done using quantitative techniques, and fewer studies have used qualitative and mixed methods. The results showed that the nature of the majority of Metropolitan regions in Iran based on inequalities and spatial imbalance. Moreover, the extant study strives to suggest some solutions based on the meta-analysis of studies as follows, the necessity of having a approach,eliminate spatial segregation from plannings, use of the neo-regionalism approach to promoting management system' efficiency in these regions, the necessity of transition from the hierarchy approach to the development of small cities and activity sub-centers to provide spatial balance, and strengthening polycentrism to create a policymaking framework in these regions.

Keywords: Iran's Metropolitan Regions, Meta-Analysis, Research Gap, Spatial Balance, Polycentrism.

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1. INTRODUCTION

The new settlements called Metropolitan regions have been shaped in the postmodern era, have increased as a global phenomenon over the recent decades (Zebardast & Hajipour, 2009; Talkhabi, 2018; Dadashpoor & Salarian, 2018), and have become the dominant urbanization models in most countries of the world (Li et al., 2019). This phenomenon first occurred due to the centralization of capital, activities, and population in the most important cities of the world. These regions are also being shaped by the decentralization of population and activities in a larger area subject to a set of social, political, economic, and industrial processes (Dadashpoor & Alidadi, 2018). So, they are also transiting from Metropolitan regions to polycentric Metropolitan regions. Moreover, the spatial restructuring of capitalism (Zebardast & Shahabi Shahriri, 2014; Lotfi et al., 2015) has led to the introduction of these regions as the engines of the global economic growth and the centers directing the national economy (the most important national development centers) in most countries (Dadashpoor & Tadayon, 2015a; Dadashpoor, 2011; Mansourian, 2016; Piri & Saremi, 2018; Siami & Vakili, 2016; Dadashpoor & Tadayon, 2015b; Zebardast & Shahabi Shahriri, 2014; Hesari et al., 2016; Dadashpoor & Salarian, 2018). These regions indeed have a specific position in urban and regional systems as they can attract a large volume of human force (population) and materials (capital) of countries.

The conceptual importance of these regions, as a place for dwelling in all countries over the second half of the 20th century, has increased their significance as a key factor in the view of theorists and researchers. Iranian researchers have also paid attention to the case in line with international studies and examined various dimensions of this phenomenon. Many studies have been done on Metropolitan regions in Iran because they serve as powerful centers attracting the population in the country. It is necessary to enrich the studies on Metropolitan regions owing to the considerable role of them in economic growth and development at regional, national, and even global scales. The extant study aims to carry out a meta-analysis of the studies on Metropolitan regions in Iran to examine the general profiles of these papers and analyze their nature in terms of different (content, theoretical, and methodological) dimensions. This study tends to find the publication trend and general profiles of scientific-research papers in the area of Metropolitan regions in Iran by scrutinizing the available studies on this topic.

How are the studies typologized in terms of distribution of research field? to what extent the prioritization of study types is consistent with the dominant global prioritization of similar studies? How are studies in terms of the content dimensions, including key themes, research questions, and study

objectives? And which areas require in-depth studies? What kind of methodology (research type, research approach, and data collection method) are the studies on this field based on, and what are methodological gaps in these studies?

What theoretical approaches were these different research types formed based on, and in which research type are there theoretical weaknesses?

Finally, what are the results and recommended solutions provided by these research types?

Therefore, the extant study aims to provide the ground for overcoming these shortcomings in further studies by identifying the content, methodological, and theoretical gaps in studies on Metropolitan regions of Iran. On the other hand, considering the lack of a comprehensive approach to an integrated review of these studies, it is attempted to allow comparing research types in terms of the theoretical approach, in addition to filling the gap caused by the lack of coherence between the results and solutions provided by various studies. Ultimately, this study aims to pave the way for creating a policymaking framework for these regions in terms of different aspects, in addition to filling the research gap concerning the typology of studies on Metropolitan regions.

2. THEORETICAL FOUNDATIONS

Metropolitan area studies began in the early 20th century and experienced many changes and milestones. The onset of population decentralization after the world war in the form of the movement to the outside the inner city is one of the key milestones affecting such studies, indicating a need for a new system for managing and planning these regions. Another influential turning point was the stream, which began in the early 1970s and caused an increasing decentralization in industrial countries and movements from the centers of Metropolitan regions to the peripheral areas. This trend then provided the ground for more decentralization of these regions and the advent of polycentric spatial patterns through spatial development policies in the new millennium (Zebardast & Hajipour, 2009; Lotfi & Shahabi Shahriri, 2016; Dadashpoor & Alidadi, 2018). This structural change highlighted the requirement for the use of a new type of study and covering relevant dimensions. It is worth noting that the results of the studies on Metropolitan regions in the 21st century confirm that these areas have moved towards decentralized concentration (Zebardast & Shahabi Shahriri, 2014).

Yeh and Chen (2020) reviewed the substantial global trends governing the studies on super megacity regions in the 21st century, and found three approaches used in these studies: the first category examines the challenges of spatial planning, the second one focuses on management-governance challenges in these areas, and the third one pays attention to economic forces

generating super megacity regions. Investigations introduce the environmental impacts of metropolitan area as another prevailing dimension of these studies. The reason is that the advent of megacities and Metropolitan regions in the 21st century has been always associated with the effects of these centers of economic activities on their surrounding environments (Folberth et al., 2015). These regions indeed have a fragile and unsustainable ecosystem due to the complicated systems, high population density, and extensive human activities in them (Tian et al., 2019), and thereby facing many environmental problems.

The research background of spatial structure generally goes back to the 1980s, and numerous studies have been assigned to this area over the recent four decades (Garcia Lopez et al., 2015, quoted by Dadashpoor & Alidadi, 2018). These studies indicate that this spatial structure in today's Metropolitan regions is not only dependent on the inner city, and activity subcenters, communication networks, and access to transportation play a vital role in the population and activity distribution system (Garcia Lopez & Muniz, 2010, quoted by Dadashpoor & Alidadi, 2018). Since the spatial structure of Metropolitan regions (spatial distribution of population and activities, as well as transportation system (communication network) as the element linking population and activity cores) reflects the spatial performance of these regions, and the adaptation of the spatial structure to the physical environment (Piri & Saremi, 2018), the extant study examines the studies on the spatial structure of Metropolitan regions in Iran under the category of physical-spatial studies.

As the third category of the prevailing global trend in the studies in this topic, economic studies began in 1960. At that point, individuals, such as Isard, Alonso, etc. approached regional planning with an economic view. This trend continued, and from the 1980 onwards, it made many scholars, like Krugman, Ja Napar, Fujita, Nijkamp, Porter, etc. play a vital role in the creation of a field entitled evolutionary economy geography in urban and regional studies (Dadashpoor & Zahedpour, 2018). Some studies (Cardoso & Meijers, 2020; Bromley & Daniels, 2001) have examined the spatial planning challenges, some others (Biswas, 2020; Zimmermann, 2014; Miller & Lee, 2011) have focused on the management/governance challenges in these regions, and some have highlighted the economic forces generating centralized Metropolitan regions. Li et al. (2015) studied the city-region integration policies and economic competition in a city-region composed of three cities of Chaozhou, Jieyang, and Shantou, for example. Rizzo and Khan (2013) studied the national and transnational influences of Metropolitan regions in developing countries considering the growing economies of these countries, and evaluated the negative effects of this growth on sustainable

development. Taubenböck et al. (2016) carried out a comparative study on the spatial distribution pattern of central business districts in Metropolitan regions of Istanbul, Paris, and London. Lengyel (2016) introduced competitiveness as one of the debatable issues in the studies on Metropolitan regions in East European countries.

Other studies, including Peng et al. (2016) and Han et al. (2015), studied the environmental dimensions in studies on Metropolitan regions. Botequilha (2012) argued that environmental principles in the visions of polycentric urban systems must be based on the uncertainties and complexity of future sciences. The mentioned study points to the future and uncertainties in studies on Metropolitan regions, while most studies in this field have considered the future only through prediction (a traditional approach), and only simulated the spatial growth and expansion of Metropolitan regions by using various models. For example, Tian et al. (2016) simulated the spatial expansion of the Tianjin metropolitan area in China by using the cellular automata model; moreover, Ahmed and Bramley (2015) used this model to simulate the spatial structure of Dhaka in the future.

Although the functional, structural, and intrinsic complexities of today's cities, and uncertainties caused by these complexities have made it difficult to examine the future of these cities, analytical complexity will be tripled in the case of Metropolitan regions. The apparent characteristics of factors affecting the future of Metropolitan regions include their severe changeability and potential transformations hidden in these factors (Rabbani et al., 2019). The paradigm shift from structuralism to poststructuralism in the late 1970s indicates the need to pay attention to uncertainties, pluralism, and probable futures rather than just to the favorable future (based on the traditional structuralism and postpositivist approaches) (Ansari & Partovi, 2017). Therefore, it is necessary to use modern methods, consider uncertainties occurring in these regions, and reflect the abovementioned paradigm shift in the studies conducted in this field.

3. METHODOLOGY

The present research was performed using meta-analysis and the initial search of papers was done based on the relevant keywords through databases of Sid, Noormags, Magiran, Iran doc, and Elmnnet for the period from 2004 to 2019. The year 2014 was chosen as the start point of research period because the first available academic-research papers were published in this year.

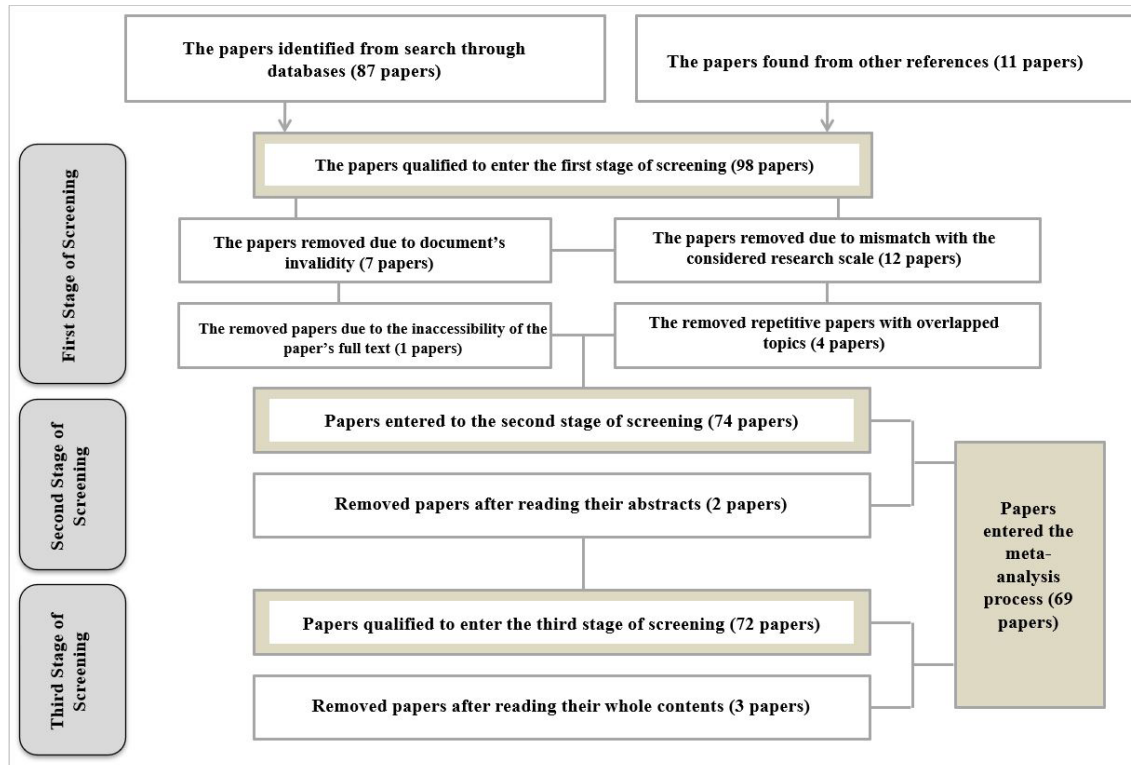


Fig. 1. The Screening Process of Studies to Enter Them into the Meta-Analysis Stage

After searching through databases, 87 papers were taken into account. In addition, 11 papers were identified based on the reviewed references. Totally, 98 papers were entered into the screening process. The screening process was done within three stages to choose suitable papers for meta-analysis. Finally, 69 papers were selected (Fig. 1). In the next step, the selected papers for meta-analysis were reviewed based on some general profiles, including publication process, scientific-research journals publishing the selected papers, academic credit of authors, and geographical distribution. Table 1 reports the other dimensions reviewed in the meta-analysis of papers. It should be mentioned that these investigations also allowed to identify some content, theoretical, and methodological gaps existing in the studies on Metropolitan regions.

Moreover, the nature of the studies (typology) was shown in combination with content and methodological dimensions in a meta-analysis matrix. The qualitative coding of the concepts available in selected papers shaped five physical-spatial, economic, socio-demographic, Managerial, and environmental types. Therefore, studies were classified into these five categories according to their nature, and then, examined in terms of the various dimensions. Figure 2 depicts the initial results of this examination in the form of a matrix.

In this matrix, the papers have been reviewed in terms of nature, content, and methodological dimensions, and some quantifiable specifications, including research type, research approach, data collection method, key themes, research objectives, attention to the future, and nature of questions. Due to the extensiveness of theoretical approaches used in the papers, and the wide range of notions presented in the results and solutions, the theoretical dimension of papers, their general results, and provided solutions cannot be quantified. Hence, they were reviewed qualitatively and the results are presented in some tables by research type.

Nature of studies/typology	Dimensions of studies	References of studies	Research objectives				Research questions		Future	Research themes				Data collection method	Research approach				Research type																
			typology/zoning	study of consequences and effects	modeling/presentation of strategies	study of theoretical foundations	identification of indicators to assess concepts	scenario -writing	how	why	what	future study/uncertainties	predictive approach /traditional	study of management challenges	assessment of livability	urban network/spatialorganization	study of spatial structure	spatial growth and development	regional development	survey (interview)	survey(questionnaire)	documentary research / Statistics	comparative analysis	systematic review/review	meta-analysis	content analysis	analytical	descriptive	descriptive-analytical	Mixed method	qualitative	quantitative			
Spatial-physical studies	Ziari et al., 2015	*							*									*		*							*		*		*				
	AbdiDanehpour & Taranatash, 2017	*							*						*					*							*		*		*				
	Asadi & Zebardast, 2013	*							*						*						*				*			*		*		*			
	Dadashpour & Afaghpour, 2016		*						*				*							*		*					*		*		*				
	Zebardast & ShahabiShahmiri, 2014a			*					*				*							*						*		*		*		*			
	Rajabi & Binesh Pajouh, 2007		*						*						*						*				*			*		*		*			
	Hosseini & Hosseini, 2015		*						*						*						*				*		*		*		*				
	Sorour & Jafari, 2009		*						*		*						*					*					*		*		*		*		
	Rajaei, 2015		*		*				*								*					*					*		*		*		*		
	Gholami & Zamani, 2010			*					*								*					*					*		*		*		*		
	Dadashpour et al., 2014		*						*			*					*						*			*			*		*		*		
	Zebardast & ShahabiShahmiri, 2014b		*		*				*				*				*						*			*			*		*		*		
	Zebardast & Hajipour, 2009		*		*				*								*						*			*			*		*		*		
	Dadashpour & Miri Lavasani, 2015		*		*				*								*						*			*			*		*		*		
	Lotfi & Shahabi Shamiri, 2016		*		*				*								*						*			*			*		*		*		
	Lotfi et al., 2015		*		*				*								*						*	*						*		*		*	
	Yousefian et al., 2014			*					*			*			*													*		*		*		*	
	Nedaie Tusi, 2018				*				*		*								*									*		*		*		*	
	Nedaie Tusi & Bagheri, 2017			*	*				*		*								*									*		*		*		*	
	Homafar & Pourjafar, 2017		*	*					*		*		*		*								*				*		*		*		*		*
	Dadashpour & Tadayon, 2015a		*	*					*		*		*		*								*			*		*		*		*		*	
	Dadashpour & Mirvakil, 2016		*	*					*		*		*		*								*			*		*		*		*		*	
	Dadashpour & Tadayon, 2015b	*		*					*		*		*		*								*			*		*		*		*		*	
	Rajaei et al., 2015		*	*					*		*		*		*								*	*				*		*		*		*	
	Dadashpour & Alidadi, 2018		*	*					*		*		*		*								*			*		*		*		*		*	
	Zahirnejad & Dadashpour, 2018	*		*					*		*		*		*								*			*		*		*		*		*	
	Dadashpour & Salarian, 2018		*	*					*		*		*		*			*				*	*				*		*		*		*		*
	Dadashpour et al., 2019		*	*					*		*		*		*			*					*			*		*		*		*		*	
	Dadashpour & Zahedpour, 2019	*		*					*		*		*		*			*					*			*		*		*		*		*	
	Piri & Saremi, 2019		*	*					*		*		*		*			*					*			*		*		*		*		*	
	Talkhabi et al., 2018		*	*					*		*		*		*			*					*			*		*		*		*		*	
	Dadashpour et al., 2016	*		*					*		*		*		*			*					*			*		*		*		*		*	
	Javaheri Taghdos et al., 2019	*	*						*		*		*		*			*					*			*		*		*		*		*	
	Sharifzadegan & Fathifarzaneh, 2016	*	*						*		*		*		*			*				*	*		*		*		*		*		*		*
Economic studies	Zebardast & Reza Pour, 2014		*					*				*		*			*				*			*			*		*		*		*		
	Zebardast & Shahabi Shahmiri, 2015		*					*			*		*				*				*			*			*		*		*		*		
	Dadashpour & Akbarnia, 2013		*					*		*		*		*			*				*			*			*		*		*		*		
	Hesari et al., 2014		*					*		*		*		*			*				*			*			*		*		*		*		
	Sharifzadegan & Nouraei, 2017		*					*		*		*		*			*				*			*			*		*		*		*		
	Zanganeh Shahraki et al., 2014		*					*		*		*		*			*				*			*			*		*		*		*		
	Dadashpour, 2011		*					*		*		*		*			*				*			*			*		*		*		*		
	Dadashpour & Deh Dehjani, 2015		*					*		*		*		*			*				*			*			*		*		*		*		
Dadashpour & Taghi Dokht, 2012	*	*					*		*		*		*			*					*			*			*		*		*		*		
Sorour et al., 2010		*	*					*		*		*		*			*				*	*		*		*		*		*		*		*	
Socio-demographic studies	Aliakbari et al., 2017		*					*		*		*		*			*				*			*			*		*		*		*		
	Bayat & Nazarian, 2011		*					*		*		*		*			*				*	*		*		*		*		*		*		*	
	Shadi Talab et al., 2011		*					*		*		*		*			*				*			*			*		*		*		*		
	Rezvani et al., 2015		*					*		*		*		*			*				*			*			*		*		*		*		
	Motavasseli & Esmailzadeh, 2006		*					*		*		*		*			*				*			*			*		*		*		*		
Managerial studies	Mansourian, 2016		*					*		*		*		*			*				*			*			*		*		*		*		
	Argani et al., 2017		*					*		*		*		*			*				*			*			*		*		*		*		
	Lalehpour et al., 2011		*					*		*		*		*			*				*			*			*		*		*		*		
	Siami & Vakili, 2015		*				*	*		*		*		*			*				*			*			*		*		*		*		
	Siami, 2015		*					*		*		*		*			*				*			*			*		*		*		*		
	Basirat, 2006		*					*		*		*		*			*				*			*			*		*		*		*		
	Lalehpour & Sorour, 2014		*					*		*		*		*			*				*			*			*		*		*		*		
	Sharifzadegan & ShamsKoushki, 2013		*					*		*		*		*			*				*			*			*		*		*		*		
	Akhundi et al., 2008		*					*		*		*		*			*				*			*			*		*		*		*		
	Sarrafi & nejati, 2017		*					*		*		*		*			*				*			*			*		*		*		*		
	Alian et al., 2019		*					*		*		*		*			*				*			*			*		*		*		*		
	Sarrafi & Turanian, 2004		*					*		*		*		*			*				*			*			*		*		*		*		
Environmental studies	Asadi, 2004		*					*		*		*		*			*				*			*			*		*		*		*		
	Asadi, 2016		*					*		*		*		*			*				*			*			*		*		*		*		
	Shaikhi, 2006		*					*		*		*		*			*				*			*			*		*		*		*		
	AbdiDanehpour & Taranatash, 2016	*	*					*		*		*		*			*				*			*			*		*		*		*		
	Ghasemi & Shahbazi, 2015	*	*					*		*		*		*			*				*			*			*		*		*		*		
	Yeganegi Dastgerdi et al., 2011	*	*					*		*		*		*			*				*			*			*		*		*		*		
	Jomehpour, 2018	*	*					*		*		*		*			*				*			*			*		*		*		*		
	zangishe et al., 2018	*	*					*		*		*		*			*				*			*			*		*		*		*		

Fig. 2. Meta-Analysis Matrix of Studies on Metropolitan Regions by Nature, Content, and Methodological Dimensions

Table 1. Reviewed Dimensions in the Meta-Analysis of Studies on Metropolitan Regions

General Profiles of Studies	Nature of Studies	Dimensions of Studies	Results and Solutions Provided in Studies
<ul style="list-style-type: none"> - Publication trend - Scientific-research journals publishing the papers - Academic credit of authors - Geographical distribution 	<ul style="list-style-type: none"> - Typology of studies in terms of the research fields emphasized in the papers - Evaluating the consistency of the studies on Metropolitan regions in Iran with the prevailing global trend of similar studies - Change in research nature due to shifting in the quiddity of regions and transformation in the dominant research paradigm (city-based regions) 	<p>Content dimension: Key themes, Research objectives, Nature of questions, Attention to the Future</p> <p>Methodological dimension: Research type, Research approach, Data collection method</p> <p>Theoretical dimension: Theoretical approaches by research types</p>	<ul style="list-style-type: none"> - General results - Solutions by research type - The emphasized concepts

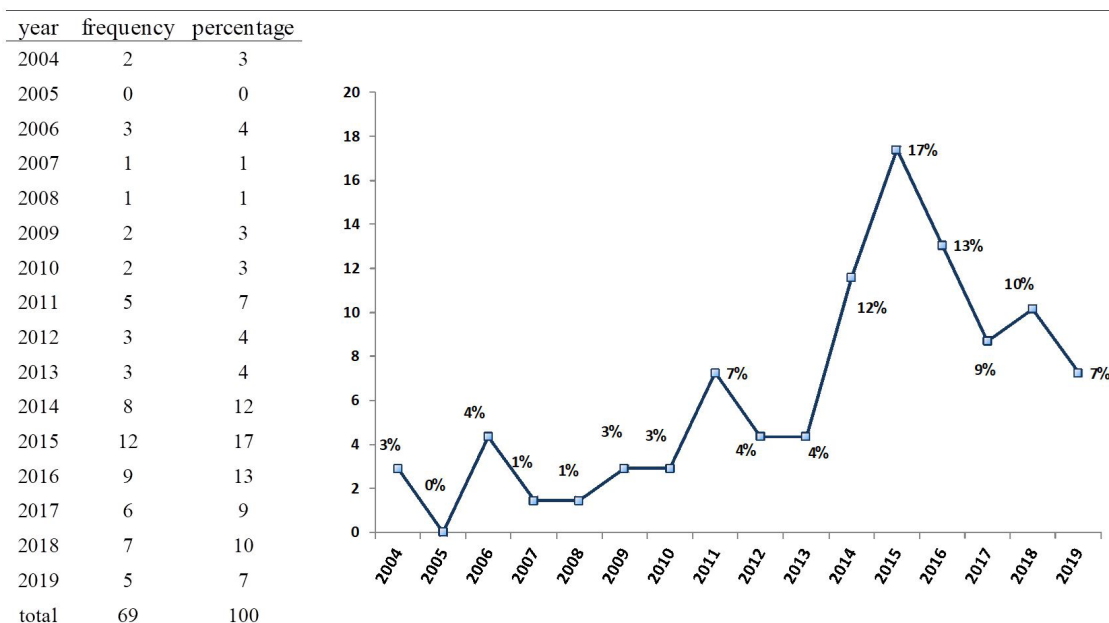
4. RESULTS AND FINDINGS

Research findings are presented within six categories: general profiles (including publication process, academic credit of authors, scientific-research journals publishing the selected papers, and geographical distribution), nature of studies, and evaluation of the consistency of the studies with the prevailing global trend, content dimension, methodological dimension, theoretical dimension, and their results and recommended solutions.

4.1. General Profiles of Papers

Publication Process: According to Figure 3, there has been an almost ascending trend in the studies from

2004 to 2015, and most studies on Metropolitan regions have been conducted in 2015, while there has been a decline in these studies since then. The increased analytical complexities imposed by the extensive scale of these studies have led to such a descending trend. The change in the research paradigm of city-based regions (as the prevailing research paradigm in this field) from macro (city-regions and Metropolitan regions) to meta-macro (megacities, urban complex, conurbation, and the concepts composed of joined macro-concepts) concepts have led the studies conducted at the scale of Metropolitan regions not to be able to support these concepts. Such a conceptual transformation has influenced the trend of researchers towards the studies in this field.

**Fig. 3. Publication Trend of Papers**

Academic credit of authors: in terms of the authors' academic credit, the results indicated that 78% of the first authors were faculty members, 19% were students, and 3% were freelance researchers. Many of

these papers have been written under the supervision of universities' faculty members, implying these papers' academic credit.

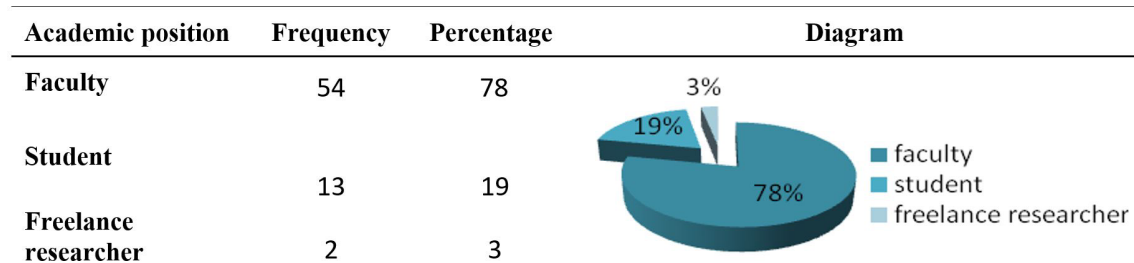


Fig. 4. Academic Credit of the First Authors

Scientific-Research Journals Publishing Papers:

Table 2 reports the titles of scientific-research journals publishing the studied papers and their publishers. According to Table 2, 69 papers reviewed in this meta-analysis have been published in 34 scientific-research journals in the urban and regional planning field. More than half of papers have been published

only in 9 journals, out of which the Journal of urban management (8 papers) and the Journal of Regional Planning (6 papers) have published the most studies in this field. The factor of the history of journals also affected the ranking of journals in the frequency of publications.

Table 2. Scientific-Research Journals Publishing Selected Papers

Title	Publisher	Frequency	Title	Publisher	Frequency
Architecture and Urbanism	College of Fine Arts, University of Tehran	4	Urban and Regional Development Planning	Allameh Tabataba'i University	1
Architecture and Urban Planning	University of Art	2	City Identity	Islamic Azad University Science and Research Branch	1
Urban Management	Research Center of Urban and Rural Management	8	Urban Regional Studies and Research	Deputy of Research and Technology, Isfahan University	3
Spatial Planning	Tarbiat Modares University	3	Human Geography Research	Institute of Geography, University of Tehran	4
Geographical Space	Islamic Azad University Ahar Branch	1	Geography	Iranian Geographical Association	4
Geographical Engineering of Territory	Iranian Geographical Association	2	Geographical Urban Planning Research	University of Tehran	2
Spatial Planning	Isfahan University	1	Urban Economics and Management	Urban Economics Scientific Association	1
Urban Studies	Kordestan University	4	Town and Country Planning	University of Tehran	2
Physical Development Planning	Payame Noor University	1	Urban Structure and Function Studies	Mazandaran University	2
Regional Planning	Islamic Azad University Marvdasht Branch	6	Geography and Development	Sistan nad Baluchistan University	1
Geography and Regional Development	Ferdowsi University of Mashhad	1	Science and Technology Policy	National Research Institute for Science Policy	1

Title	Publisher	Frequency	Title	Publisher	Frequency
Socio-Cultural Strategy	Institute for Strategic Research of Expediency Council	1	Geographical and Urban Planning Journal of Zagros Landscape	Islamic Azad University Borujerd Branch	1
Strategic Studies of Public Policy	National Center for Globalization Studies	1	Geographical Planning of Space	Golestan University	3
Interdisciplinary Studies in Humanities	Institute for Social and Cultural Studies of Ministry of Sciences	1	Iranian Journal of Social Problems (former Journal of Social Sciences)	University of Tehran	1
Environmental-based Territorial Planning	Islamic Azad University Malayer Branch	2	Great Khorasan	Imam Reza University	1
Majles (Parliament) and Strategy	Center of Islamic Consultation Assembly Studies	1	Geography and Urban Regional Planning	Sistan nad Baluchistan University	1
Baghe-e-Nazar	Nazar Research Center for Art, Architecture, and Urbanism	1	Research of Art	Isfahan Art University	1

Geographical Distribution of Papers: Figure 5 illustrates the unequal geographical distribution of considered papers: 72% of studies were on the Tehran metropolis, while only 6% of the studies were conducted on other Metropolitan regions, particularly Karaj and Shiraz. Although the concentration of

studies on the Tehran metropolitan area stems from the strategic position of this city compared to other cities, it must be considered that other Metropolitan regions should also be studied. This measure supports moving toward the objective of national spatial planning, and thereby, preventing polarization.

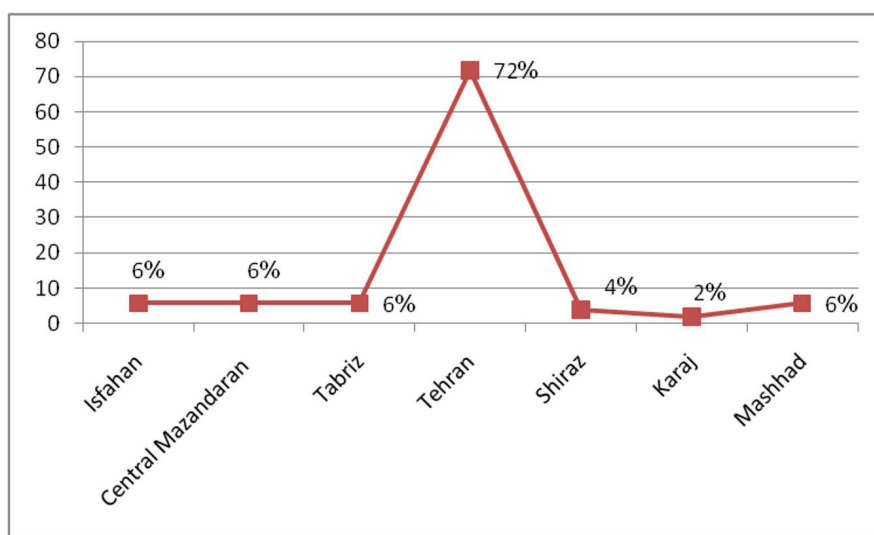


Fig. 5. Geographical Distribution of Studies

4.2. Nature of Studies and Evaluation of Their Consistency with the Prevailing Global Trend

According to the results of the meta-analysis, most of the reviewed studies (49%) examined the physical-spatial aspect of Metropolitan regions, and the rest studies studied Managemental (19%) and economic

(16%) aspects. However, socio-demographic (9%) and environmental (7%) types had the lowest frequencies in the reviewed studies (Fig. 6). According to the prioritization of studies in research type, the reviewed studies were consistent with the prevailing global trend. The dominant global paradigm ruling these studies in the 21st century consisted of three

research categories of spatial planning challenges, management-governance challenges, and economic factors generating Metropolitan regions. The mentioned categories were covered by physical-spatial, Managerial, and economic studies, respectively. The nature of studies in this field has been influenced by the change in the nature (spatial structure) of these regions, and subsequently the tendency toward polycentric Metropolitan regions,

the movement towards the acceptance of network pattern, and transformation in the research paradigm of city-based regions (transition from macro-concepts towards meta-macro-concepts). Although studies on Metropolitan regions can still support some dimensions related to abovementioned transformation, such an alteration in concepts, in most cases, requires moving towards the broader research scales.

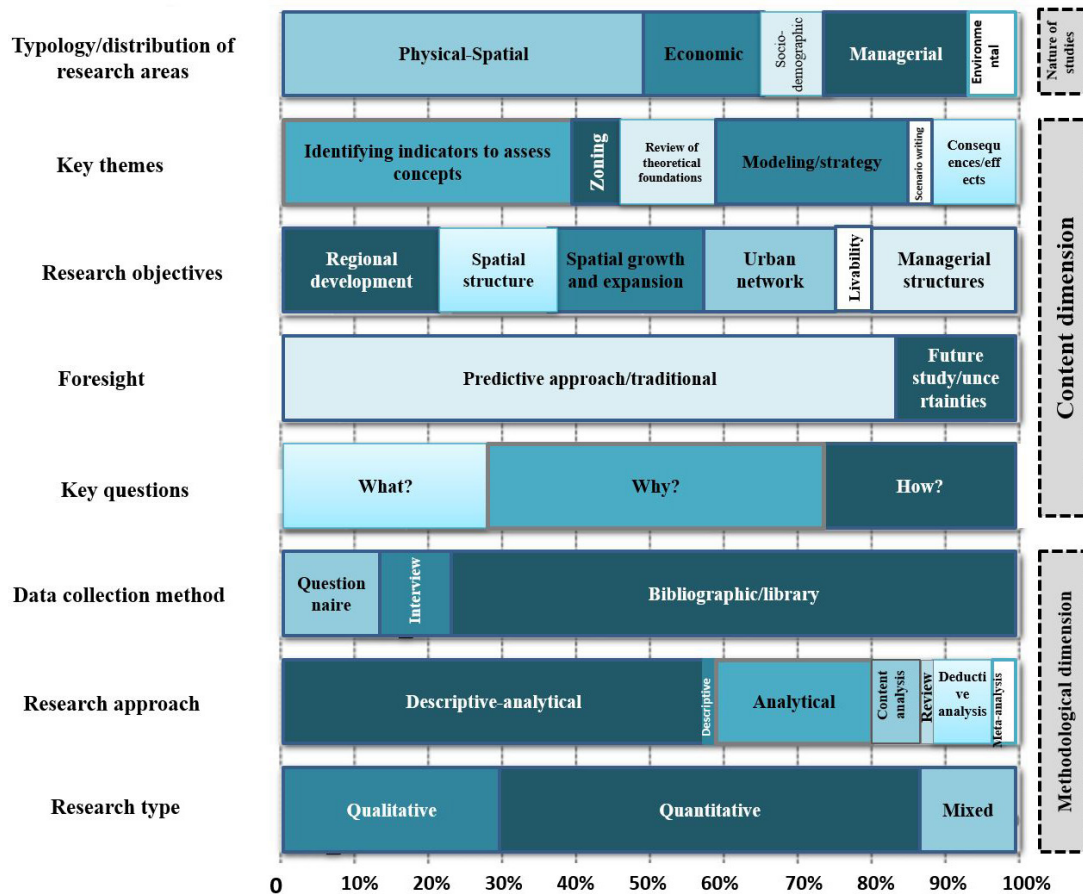


Fig. 6. Frequency (%) of Studies by Nature, Content, and Methodological Dimensions

4.3. The Content Dimension

Key Themes: following the coding process, the key themes of studies mainly comprised regional development, spatial growth and expansion, spatial structure, urban network, livability, and Managerial structures. As seen in Figure 6, three themes of regional development, spatial growth and expansion, and Managerial structures had the highest contribution (jointly, 20.3%), followed by the papers with the themes of urban network (17.4%), spatial structure (14.5%), and livability (5.8%), respectively. The few studies on the urban network may seem a high frequency at first glance, and the considered paper scale may imply the assumption that the network approach cannot be a core theme

of these papers. According to the qualitative coding used to determine the research themes, those papers examining theoretical foundations and presenting a framework must examine the network through the evolution of theories supporting Metropolitan regions. Some studies have also used this approach to examine the actualization of the network concept, assess the notions associated with the acceptance of this pattern, or investigate the realization of polycentric pattern arrangement in Metropolitan regions.

Although the results of this study indicate some signs of moving toward the polycentric spatial arrangement in the Tehran metropolis, the "network" concept has not been realized in this region. However, in a few cases, such as Central Mazandaran Metropolis, there is evidence of a polycentric metropolitan area and

there are some signs of the acceptance of the network approach. Although Shahabi Shamiri and Zebardast (2015) found an increased horizontal synergy and collaborative links over recent decades and the formation of bases required for accepting the network pattern in this metropolitan region, assessment of the economic role distinction as a prerequisite for vertical synergy (spiderweb) has indicated the poor performance of cities located in this region and 50% decline in their complementary economic roles over these decades. Finally, Nedae Tousi (2018) used a network approach to write a scenario and create alternative futures in the Karaj metropolitan area.

The results show that Iranian studies on the considered topic are in line with the prevailing global trends. However, they also emphasize doing further studies on livability, quality of life, social sustainability, and generally sustainable development of these regions (in terms of different economic, social, and environmental dimensions). Furthermore, only 14.5% of papers examined the spatial structure, despite the significance of this theme in international papers in recent decades and the direct effects of this structure on sustainable development. These studies have also neglected the roles of communication networks and access to transportation, as well as activity subcenters as the main factors affecting the formation of the spatial structure of these regions.

Research Objectives: The results indicate that a considerable number of studies (39%) tended to identify indicators to investigate some concepts, such as degree of polycentricity, the phase of urbanism in which metropolitan regions are based on the variable urbanism model, interaction between regions and global cities network, and regional competitiveness. A few numbers of studies (3%) adopted scenario-writing as their research objectives, and only 7% studied zoning. In total, 24% of studies addressed theoretical foundations/consequences and impacts. While, these objectives have been highly significant in the metropolitan area studies. For example, zoning (determining areas as homogenous planning units) is the first step in the planning process at the macroscale; moreover, the identification of theoretical foundations can pave the way to finding the theoretical root of challenges. Finally, assessment of consequences and impacts can be a complementary dimension for all research dimensions, especially the environmental dimension.

Key Questions/Footprint of Attention to the Future: Identification of questions in metropolitan area studies can be considered another key aspect to evaluate the content dimension of studies. Therefore, Blaikie's three questions (what, why, and how) were chosen to evaluate research questions. As seen in Figure 6, only 29% of studies examined what the phenomenon is, and most of the studies (44%), in addition to the quiddity of the phenomenon (what?), examine why the concepts were considered in Metropolitan regions

superficially (not in-depth and analytically). Few numbers of studies (27%) tried to answer the How question and presented some solutions for having a desired spatial structure, governance-institutional orders, and creating regional balance. The studies that have considered how questions mostly proposed solutions and recommendations. In this case, only two papers considered normative positions (do's and don'ts) based on the future study principles. Attention to the future was only seen in 12 papers of which, only 17% considered uncertainties and normative positions, and the rest (83%) predicted some cases, such as land-use changes or prospect trend of spatial growth and development by using the traditional approach, and retrospective models, including MOLAND, cellular automata model, Markov chain, or a combination of logistic regression, Markov chain, and cellular automata model

4.4. Methodological Dimension

According to the results obtained for the theoretical dimension of papers (research type, research approach, and data collection method), most of the studies (58%) on the Metropolitan regions used quantitative methods, and few studies (30%) applied qualitative ones, and only 12% used mixed research method (quantitative-qualitative). In terms of research approach, the majority of studies (58%) just referred to the descriptive-analytical approach, while they had no standard analytical framework, and few papers were conducted based on some standard approaches, such as systematic review, meta-analysis, or content analysis. The bibliographic-library method was mostly used for collecting data, while questionnaires or interviews were less used for this purpose (Figure 6).

4.5. Theoretical Dimension

Meta-analysis of papers led to the identification of various theoretical approaches based on the different aspects of the studied phenomenon. Table 3 reports the research type derived from the meta-analysis process. As seen in this Table, those theories supporting the physical-spatial research type consist of theories concerning spatial structure development, urbanism phases, and the formation of urban development patterns. Investigating the theories about spatial structure development indicate the paradigm shift from traditional hierarchy to network paradigm. The hierarchy theories (including Von Thünen's Location Theory (1826), Christaller and Losch's Central Place Theory, Chicago School's urban ecology (McKenzie, Bogo, and Howley), and Alonso's monocentric theory (1964)) are indeed based on the functional dependence of the surrounding area to the center. On contrary, network paradigm theories (including City-systems in Advanced Economies by Pred (1977), Camagni and Salon (1993), Batten (1995), and Capello (2000)) have been shaped based

on a viewpoint arguing that functional connections between the cities in a metropolitan area are based on the mutual links. According to this paradigm, the direction of the links is not only from megacities to small cities but also from small cities to megacities, and the same links are established between cities of the same size. Accordingly, the connections and relationships between cities are complementary, and are based on the competitive and cooperative functions (complementary and synergic networks). Theories concerning the steps of urban development patterns (S-shaped curve by Davis (1981), Klassen's urbanization cycle (1981), urban development steps by Renée Short (1984), stages of daily urban system by Berg et al. (1982), urban morphology theory by Knox and Pinch (2000), and Metropolis Explosion Theory) have also been used as theoretical approaches in physical-spatial studies. Klassen's urbanization cycle (1981), urban decline theory by Berg et al. (1982), and urban morphology theory by Knox and Pinch (2000) were chosen as the basic theories in most studies conducted based on the urban development theories.

The Management research types have been mainly based on the regionalism approaches, and few studies used complementary approaches, such as game theories. This theory predicts the context and results

of interactions between decision-making groups in the urban management process (at macro and micro levels) by modeling these interactions and analyzing the joint measures (Roumboutsos & Kapros, 2008, quoted by Alian et al., 2019).

Three core theories can be introduced in the case of regionalism as the dominant theoretical approach used in this type of study: traditional regionalism (1900-1970), general choice approach (1970-1990), and modern regionalism (after the 1990s). Although theorists of traditional regionalism were willing to create metropolitan governance and accounted for a solution to overcome the political fragmentation challenge in metropolitan regions, proponents of the general choice approach do not consider the political fragmentation as a challenge but introduce it as an advantage. They believe that political fragmentation is an agent that makes local governments compete in attracting more residents and businesses by reducing the tax rate and providing inexpensive public services (Savitch & Vogel, 2009, quoted by Asadi, 2004). Ultimately, modern regionalism theorists emphasize metropolitan governance that is based on informal horizontal networks. They also are concerned about decreasing the difference between the inner city and the peripheries (Sarraf & Nejati, 2017).

Table 3. Theoretical Approaches by Research Types

Physical-Spatial	Managerial	Economic	Socio-Demographic	Environmental
<p>* Soja (1989)</p> <p>-Capital accumulation and concentration, expansion of cities and onset of rural-urban migrations;</p> <p>- Capitalism city under the monopoly of large industrial enterprises: in the 1920s, reduction in industrial production concentration around the urban cities and old urban cores</p> <p>*Maciocco (2008)</p> <p>-Advent of polycentric cities in 1960 and 1970, especially in North America, and expansion towards surrounding areas</p>	<p>*Regionalism theories</p> <p>- Traditional regionalism (1900-1970)</p> <p>- General choice approach (1970-1990)</p> <p>-Modern regionalism approach (the 1990s onward)</p> <p>* Wheeler (2004)</p> <p>-The necessity of moving towards relational and collaborative planning processes, with the participation of all stakeholders</p> <p>-Douglass (2006)</p> <p>He believes in simultaneous investment in urban and rural spaces based on the regional network strategy</p>	<p>*Globalization theories and change in the role and spatial pattern of megacities</p> <p>-Saskia Sassen (1990)</p> <p>-Manuel Castells (2010, 1989): strategic urban planning for sustainable development, providing the ground for increasing competition potential in the global city network and no conflict with the concept of sustainable development</p> <p>-John Friedman (1999)</p> <p>* Spatial planning theories to organize unequal development</p> <p>- Myrdal's convergence theory (1975) by using effects of gradual dissemination of growth</p> <p>- Hilhorest (1971): eliminating interregional duality with emphasis on strengthening second-class centers around the center of the region and third-class centers around the region limits</p>	<p>* Brian Berry's view (1976): counter urbanization or reverse immigration flow</p> <p>Other theoretical approaches of counter urbanization:</p> <p>-Bourne and Logan (1976)</p> <p>The study of "population rotating space" in the USA, Canada, Australia, and a large part of West Europe</p> <p>-Coombes et al. (1989): Counterurbanization in Europe;</p> <p>-Klaassen and van den Berg (1981): urbanization cycle: counter urbanization means that the decline of population in the center overtakes suburb population decline</p>	<p>* Friedman & Weaver's (1979) view</p> <p>- Emphasis on the place, ecological and spatial view to territory development and paying attention to geographical and ecological limitations and potentials</p> <p>* Mark j. Smith (1998)</p> <p>Ecological citizen;</p> <p>* Dobson (2007)</p> <p>Environmental citizen</p>

Physical-Spatial	<p>*Hall and Pain (2006): Developing the lands around the city and the occurrence of sprawl phenomenon in 1980 and 1990; cities' orientation towards polycentric complexes and the advent of polycentric megacities in the late years of the 20th century</p> <p>*Hierarchical theories: Von Thünen's Location Theory, Christaller and Losch's Central Place Theory (1995)</p> <p>City construction theories (Park, Burgess, & McKenzie (1987), Alonso's monocentric theory (1964)</p> <p>*Taylor (2007): urban-suburb theories: Christaller's Central Place Theory and traditional/hierarchy model-based patterns (service-dependence-based approaches), Urban-regional theories (competition-based approaches)</p> <p>* Kampen and Ozaken theories: (spatial segregation patterns), Human ecological approach theory, Social and ecological area analysis-based approach, Behavioral approaches based on the aspects of housing market demand, such as demographic structure, income level, and accessibility to loans</p>
Managerial	<p>*Game theory models (interactive decision-making theory): Von Neumann and Morgenstern (1994), Howard (1971), Fraser & Hipel, Kilgour, Hipel, and Fang (Graph model for conflict resolution)</p> <p>* Richard Norgaard (1994): An effective model for the coevolutionary process</p>
Economic	<p>* Concept of industrial clusters (1980)</p> <p>* Soja (2009) : Transition from the economic development of regions to multidimensional development (economic, social, physical, etc.) to enter the information and globalization era, Replacing top-down regional development with states (welfare state) with modern regionalism approach based on the necessary participation and role of people and private sectors in bottom-up development</p> <p>*R.P. Misra's basic concept (1987): centralized Decentralized or moderate centralization</p>
Socio-Demographic	<p>*Richardson (1973): Polarization reversal</p> <p>*cuberes (2011): Urban growth</p>
Environmental	<p>* Ecological footprint index (1992): Assessing the consumption of environmental resources and comparing it with environmental capacities, the guideline for planners and decision-makers to adopt policies helping the stabilization of or change in lifestyle and general consumption</p>

The regional competitiveness theories are one of the main principles affecting regional development based on two views: competitiveness as the sum of micro-economies (Porter, 1990, 2002; Krugman, 1988), and competitiveness as a macro-economic derivative (Storper (1997) and Teixeira). The first approach considers regional competitiveness as the productivity of enterprises existing in the region, which finally bring regional development. The second approach, however, as a macro-economic derivative, believes that a single emphasis on enterprises' productivity (first approach) is not in favor of companies and people of the region, so companies must improve the quality of life and wellbeing of citizens by producing stable value-added (Borozaan, 2008, quoted by Dadashpoor & Dadejani, 2015).

The spatial advantages theories used in the papers indicate the evolution of these theories over time. Theories of the first period (1800-1950) are based on determining the optimum place of industries with minimum cost, and the German School's theories of industrial location (Van Thunnen, Lenhart, Weber, Hoover, and Loch) are theories introduced in this period. The second period (from 1950 to late 1970) includes theories based on the necessity of the maximum distance between the cost and revenue curves as the basis for optimal location of industries (Greenhut),

and emphasizes production cost, as well as the role of social factors affecting the success of an activity (Walter Izard), economies of scale and substitution of elasticity and demand factor in industries' location (Alonso). The third period (since 1980 then) is known under the title of evolutionary economic geography/modern economic geography theories introduced by (Krugman, Ja Napar, Fujita, Nijkamp, and Porter) emphasizing the concept of industrial clusters as the determinant of location (spatial) decisions made by industrial firms (Dadashpoor, 2011). The strategy of industrial clusters development- geographical concentration of industries with internal connections and its relevant institutions in a specific area- indeed provides the ground to create different economic profits and new ideas to achieve competitive advantage in the globalization trend and thereby, regional development (Cruz & Teixeira, 2010, quoted by Sharifzadegan & Norayi, 2015).

Regarding the prominent role of globalization in shifts to regional urbanization, theories proposed by Sassoon (1990) and Manuel Castells (1989) were used. These theories stipulate that globalization occurs with global division of labor and formation of transnational enterprises, as well as the establishment of fluid capitals of these companies for optimum production in Metropolitan regions. As

such, the emergence of new functional opportunities for cities, especially in Metropolitan regions at a global scale made a suitable potential for the development of these regions, particularly in developing countries due to their essential need for capital, technology, and completion of industrialization. Regarding the globalization and sustainable development, John Friedman (1999) stated strategic planning of cities for sustainable development will lead to participation in the global division of labor, adoption of suitable roles, and increasing competitiveness potential in global cities network. Sustainability of metropolitan regions, in particular economically, cannot be achieved without considering the global economy requirements. Therefore, the functional area of these cities must be beyond the national level, and these cities must be leading in the use of international opportunities. Despite the claim of globalization opponents, this case is not in conflict with sustainable development (Sorur et al., 2010; Lalehpour et al., 2011; Lotfi & Shahabi Shamiri, 2016).

The reviewed socio-demographic studies indicate that these papers have been mainly based on the concepts and theories associated with urbanization (population decentralization) and population decline in the inner city. Urban decline (counterurbanization, deurbanization or polarization reversal) occurs when the growth of external loops of megacity overtakes the core regions. It is worth noting that counter-urbanization is seen in developed countries, and polarization reversal is mainly the specification of advanced developing countries (Mansourian, 2016; Argani et al., 2017). The polarization reversal theory of Richardson (1973) is one of the widely used theories in the theoretical foundations of these papers. Finally, the reviewed environmental studies indicate the existence of some basic concepts and theories in these papers. One of the interesting theoretical approaches used in these papers is the theoretical model of the coevolutionary process by Richard Norgaard (1994). The systematic framework of this ecological economist allows assessing the link between different factors and components (values, knowledge, organization, human systems, environment, and technology), as well as their interactions within a procedural flow. This framework also paves the way for the movement of metropolitan regions towards sustainable development by strengthening the potential for structural-institutional or social changes.

4.6. Results and Recommended Solutions

According to the results obtained from studies, there are two types of imbalance in Metropolitan regions in Iran. One kind of imbalance is associated with the territorial zone (whole country) and is seen on a national scale (between Metropolitan regions). This imbalance stems from the growth pole policies and the concentration of facilities and capital in some Metropolitan regions, particularly the Tehran metropolis. Another type of imbalance is seen on the intraregional scale (between center and periphery), and is occurred due to political fragmentation and rural-urban segregation in planning, as well as the neglect of regionalism. Globalization has also intensified this spatial imbalance and doubled the inequality between the central Metropolitan regions and other places (spatial planning challenges) by the over-concentration of facilities and amenities in the central metropolis. This trend has been directly created by growth pole policies. On the other hand, the governing centralized structure, sectoral attitude, top-down planning, and organizations' avoidance of planning, abuse of urban

management under such chaos, polarization, and lack of spatial planning-based policies (challenges in management/governance of these regions) have intensified such regional inequality and imbalance. The conditions mentioned above lead to a concentration of amenities in some regions compared to other areas and an increased orientation of capital and human force towards these regions.

Among these regions, the Tehran metropolis has become a consumption pole, rather than being a pole for economic production, central employment market, added values, and economic output, due to its specific strategic position, accumulation, and concentration of the capital raised from oil revenues (economic factors generating Metropolitan regions) in this city, devouring all available capital and human forces in the country. Therefore, such excessive centralization caused by growth pole policies has overtaken the ecological capacity of this region. This, in turn, has led to many problems not only for this region but also for the whole country in terms of all dimensions, particularly the environmental dimension. This also causes the second type of imbalance (intraregional imbalance between center and periphery), which began in the 1970s and was revealed as the spatial polarization metaphor (conflict between center and periphery). Although the increasing rate of the prime urban phenomenon is one of the outstanding specifications of urbanization in developing countries, the oil economy or rentier economy has intensified the unequal economic competition in the space and urban-rural duality (Mahdaviava, 2009). The oil-depending economy has led to a type of spatial duality at both micro and macro (territorial zone) levels.

Population measure (i.e., human capital attracted in Metropolitan regions) is another factor affecting this intraregional imbalance. The movement of dominant population flows towards these regions (population factor generating Metropolitan regions), and the advent of cities without functional autonomy but dependent on suburbs around these central regions indeed indicate the increasing decentralization trend in inner cities (population projection and growth of small cities farthest from the inner city) and polarization reversal. These dominant population flows are indeed the inter-regional immigrants who go to Metropolitan regions attracting the population (especially Tehran) to have a better life. However, many problems particularly economic issues (economic factors generating metropolitan regions) have made them intraregional immigrants and led to the creation of spontaneous peripheral settlements, a reduction in the population of the main city, and an increase in population attraction in small cities (polarization reversal phenomenon), continual reproduction of secondary settlements. This trend has led to severe sprawl spatial growth and development patterns in Metropolitan regions. Unfortunately, no effective policy has been taken in planning for the fungal-like growth of the population either at the regional level or national level.

According to the studies on Metropolitan regions in Iran, the monocentric pattern has been the prevailing pattern in these regions, and only a few studies, such as those on the Tehran metropolitan area (Dadashpoor & Alidadi, 2018), have shown the outstanding role of activity subcenters in population distribution in this region. These studies imply the formation of the polycentric metropolitan region. The evidence of the central Mazandaran metropolitan area also indicates the formation of the polycentric region and its evolution process (Zebardast & Shahabi Shamiri, 2014; Dadashpoor, Haqjou & Shahabi Shahmirmi, 2015). Therefore,

most Metropolitan regions in Iran have monocentric spatial structures (traditional hierarchy and dependency-based). Spatial segregation in planning, and rentier, and single-product economy, leads to improper plans and policies about

industrial activities' location, etc.. This case has caused imbalance and unsustainability as a challenge affecting the spatial planning of these regions.

Table 4. Solutions Proposed by Different Research Types

Research Type	Concepts	Solutions to Overcome Challenges in each Research Type
Physical-Spatial	Flow Network Hierarchy Monocentric and Polycentric Approach Activity Subcenters Main City's Center Distance from Communication Networks Activity Subcenters Commuting	Need for localizing the concepts derived from typology and genealogy of city-based regions reviewed on global scale and using these concepts in the spatial system of country; Need to identify different indicators such as population, position of locations, physical link between locations, commutation of passengers and products between locations and functional (service) dependence to assess city-based regions; Necessity of shifting from prediction to future studies to provide an integrated regional model instead of emphasizing the future prediction models (MOLAND, Markov, cellular automata model, Markov chain method or A combination of regression logistic- Markov-CA model); Solutions for decentralization in Metropolitan regions by providing required infrastructures/ emphasis on the development of middle cities through role-playing of activity subcenters to reduce existing spatial divergence, and providing the ground for creating balance at regional level; Equal spatial distribution of population and employment opportunities, and strengthening regional growth focuses by decreasing population rate of the central metropolis through the adaptation of some effective policies, such as provincial divisions and correction of executive-Managerial structure; Improving communication network between small and medium-sized cities to create more integrated zones in metropolitan regions; Designing comprehensive plans to manage travels and commutations in regions (management of the travel demand and elimination of unnecessary travels), and create a balanced and integrated system of commutation flows in Metropolitan regions
Managerial	Regionalism Neo-Regionalism Bottom-Up/Top-Down Planning	Paving the way to enhance the capacity for a strategic approach to regional problems and promoting political effectiveness based on the regionalism approaches (management and governance of Metropolitan regions); Improving the efficiency of the management system of Metropolitan regions by using the neo-regionalism approach in the framework of strengthening multilevel and multifaceted governance system with the collaboration of all regional actors (necessity of participation of all private and public sectors/simultaneous bottom-up and top-down planning and decision-making process); The integrated and systematic management strategy in the framework of regional and transregional links
Environmental	Ecological Capacities Livability Quality of Life	Making balance between natural and built environment; Paying attention to ecological capacities of metropolitan area/paying attention to the ecological footprint index; Using some strategies and methods, such as green belts, green rings, regional parks, and ecological interests to protect agricultural lands and gardens in the development process; Regional management system should propose some measures to prevent negative consequences of growth and spatial expansion of regions, as well as the destruction of valuable natural and environmental resources
Socio-Demographic	Counterurbanization Polarization Reversal Population Decentralization Prime Urban Pattern Secondary Settlements/Secondary Cities	Using demographic measures as a factor controlling the spatial organization of Metropolitan regions' growth patterns by setting policies and providing solutions to encourage demographic movements; Adopting some measures in national and regional planning to cope with fungal-like physical and population growth because inter-provincial immigrants became intra-provincial immigrants; The equal distribution of facilities in the region and reducing the difference between center and periphery, decreasing secondary settlement' dependence on the inner city by providing and completing infrastructures, services, and urban equipment in these settlements, developing job-creation plans to decrease daily travels to the inner city; The required control and surveillance to prevent the expansion of new suburbs around the existing secondary settlements

Research Type	Concepts	Solutions to Overcome Challenges in each Research Type
Economic	Regional Development	Necessity of spatial attitude and systematic view towards the space with emphasis on the spatial planning and regional approach to problems to make balance; Necessity of moving from growth pole policies in regional development to a holistic planning attitude towards the space; Taking various measures to improve activity centers in Metropolitan regions to use spatial advantages of Metropolitan regions and strengthen polycentrism in these regions; Necessity of using positive effects of industrial clusters to enhance regional development; Metropolitan regions must join the economy globalization process and global city network paying attention to positive effects of these interactions in sustainable development of these regions; It is required to provide suitable strategies for equal development of Metropolitan regions with emphasis on strengthening second-class centers around the region center and third-class centers around the region border to eliminate intraregional duality; Planning for small cities as administrative or political centers to enhance demographic capacity, development competitiveness and moderate the dominance over urban network system and simultaneously limit investment, industrialization and new centralization in larger cities
	Spatial Planning	
	Sprawl	
	Economic Clusters	
	Economic Firms	
	Competitiveness	
	Global Cities	
	Network	
	Economy	
	Globalization	
	Small and Medium-Sized Cities	

Unsustainable economic development is one of the factors intensifying the spatial unsustainability of Metropolitan regions in Iran, particularly in recent decades. The lack of positive communications and interactions of these regions with globalization evolutions and global cities network may cause such unsustainable development (Sorur et al., 2010). Although these regions have increasingly joined the globalization since 2010 in some intervals, there is a kind of Managemental and political shortcomings (adverse policies, lack of integrated management system, political fragmentation, spatial segregation in planning, and lack of attention to spatial inequalities and regional imbalance) at both national and regional scales. Therefore, Managemental studies play a vital role in filling the content gap. However, the management of Metropolitan regions in Iran deals with a kind of political fragmentation or lack of planning institutions and regional management due to the high numbers of actors in these regions. These are procedural challenges for the management and governance of these regions (Alian et al., 2019; Asadi, 2016). Most Managemental studies have aimed to provide solutions for the management of these regions considering this critical challenge occurring in management and governance of these regions: design of various governance types, especially integrated governance/structure integration, management system process and policies, and planning for sustainable management/perspective statements to create an interterritorial and intersectoral joint action/using theoretical neo-regionalism and general choice views to improve management system' efficiency in these regions to deal with multiple decision-making institutes.

In addition to the critical challenge in management and governance of these regions, political fragmentation is one of the factors stimulating spatial growth and expansion of these regions, and forming sprawl patterns, causing destructive environmental consequences (e.g., traffic congestion and air

pollution, loss of open spaces, and agriculture lands) by redirecting growth towards peripheral areas around the central metropolis (Asadi & Zabardast, 2013). In other words, unplanned growth and expansion of megacities and moving towards peripheral natural environments have led to the advent of Metropolitan regions. Moreover, Abdi Daneshpour and Taranatash (2016) calculated the ecological footprint index to analyze the effects of the formation of the Tehran metropolitan area, indicated the overuse of ecological potential and capacity of the peripheral natural environment around the central metropolis. Furthermore, the studies on the Metropolitan regions' future indicate that the spatial growth and expansion of these regions lead to excessive destruction of valuable natural and environmental resources.

According to the nature of studies on Metropolitan regions in Iran regarding the distribution of research field, these studies have mainly examined the physical-spatial, Managemental, and economic dimensions of these regions. Hence, these studies have been in line with the prevailing global trend in these studies over the 21st century. On contrary, few studies have assessed the environmental cases, so this field requires further studies. The content dimension of studies indicates that the key research themes, such as livability, quality of life, and sustainable development require further studies; on the other hand, other concepts, including the role of communication networks, accessibility to transportation, and activity subcenters must receive greater attention from spatial structure studies. Moreover, it is useful to improve studies on this field by focusing on the analysis of the spatial-functional structure to distribute economic activities equally at the geographic level of these regions. There are few studies on social-spatial segregation. Therefore, this area must receive greater attention due to the undeniable role of small cities, competitiveness, and spatial advantages in the planning process and regional development.

The research objectives must be chosen more

sensitively and based on the research gap in this area. On the other hand, more attention should be paid to studies on scenario-writing, zoning, assessment of theoretical foundations, and consequences/effects. Most relevant studies have gone beyond the quiddity (what) and have considered reasons (why); however, the reasons and factors affecting the metropolitan area phenomenon and its challenges have been studied superficially. Therefore, this research area requires in-depth studies. According to the obtained results, most studies on this topic have identified the existing situation (identifying factors and processes) without considering the future, uncertainties, and how conditions should be (conditions/normative positions). Therefore, the paradigm shift (occurred in the 1990s) governing the urban planning studies towards poststructuralism, pluralism, and alternative future must be shown in the studies on a regional scale (Metropolitan regions).

5. CONCLUSION

There has been a descending trend in the number of studies on metropolitan regions in Iran since 2015. The difficult nature of these studies, especially increased analytical complexities in problems of these regions, can be mentioned as a factor causing such a decline. These changes have made studies on metropolitan regions inadequate to support these concepts. Assessment of some dimensions of these concepts requires moving towards broader research scales. It should be noted that these concepts have been mainly adopted from global experiences. Because required contexts and fields have not been provided for the realization of these concepts in Iran, these concepts must be standardized to be used in the Iranian studies.

The theoretical dimension of studies shows a weak theoretical foundation of some studies, especially studies on environmental and socio-demographic areas. Therefore, theoretical foundations, particularly in the two abovementioned area must be strengthened and the root of challenges should be found. The changing nature of these regions and the shifted prevailing research paradigms have led to variations in theoretical approaches used in the studies, especially in physical-spatial and economic research types. The changed theoretical approaches applied in spatial structure studies (one of the categories of studies in the physical-spatial research type) imply the shift from theoretical approaches of the traditional hierarchy paradigm to theories supporting the network paradigm. Economic research type was mainly based on the growth pole theories and the center-periphery hierarchy view but experienced a theoretical change, and used small city, regional competitiveness, and spatial advantage theories as supportive theoretical approaches. These studies have experienced a transition from the viewpoint related to economic

development dissemination (from center to periphery (effect of distribution)) towards theories emphasizing the role and function of small cities. Moreover, spatial advantages theory-based studies have emphasized the concept of industrial clusters (evolutionary economic geography/modern economic geography) to create competitive advantages, and pave the way for regional development and strengthening the polycentric pattern.

In terms of methodology, most of the studies were descriptive-analytical, and used quantitative methods, while qualitative and mixed methods have been less used in these studies. Due to the dominance of the quantitative method, we must pass from the unilateral positivism of quantitative methods to qualitative and mixed methods. Therefore, the latter case should be used in the methodology of studies on Metropolitan regions in Iran. Figure 7 presents the results of a meta-analysis of studies and to be precise, research outputs in the frame of an integrated hybrid model based on the four general dimensions: (1) what, (2) why, (3) results, and (4) mechanisms of the functional system.

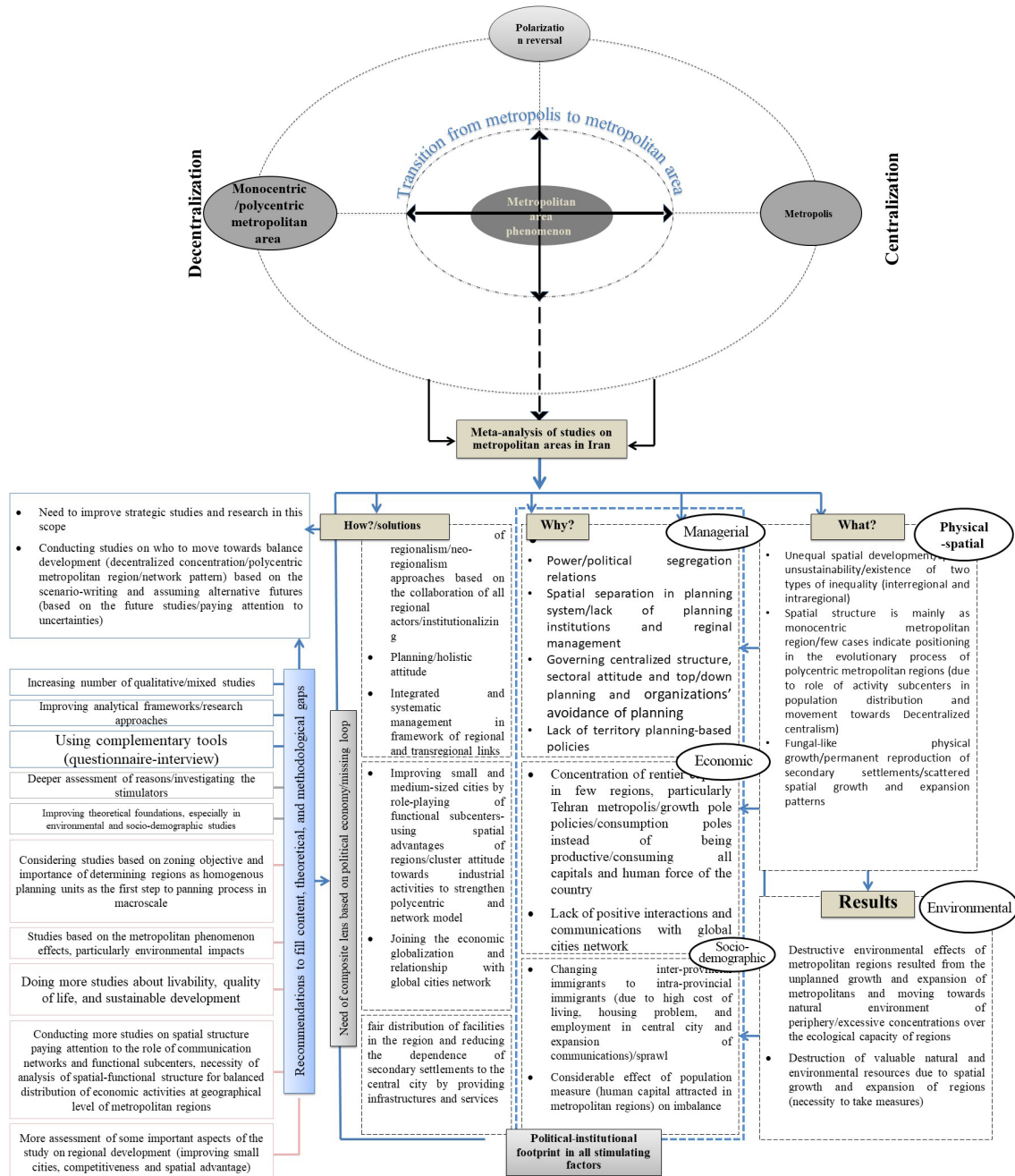


Fig. 7. Integrated Meta-Analysis Model of Studies on Metropolitan Regions in Iran

The most important results of this study can be categorized into four dimensions shown in Figure 7:

1. First dimension: what is the metropolitan regions phenomenon?

Physical-spatial studies mainly examine the quiddity of the metropolitan area phenomena regarding spatial balance, spatial structure, and spatial growth and expansion. The results of physical-spatial studies have indicated the existence of a kind of spatial imbalance at the interregional scale (national/macro level) and intraregional scale (regional/between center and periphery). According to the quiddity of these regions, in terms of spatial structure, most

Metropolitan regions in Iran are monocentric, while a few cases, such as central Mazandaran and Tehran Metropolitan regions indicate the evolution of polycentric Metropolitan regions, and the acceptance of the network pattern.

2. Second dimension: why does the metropolitan regions phenomenon occur?

The Managerial, economic, and socio-demographic studies support the reasons indicating why this phenomenon has occurred and what challenges are seen in this case. These studies (Managerial studies) examine the policies and plans affecting the Metropolitan regions.

3. Third dimension: consequences and results caused by the metropolitan regions phenomenon;

Like other urban and regional phenomena, Metropolitan regions leave some effects; environmental studies cover these consequences. These results mainly appear due to the unplanned growth and expansion of metropolitans and moving towards a natural suburb environment. Excessive centralizations over the ecological capacity of regions and permanent spatial expansion of these regions will lead to various destructive environmental effects that require taking crucial measures

4. Fourth dimension: mechanisms to overcome challenges in Metropolitan regions;

Most studies on this topic have suggested some solutions to overcome challenges in Metropolitan regions. Therefore, these studies aim to find how to improve the current condition of Metropolitan regions. Therefore, they have proposed some solutions based on the conducted meta-analysis to provide a policy-making framework for these regions. According to solutions proposed in the majority of studies, the theoretical neo-regionalism approach plays a vital role in improving the effectiveness of the management system in these regions to deal with a high number of decision-makers and responsible institutions. Therefore, the management system of Metropolitan regions is based on the governance and collaboration of all actors (including governmental

and non-governmental) simultaneously (bottom-up and top-down). On the other hand, it is useful to integrate the policies, structure, and process of the management and planning system of Metropolitan regions in the framework of regional and transregional links to overcome political fragmentation and control physical-spatial evolutions in these regions.

It may be possible to use the potential of the Management research type to cope with economic and sociodemographic stimulators generating challenges in the spatial planning of these regions. This research type must be used based on the footprint of policies and plans affecting the metropolitan regions. Management research type provides some potential: directing national macro plans towards the spatial organization of Metropolitan regions, paving the way for political and institutional reforms, and directing it towards integrated management (without political fragmentation) based on the neo-regionalism. More attention to mixed view-based studies (e.g., political economy lens) allows enriching the research area, in addition to examining all economic, political, and social factors ruling this phenomenon simultaneously. It is recommended to improve the content, methodological, and theoretical shortcomings in future studies to make it possible to propose suitable policies for these regions, in addition to providing the ground for organizing strategic studies on this area, and also .

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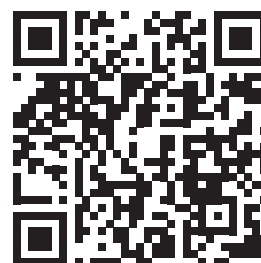
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