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Analysis of the Regional Development Status and Spatial Disparities in Yazd Province, Iran

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ABSTRACT

It is more than two decades that policy makers, planners and pundits in Iran have considered the different methods of planning such as regional and land use planning. However, in economic and social fields, only one or two regions have been responsible for income and national production. Spatial inequalities originate from two main contexts: first, the natural conditions of each geographical region and second the decisions of economic policy makers and planners. Yazd province is one of the central provinces of Iran that is 8^{th} and 23^{th} province of Iran (among 31 provinces) in terms of area and population respectively. In this article, more than 160 variables and 13 development indices were provided to analyze the condition of regional development and spatial inequalities in Yazd province. Then, the condition of intra-regional inequalities was zoned and its values was calculated using Fuzzy C-Mean Clustering and Kriging methods. The analysis of regional development in Yazd province shows that the severe centralization of capital, population and facilities in the central (and close to the center of the province) corridors and following the pattern of growth pole have led to the fruition of this section, the mustiness of other sections, and spatial inequalities in access to facilities and services in the province. however, natural and geographical limitations have also provoked this problem.

Keywords: Regional Development, Spatial Inequalities, Population and Activity, Fuzzy C-Mean Clustering, Yazd Province.

I. INTRODUCTION

In the modern world, social and economic inequalities can be observed as a pervasive and growing phenomenon [1, 2]. The historian, archaeologist and professor of Stanford university, Ian Morris, says by looking at the history of inequality: "this isn't a new phenomenon and there have been in human societies in different forms during the history but the dangerous thing is its unprecedented intensification and now the important thing is how humans pass the era that can be named as "the era of inequality" [3]." The growing trend of this dispirit have been associated with the different levels of local and spatial fields so that the difference in fruition level of development indices in cities and regions have created concepts such as urban inequalities and regional disparities. Overall, the regional disparities show the continuity of development challenges in cities [4]. This type of spatial disparity increases the possibility of poverty incidence, exclusion intensification, unemployment, marginalization, migration and injustice. Also, it harms the foundation of national unity and stops the general development of economy [5]. In fact, in the modern world, facilities and services haven't been distributed fairly and uniformly in different regions specially in cities [6]. The balanced and coordinated development of regions is a very important prerequisite for economic stability and integrated development of country [7]. Thus, the reduction of regional disparities is part of public social goal for general inequality reduction and in particular for reduction of inequality between individuals [8]. In recent years, many governments and policy-makers seek to confront these regional disparities [9]. There are some regional disparities in the spatial development of Iran [10]. Such a status exists in most regions and provinces of Iran and due to undesirable national and centralized planning in the field of development and its infrastructures there are obvious differences in the development trend of regions [11]. In this regard, the studies of Iran's researchers [12, 13, 14, 15, 16, 17, 18,

19, 20, 21, 22, 23, 24, 25, 26]. Emphasize consistently that the spatial organization of country is associated with unbalanced development, development gap between regions, and the lack of regional balance. So, what is discussed in this study is the recognition of regional disparities and the necessity to take comprehensive planning perspective, especially spatial planning, to solve it. Based on this role and responsibility that is resulted from natural and legal process of each region as well as based on regional planning, national development plan can be performed in different regions [27]. The first step in this context is to codify efficient and reality-oriented plans, access to social justice and recognize current conditions [28]. Achieving this process is only possible by governmental measures and urbanism promotion in non-developed regions. This approach is known as growth poles or the growth and development centers of regions [29]. From the traditional viewpoint of rapid growth, the obstacle of rural development is the creation of urban industrial development typical patterns [30]. These points distribute the development in some channels to flow it in total economy [31, 32]. What can solve this problem is to coordinate the level of social management of these regions with other ones [33]. It is better that the operation process is implemented in a planned framework known as management plan [34]. The professionals of spatial planning handle the guidance of main sources and macro-management and make various changes [35].

According to the definition of "the surveillance network of Europe spatial planning", spatial planning is a coherent and active approach of spatial development to form the future of cities, areas and larger geographical regions so that go beyond the policies of regional development and approach to spatial planning approach [36]. Therefore, in this study, we analyze the status of regional development and spatial inequalities in Yazd province (of Iran) based on existing processes and previous studies as well as we prove inequality hypotheses and spatial imbalances in macro and micro levels.

1.1 Centralization and imbalances in Iran and Yazd province

Iran country is among the large countries of the world in terms of area and population; however, the existing population isn't distributed uniformly around country [37]. With 137.5 million oil barrels, Iran is the second largest owner of oil in the world and contain 10.3% of total world oil reserves. In addition, after Saudi Arabia, Russia and America, Iran is the fourth largest producer of oil around the world with production of 202.4 million tons that is 5.3% of total world oil productions [38]. Yazd province is placed in the central part of Iran plateau with 74493 km^3 of area and its coordinates is $29^\circ\ 35' - 35^\circ 7' N\ and\ 52^\circ\ 50' - 58^\circ\ 16'\ E$. According to the last divisions in 2011, this province has 10 cities, 21 towns, 21 parishes and 45 rural districts (figure 1). According to the general census of population and housing in 2011, the population of Yazd had been 1074428 people [39]. Residence system of Yazd province relies on two life patterns namely rural and urban patterns and due to the limited water resources and the dominance of drought and dry climate, nomadic life pattern isn't common in this province. Despite the existence of these two dominant residence patterns, population settlement is mostly based on village settlement; however, urbanization has had a growing trend due to natural factors and centralization of services. So, the village settlement of the province is shifting from mostly distributed rural form to centralized urban pattern. These changes have led to some kind of heterogeneity in the distribution of the province's population and have caused most settlements to be centralized in the western middle part and to be decentralized in the northeastern, southeastern, south, west end, and center parts of the province. It is more than two decades that the policy-makers, planners and pundits of Iran have considered different planning methods including regional and spatial planning in order to establish a comprehensive and pervasive development in natural, economic, social, cultural and political fields through codifying desirable and endogenous strategies in the national arena while emphasizing on the capabilities and environmental resources of geographical areas [40]. Similar to other developing countries, there are a few regions in Iran that are responsible for national production and making income; these regions possess public services and accordingly they have economic and social efflorescence at the expense of other regions' mustiness. It should be noted that inequality and exclusion can be a direct danger for community safety [41, 42, 43] and no kind of development planning can be realized without public planning.

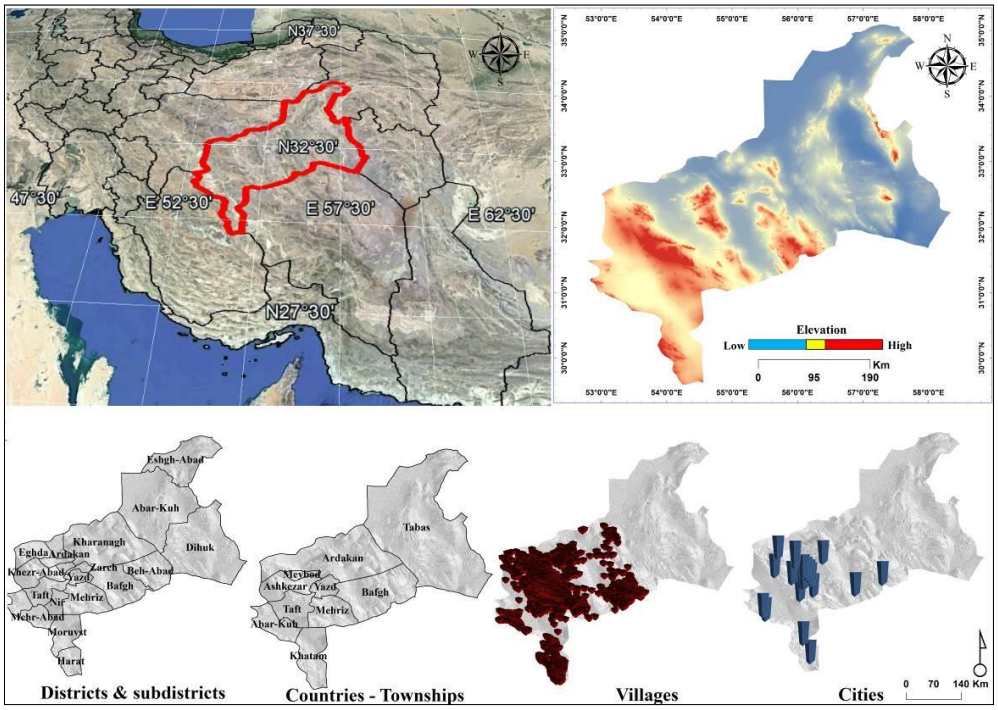


Figure 1: The status and position of Yazd province in Iran

So, this paper aims to study the development indices and spatial structure of Yazd province as a form resulted from spatial development. Studying and investigating the spatial structure, in fact, is the analysis of social identities that are created as reflected facts in the geography of each region. Studying settlements based on agricultural production (Von Tunen, 1826), industrial and resource distribution places (Weber, 1909) or commercial and service centers are among the first studies related to spatial structure and organization—both theoretically and practically. Finally, the subject of the spatial organization and geographical structures of population and activity is shifted from economic issues to social and cultural issues [44]. The necessity and importance of this study begins from the point that discussion and recognition of region's statuses, capabilities and restrictions in planning process is very important because the awareness of the strengths and weaknesses of regions is necessary to provide regional plans and schemes. Therefore, the recognition of country divisions in terms of fruition and prioritizing them for next measures have always been among the concerns of development officials [45, 46, 47] so that using indices such as economic, social and cultural ones can be appropriate indices to determine the place of those regions as well as a factor to eliminate problems and insufficiencies to reach economic welfare and social health and in turn to realize development [48]. Hadder believes that due to this fact that the main goal of development is elimination of community inequalities, the most appropriate concept for development is "growth along with social justice" [49]. According to the United Nations (UN), when we talk about social inequalities, we must take into account not only the environmental justice but also its relationship with social and cultural aspects [50]. In recent years, some studies have been conducted in the field of development and its rating in Iran [51, 52, 53, 54, 55, 56, 57] —figure 2. Similar to other developing countries, there are a few regions in Iran that are responsible for national production and making income; these regions possess public services and accordingly they have economic and social efflorescence at the expense of other regions' mustiness. The spatial organization that implies how to establish spatial system and the relationship between them have three elements namely human settlements (urban and rural), activity centers (agriculture, industry and services) and communications. The spatial organization of Yazd province indicates the existing dispersion among these elements. In terms of activities, according to human settlements, most industrial and service activities have been distributed and centralized in the middle zone, especially in Yazd and Ardakan cities. The study of Yazd's urban settlement centers shows that

different climates and utilities has led to unbalanced settlement of these centers across the province. Currently, most urban settlements of the province are established in the western middle zone and by getting away from this zone, the density and population of these centers are reduced significantly. The main reason of this is difficult living conditions resulted from water shortage and existing deserts that has led to scarce rural spaces and consequently to scarce major urban centers and reduced influence of them.

II. METHODS AND MATERIAL

In most studies of regional planning (including urban and rural), we observe Multi Criteria Decision Making (MCDM) problems which are mostly Multi Attribute Decision Making (MADM) problems. In these decision makings, we may use multiple measurement criteria instead of a single measurement criterion of optimality. Thus, the decision matrix in such planning problems include different regions or planning units as options and indices or the factors associated with planning as criteria [58].

Although the none-statistical MADM methods such as AHP or mathematical planning methods are also used by some researchers, the base of such studies is above-mentioned decision matrix and commonly used methods are multi variable statistical methods such as factor analysis, cluster analysis, audit analysis and particularly taxonomy analysis. fuzzy set theory and fuzzy logic as mathematical theories are efficient and useful tools to model and formulate the existing inaccuracy and ambiguity in human cognition processes [59].

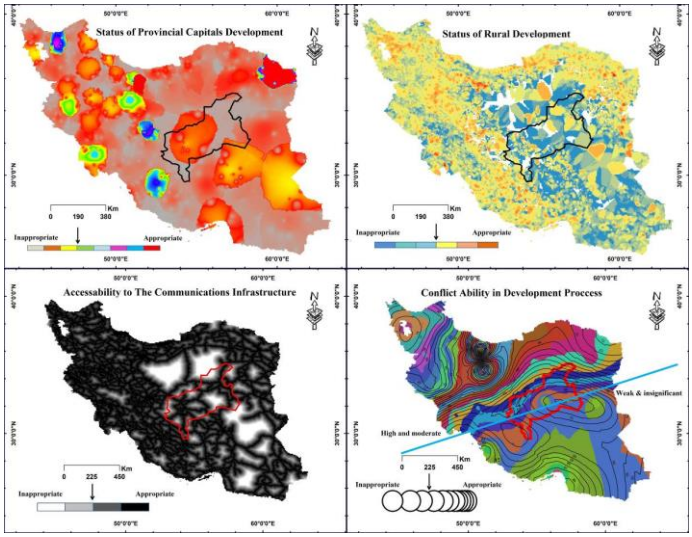


Figure 2: Analyzing some indices of regional development status in Iran compared to Yazd province

Fuzzy c-means (FCM) is a method of clustering which allows one piece of data to belong to two or more clusters. This method (developed by Dunn in 1973 and improved by Bezdek in 1981) is frequently used in pattern recognition. It is based on minimization of the following objective function:

$$J_m = \sum_{j=1}^{N}\sum_{j=1}^{c} u_{ij}^{m}\|x_i - c_i\| \qquad 1 \le m < \infty$$

where m is a real number greater than 1, u_{ij} is the degree of membership of x_i in the cluster j, $x_i$is the i^{th} d-dimensional measured data, C_j is the d-dimension center of the cluster, and ||*|| is a norm expressing the similarity between any measured data and the center.
Fuzzy partitioning is carried out through an iterative optimization of the objective function shown above, so that the membership u_{ij} and the cluster centers c_j are update as follows:

$$u_{ij} = \frac{1}{\sum_{k=1}^{c}\left[\frac{\|X_i - c_i\|}{\|X_k - V_j\|}\right]^{\frac{2}{m-1}}} \quad , \quad c_j = \frac{\sum_{i=1}^{N} u_{ij}^{m} .. x_i}{\sum_{i=1}^{N} u_{ij}^{m}}$$

The iteration will stop when $\max_{ij} = \{\left|u_{ij}^{(k+1)} - u_{ij}^{(k)}\right|\} < \varepsilon$. Where ε is a termination criterion betwwen 0 and 1 and k is the iteration step. This procedure converges to a local minimum or a saddle point of J_m. The algorithm is composed of the following steps [60, 61]:

1. Initialize $U = [u_{ij}]$ matrix and $U^{(0)}$
2. At k-step: calculate the center vectors $C^{(k)} = [c_j]$ with $U_{(k)}$
$$c_j = \frac{\sum_{i=1}^{N} u_{ij}^{m} .. x_i}{\sum_{i=1}^{N} u_{ij}^{m}}$$
3. Update $U^{(k)}, U^{(k+1)}$
$$u_{ij} = \frac{1}{\sum_{k=1}^{c}\left[\frac{\|X_i - c_i\|}{\|X_k - V_j\|}\right]^{\frac{2}{m-1}}}$$
4. If $\left\|U^{(k+1)} - U^{(k)}\right\| < \varepsilon$ then stop; otherwise return to step 2.

To perform fuzzy c-means clustering, first the data and indices of research were processed in Excel software. Then, they were applied to Arc GIS software to perform

spatial analyses and make necessary changes. Next, the layers were rasterized with a certain cell size and then the geographical span of the province (latitude and longitude) was exported with "Raster to Ascii.txt" format to digitalize all the layers. Then the digital data were called in Matlab software and the order of fuzzy c-means clustering was applied to them to obtain the quintuple values of development (physical, infrastructural, economic, cultural and human values). After performing clustering calculations, the data were Matched and overlapped again and the overall status of regional development were extracted. Finally, the digital data were to the Arc GIS software to indicate spatial inequality map and analyze the regional development status of Yazd province (Figures 3 and 4).

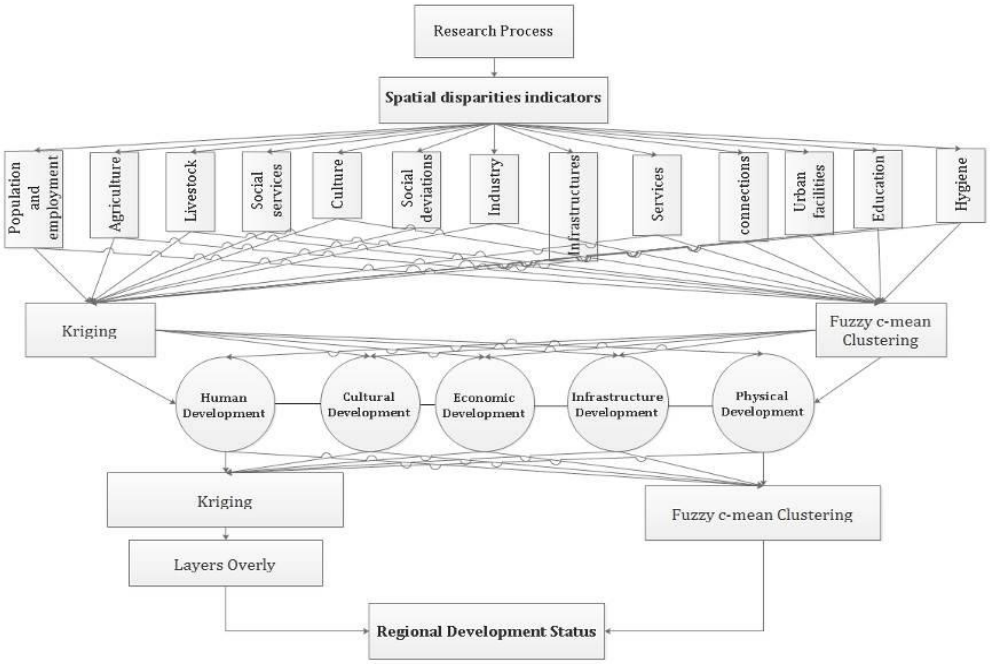


Figure 3: The Research Procedure

1.2 Geo-statistical Methods

According to the simplest definition, geo-statistic is an interpolation method in which the used criterion for interpolation or estimation is the minimization of variance value. Geo-statistic estimation is among the most accurate estimation methods because it takes into account many factors such as the distance between the points, anisotropy and spatial variability [62]. This method checks whether there is a spatial structure among data or not firstly. Then, if there is a
Spatial structure, it analyzes the data. So, the geo-statistical estimation has two phases. The first phase is

recognition and modeling of spatial structure that can be examined by variogram analysis and the second one is the estimation of considered variable by geo-statistical functions—in this study, Gaussian function is used. The first step in the first phase of geo-statistical methods is to check whether there is a spatial structure among the data by variogram analysis. In geo-statistic, variogram is used to quantify the spatial variations of studied variable (spatial inequality). Variogram measure the amenability between two data points as a function of distance [63]. The use condition of this analysis is the normality of data. One the methods that can be used to evaluate the normality of data is the coefficient of skewness; when this coefficient is smaller than 0.5, there is no need to convert data, but when that is greater than 0.5, the Normal Log distribution must be used to normalize data. In the next step, after normalization of spatial functions, Kriging and Correlated Kriging methods are used for interpolation. Kriging is a set of geo-statistical methods that are employed to predict a variable's value in a certain place [64]. There are various Kriging methods that the most famous ones are Simple Kriging, Ordinary Kriging and Universal Kriging.

$$Z(x_i) = \sum_{i=1}^{n} \lambda_i Z(x_i) \qquad (1)$$

Where $Z(x_i)$ is a estimation parameter, λ_i is the weight or importance of the quantity dependent on i^{th} sample and $Z(x_i)$ is the known parameter. The weights are dependent on the degree of the correlation between the sample points and estimated points; and their sum is always 1. So. We use Gaussian model (equation 2) for spatial inequality function:

$$\gamma(h)C_o + C = \left\{1 - e^{-\left(-\frac{h}{2}\right)^2}\right\} \qquad (2)$$

Where γ is the variogram in step h, C is partial sill, nugget and distance parameter, and C_0 is sill. In this study, we use the proportion of nugget to sill to measure the spatial robustness of models. This proportion can be studied to evaluate the spatial structure of variables. When this proportion is less than 0.25, the considered variable has a strong spatial structure; when it is between 0.25 and 0.75, the variable has a mean spatial structure; finally, when it is greater than 0.75, the variable has a weak spatial structure (Robinson et al, 2006: 100). This proportion can be expressed as a percentage too. Then the cross-validation of models was performed and the most appropriate method was selected finally. In this study, we use Mean Error (ME)—equation (3)—Root Mean-Square Error (RMSE)—equation (4)—and Root Mean standardized Square Error (RMSSE)—equation (5)—for cross-comparison of models:

$$ME = \frac{1}{N}\sum_{i=1}^{N}[z(x_i) - z(x_i)] \qquad (3)$$

$$RMSE = \sqrt{\frac{1}{N}\sum_{i=1}^{N}[\bar{z}(x_i) - z(x_i)]^2} \qquad (4)$$

$$RMSSE = \sqrt{\frac{1}{N}\sum_{i=1}^{N}\frac{[\bar{z}(x_i) - z(x_i)]^2}{\sigma^2(x_i)}} \qquad (5)$$

Where $Z($ is the estimated value in cross-validation point, $Z($ is real measured value in the point, N is the number of data sets' measurements, and $\sigma^2($ is Kriging variance in the cross-validation point. The (more) closer to zero the ME, the (more) closer to 1 the RMSSE; and the less the RMSE and RMSSE, the more statistically accurate the applied pattern [65].

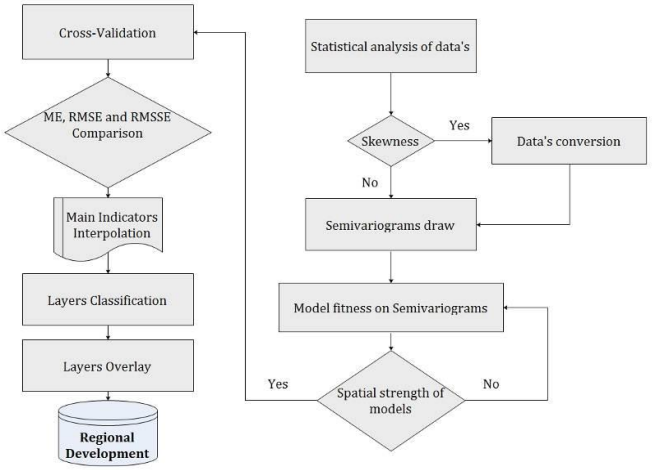


Figure 4: the process of geo-statistical studies and selecting the best method to estimate the intended quantity.

III. RESULTS AND DISCUSSION

In this equation, more than 160 variables related to the various aspects of regional development (social development, cultural development, human development, economic development, infrastructural development and physical development) were selected and the data related to them were collected through statistics and statistical yearbooks of Yazd province, the province's planning and management organization (department of statistics and information), various plans and schemes, the studies of authors and visiting the relevant organizations. Then the gathered data were imported to Matlab, Arc GIS and Excel softwares for processing, calculations and analysis.

TABLE 1. THE EFFECTIVE INDICES IN THE ANALYSIS OF YAZD PROVINCE'S REGIONAL DEVELOPMENT STATUS

Main indices	Relevant primary variables	Main indices	Relevant primary variables
Population and	1. Population 2. Population density 3. Urban population 4. Rural population 5. Urbanization rate 6. The ratio of city population to the total population 7. Those born 8.	Industry	1. Knitting and Textile 2. Industrial workshops 3. Sweetmeats 4. Tile and ceramic 5.

Employment		Mortality rate 9. 10-years or more population 10. Economic population 11. Employed population 12. Unemployed population 13. The number of employed staff 14. Annual income of urban and rural households.		Machine woven carpet 6. Mines 7. Electricity 9. Industrial parks
Agriculture	Agricultural lands	1. Total area 2. Cultivable lands 3. Cultivable irrigated lands 4. Cultivated irrigated lands 5. Irrigated garden nursery 6. Cultivable rainfed lands 7. Cultivated rainfed lands 8. Rainfed garden and nursery 9. Greenhouse 10. Forest 11. Grassland 12. The number of planters 13. The number of gardeners 14. Operators	Services	1. Tourism 2. Value added 3. The proportion of value added to the output of service sector in the province
	Agricultural water	1. The number of deep wells 2. Semi-deep wells 3. Aqueducts 4. Fountain 5. Annual water evacuation 6. The amount of consumed water (daily, monthly and annual) 7. Surface water withdrawal 8. Groundwater withdrawal		
	productions	1. The amount of production 2. Date 3. Citrus	Infrastructures	1. The number of villages with electricity 2. Total electricity consumers 3. The length of roads 4. The villages with water piping 5. Households with electricity 6. The dense of roads 7. Airport 8. Hospital 9. Clinic
	Machines and other agricultural institutions	1. The number of tractors 2. Tiller 3. Combiner 4. Trailer 5. Reaper 6. Mover 7. Rower 8. Bieler 9. Chopper 10. Flail 11. Tractors plow 12. Disk 13. Furrower 14. Ditcher 15. Cultivator 16. Fertilizer 17. Tractor sprayer 18. Motor sprayer 19. Sprayer 20. Water pumps motor 21. The amount of seed 22. Fertilizer 23. Poison		
Livestock	Livestock population	1. The total number of 2. Original cows 3. Hurak cows 4. Native cows 5. Sheep 6. Goats 7. Camels	Urban facilities	1. The area of public park (m^2) 2. The number of parks 3. Public toilets 4. Slaughterhouses 5. Fruit and vegetable markets 6. Fire stations 7. Slaughterhouse capacity 8. Highway length 9. Access to bus and public transportation
	Livestock production	1. The total production of 2. Milk 3. Red meat 4. Chicken meat 5. Egg 6. Honey 7. Shrimp 8. Camel meat 9. Ostrich meat 10. Ostrich egg		
		1. The number of providers of rehabilitation services 2. Rural complex of Welfare Organization 3. Kindergartens 4.		1. The number of villages with telephone communication 2. Internet access 3. Rural post office 5. Rural telecommunication

Social services	The urban complex of welfare organization 5. Insured persons covered by Social Security Organization 6. Insured persons covered by health insurance 7. Permanent clients of Relief Committee	connections	office 6. Urban mailbox 7. Landline phone 8. Mobile phone 9. Intra-provincial trips 10. Extra-provincial trips 11. Access to communication networks
culture	1. The number of theaters 2. Printing offices 3. Cinemas 4. The number of public libraries 5. The capacity of libraries 6. The number of books 7. Mosques 8. Religious places	Hygiene	1. The number of health homes 2. The villages covered by health homes 3. Health centers 4. Urban health centers 5. Health centers 6. Rural health centers 7. Medical labs 8. Pharmacies 9. Radiography centers 10. General practitioners 11. Specialists 12. Health institutions 13. Hospitals 14. Maternities 15. The number of hospital beds
Social deviations	1. The number of captured drug smugglers 2. Captured drug addicts 3. Theft 4. The amount of discovered drugs	Education	1. The number of schools 2. Classrooms 3. Students 4. People per classroom 5. Bachelor (and higher) employees 6. Associate degree employees 7. Diploma (or lower) employees 8. Literacy movement class 9. National university 10. Azad university 11. Payam-Noor university 12. Elmi-Karbordi university

The overall ratio of inequality for 13 main indices are presented in table (2) based on the results of spatial inequality calculation using Kriging method. These results show that the ratio of industry index is more than other ones'. In addition, the overall ratio of inequality in education and social deviations are the least ratios.

Table 2. The overall ratio of spatial inequality in terms of different indices

Main Indicators													**overall ratio of Spatial inequality**
Total	Education	Hygiene	Connections	Urban facilities	Infrastructures	Service's	Industry	Social deviations	Culture	Social services	Livestock	Agriculture	Population and employment	
0.31	0.13	0.20	0.20	0.25	0.34	0.19	0.39	0.03	0.16	0.17	0.13	0.14	0.26	

According to the statistical analysis of spatial inequality, the overall index of inequality that had a high skewness was detected as abnormal and the logarithm method was used to normalize it (table 3). Also, according to the performed level analysis, a western-eastern trend was observed in inequality data—this trend was deleted for estimations.

Table 3. The results of the statistical analysis of spatial inequality

Kurtosis	Skewness	Standard deviation	Average	Maximum	Minimum	Spatial inequality
-0.3533	0.5317	0.18	0.20	0.39	0.03	**Main data's**
-1.5414	-0.0335	0. 39	0.39	0.79	0.006	**Normal lag distribution**

In the next step, a correlation test was done between overall spatial inequality index and other indices. The results of this test show that there is a high correlation between overall spatial inequality index and urban facilities index (table 4). In this regard, the urban facilities index was used as auxiliary index in Correlated Kriging method.

Table 4. The correlation between overall spatial inequality index and other indices

Education	Hygiene	Connections	Urban facilities	Infrastructures	Service's	Industry	Social deviations	Culture	Social services	Livestock	Agriculture	Population and employment	
0.2351**	0.4561**	0.3267**	0.7351**	0.5950**	0.6116**	0.6799**	0.0321**	0.5801**	0.6680**	0.2669**	0.3781**	0.4320**	**overall ratio of Spatial inequality**

According to the variogram of Gaussian model, figures 6(a) and 6(b) were plotted based on Kriging and Correlated Kriging methods respectively and the ratio of nugget to sill was computed. Gaussian model has a strong structure in Kriging method but has a mean structure in Correlated Kriging method (table 5).

Table 5. The ratio of nugget to sill

The ratio of nugget to Sill (%)	Impact radius (m)	Nugget	Sill	Model	Method
3.99	40108	0.0416	1.0416	Gaussian	Kriging
26.69	63399	0.055	0.206	Gaussian	Co-Kriging

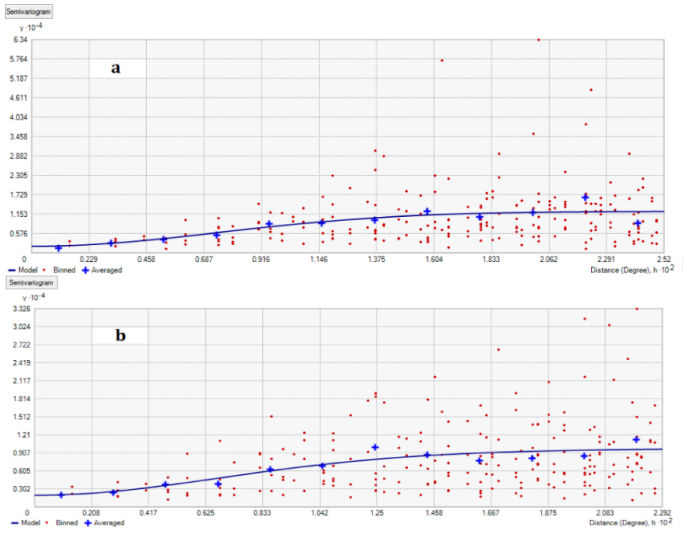
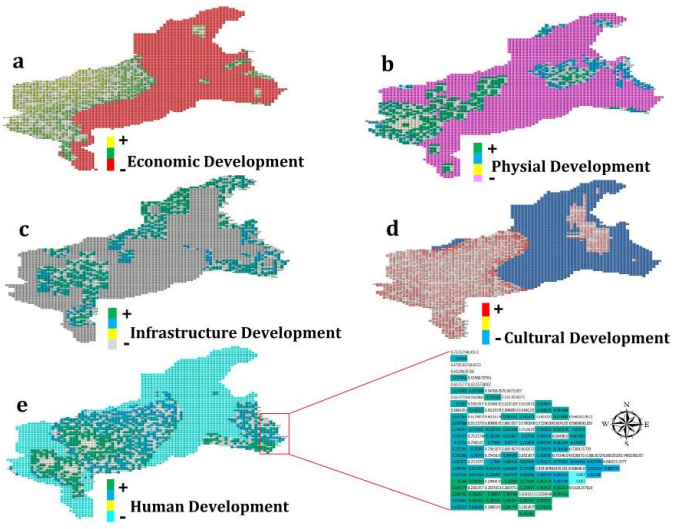


Figure 5 : spatial inequalities' variograms based on Gaussian model; (a) Kriging method (b) Co-Kriging method

In addition, in cross-validation, we can measure the validity of used Gaussian model based on the difference between the results of spatial inequality of indices (Kriging method). According to table 6, Gaussian model has a stronger structure in Kriging method. So, the cross-validation was done. Results show that the used model and Kriging method has a high validity according to the values of ME (equation 3), RMSE (equation 4), and RMSSE (equation 5).



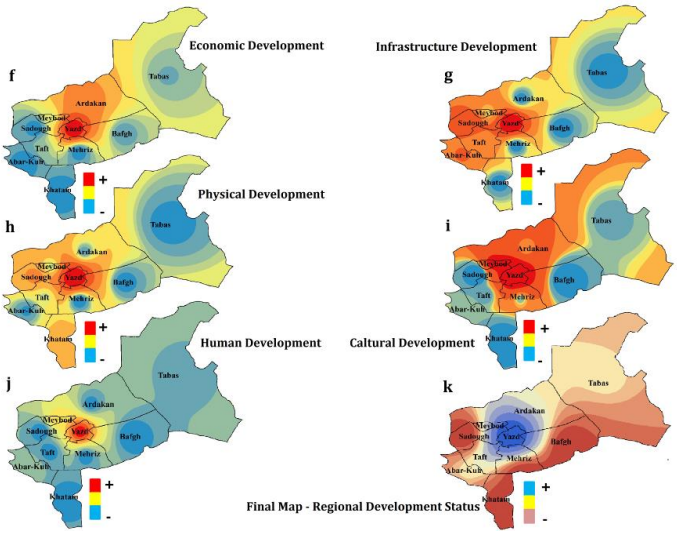


Figure 6 : (a, b, c, d, e) regional development status based on FCM; (f, g, h, I, j, k) based on Kriging method

After cross-validation, we attempted to interpolate by Kriging method and Gaussian model and based on 13 above-mentioned indices of spatial inequalities. Initially, 13 layers of map was provided for main indices, then the layers and indices are placed in a quintuple classification and spectrum (table 7). Finally, 5 layers and development indices were overlapped to achieve the overall status of spatial inequality and regional development.

Table 6. the parameters of the cross-validation of selected variogram model

Nugget than Sill (%)	Impact radius (m)	Nugget	Sill	Model	Method
3.99	40108	0.0416	1.0416	Gaussian	Kriging
26.69	63399	0.055	0.206	Gaussian	Co-Kriging

Table 7. The classification of the main indices of regional development in five development statuses

Regional Development Main Indicators				
Physical Development	Infrastructure Development	Human Development	Economic Development	Cultural Development
-Urban facilities	- Infrastructures - Connections	-Social Services - Education - Hygiene	-Industry -Services -Agriculture -Population & employment -Livestock	-Culture -Social deviations

IV. CONCLUSION

According to Peter Hall, planning is the attainment process of a goal that is done through regular and consecutive measures [66]. After 60 years of planning

emergence in Iran, still sectional attitude is dominant in the planning system of Iran. Such a structure has caused the sectional-national levels' planners to neglect regional and spatial dimensions. The management system of Iran isn't integrated and accordingly hasn't required performance and coordination [67]. However, what has been neglected in these systems permanently or has attracted little attention are two major issues; the first one is the dissimilar importance of space and making cumulative (spatial-physical policy making tools as a whole) to facilitate the competitiveness of all activities in all fields [68, 69, 70, 71, 72] and the second one is to pay attention to social factors as another important factor expect spatial factors to create competitiveness, in other words to create intra-corporation relationships, social networks and knowledge networks among the activity units [73]. To eliminate this weakness in the researches of development measurement, it is necessary to exploit the concept of efficiency as the ratio of output to input. Rationality and efficiency in the concept of efficient resource allocation [74] are realized in the framework of rational corrections [75, 76, 77] and informed assessment of measures and activities.

Despite the high mineral and industrial potentials to develop trade and commercial organization of productive-industrial plans, Yazd province doesn't have appropriate physical capacities to establish activities and introduce them to target markets. Currently, this province has covered the major plans of industrial activity organization in the form of industrial parks. Although this matter has an especial importance in the creation of benefits resulted from scale, control and guidance of environmental issues, development of technical surveillance programs and suppling water of Yazd province, it provides some limitations to the industrial development of the province due to the restrictions of industrial parks in international (and partly internal) marketing programs. Currently, Yazd province has 9 industrial parks including 5 special economic zones to build new industrial parks. Another potential of Yazd province is the province's capacities in the field of tourism activities. As it is obvious, the quality and quantity of regional development in Yazd province is more or less proportional to the urban population size of the province and the economic status of its cities (Figure 3) so that more than 50% of the province's population is settled in two counties, Yazd and Ardakan. However, what intensifies the unbalanced orientation of capital across the province and particularly in this zone is dominant power of Yazd city that is the reflection of economic power of Yazd city, its climate and the intersection point of national transportation lines and influence spheres of regional markets. The formation of major urban centers in Yazd-Ardakan axis and the flow of services, financial resources and employment opportunities in this corridor, in addition to unbalance settlement and activity have led to differences in rural settlement and housing in this axis compared to other points of the province. Yazd city has more and better services due to its economic power and being the most thriving urban center of the province. in this regard, it provides much of the province's services and accordingly it has provided appropriate facilities to cover city services. Next to Yazd, the population centers of Ardakan and Meybod have better status. In some zones of Yazd province in which population and activity establishment centers have been created close together, the spatial organization is possible by levelling the villages and hierarchical equipment of rural service centers. However, in the zones that have sporadic and low-density rural points, the spatial organization requires special policies. Although the establishment and activity pattern of these zones has been created due to natural and social conditions in the past, currently they have small populations, cause capital and energy losses, disturb environmental balances and don't possess stable conditions. The hierarchical system of cities in Yazd province isn't consistent with hierarchical performance of urban centers and the number of these centers and their population don't follow a hierarchical operating system and imply the huge difference between Yazd city and other cities of the province and even between centers and towns of each county-in terms of quality, quantity, performance and influence sphere of operations. Therefore, Yazd province has an intensive heterogeneity in the dispersion of population and activity as well as the existence of climate conditions and the importance of establishment and activity axis in Yazd-Ardakan corridor has led to the creation of a gap in the relative desirability (utility) of life in different points. During the past few decays, particularly in third world countries, there has been some kind of separation and segregation between city and village in most used mechanical models that is resulted from the dominance of centralization-oriented, sectional, top-down and undemocratic attitude in planning processes. In southern countries like Iran, the development of cities in space

and time has created the spatial organization of urban system and currently Tehran has the highest level of living center and activity in the urban system of Iran and is an urban pole with national influence sphere. After Tehran, province centers are in the next rank and have unbalanced relationships with other cities, particularly with capital [78]. So, the more developed the urban system of a country, the closer to the normal distribution pattern the urban system [79]. Yazd province of Iran has special features in terms of ecology, landscape and spatial structure. In 2006, the portion of Yazd province in the creation of value added (GDP) in Iran was 1.2% that in this respect, is 21^{th} province of Iran (among the 31 provinces). The results show that the existence of appropriate infrastructures and suppling accesses for residence points around the diagonal axis of Mehriz-Aghda with the center of Ardakan-Yazd has caused this central zone to possess a strong attraction to form an activity structure and system in the province. accordingly, except some special points of the province that have stronger attractions like access to raw material and main (mother) industries, other activities in the province zone tend to establish in this area and this area attracts new activities like a strong magnet. The results of Fuzzy c-means clustering for 5 development indices (cultural, human, economic, infrastructural and physical) and overall spatial development index show that Yazd, Ardakan and Meybod counties have the highest development status and Khatam, Bafgh and Behabad counties are in underdeveloped status (figure 7 and table 8).

Table 8. The final status of regional development in the counties of Yazd province

Total Status of Regional Development	Spatial Inequality Indicators					Country
	Physical Development	Infrastructure Development	Economic Development	Human Development	Cultural Development	
0.140	0.123	0.356	0.118	0.200	0.204	Abar-Kuh
0.179	0.137	0.120	0.450	0.123	0.221	Ardakan
0.100	0.112	0.110	0.109	0.170	0.132	Bafgh
0.100	0.117	0.207	0.320	0.114	0.310	Behabad
0.156	0.156	0.289	0.230	0.112	0.187	Taft
0.101	0.200	0.117	0.104	0.104	0.130	Khatam
0.111	0.230	0.460	0.109	0.101	0.111	Sadough
0.141	0.111	0.117	0.201	0.164	0.193	Tabas
0.135	0.101	0.100	0.114	0.108	0.201	Mehriz
0.178	0.157	0.216	0.254	0.341	0.321	Meybod
0.295	0.567	0.750	0.889	0.660	0.546	Yazd

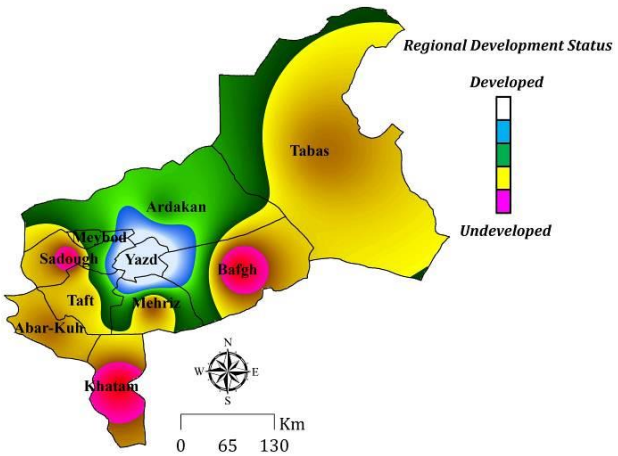


Figure 7. The final zoning of regional development status

Passing one of the main axes of Iran (Kerman-Yazd-Tehran axis) from the middle zone of Yazd province has led to the intensification of populated points in this zone that due to the existence of appropriate lands for agriculture and activity, industrial centers has been created in the zone. State funds, location economy and implemented integrations in this axis have stimulated the inherent nature of capital (capital movements) to move towards this area and seek certain points in that which have more potential to gain more profit and faster invest return rate. Based on the above-mentioned subjects, in order to make a change in different sections of development and make a balance in the population and activity spaces of the province's cities, we need to recognize and review two fundamental concepts. First, paying attention to the process of capital accumulation

and prospect of funding, and stabilizing the capital accumulation and fixating the constant capitals particularly in the urban parts of the province; second, reducing the influence of capital flow lines in high-profit economic activities (and low-benefit in terms of macro-economy) as well as moving it spatially through making other urban points of the provinvce profitable (creating economic attractions by authorizing scheduled protection laws), in other words disturbing the movement lines of current capital knowingly and creating and growing new capital lines in developmental and economic activities in other spatial points.

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