

## Determining Levels of Agricultural Development in Zanjan Province Iran.

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**Abstract:** Iran is one of the countries which has high regional imbalances in general and agricultural disparities in particular. This disparity is visible within provinces also. Thus the main objective of this paper is to measure the level of agriculture development in Zanjan Province to determine the agricultural development gap within this province. For this purpose, 31 agricultural development indicators for 46 rural districts were used to measure agricultural development level. The obtained results show that regional inequity in respect of water resources is more than other agriculture sub – sectors. Spatial pattern indicates that the developed rural districts are located in northeast; northwest and east of the province, while rural districts located in central and south of the province have low level of development.

**Key words:** Agricultural development, Regional inequities, Development indicators

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### INTRODUCTION

Until beginning 1970s, there was paid less attention to spatial aspects in analysis development matters. But in this decade, there were considered to eliminate development inequities in different aspects and pay attention to regional development as main objective of development programs, by direction attitudes based on social justice (Binswanger, H.P, 2001). In this field, there was felt the necessity that in order to achieve to develop economic, social and cultural aspects, planning spatial aspect of development must be considered simultaneously, with regional programming. Neglecting classical and neo-classical theories from spatial and place aspect of development provided necessary beds for spatial analyzing of development, as which it was taken out development concept from exclusive of economic growth and development perspective and its pattern, and sectors balance necessity to develop levels was considered as basis of economic and social development programs in different regions. After that, governments tried to execute permanent and balanced development programs in different regions of the country and different economic sections, by using short and long term programs. In order to balance of development, intellectuals and theorists in regional programming and development have analyzed regional and regional inequities according to their time and place situation. Neo-classic economists believe that regional growth and development is effected by balance mechanism and replacement factors, as which free flow of resources among regions of a country provides a regional balance. Neo Keynesian believes that it is dependent on exports, as which they have divided a region economic to two essential and unessential sections and they believe that regions development is because of basic sections and other activities are resulted from growth and developments of this sections. (Gharabaghian – 1976). GomarMirdal considers foreign factors as reason of regional inequities, which it has been formed for profit motivation, and primary privilege and historical fields of regions sever it (Gilbert and Kalger – 1976). Franswa Pero considers attitude type to development as a result of development poles, as which there is formed an inequity because of industrial huge investment in large regions; and there is provided a equity by gradual penetrating development in other regions (Willer and Muller – 1986). John Friedman (1975), by providing "center – Peripheral" theory, considers center as development origin, which it develops to its surrounding environment by raising development in the center in economic maturity stages of development flow (Clark – 2000). According the theory, relationship between center with surrounding is a colonized relationship which during this relationship, center development is implemented by backwardness surrounding.

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In Iran, this matter hasn't been considered seriously, despite of available a significant inequity among and inside of provinces in different social – economic aspects. Carried out studies by international organizations and regional and foreign researchers, in evaluation frame of regional differences about industrial, agricultural and services potentials and capabilities have shown growing inequities in distribution and using of services, possibilities, resources and infrastructure in different fields (Planning and Budgeting Organization, 1982, 1984; Studies and Researches Center of Urbanization and Architecture of Iran, 1991; Azar and Gholamrezaei, 2006; Kalantari 1998, 2004; Amirahamdi, 1986; Atash, 1999; Sharbatgholei, 1999; Noorbakhsh, 2002, 2005).

The mentioned inequities have affected the development agriculture as one of the important economic sector, in addition to industry and services sectors. Although there has been carried out few studies in this field, but some of them in this field, confirm inequity in agriculture development. In this field, Matin (1975) calculate compounded indicator of agriculture development, by studying agriculture inequities in different Iran's provinces. He represented that there has not been developed agriculture sector in different provinces of the country appropriately and it has a growing inequity. Kalantari and Rostami (2004) analyzed and categorized agriculture development trends in provinces of the country. They divided them in to the three following provinces from developing agriculture level:

1. Developed province (9 provinces)
2. Medium province (9 provinces)
3. Under-developed provinces (10 provinces)

All North, North–West and North–East provinces were categorized in developed provinces group.

This study also represented that since 1949 to 1979, efficiency – based agriculture policies has empowered regional inequity problem among Iran's provinces, because of ignoring under-developed provinces. In their study, Mahmoodi and Feizpoor (1996) have also confirmed high difference in developed degree of agriculture developing in Yazd province. Results of Kalantari and et al (2004) confirmed regional inequity about having some physical and human potentials and services of the agricultural extension. This study also represented that there isn't a logical proportion between agriculture potentials and capabilities of provinces as well as physical and human services extension.

Studying previous researches represent that many carried out researches in Iran have studied lack of development balances among provinces of the country, while subject of inter – province inequity has been less considered. Therefore, this article wants to evaluate agriculture development level in rural districts of Zanjan province development indices by using 38 agricultural and then it analyzes inter – province inequity of agriculture sector.

## MATERIALS AND METHODS

The current study is a applied study and its survey method is a descriptive and analytical method. Studied unit consists 46 rural districts of Zanjan province, according political – administrative divisions in 2006.

In order to evaluate and identify agriculture development surface, it was used from 31 indicators (including 19 Planting indicators, 5 gardening indicators, 2 livestock indicators and 5 water resource indicators) which required data in rural districts of Zanjan province were accessible. (Table 1)

Required data was gained from census data in 2006 and agriculture statistics in 2003. It was used analysis technique of main components with the following formula, in order to evaluate development level:

$$CI = \sum_{i=1}^n \frac{x_{ij}}{\bar{x}_i} \times W_{ij}$$

Where:

CI= Composite Indicator

$x_{ij}$ =  $i^{\text{th}}$  Indicator of the  $j^{\text{th}}$  Dehestan(rural districts)

$\bar{x}_i$  = Mean of the  $X_i$  indicator

$w_{ij}$ = Factor loading of the first principal component vector relating to  $i^{\text{th}}$  Indicator.

Apart from this method, the coefficient of variation (CV) is considered adequate for judging the regional disparities of each indicator. The formula adopted is as follows:

**Table 1:** Used indicators for evaluating agricultural development level in Zanjan province with amount of coefficient of variables.

Coefficient of Variable	Indicator Title	Variable Name	Variable Type
0.68	Per capita agriculture lands to beneficiary (Hectare)	X1	Planting indicators
0.552	Per capita lands under water cultured to beneficiary (Hectare)	X2	
0.816	Per capita agriculture lands to active population (Hectare)	X3	
0.535	Per capita lands under water cultured to active population (Hectare)	X4	
0.867	Percentage of watered lands to total agriculture lands	X5	
0.421	Per capita culturing of every watered culture beneficiary (Hectare)	X6	
0.553	Per capita culturing of every dry Planting beneficiary (Hectare)	X7	
0.581	Mean performance of watered wheat (Kg)	X8	
0.614	Mean performance of non-irrigated wheat (Kg)	X9	
0.546	Mean performance of watered barely (Kg)	X10	
0.635	Mean performance of non-irrigated barely (Kg)	X11	
2.684	Mean performance of rice (Kg)	X12	
1.346	Per capita beneficiary of watered wheat (Tone)	X13	
0.563	Per capita beneficiary of non – irrigated wheat (Tone)	X14	
0.72	Per capita beneficiary of watered barely (Tone)	X15	
1.091	Per capita beneficiary of non-irrigated barely (Tone)	X16	
2.426	Per capita beneficiary of rice (Tone)	X17	
1.037	Number of tractors against 1000 hectare lands	X18	
1.57	Number of combines against 10000 hectare lands	X19	
1.494	Percent of garden and nursery from all agriculture lands	X20	Gardening indicators
0.536	Number of trees against every 10 hectare under cultured garden	X21	
0.686	Number of trees against every 10 hectare under gardening lands (Kg)	X22	
0.627	Manufacturing gardening products against each tree (Kg)	X23	
0.512	Manufacturing gardening products against each hectare (Kg)	X24	husbandry indicators
0.567	Per capita sheep and goat	X25	
0.615	Per capita cow and calf	X26	Water resources indicators
0.965	Number of permanent springs against 100 hectare agriculture land	X27	
1.194	Number of seasonal springs against 100 hectare agriculture land	X28	
2.382	Number of permanent rivers against 10000 hectare agriculture land	X29	
3.187	Number of seasonal rivers against 10000 hectare agriculture land	X30	
1.3	Number of deep well against 100 hectare agriculture land	X31	

$$CV = \frac{\sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{N}}}{\frac{\sum_{i=1}^n x_i}{N}}$$

Where:

CV= Coefficient of Variation

$x_i$ = Value of indicator of  $i^{th}$  Dehestan

$\bar{x}$  = Mean value of indicator

N= Number of Dehestan.

All statistical results in respect of regional disparities are best represented through map. The figure1 was prepared by GIS software to represent the spatial pattern of agricultural development in Zanjan Province.

**Conclusions and Discussions:**

In this research, Zanjan province was selected as studied region, which it has been studied in rural district levels. This province which has been located in West of the capital and Northwest of the country, with surface area 22,164 square Kilometer and 970,946 residents (according to census in 2006) has 7 cities 16 sections and 46 rural districts. This province locates from 47° and 10¢ to 49° and 27¢ east length and from 35° and 25¢ to 37° and 10¢ North wide from equator line.

There has been used from 31 indicators (Table1) in order to evaluate rural development level in rural district of Zanjan province. These indicators represent agriculture situation of the province in Planting, gardening, livestock and water resources sub-sectors. There has been used from coefficient of variables (C.V) technique, in order to analyze spatial distribution kind of considered indicators in rural districts of the province, which amounts of coefficient variables of each indicator is provided in Table 1. The smaller statistic of an

**Table 2:** Agricultural development level in rural district of Zanjan province to sub-sectors and total development level

Rural district	Mixed indicator of Planting development	Mixed indicator of Planting development	Mixed indicator of husbandry development	Mixed indicator of potentials of water resources	Mixed indicator of Planting development
ab bar	7.16	5.23	0.14	13.9	26.44
gilvan	8.78	6.64	0.11	6.61	22.14
dastjerde	9.97	3.47	0.11	3.94	17.49
darram	3.98	3.38	0.23	9.48	17.07
geshlagat afshar	9.24	2.39	0.24	1.8	13.67
chaypare paein	8.44	1.32	0.34	3.11	13.22
mahneshan	4.02	2.05	0.19	6.84	13.1
gale jog	4.02	1.51	0.2	5.24	10.98
chavarzaq	4.65	3.12	0.19	2.98	10.94
zanjanrood paein	5.92	1.26	0.16	3.01	10.34
soltanie	5.34	1.19	0.29	2.75	9.57
sohrevard	6.81	2.42	0.1	0.1	9.43
alvand	6.41	1.9	0.48	0.52	9.32
khoramdare	2.92	4.29	0.1	1.49	8.8
abharrod	3.73	2.97	0.21	1.86	8.77
gezel gechilo	6.25	1.6	0.15	0.66	8.65
gare	7.2	0.64	0.36	0.35	8.55
taham	3.72	2.39	0.33	2.03	8.47
darsjeen	4.01	3.37	0.22	0.77	8.38
goltog	5.44	2.5	0.12	0.23	8.29
gozadare	4.38	1.82	0.11	1.83	8.14
saeingale	3.68	2.59	0.17	1.27	7.72
bezinerood	4.14	2.53	0.12	0.87	7.66
homeh	4	2.41	0.37	0.76	7.54
zajanrod bala	2.59	2.53	0.14	2.28	7.53
shivanat	4.28	2.12	0.16	0.86	7.42
eijrod `paein	4.68	2.08	0.21	0.38	7.36
gani biglo	4.97	1.52	0.24	0.63	7.35
angoran	4.9	1.6	0.39	0.4	7.29
sonolabad	4.45	1.49	0.18	0.96	7.07
dolatabad	4.55	1.7	0.38	0.36	6.99
oryad	4.54	1	0.34	0.91	6.79
chaypare bala	4.72	0	0.15	1.86	6.73
sojasrod	4.19	1.48	0.2	0.83	6.69
bogdakandi	4	1.62	0.13	0.92	6.67
agbolag	3.64	2.41	0.17	0.3	6.52
moejezat	1.78	2.85	0.16	1.62	6.41
bonab	2.64	1.89	0.32	1.44	6.28
khararod	3.65	2.03	0.15	0.4	6.23
glabar	3.6	1.96	0.16	0.48	6.2
gareposhtlo bala	4.55	0.86	0.19	0.29	5.89
zarinerod	3.51	1.88	0.14	0.35	5.87
eijrod bala	2.67	2.77	0.11	0.29	5.84
saeid abad	2.94	2.48	0.08	0.18	5.68
homeh markazi	3.94	0.14	0.12	0.54	4.74
keresf	1.92	1.71	0.14	0.29	4.05

indicator shows that there is an appropriate spatial balance among rural districts of the province about that indicator, and the studied rural districts have more balance development level in that field, and the more amount of coefficient of variables shows regional inequity and development gap among rural districts of the province.

Accordingly, rural districts in Zanjan province has an appropriate regional development pattern, from perspective indicators X6, per capita cultivation for every beneficiary from aquaculture (0.42); X24, production gardening products against each hectare (0.512); X4, per capita lands under aquaculture to active population (0.535); X21, number of different trees against each 10 hectare land under gardening (0.536); X2, per capita lands under aquaculture to productivity (0.552); and X7, per capita cultivation of each beneficiary of dry Planting (0.553). in contrast, rural districts of the province will be faced with many inequities in perspective of indicators X30, number of seasonal rivers against every 1000 hectare of agriculture lands (3.187); X12, average rice performance (2.684); X17, per capita production of rice beneficiary (2.426); X29, number of permanent rivers against ever 10.000 hectare of agriculture lands (2.382).

Inequity indicators are more obvious, mainly in water resources of the province, generally; as which majority of water resources and rice production has been concentrated in north section of this province, where

there have been located Gilavan, Abbar and Darram rural districts as aqueduct rural districts.

This region has high water resources in perspective of climate conditions, because of its closing with North provinces of the country and passing away Ghezel – Owzan River (Sefidrood); for this reason, rice cultivation has a appropriate situation, in comparison with other regions of the province, because of having potentials and appropriate climate conditions.

Table 2 represents a brief analysis from development pattern in agriculture sector in rural districts of Zanjan province. Obtained results from this table are drawn by using ArcGis software, as figure 1 to 5. According these figures development levels of rural districts in this province are categorized in three levels; Developed level; mediated level; and less developed level

Fig 1 which it has been obtained in accordance with compounded indicator relating to develop Planting sub-sector as well as according to 19 indicators from table 1, shows that Dastjerdeh (9.97), Afshar Winter Quarters (9.24), Gilavan (8.78), Lower Chyepareh (8.44) rural districts have higher Planting development level. These rural districts which they have been concentrated on North section of the province have better potential for agriculture development, generally, and Planting development, especially, because of having water resources of raining, permanent rivers, enriched water ground, smooth plantation and appropriate climate conditions. While in development of planting sub-sector perspective, mojezat (1.78), Kersef (1.92), Up Zanjanrood (2.59), Bonab (2.64) and Up Ijrood (2.67) back warded rural districts of the province respectively. These rural districts which they have located in West and North of the province, as spillway field of Ghezel – Owzan River (permanent and well – watered river) have higher Planting situation. These rural districts are often located at Mahneshan city, West of Ijrood city, North of Zanjan city and Tarom city.

The best planting productions in Mahneshan city are wheat, forage plants and paddy, these productions in Ijrood city are corns and forage plants; onion, cucumber and summer crops in Zanjan; and vegetables and summer crops in Tarom city.

Developed rural districts from horticultural activities perspective have same pattern as like as Planting sub-sector, by a little difference (fig. 2), as which Gilvan (6.64), Ab-bar (5.23), Khoramdareh (4.29), Dastjereh (3.47) and Tarom (3.38) have allocated the highest degree from Planting development perspective.

Indicators of gardening sub-sector represent that the above rural districts have appropriate situations in perspective of percent of garden and tree nursery, fruit trees and variety of gardening products. In contrast, Up chaypareh (0.00), central Hoomeh (0.14), Ghareh (0.64), Up Ghareh Poshtloo (0.84), Uryad (1.00) and Soltanieh (1.19) rural districts have a very poor potential in gardening development, as which in some of them, there isn't necessary potential for developing gardening products, because of cultivation dependence on sky fallings and lack of permanent water resources (such as spring, canal, river and deep wells) or there isn't any investment in here. From this perspective, Tarom city includes 6 rural districts (Darram, Chavarzagh, Ab-bar, Dastjerdeh and Gilvan) has allocated the highest development level of gardens, because of having wet weather and neighboring with wet regions of North of Iran, Sefidrood Dam and enriched water resources. There are often cultivated semi-tropical products such as pomgrante, olive and fig, in these rural districts.

Khoramdareh city includes 2 rural districts under named Alvand and Khoramdareh with 3 rural districts of Abbaar city including Sain Ghale'h, Abharrood and Dresjin have high development level, by cultivating grape. Also 3 rural districts, i.e Zanjanrood, Mo'ajezat and Ijrood, located in river basin of Zanjanrood have appropriate performance by cultivating walnut, plum, apricot which these products have adopted with cool weather of this region.

Regional development of livestock sub-sector in rural districts of Zanjan province has a different pattern, in comparison with two previous sections (fig.3), as which Alvand (0.48), Angooran (0.39), dowlat – Abad (0.38) Homen (0.31) have allocated the highest rate of developing livestock activities respectively; while saeid – Abad (0.08), Sohrevard (0.10) and Khoramareh(0.10) have allocated the lowest rate in this field. Also surveying livestock situation in this province shows two categories: industrial livestock, which it is maintained in a closed state and it is depend upon closeness to conjunction ways and consumption markets; and the other is regional livestock with traditional culture system and keeping in open environment, which it is depend upon to natural grass lands and enriched grasses in mountains of the province. In this field, 4 rural district of Mahneshan city, including Angooran, Uryad, Low Chaypareh and Ghani Biglu by having high amount of traditional livestock, and some rural stricts in Zanjan and Abhar by having the highest amount of industrial livestock, have allocated a high level of developing in livestock sub-sector. Developing Planting and garden sub-sectors has a close relationship with potentials of water resources in each region. Therefore, it can be traced a similar spatial development pattern among these sub-sectors. Analyzing situation of agriculture water resources in rural districts of Zanjan province (fig.4) shows that in Ab-bar (13.9), Darram (9.48), Mahneshan (6.84) and Gilavan (6.61) provide more appropriate water resources for farmers in this regions, because of

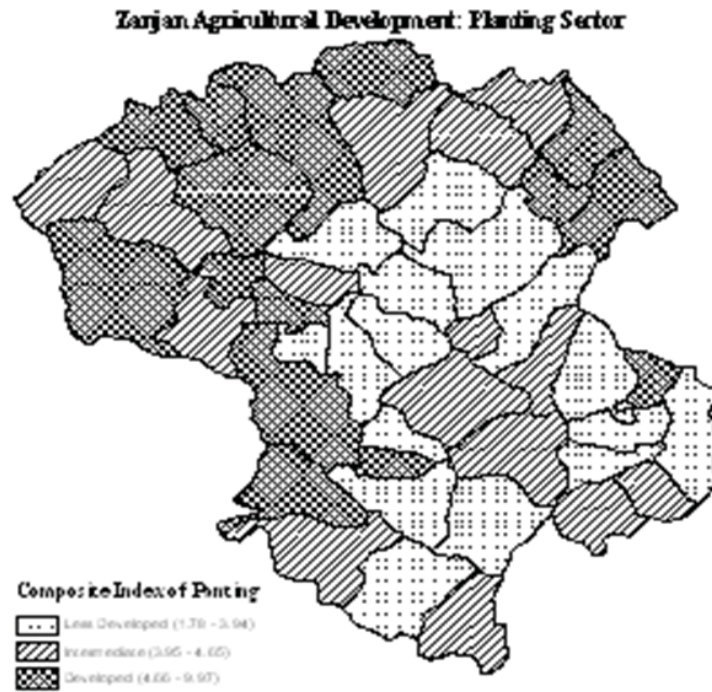


Fig. 1: Development levels of Planting sub – sector in rural districts of Zanjan Province

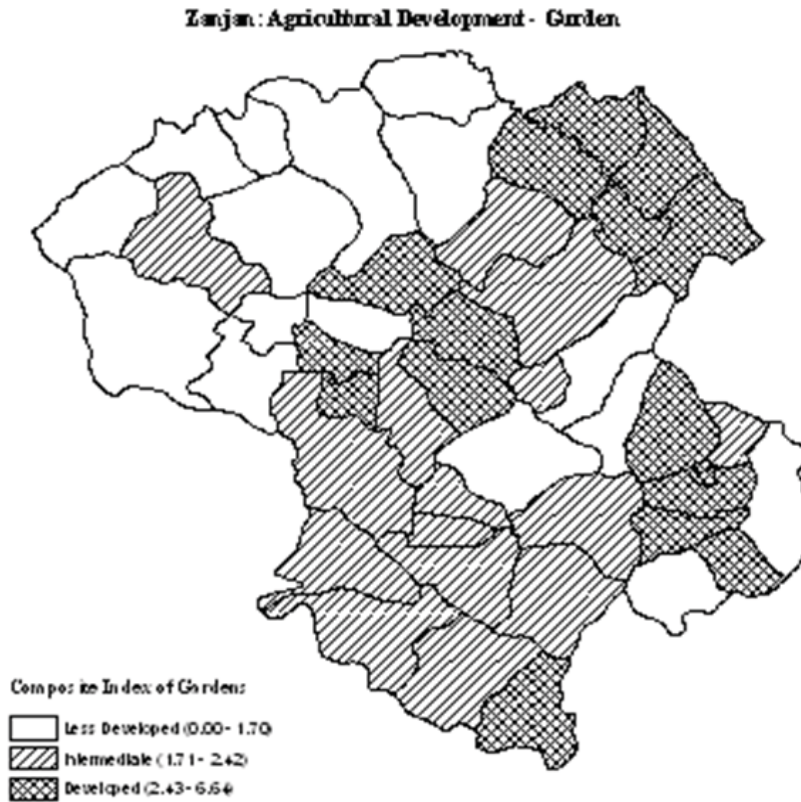
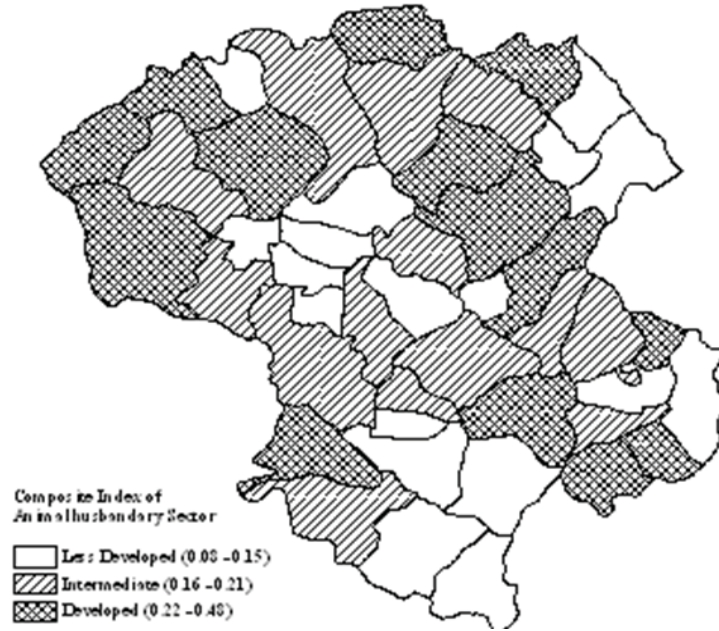


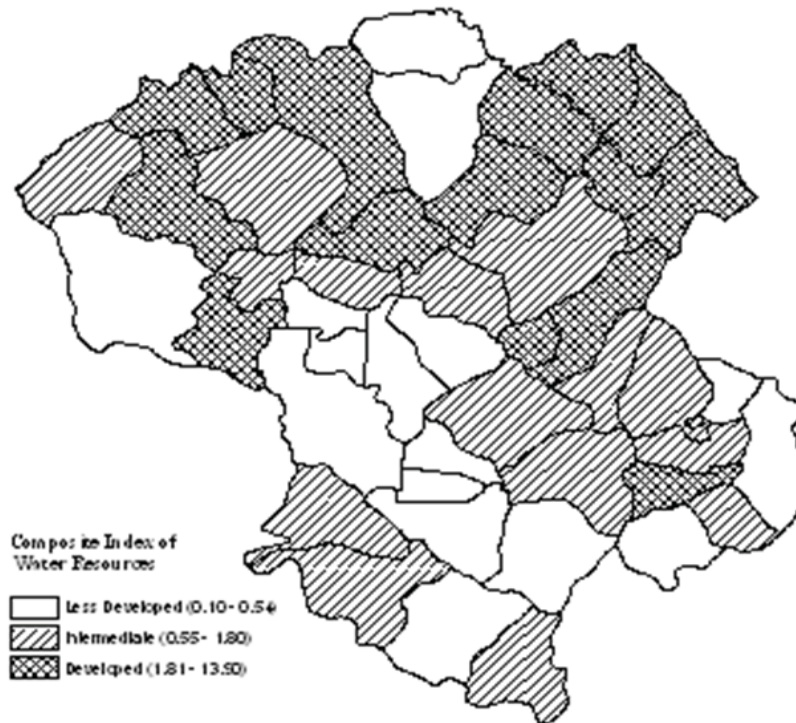
Fig. 2: Development levels of Gardening sub – sector in rural districts of Zanjan Province

**Zanjan: Agricultural Development - Animal husbandary Sector**



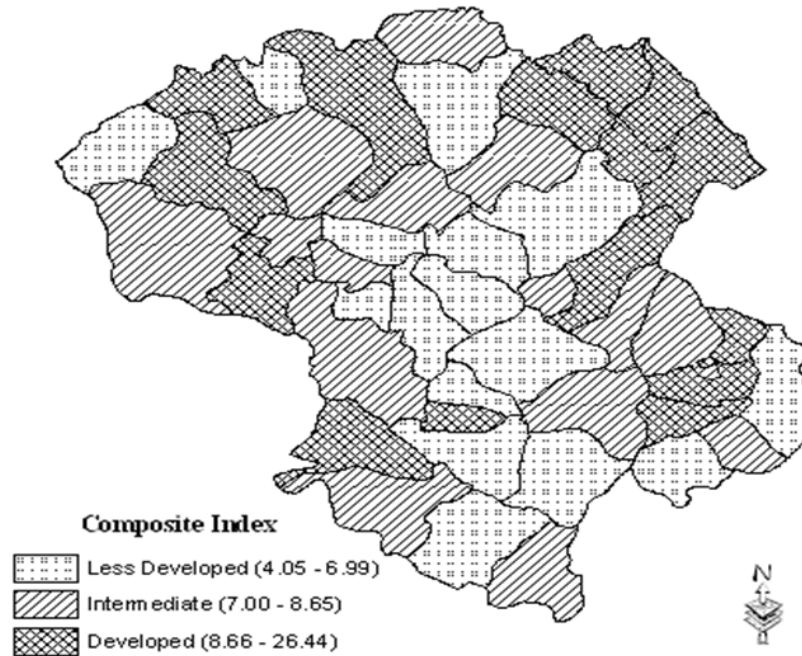
**Fig. 3:** Development levels of animal husbandries sub – sector in rural districts of Zanjan Province

**Zanjan: Agricultural Development: Water Resources**



**Fig. 4:** Development levels of water resources in rural districts of Zanjan Province

**Zanjan: Levels of Agricultural Development**



**Fig. 5:** Agriculture Development in Rural Districts of Zanjan Province

having seasonal and permanent rivers and springs, which it has resulted developing other agriculture sub-sectors in these regions. In contrast, Sohrevard (0.10), Saeid – Abad (0.18), Gholtoogh (0.23) and Up Ijrood (0.29) rural districts have allocated the lowest ranks, because of water resources' limitation of the province. By studying situations of water resources in the province, it can be said that permanent and watery rivers such as Ghezal Owzan, Abharrood, Zanjanrood and their river basin field in these regions have a significant effect in surface water agriculture in Zanjan province. Collecting used general indicators in this study design pattern of a general spatial development in agriculture sector in Zanjan province. According to the final pattern, Ab-bar with mixed indicator 26.44, Gilavan with 22.14 Dastjerdeh with 17.49 and Darram with 17.07 are considered as the most developed rural districts of Zanjan province in agriculture sector. These rural districts locate at North sector of the province, neighboring Gilan province. While Kersef (4.05), Central Hoomeh (4.74), Saeid – Abad (5.68), Up Ijrood (5.84), Zarinrood (5.87) and Ghareposhtlu (5.89) rural districts have a low agriculture development level. Finally, as it can be seen in fig.5, results of analyzing main components represent this fact that agriculture development in Zanjan province has a high correlation with water resources, and this section has a high agriculture development, because of having appropriate water resources in Northeast, Northwest and East of this province, but central and south areas of the province doesn't have appropriate agriculture situations, because of water shortage.

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