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Comparative Evaluation of the Degree of Agricultural Development of Iranian Provinces During the Third and Fourth Economic Development Plans

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Abstract: The regional inequalities and disequilibrium in agriculture sector are main attributes of the developing countries that result in polar growth policies. The recognition of available differences between different areas at level of country in view of their enjoying of agriculture indexes, to purpose for knowledge of development levels and or their deprivation and reduction in regional inequalities and regulating of plans suitable with conditions and facilities of each region are an inevitable necessity. The purpose of this paper is to investigate and compare the degree of agricultural development in Iranian provinces and agricultural duality, during the third and fourth five-year economic development plan. First, in this paper, introduced 24 indexes were evaluated. Then, using the technique of factor analysis, the multicollinearity between primary indexes are deleted and reduced to fewer factors. Then, using the techniques of numerical taxonomy, the degree of agricultural development of Iranian provinces is calculated and finally the agricultural duality was investigated. Results show that the level of Iranian provinces agricultural development in the fourth plan has average increase compared to third economic development and the agricultural duality between them is reduced. Isfahan as the most developed provinces in most years' plans and Fars had remarkable progress in compared with the third economic growth plan.

Key words: Factor analysis · Numerical taxonomy · Agriculture duality

INTRODUCTION

Development in its broad sense means to improve the quality of life in all its aspects, is nothing more than the increase in revenue, a better education, poverty reduction and a healthier environment [1]. The development has many definitions. Todaro's development: "development is not a purely economic phenomenon, is a multidimensional process that encompasses all aspects of life" [2]. The important thing is not to be considered as the same process of economic development, it may be that despite economic growth, people's lives are not only better, it is worse. With regard to elapsing of about 60 years from economic development planning in Iran and this is resulted to improvement of life condition in villagers and farmers; however, the regional inequalities in rural regions are something remarkable due to lack of resources that are reminiscent of the villages hundred years ago [3]. Observed that about 40% of the rural population in developing countries, where many facilities do not live [4] that necessitates such as regional development and removal of regional disparities and the development of agriculture is felt. Many studies have been conducted in Iran to assess the development that through of the majority of them the development has been studied in two periods [5-7] however, the difference of current study with other is that the investigation of the processes of agriculture development during one course of 10 years includes two 5 years plans- third and fourth-economic development. The purpose of this paper is the national rankings for the degree of development in Iranian provinces with the help of the agricultural development

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indicators and investigation for duality in agriculture during the third five-year plan (2000-2004) and fourth (2005-2009) of economic development in Iran. The results of this paper help the economic planners for designation for finance, technical and physical different resources for agriculture development and predispose the necessities for dissolving of lagging of regions with less degree of development and introduction of strategy against agriculture duality.

Theoretical Background

Center-Around Theory: On the Center-around Theory- John Friedman which formed from combination of two patterns of Rostov-economic development in the 1960 and Radwin-regional planning strategies model in 1973, to introduce a simple model of regional in the less-developed countries. According to this theory, the inside spaces of the country split into the center as power and the around as dependent component [8]. Friedman to describe the relationship between economic development and spatial structure in the region argues that to move from a pre-industrial state to state industrial maturity will have four stages [9].

- Pre-industrial stage: In this stage the centers and district work individually; and the centers and villages can be seen scattered and are not interdependent.
- Transitional Stage: This stage occurs during early industrialization ages and the progress commences on one of the two main poles and the central city over the whole economy begins to dominate and the continuing flow of resources towards the center results that the regional inequality is greater.
- Industrial stage: In this stage, you can see the gradual transformation of the circumstances surrounding the center of the stage where they create multiple centers, respectively.
- Post-industrial phase: In this phase, the work associated cities, regions and areas appear and the areas surrounding deleted there is complete unity and regional disparities are minimized.

Growth Pole Theory: Perrou, the main theorist of this theory is believed that the growth does not emerge all at once and everywhere, but in different areas and with different intensities to occur. The sectors that are more susceptible are as precursor and at early distribution of them; the disparities processes are increased and in continue will be decreased by elapsing of time [10]. Myrdal and Hirchman of the first people who recognized the implications of regional development and deal with to the link between economic growth models and their development process. Attendance of Hyrshmn to unbalanced growth and investment in leading industries and the pole and mother was which would pave the way for other sectors. This development can be facilitated [11]. Myrdal believed that development is a process of interactivity between different regions is the primary differences for future success [8]. Myrdal, Harrison, Dwyer believes that the growth pole theory has been unable to overcome inequalities between different areas in underdeveloped countries, but also because it has been intensified. So it cannot be an adequate model for developing countries. [12]. The following empirical studies review on the growth pole theory:

Fedrov [13] shown the development of regional inequality in Russia in the 1990s. Kim and wei found the regional inequality in China because of current regional problems in China and a barrier to the development of regional. Dreze and Sen [14] found the distribution of social and economic development among the states of India as a major cause of poverty in this country. Now, Economists for balanced growth theory in different areas, the need for correct regional planning to achieve balanced development proposed and believed that a balanced development of the region is for to provide the best conditions for the development for all of the areas and minimize the difference inter-area and intra-area and delete finally.

Background of the Study: Xia [15] based on data from China Statistical Yearbook 2010 and using 12 indicators deals to evaluate the contribution of agriculture to rural development and factor analysis and cluster analysis, in 31 provinces in China. According to the results, three provinces are placed in the highest level of development, three provinces are placed in relatively developed and 12 provinces are places in less developed in and 13 provinces are placed in the underdeveloped level. Yang and Zhang [16] with the help of 10 indicators and data in Statistical Yearbook village in 2008 China, using factor analysis and cluster analysis deal with to evaluate the level of development in rural areas in 31 provinces. The results indicate that the 5 developed provinces, 8 relatively developed provinces and 11 provinces less developed and 7 provinces are underdeveloped. Vincze and Elmer [17] by using of 33 indicators and with help factor analysis and cluster analysis deal to classify and study the development of rural areas in the Romania.

The results showed that areas classified in different categories, generally requires different measures for rural development and rural employment. This study also provides information to decision-makers at local and regional levels to identify the most efficient way to stimulate in the development sector. Yang and Liu [18] attempted to assess the level of agricultural and rural development, regional inequality and rural incomes in China, by using the method of simultaneous equations based on data from the 2445 rural. The results show that the increasing in level of expertise in agriculture and improve agricultural organizations and associations can lead to the improvement of agriculture and increase rural incomes and to reduce regional disparities. Fetres and Beheshtifar [6], deal to survey for agricultural development and ranking of the provinces of Iran using 78 indicators and with the help of factor analysis methods and numerical taxonomy in ages 1993 and 2003. The results show that in the year of 1993, Isfahan province has been introduced as the most developed and Sistan va Baluchestan province as the most underdeveloped, respectively. But in 2003, Tehran province as the most developed of and Sistan va Baluchestan province has been introduced as the most underdeveloped. Molaii [5], deals to survey for agricultural development and ranking of the provinces of Iran by using 54 indicators and with the help of factor analysis methods and numerical taxonomy in ages 1994 and 2004. The results show that in the year of 1993, Isfahan province has been introduced as the most developed and Kordestan province as the most underdeveloped, respectively. By 2004, Isfahan province as the most developed of and Sistan va Baluchestan province has been introduced as the most underdeveloped. Khaledi and Sharifi [7], deal to survey for development in rural regions of Kordestan province in ages 1996 and 2006 by using 45 indicators and with the help of factor analysis methods and numerical taxonomy. The results show that the ranking change more has been included in central sections of province and other section have not been changes.

MATERIAL AND METHODS

In this study, 24 agriculture indicators using two methods of factor analysis and numerical taxonomy for assessing of development in provinces are applied. The times for study are two 5 years plans-third (2000-2004) and fourth (2005-2009)-economic development and 28 provinces being placed for study. Because the provinces includes North Khorasan, Central Khorasan and Razavi Khorasan have been components for Khorasan province and special statistics for them are not exist by 2000; in this study, however, the level of the development for them is proposed in third and fourth economic development plans. The method for gathering of information is based on library and statistics which issued by Iran Statistic Center and Agriculture Database and Agriculture jihad ministry.

Data Description: Performance and yield per hectares and high capitation for agriculture products represent scientific and technical progresses in agriculture and various stages of cultivation, farming and harvesting. Although the relative advantage in relative growth promoting effects for agricultural growth promoting but the suitable weather conditions and sustainable for agriculture can potentially increase the yield per hectares. Fostering of livestock and poultry is not considered only as a complementary activity in agriculture but also it is considered in the production of meat and dairy products and is also one of the ways to eliminate unemployment and reduce deprivation and increase the per capita income; Infrastructure services can also lead to improved conditions for more production and ultimately increase the level of development. The reason for choice of indicators used is having the third edition in ISIC and availability of their data during the years of the study. Based on the above, 24 indicators are introduced that based on them the development of the agricultural sector being to examine.

1-yield per hectares for irrigated wheat, 2-yield per hectares for non-irrigated wheat yield, 3-yield per hectares for barley water, 4-yield per hectares for non-irrigated barley, 5-yield per hectares for potato, 6-yield per hectares for onion, 7-yield per hectares for tomatoes, 8-yield per hectares for cucumber, 9-yield per hectares for beans, 10 per capita production for meat, 11-per capita production for milk, 12-per capita production for poultry meat, 13-capita production for eggs, 14 - Average power consumption of the total electricity consumed in agriculture, 15-average share of agriculture in total electricity consumption of consumers, 16-Average total fertilizer consumption per 1000 hectares of agricultural land, 17-the rural sand road per 100,000 rural population, 18-the rural paved road per 100,000 rural population, 19-Rural Cooperative Union components average, 20-Legal reserve for rural cooperative unions average, 21-Rural Cooperative Union investment average 22-Rural cooperative components average, 23-Rural cooperative legal reserve average, 24-Rural cooperatives investment average.

Factor Analysis Technique: The determination of the level of development for regions through a set of variables usually encountered with two difficult:

A. correlation between selected indicators
B. Non-determination of importance coefficient (weight) of each indicator.

Due to two mentioned problems, the method of "the principal components analysis" was used that in fact, it is the most common method of factor analyzing and the aim of doing is solving of the problem of the intra-dependence of a set of variables and summarizing some key components (factor). The initial data for factor analysis, however, is the correlation matrix between the variables. In this study, using factor analysis, the large set of variables despite internal consistency was summarized in the several factors. These factors that the multicollinearity problem has been eliminated which in them are used to determine the degree of development in the analysis of numerical taxonomy. The extraction of the factors with this purpose is done by factor score which factors are almost independent.

The main component (factor) is the new factor that through the linear combination of the principal variables is estimated based on the following formula:

$$F_j = \sum_{i=1}^{p} Aij\ Xi = A_{j1} X_1 + A_{j2} X_2 + \ldots A_{jp} X_p \qquad (1)$$

The aim of the using of this method is finding of the combinations of the variable P (X1, X2, ... Xp) for producing of independence and non-correlated variables F1, F2, ... Fj. In fact, these new variables in their place are different variables and redundant information has been missed. In the above equation, “A” shows factor score coefficients and “p” represents the number of variables [7].

Taxonomy Technique: Numerical taxonomy definition is numerical evaluation similarity and proximities between taxonomic units and the rating is the same taxon groups. This method of grading is the most sophisticated techniques combining multiple indicators that with incorporating of variuos indicatorsbeing to determine the level of development. Steps of the method are discussed generally. (Figure 1) the criterion of decision for determination of homogeneous locations is far from homogeneous. Where the distance between them is too high or low, are are known Homogeneous locations and are being analyzed to determine the degree of development.If an area is heterogeneous, it is removed

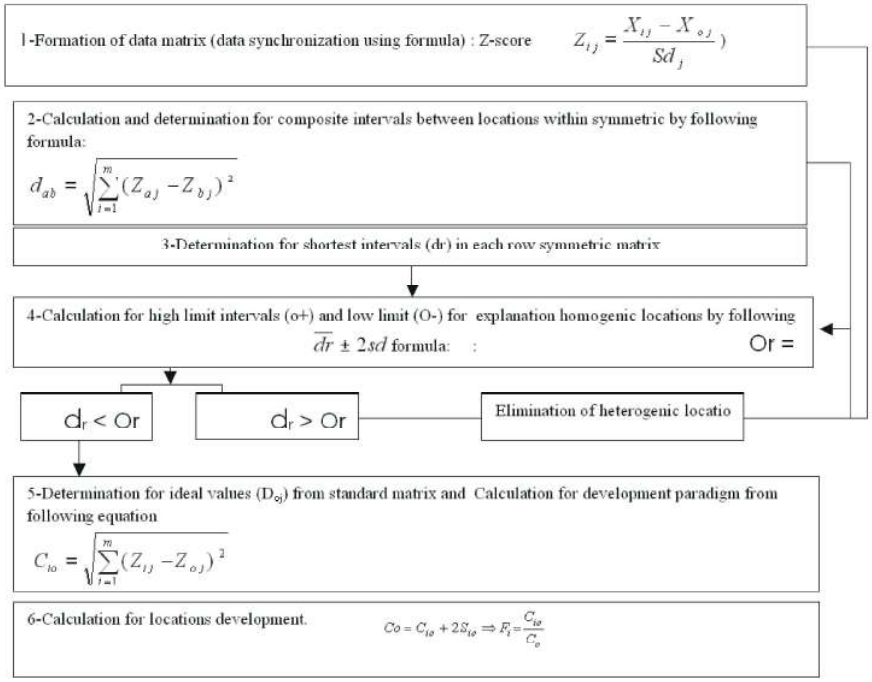

Fig. 1: Stages of data analysis in numerical taxonomy method

from the analysis and should be performed again steps outlined in the diagram for homogeneous locations. In this graph, Fi is the degree of development for each location (location i) and varies between zeroand one. Much closer to zero, the location is closer to a much less developed. In other words, the degree of development attained has a inverse relationship with the level of development Resourse [7].

RESULTS AND DISCUSSION

First, the number of indicators using factor analysis (the principal component analysis) with a weight and multicollinearity between them was lifted and the extracted factors are determined. In continue; proceed to calculating the sum of the factor scores and the mean as the criterion to determine the specificity of the provinces. Obtained factors are considered as the data of numerical taxonomy and the heterogeneous provinces were identified and ranked each province in each year. As can be seen in Table 1, the ranking of the number of provinces has changed in the economic development third and fourth plans. Generally, these changes are classified in five categories. In the first category can be seen in most of the provinces of both the third and fourth five-year plan of economic development, have lower ratings. Provinces such as Ilam, Hormozgan, Sistan va Baluchestan and Bushehr and Yazd Kohgiluyeh va Boyerahmad are in this category. the cause can be found in the low of the indicators such as yield in irrigated and non-irrigated wheat, irrigated and non-irrigated barely, beans, potatoes, red meat per capita, amount of paved highway and rural per 100 thousand rural population. The latter can be seen in most of the provinces that are ranked in high level at most of the study years and economic programs of study. For example, Isfahan province in most of the subjects had one position and provinces such as Tehran, Markazi, Chahar Mahal and Bakhtiari and Hamadan, have high rank. This can be caused by high levels of indicators such as the ratio of the average power consumption in the agricultural sector as the total power consumption, the average total fertilizer consumption per 1000 hectares of agricultural land, the average of legal reserve and capital and rural cooperative unions.

Table 1: Provinces annual ranking in two third and fourth- 5 years economic plan in IRAN

		Third 5-years economic development plan					Fourth 5-years economic development plan				
No.	province	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
1	East Azarbayjan	12	11	22	9	11	7	4	10	9	13
2	West Azerbayjan	3	13	5	2	7	11	8	9	16	12
3	Ardabil	20	16	18	19	20	22	20	24	17	20
4	Isfahan	1	4	1	1	4	1	1	1	1	1
5	Ilam	22	18	13	23	24	26	23	25	24	25
6	Bushehr	25	21	11	24	23	25	24	22	26	24
7	Tehran	11	5	9	10	3	3	2	3	3	2
8	Charmahal va bakhtyari	9	3	2	4	2	2	6	7	8	8
9	Khorasan	6	8	14	11	9	6	16	15	13	10
10	Khuzestan	17	10	6	13	17	13	9	18	11	9
11	Zanjan	5	19	21	15	5	5	3	12	10	16
12	Semnan	2	9	10	12	21	10	12	14	21	15
13	Sistan va baluchestan	24	21	24	22	26	24	26	Het	27	27
14	Fars	Het	Het	Het	Het	14	12	15	8	7	4
15	Qazvin	18	17	17	16	10	9	10	16	18	18
16	Kordestan	8	20	19	14	12	20	25	13	20	19
17	Kerman	Het	6	4	20	18	4	19	17	12	7
18	Kermanshah	15	12	20	18	15	17	11	11	22	21
19	Kohgiluyeh va Boyerahmad	19	7	3	3	22	19	18	19	23	22
20	Golestan	16	14	16	8	13	15	7	4	6	5
21	Gylan	13	22	15	25	19	16	14	21	14	11
22	Lorestan	14	15	23	17	16	23	17	20	15	17
23	Mazandaran	7	Het	8	6	6	21	13	6	4	14
24	Markazi	10	2	7	7	8	8	5	2	2	6
25	Hormozgan	23	24	25	Het	25	27	27	26	25	26
27	Yazd	Het.	23	Het	21	Het	14	22	23	19	23

Resource: research findings

Het: heterogeneous

Table 2: Annual calculation for the changes of the level of the Agricultural development for provinces during the third and fourth five-year economic development plan in IRAN.

year	percent	Increase/decrease
2000-2001	216.66	Increase
2001-2002	42.85	decrease
2002-2003	367.4	decrease
2003-2004	110.92	Increase
2004-2005	462.71	decrease
2005-2006	209.81	decrease
2006-2007	144.94	Increase
2007-2008	5.74	Increase
2008-2009	66.66	Increase

Resource: research finding

Table 3: The calculation of the Mean total factorial scores and changes of level in agricultural development plans in the Third and Fourth Five-Year Economic Development in IRAN

Plan	Summation of factorial scores	Change percent	Increase/decrease
Third (2000-2004)	-452×10^{-10}	215.478	Increase
Fourth (2005-2009)	522×10^{-10}		

Resource: research finding

Also, as well as other indicators such as per capita yield of tomatoes and meat and milk production have been effects on top ranking for these provinces. The third category, the provinces seen in the fourth five-year plan of economic development into the Third Development Plan has been mutated progress. For example, the Fars province which was known to be heterogeneous in the third economy plan, but in the fourth plan has reached to high ranking. The cause for this can be seen in improvement of indicators such as the production for red meat and milk per capita, the yield in irrigated and non-irrigated wheat, irrigated and non-irrigated barely, amount of paved highway and rural per 100 thousand rural population in the fourth plan compared to third economic development plan.The fourth category are Mazandaran, Kermanshah, Kurdistan, Khuzestan and Semnan provinces which have downward trend in the fourth plan compared to the third plan of economic development. The causes for this can be found in reduction of indicators such as the amount of legal reserve and capitals of rural, the mean value of the total electric power consumption in the agricultural sector, yield beans, potatoes, irrigated and non-irrigated wheat and barley. Finally, the fifth category, you can see both provinces during the third and fourth development plan, had a place roughly constant. Provinces such as Eastern Azerbaijan, Western Azerbaijan, Ardabil, Qazvin, Khorasan and Lorestan are in this category. Qom provinces known as heterogeneous province in all years studied. It can be affected by indicators such as non-irrigated wheat and barley.

In continue, with regard to investigation on the level of the agriculture development in the provinces, proceed to calculation to the sum of the mean factor scores of each year and the percentage changes and both the third and fourth five-year plan for economic development was analyzed .The results can be seen in Tables 2 and 3.

See Table 3, it is observed that the level of the fourth five-year economic development of agriculture in the Third Five-Year Economic Plan, equal to 215.49 % increased. This confirms that the authorities' actions in relation to macro-economic planning in the areas of agriculture, was effective that it can cause an increase in the yield of irrigated wheat, irrigated barley, potatoes, tomatoes, beans, per capita production of meat, milk, poultry, eggs, legal reserve capital and rural cooperatives, agricultural trade and capital reserve, ratio of the total electric power consumption in the agricultural sector, the main roads and rural asphalt per 100 thousand rural population in the fourth compared to the third plan of economic development.

To investigate the duality of the degree of agricultural development for provinces which was calculated using numerical taxonomy, the coefficient of variation in the degree of development, can be indicative of the distribution between provinces [6]. In general, the coefficient of variation and coefficient of variation is calculated from the following formula:

Table 4: Calculation for annual agriculture duality of provinces

Year	Percent	Increase/decrease
2000-2001	4.295	Increase
2001-2002	-16.424	Decrease
2002-2003	27978	Increase
2003-2004	-1.385	Decrease
2004-2005	14.026	Increase
2005-2006	-15.317	Decrease
2006-2007	-4.254	Decrease
2007-2008	-3.306	Decrease
2008-2009	1.547	Increase

Resource: research finding

Table 5: calculation for coefficient of variation and agriculture duality level changes in third and forth five-years of economic development plans in IRAN

Plan	mean of development level	Standard deviation	Coefficient of changes	Percent of change	Increase/decrease
Third (2000-2004)	0.761	0.114	0.150	-6.395	Decrease
Fourth (2005-2009)	0.842	0.119	0.141		

Resource: research finding

$$C.V = \frac{\delta x}{\bar{x}}$$

Where

δx : Standard deviation of the degree of development in each year

$\bar{x}$: Average of degree of the development in each year.

After the calculation of the dispersion coefficient of the development degree each year, it is proceed to estimate of agriculture duality, so that the data in Table 4 and 5 shows, Agricultural duality in the years 2000-2001, 2002-2003, 2004-2005, 2008-2009 has been increased and in the years 2001-2002, 2003-2004, 2005-2006, 2006-2007, 2007-2008 has been decreased. However, the agricultural duality in the Forth Five-Year Plan compared to the Third Five-Year Economic Development Plan has been decline equal to 6.395%. This implies that the planning done in this field has been a success.

CONCLUSION

In this paper, during both the third and fourth five-year plan of economic development, with the help of 24 indicators of the agriculture and rural development using factor analysis and numerical taxonomy, proceed to investigation for the degree of development of the provinces in Iran and the intensify of inequality during mentioned plans. First, the multicollinearity and weighing between indicators is removed by using factor analysis and principal component and the Varimax rotations and extracted factors are determined. Then the sum of the factorial scores is computed and the mean of them is considered as a criterion to determine the level of agricultural development. Then the factors obtained were used as input data for taxonomic method and using distances matrix, the heterogeneous provinces are identified and other has been ranked as homogeneous sets. To evaluate the agricultural duality between provinces, the degree of development by using taxonomic methods and their coefficient of variation, both the annual and two 5-year plans was reviewed. The results show that the ranking of some provinces, such as Isfahan, Tehran and Markazi has been in top both the third and fourth economic development plan. Some provinces such as Ilam, Hormozgan, Sistan va Baluchestan in both the third and fourth economic development plan has been low. Some provinces, such as Golestan, Gilan, Zanjan, Kerman in the fourth plan compared to third economic development plan has a declined trend and in some provinces such as Kermanshah, Kurdistan and Mazandaran has been rising. Finally, the numbers of Qazvin province too such as Lorestan, Ardebil in both the third and fourth development plan ratings were almost constant. Also, the average level of agricultural development in the provinces in the forth plan against third economic development plan has increased and has been considered in the agricultural duality evaluation by 6/395% decline. If the result of the this research work are compared to others such as Vincheze and Elmer [17] and Yang and Li-Yu [18], it is observed that only a comprehensive plan can be proceed to introduction information to decision-makers at local and regional level to identify the most efficient ways to improve the development.

In comparison with the Mola'i [5] study, it is approved that the Isfahan province most developed provinces in the most years of the study, but the agriculture duality unlike mentioned study has been reduced.

RECOMMENDATION

Due to declining ratings of some provinces and the increasing of the level of agricultural development in fourth five-year plan than the third Five-Year economic development plan, there is changing for indicators such as yield per hectare of irrigated wheat, irrigated barley, potatoes, tomatoes, per capita production of meat, milk, poultry, eggs, average power consumption of the total electricity consumption in the agricultural sector, the value of main and rural asphalt per 100 thousand rural population. Therefore, we propose to government to apply the higher priority in the allocation of subsidies to items such as rural education, agricultural machinery and equipment, all kinds of pesticides, poultry and livestock feeds and provide more funds to the Company and the Union of Agricultural Facilities Which leads to improved agricultural development and agricultural duality is reduced.

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