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Evaluating and Ranking the Development level of Rural Areas of Tabriz using Copeland Model and Comparison the Results with Topsis, Vikor and Electre Models

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Abstract: Agricultural development is a major part of the rural development process, and it is impossible to imagine a developed world without agricultural development. Thus, the purpose of this study was to determine the level of agricultural development in Tabriz rural areas and to rank them in terms of agricultural development using Topsis, Vikor, Electre, and Copeland models. In this study, 8 agricultural criteria including level of Education, area of fields and orchards, mechanization level, livestock, fish farming, service-support and yield were used. The weight of the criteria was determined by paired comparison method and all the analysis steps were performed by Excel software and finally GIS software was used to produce the map. The results indicated that in the Topsis model, Lahijan was ranked first and Ajichai was the last, and in the Vikor model, Lahijan was ranked first and Maidanchai was the last. Thus to obtain consensus on the results of the models, Copeland method was used. Copeland's method is a Condorcet method in which the winner is determined by finding the candidate with the most pairwise victories. According to the Copeland model, Lahijan and Ajichai were ranked first and sixth, respectively. The status of all the considered rural areas was at "in developing" status. Coefficient of variation showed that fish farming criteria (CV=2.24) had the most distribution inequality among the villages and rice yield criteria (CV=0) had the most suitable distribution among the villages.

Copeland Modelini Kullanarak Tebriz'in Kırsal Alanlarının Gelişim Düzeyini Değerlendirme ve Sıralama ve Sonuçları Topsis, Vikor ve Electre Modelleriyle Karşılaştırma

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Öz: Tarımsal gelişme, kırsal kalkınma sürecinin önemli bir parçasıdır ve tarımsal gelişme olmadan gelişmiş bir dünyayı hayal etmek imkansızdır. Dolayısıyla, bu çalışmanın amacı Tebriz kırsal alanlarındaki tarımsal gelişme düzeyini belirlemek ve bunları Topsis, Vikor, Electre ve Copeland modellerini kullanarak tarımsal gelişme açısından sıralamaktır. Bu çalışmada, Eğitim seviyesi, tarla ve bahçe alanları, mekanizasyon seviyesi, hayvancılık, balık çiftliği, servis desteği ve verim olmak üzere 8 tarımsal kriter kullanılmıştır. Kriterlerin ağırlığı eşleştirilmiş karşılaştırma yöntemiyle belirlenmiş ve tüm analiz adımları Excel yazılımı ile yapılmış ve harita oluşturmak için son olarak

Anahtar kelimeler

Copeland,
Kalkınma,
Electre,
Tebriz,
Topsis,
Kırsal Alanlar,
Vikor.

GIS yazılımı kullanılmıştır. Sonuçlar, Topsis modelinde Lahijan'ın birinci, Ajichai'nin en son ve Vikor modelinde Lahijan'ın birinci, Maidanchai'nin sonuncu olduğunu göstermiştir. Böylece modellerin sonuçları üzerinde fikir birliği sağlamak için Copeland yöntemi kullanılmıştır. Copeland'ın yöntemi, kazanan adayın en fazla ikili galibiyet ile bularak belirlendiği bir Condorcet yöntemidir. Copeland modeline göre, Lahijan ve Ajichai sırasıyla birinci ve altıncı sırada yer almıştır. Tüm dikkate alınan kırsal alanların statüsü "gelişme aşamasında" bulunmuştur. Değişim katsayısı, balık çiftliği kriterlerinin (CV = 2.24) köyler arasında en fazla eşitsizliğe sahip olduğunu ve pirinç verim kriterlerinin (CV = 0) köyler arasında en uygun dağılıma sahip olduğunu göstermiştir.

1. Introduction

Regional inequalities and uneven distribution of facilities and services are characteristics of Third World countries. In Iran, different geographical and climatic conditions have led to the emergence of different geographical landscapes over time. As a result, different parts of the country have resulted in inequalities in the benefits of facilities and services (Fields, 1981). Therefore, recognizing inequalities and imbalances within different geographical areas (country, province and city) and thus identifying differences as well as policy making to reduce inequalities are essential tasks for development managers (Latifi, 2009).

The agricultural is one of the most important sectors of the economy because of its vital role in ensuring food security. In the process of development of most countries, this sector has played a decisive role in creating economic and currency surplus. Today, in some developing countries, agricultural activities are also important in terms of employment creation. In most developed countries, the role of agriculture goes beyond the supply of essential food and also includes the provision of political, social and economic priorities, and is therefore irreplaceable.

The necessity of research arises from the fact that agricultural development is one of the most important issues facing the economy and society of the country; and the role of rural areas is undeniable in the development and survival of any country, especially developing countries. This research can provide the appropriate tools for authorities to achieve a reasonable balance between the rural areas. In this regard, a number of internal and external studies have been carried out, which are summarized below:

Eslahi (2011) analyzed the level of rural development in Zanjan province using three methods: Morris, Taxonomy and Factor Analysis. He concluded that due to the lack of comprehensive rural development policies in rural areas of Zanjan, the development of all areas was not uniform and resulted in the migration and destruction of facilities in these areas. AL-Hassan (2007) studied on regional inequalities in Ghana during 1990-2000. The results showed that economic growth during this period led to a reduction in public poverty, but since growth was mainly due to export of agricultural products, the development gap between the northern, which could not compete in agriculture, and southern regions widened. He suggests the attracting enough investment in less developed areas for economic prosperity. Badri et al. (2005) studied on the development level of rural areas of Kamyaran using the Morris method. The results showed that development coefficients were different between Kamyaran districts and there were differences and inequality. Heidari (2012) ranked the rural areas of Meshginshahr in terms of agricultural development levels using the TOPSIS method. The results showed that among the rural districts studied, Gharasu was ranked first, and Noghdi district came in last. Other researches can be mentioned to Mousavi and Sadigh, (2015); Jamshidi (2018); Pezeshki and Zarafshani (2008); Khakpour (2006); Xuegong (2006); Sharifi and Khaledi (2009); Fayyaz Azar et al. (2012); Kalantari (2012); and Kohansal and Rafiei Darani (2009).

The purpose of the present study is to rank the development level of rural areas of Tabriz using agricultural development criteria using Topsis, Vikor, Electra and hybrid Copeland model.

2. Material and Methods

2.1. Introduction to the study area

Tabriz city with an area of 2167 km^2 (4.8% of the total area of province) is the center of East Azerbaijan province and its approximate altitude is 1350 m above sea level. Tabriz is bounded on the north by Varzegan, on the east by Haris and Bostanabad, on the west by Shabestar and Osco, and on the south by Maragheh. According to the latest national divisions of Tabriz, the city has two districts namely central (including Sections of Maidan Chai, Sard Sahara, Ajichai and Spiran) and Khosrowshah (including Lahijan and Akhandakand).

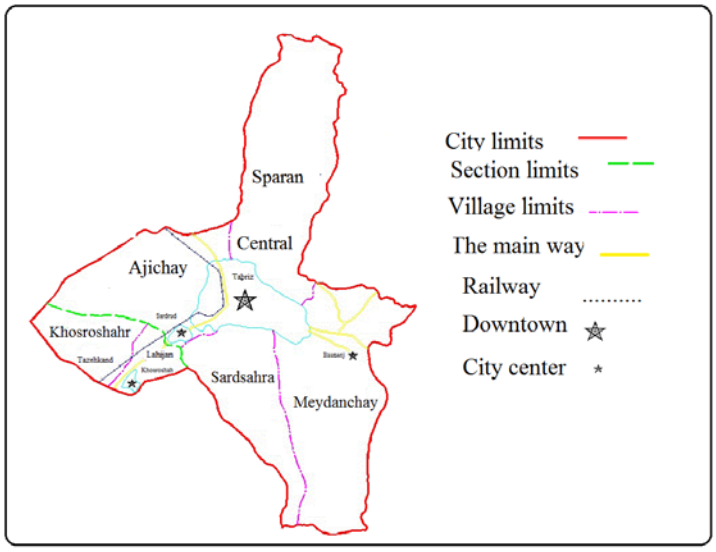

Figure 1. Geographical map of the study area.

2.2. Methodology

In this study, the research method is descriptive-analytical and applied. The population of a statistical study includes Lahijan, Ajichai, Espran, Sardsahra, Maidanchai and Tazekand. A list of 8 agricultural development indices (Table 1) including literacy, horticulture, animal husbandry, mechanization, fish farming, services–support system and yield of agricultural products were defined using the last statistical census of East Azerbaijan province. Then, agricultural development level of rural areas was evaluated using Vikor, Topsis, Electra and Copeland methods in Excel. GIS software was used to draw the map. Also, the coefficient of variation (CV) was used to determine agricultural inequality between the studied villages.

Table1. Agricultural Development Indices of Tabriz Villages

Indices	Variables
Ratio of non-farmers with associate degree and higher to total Literates (X_1) Ratio of farmers with associate degree and higher to total literates (X_2)	Literacy
Average irrigated farming area (X_3) Average dry-land Area (X_4) Ratio of area under cultivation to total land use (X_5) Ratio of fallow area to total land use (X_6) The ratio of land area to the number of land uses (X_7)	The size of the land
Ratio of sheep and lamb to number of owners (X_8) Ratio of Goat to number of owners (X_9)	Animal husbandry
Ratio of cattle and calf to number of owners (X_{10}) Ratio of buffalo to number of owners (X_{11})	
Ratio of number of users of cold water fishes to total number of users (x_{12}) Ratio of number of warm water fishes to total number of users (X_{13})	Fish farming
Annual crop yield per ha (X_{14}) Wheat yield per ha (X_{15}) Dry-land wheat yield per ha (X_{16}) Barely yield per ha (X_{17}) Dry-land barley yield per ha (X_{18}) Rice yield per ha (X_{19})	Performance of agricultural products
The ratio of garden area to total land use (X_{20})	The size of the garden
Ratio of number of agricultural machinery repair centers to total area of lands (X_{21}) Ratio of the number of agricultural machinery repairmen to the total area of arable land (X_{22}) The ratio of the number of pressurized irrigation equipment to the total area of land (X_{23}) Ratio of spare parts of agricultural machinery to total area of Lands (X_{24}) The ratio of the number of pressurized irrigation equipment stores to the total land area (X_{25})	Support service
Ratio of tractor utilization to total area (X_{26}) Ratio of number of combine to total area of land (X_{27}) Ratio of the number of utilizations of the trailer to the total area of arable land (X_{28})	Mechanization

2.3. Multi- attribute decision making (MADM)

In this method, unlike the classical, instead of one attribute, several attributes play a role in determining the best option. In MADM models, a number of options are analyzed according to a set of criteria. At first, the qualitative criteria are quantified and scaled, if any (Triantaphyllou, 2000).

2.3.1. Vikor approach

Vikor's approach is applied to problems with incompatible criteria so that the decision maker needs a solution that is close to the ideal solution. To choose the best option using this method, follow these steps (Chatterjee & Chakraborty, 2016).

Step 1: Form the decision matrix (X_{ij}) where X_{ij} is the function of the option (i = 1, 2, ..., m) with respect to the attribute (j = 1,2, ..., n) j.

$$X_{ij} = \begin{bmatrix} x_{11} & x_{22} & \cdots & x_{1n} \\ x_{21} & x_{22} & \cdots & x_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ \cdots & \cdots & \cdots & \cdots \\ x_{m1} & x_{m2} & \cdots & x_{mn} \end{bmatrix} \quad (1)$$

Step 2: Normalize the decision matrix; at this stage, by standardizing the data, the range of values (X_{ij}) is converted to a standard range between 0 and 1 and V_{ij} matrix is obtained.

$$V_{ij} = \begin{bmatrix} v_{11} & v_{22} & \cdots & v_{1n} \\ v_{21} & v_{22} & \cdots & v_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ \cdots & \cdots & \cdots & \cdots \\ v_{m1} & v_{m2} & \cdots & v_{mn} \end{bmatrix} \quad (2)$$

Step 3: Determine the weight vector of the criteria; in this step, the weights assigned (wj) is determined. The sum of the weights must be such that $0 \leq .wj \leq 1$ and $\sum_j w_j = 1$ are obtained.

$$w = \{w_1, w_2, ..., w_n\} \quad (3)$$

Step 4: Determine the best (Ideally Positive) and worst (Ideally Negative) value among the values for each criterion. The best values for positive and negative criteria are calculated by equations (4,5).

$$f_i^* = \min_i f_{ij} \quad (4)$$

$$f_i^* = man_i f_{ij} \quad (5)$$

The worst values of positive and negative criteria are calculated from the equations (6) and (7).

$$f_i^- = \min_i f_{ij} \quad (6)$$

$$f_i^{*-} = man_i f_{ij} \quad (7)$$

Step 5: Calculate the ideal or useful value (S) and the anti-ideal (R) value calculated according to the equations (6) and (7).

$$s_i = \sum_{n-1}^{n} w_j \frac{f_j^* - f_{ij}}{f_j^* - f_j^-} \quad (8)$$

$$R_i = \max\left\{ w_j \frac{f_j^* - f_{ij}}{f_j^* - f_j^-} \right\} \quad (9)$$

Step 6: Calculate Vikor index (Q value) that represents the distance from the ideal and is calculated according to equation (10) and (11).

$$\underset{\sim}{0}_I = v\left[\frac{s_i - s^-}{s^* - s^-}\right] + (1+v)\left[\frac{R_i - R^-}{R^* - R^-}\right] \quad (10)$$

$$R^* = \max R_I R^- = mixR_I S^- = mixS_I S^- = mixS_I \quad (11)$$

Step 7: Sort Options by R, S, Q Values that is arranged in three groups from small to large according to the values of R, S, Q. Finally, the first option is to be recognized as the top rank in the Q group.

2.3.2. Topsis approach

The idea of Topsis can be expressed in several steps (Kabli, 2009: 43).

Step 1: Normalization that there are several methods. In this paper, it was used the ratio of the initial value (a_{ij}) and the sum the initial values (eq. 12).

$$n_{ij} = \frac{a_{ij}}{\sqrt{\sum_{i=1}^{m} a_{ij}^2}} \tag{12}$$

Step 2: Obtain a standard weighted matrix

$$w = \{w_1, w_2, ..., w_n\} \tag{13}$$

Step 3: Determine the ideal positive solution vectors (V_j^+) and the ideal negative solution (V_j^-).

$$A^* = \left\{\left(\max_i v_{ij} \mid j \in J\right), \left(\min_i v_{ij} \mid j \in J'\right) i = 1,2,...,m\right\} = \{v_1^*, v_2^*, ..., v_j^*, ..., v_n^*\} \tag{14}$$

$$A^* = \left\{\left(\min_i v_{ij} \mid j \in J\right), \left(\max_i v_{ij} \mid j \in J'\right) i = 1,2,...,m\right\} = \{v_1^-, v_2^-, ..., v_j^-, ..., v_n^-\} \tag{15}$$

Step 4: Calculate the distance of each option from V_j^+ and V_j^- using the following equations (16-17)

$$d_j^+ = \sqrt{\sum_{i=j}^{n} (v_{ij} - v_i^+)^2} \tag{16}$$

$$d_j^- = \sqrt{\sum_{i=j}^{n} (v_{ij} - v_i^+)^2} \tag{17}$$

Step 5: Calculate the proximity of the options to the ideal solution

$$C_j^+ = \frac{d_j^-}{d_j^+ + d_j^-} \tag{18}$$

Step 6: Rank the options that highest value is the most effective.

2.3.3. Electre approach

The steps of the Electre approach can be described as follows (Amiri and Dastani Farahani, 2013).

Step 1: Create a Normal Matrix (R).

$$r = \frac{x_{ij}}{\sqrt{\sum_i (x_{ij})^2}} \tag{19}$$

$$r = \begin{pmatrix} r_{In} & \cdots & r_{1In} \\ \vdots & \ddots & \vdots \\ r_{m1} & \cdots & r_{mn} \end{pmatrix}$$

Step 2: Applying the weights of the criteria and forming the weighted matrix V using the vector W.

$$V = W * R \tag{20}$$

$$\begin{pmatrix} v_{I1} & \cdots & v_{In} \\ \vdots & \ddots & \vdots \\ v_{m1} & \cdots & v_{mn} \end{pmatrix} = \begin{pmatrix} w_1 * r_{I1} & \cdots & w_n * r_{In} \\ \vdots & \ddots & \vdots \\ w_m * r_{m1} & \cdots & w_m * r_{mn} \end{pmatrix}$$

Step 3: Calculate the concordance matrix.

$$C_{KI} = \{ j / x_{kj} \geq x_{ij} \} = JC_{KI} \tag{21}$$

Step 4: Calculate the discordance matrix, which shows non-superiority. Then, in this step, after specifying the set of inconsistencies, we divide the criteria for the discordancy of the criteria and divide the maximum value of the "difference between two options" by the maximum value of the "variance difference" in all the criteria.

$$C_{KI} = \frac{\sum_{j \in C_{Ki}} w_j}{\sum_{j=1}^{n} w_j} \tag{22}$$

$$C = \begin{bmatrix} - & c_{I2} & \cdots & c_{In} \\ c_{2I} & - & \cdots & c_{2n} \\ c_{mI} & \cdots & c_{m(n-1)} & - \end{bmatrix}$$

Based on the above mathematical relation, we form the matrix of dissonance (eq. 23).

$$d_{kI} = \frac{Max_{j \in D_{kI}} \{ |v_{kj} - v_{Ij}| \}}{Max_{j \in J} \{ |v_{kj} - v_{Ij}| \}} \tag{23}$$

$$D_x = \begin{bmatrix} - & d_{I2} & \cdots & d_{In} \\ d_{2I} & - & \cdots & d_{2n} \\ d_{mI} & \cdots & d_{m(n-1)} & - \end{bmatrix}$$

Step 6: Identify the effective concordance matrix

$$D_x = \begin{bmatrix} - & d_{I2} & \cdots & d_{In} \\ d_{2I} & - & \cdots & d_{2n} \\ d_{mI} & \cdots & d_{m(n-1)} & - \end{bmatrix} \tag{24}$$

In order to have a better relative assessment of the preference of the options, the components of the con*cordance* matrix are compared with a threshold value to determine which of these components exceeds the minimum threshold and meet our minimum expectations.

$$h_{ki} = 1, if c_{ki} \geq c^{-} \tag{25}$$

$$h_{Ki} = 0, if c_{Ki} < c^{-}$$

Step 7: Identify the effective discordance matrix

$$d^{-} = \frac{\sum_{k=1}^{m} \sum_{i=1}^{m} d_{k1}}{m(m-1)} k \neq 1 \tag{26}$$

Step 8: Identifying the overall and effective matrix. In order to finally be able to come to a conclusion on the superiority of the options, we multiply the two effective concordance matrix and effective discordance matrix.

$$g_{ki} = h_{ki} . g_{ki} \tag{27}$$

Step 9: Draw the preferred grid to select preferred option.

2.3.4. Copeland approach

The Copeland method determines the number of wins (C_1) and the number of losses ($\sum R$) for each criterion, and finally the score that Copeland gives to each option is obtained by reducing the number of wins ($\sum C$) to the number of wins ($\sum R$).

2.4. Coefficient of variation

This is used to examine the trend of inequalities in development indices across large-scale areas that high CV indicates more inequality in the distribution of indices.

$$CV = \frac{\sqrt{\frac{\Sigma_{i1}(xi - \bar{x}_i)^2}{N}}}{\frac{\Sigma_i^N =_2 x_i}{N}} \quad (28)$$

Here;

X_i : The value of an index in a specific region

$\bar{x}$: Average index i

N : Number of zones

3. Results

In order to determine the level of importance (weights), each of the criteria is compared one by one and the pairwise comparison matrix is formed and then the relative weight is calculated using this matrix. Weights determine which criteria are most important. Euclidean vector method was used to calculate the relative weight of the criteria.

The results given in Table 2 showed that the highest importance factor belonged to mechanization and the least to educational sector. Among the mechanized attribute, the highest weight was 0.086 for tractor and the lowest was 0.079 for trailer. Service-support was also of the highest importance after mechanization and yield. The size of orchards, livestock, fish farming and land area were placed in the next, respectively.

Table2. Weights calculated by pairwise comparison

Criterion	W	Criterion	W
X1	0.002	X15	0.038
X2	0.006	X16	0.05
X3	0.009	X17	0.043
X4	0.013	X18	0.055
X5	0.015	X19	0.026
X6	0.014	X20	0.036
X7	0.02	X21	0.05
X8	0.023	X22	0.049
X9	0.022	X23	0.043
X10	0.026	X24	0.044
X11	0.022	X25	0.047
X12	0.017	X26	0.086
X13	0.018	X27	0.085
X14	0.062	X28	0.079

Table 3 separately evaluates the measurement of development for each method according to its methodology, which was conducted by rural development experts. In the following, and according to the valuations of Table 3, the status of development of studied rural area are given in table 4. As it can

be observed, except Vikor approach, there is not difference between the method of analysis of Topsis, Electre and Copland, and the same result is that all the rural areas are in under developing state.

Table3. Value of measuring the status of rural development using different approach

Approach	Developed	Relatively developed	Under developing	Relatively deprived	Deprived of development
Vikor	0-0.02	0.02-0.4	0.4-0.6	0.6-0.8	0.8-1
Topsis	0-0.02	0.02-0.4	0.4-0.6	0.6-0.8	0.8-1
Electre	50 to 30	30 to 10	10 to -10	-10 to -30	-30 to -50
Copeland	25 to 15	15 to 5	5 to -5	-5 to -15	-15 to -25

Table4. The status of development of studied rural area using different approach

Approach	Rural Areas	Maidanchai	Sardsahra	Espran	Ajichai	Lahijan	Tazekand
Vikor	Development Level	1	0.133	0.382	0.508	1	0.592
	Development status	Deprived	Developed	Relatively developed	Developing	Developed	Developing
Topsis	Development Level	0.489	0.463	0.475	0.455	0.5	0.467
	Development status	Under developing					
Electre	Development Level	5	-3	1	0	-4	1
	Development status	Under Developing					
Copeland	Development Level	3	-2	1	-5	5	-1
	Development status	Under developing					

The results of the ranking of development level of villages are presented in Table 5. In the Vikor approach, the lower the Qi value, the more desirable the agricultural development status of the village is. Lahijan with the lowest Qi is in the first place and Maidanchai with the highest Qi in the last place. In the Topsis approach, Lahijan was the first with the highest value of 0.5 and Ajichai was the last with the lowest value of 0.455988. In Electra approach, Maidanchai with the difference of wins and losses of 5, was positioned in the first and Lahijan in the last place.

According to table 5, different results were obtained using Vikor, Topsis and Electre approach. Thus Copeland's method was used which is an integrated method that the winner is determined by finding the candidate with the most pairwise victories. According to the Copeland model, Lahijan was ranked first and Ajichai was sixth in agricultural development.

Table 5. Ranking of development level of rural areas of Tabriz using different approach

	Vikor		Topsis		Electre		Copeland	
Rural district	Value	Rank	Value	Rank	Value	Rank	Value	Rank
Tazekand	0.592	5	0.467	4	1	2	-1	4
Lahijan	0.045	1	0.5	1	-4	6	5	1
Ajichai	0.508	4	0.455	6	0	4	-5	6
Espran	0.382	3	0.475	3	1	2	1	3
Sardsahra	0.133	2	0.463	5	-3	5	-2	5
Maidanchai	1	6	0.489	2	5	1	3	2

Figure 2 represent the result of ranking rural area of Tabriz from development level perspective using Copland model. As mentioned above, to resolve the differences and conflicts between the various rankings of the considered models in this paper, the integrated Copeland model was used. According to this model, Lahijan was ranked first from agricultural development

perspective; then Maidanchai, Espran, Tazekand, Sardsahra and Ajichai were ranked 2nd to 6th, respectively.

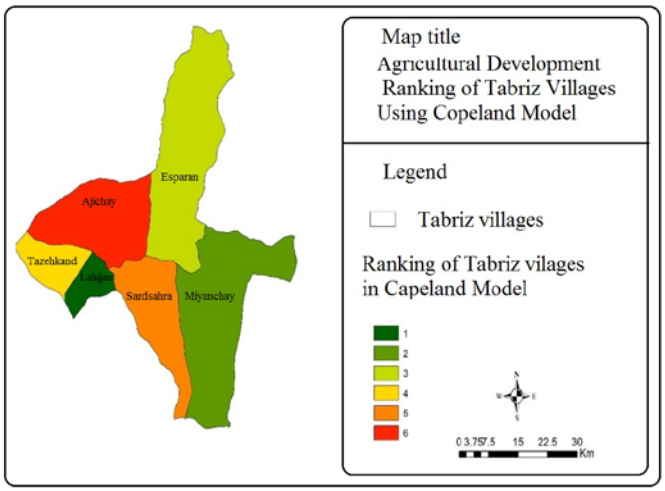

Figure 2. Agricultural Development of Tabriz villages in the Copeland Model.

Lahijan's superiority may be related to the high number of people with a diploma or higher literacy, the high number of cows and calves, the high number of cold-water and warm-water fish. Also, rice yield per ha and the number of pressurized irrigation equipment stores was the highest among the studied villages. Other causes include the presence of two towns of Khosrowshah and Sardrood near the village and the main road crossing the village which provides access to municipal services. After Lahijan, Maidanchai was ranked second in due to high yield of wheat and barley per ha, high number of repair shops and agricultural machinery repairmen. Also access to the main road and proximity to the city of Basmang was another reason. Esperanza, Tazekand, Sardsahra and Ajichai, which rank third to sixth, respectively, do not have access to main road compared to Lahijan and Maidanchai districts.

According to Table 6, the highest distribution inequality is related to fish breeding index (CV=2.24) and the most appropriate distribution is related to rice yield index (CV=0).

Table6. Coefficient of variation for all attributes of this research

Index	CV	Index	CV
X1	0.62	X15	0.42
X2	0.42	X16	0.74
X3	0.75	X17	0.44
X4	0.79	X18	0.69
X5	0.37	X19	0
X6	0.86	X20	0.67
X7	0.50	X21	0.75
X8	0.51	X22	0.79
X9	0.50	X23	1.42
X10	0.55	X24	1.26
X11	0.75	X25	1.28
X12	2.24	X26	0.98
X13	2.24	X27	0.92
X14	0.33	X28	0.86

4. Discussion and Conclusion

Agricultural development level of rural district of Tabriz was evaluated with 8 attribute and 6 rural areas. In terms of agricultural development status, they were divided into five developed, relatively developed, developing, relatively deprived and deprived classes. According to the results of

Topsis, Vikor and Electra models, these three methods were not concluded the similar results. In the Topsis model, Lahijan was ranked first and Ajichai was the last, and in the Vikor model Lahijan was ranked first and Maidanchai was the last. In the Electra model, Maidanchai was in the first place and Lahijan in the last. Previously, Pourjavad and Shirouyehzad (2011) compared three methods of multi-criteria decision makings called Topsis, Electre and Vikor to understand which of these methods yields optimum result. But they also reported that these methods did not produce similar result to methods. Finally, at present study, Copeland's method was used for consensus on the results of these models. The results of this research are consistent with the research conducted by Nazmfar et al. (2015). They studied on the inequality of development in Kermanshah province using the method of SAW, Electre, Vikor and Copeland. They also reported that they obtained different results using SAW, Electre, Vikor methods and used the Copeland method to prepare a single ranking.

According to the Copeland model, Lahijan was ranked first and Ajichai was ranked sixth. The results of this research are consistent with the research conducted by Safari and Bayat (2012). They reported that there is a difference and inequality between the rural areas of east Azerbaijan in terms of development level and distribution of facilities in the villages. Another important result of their research was the impact of communication path on rural development.

All six districts are in a state of under developing. Given that under developing regions are limited in the production of agricultural products, sustainable agricultural is one of the necessities. Therefore, it is necessary to pay special attention to the restoration, protection and proper use of resources. Natural growth has led to the growth and development of the agricultural sector, otherwise it will lead to the destruction of the agricultural sector and bring poverty. In order to achieve sustainable agricultural development, the management structure must be reformed. Also, the production and supply of water, the reform of the consumption pattern, marketing and production must be considered and examined. In terms of production, under developing regions are the largest producers of primary agricultural products. But share of them in agricultural exports is low because of the lack of specialized knowledge and technical information and the lack of cultural infrastructure in achieving their national production goals.

Training of human resources involved in the agricultural sector, creating motivation among graduates majored in agriculture, empowering human capital by creating cooperatives and agricultural trade unions, reducing the cost of products and services, increasing the quantity and quality of products, increasing productivity of processing industry and encouraging producers to produce high quality products with more added value will lead to optimal supply and demand and reduce dependence on developed areas.

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