Prioritize factors affecting the high-tech industry investment in East Azerbaijan province using prioritization techniques VIKOR

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ABSTRACT

This study aimed to prioritize investment factors affecting the high-tech industry in the East Azerbaijan province, using the technique of prioritization, fuzzy VIKOR. This study is the kind of researches is descriptive- survey and placed in the category applied research whose results can be used to improve the high-tech industry investment in East Azerbaijan province. In this study Research population, including the administrators and industrialists are the province of high-tech equipment and technology. According to the information received by the community of 10 companies and organizations manufacturing. When population size is limited (10 units) and qualitative variables, so all population used as a sample. According to the results management criterion most significant role in attracting investment in high-tech industries, and measures affecting investment profit in second place in the industry is high-tech and to the next level, with measures of political stability, opportunity, risk and cost.

KEY WORDS: *High-tech Industry, Investment, Opportunity, Cost, VIKOR Fuzzy Techniques*

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INTRODUCTION

In the world of liberalization and globalization, in the case of economic growth and development can continue that countries can develop higher value-added activities and newer and to produce goods and services that would maintain their position in the competitive market. In this investment as an effective tool in production can play an important role in helping firms (Carbaugh, 2002). Today it's no secret that indispensable for economic growth and development in all human societies, whether developed or developing, Investments to increase the quantity and quality of the product and create new job opportunities and thus improve public welfare (Sitkin, Weingart, 2005). Obviously, there is a flourishing industry for pure and definite policy, But always need to adopt effective strategies is to review investment and pushing it toward the optimal policy and it would not be possible unless the targeted studies and research periodicals, new and effective solutions to be put before the owners and activists industry (Satya, 2012). In this regard, the information collection and provision of special indicators can be effectively used to adopt effective solutions. In other words, economic indicators last survey that enables future growth (Yong, 2006). Over the past years, harvest technology professionals, has been picked up hardware and in most cases, managers of the industry to achieve the advanced technology as the only way to buy newer machines and Purchased with the latest models of machines and equipment tried to stay back behind the rapid technology (Agrawal, 2008).

Today, the notion of science in the field of industry has been largely transformed and Managers know that buying hardware, although sometimes necessary in order to achieve superior technology, but no-doubt is not enough and Elements such as human resources or technical knowledge is essential for optimal performance of each hardware platforms (Banga, 2009). Referred to as high-tech technologies that have certain characteristics. First, the development of high-speed technologies (Ertuğrul, Karakaşoğlu, 2006). Sometimes the life of these technologies is less than a year, whereas in traditional technologies, life expectancy more than 10 years. Second, the role of human resources is higher than the hardware (Frawsen, Henrick, 2004). This means that if we measure the extra value that is created, the share of high-tech human resources in the creation of added value, much more bold. In addition, the factors that cause this effect, the practical capabilities of manpower nor the experience or physical effort for him. In other words, the role of science in hitech over the role of experience. Third, the added value of technology in the production of the final product rather than other factors (such as raw materials, energy, etc.) is very high (Carbaugh, 2010). Economic development aspirations of all developing countries and countries choose different means to achieve this (Kahraman et al., 2007). Capital One factor is the fact that the main factors in the development of countries and other economic variables such as employment, GDP, supply of goods and services and this factor affected directly (Aswicahyono, 2011). Countries to design mechanisms are used by some countries to attract more capital from internal and external sources. Among the mechanisms used by some countries to achieve this objective is to invest in high-tech industries, which if successful could be technology transfer, employment, human resource development and exports also be followed (Robert, Hong, 2010). Ultimately enhance current investment objective is capital appreciation, which in and of itself in this process, the next time, efficiency, risk factors, cash flow patterns, building capital, capital costs, etc. will be discussed. So to achieve this goal, we must follow the fundamental thinking and in the meantime, according to the theory of investment is required (Lutz, Turrini, 2006). Willingness to invest in high-tech industries, in itself, not a means of attracting investment, but also in terms of attracting investment in this industry are many factors involved in this study factors will be identified and Prioritization. Identification of investment opportunities with high efficiency and prioritization of the matter is that today the main focus in the allocation of investment resources

with extended features. Prioritize investments in addition to providing the possibility of allocating resources, the time and costs of pre-investment, reduce the project study. Prioritize investments, although activity is common, but is certain complexities. The complexity of quantitative and qualitative evaluation of the effects of multiple criteria and multiple decision makers involved in this process stems (Kaufmann et al., 2009). With regard to the issues raised in this study using the opinions of experts and professors studied management and economics to identify the main criteria and then use the following investment criteria (cultural, governmental, legal, administrative, regional, economic and investment Mark) shall pay to the ranking criteria (risk, cost, time, profit, management and political stability) affecting investment in high-tech industries. The aim of this study is to prioritize investment factors affecting the high-tech industry in East Azerbaijan province using prioritization techniques VIKOR phase.

RESEARCH METHOD

In this study, the independent variables are the main criteria (risk, cost, time, profit, management and political stability) and sub-criteria (cultural, governmental, legal, administrative, regional, economic and investment) is. The dependent variable is investment in high-tech industries.

Figure 1: Conceptual Model Research

The study was a descriptive study - a survey of sight is practical purpose. The population in this study, including managers and owners of large industries in East Azarbaijan Province single-use industries as they are. According to information received study population consisted of approximately 10 organizations and companies are manufacturing. Such as population size was limited (10 units) and qualitative variables, so use all the population as the sample size. This study of the implementation of the first half and at the end of 2014 beginning of 2014 come to an end. Data analysis was performed using fuzzy techniques VIKOR.

RESEARCH FINDINGS

In this section, after identifying major and minor criteria by professors and experts (according to research conceptual model) using'll Payment sub-criteria ranking of the main criteria affecting investment in high-tech industries using fuzzy VIKOR. To determine the weight of importance of the criteria used by the decision-maker $10 = k$ through linguistic variables. Experts were asked the following criteria on the basis of 28 criteria in six linguistic variables compare. Table 1, criteria and sub-criteria used shows.

Table 1: Evaluation criteria for investment in high-tech industries

criteria		sub criteria	
C1	Cultural variables	C11	Appropriate behavior related institutions and organizations
		C12	Suitable culture of work and production
		C13	Investment worth thinking
		C14	Ethnic and religious tensions
C2	State variables	C21	Government policies and policy
		C22	The relative stability in rates and prices
		C23	Transparency in the production
		C24	Transparency of information and statistics
		C25	Lack of discrimination between the productive sectors
C3	Legal and administrative variables.	C31	Stability in the rules and regulations
		C32	There are mental and simplified administration
		C33	Flexibility rules
		C34	Coherent relationship between science centers
		C35	Reduce holidays and vacation
C4	Regional variables	C41	There are infrastructure facilities like roads, railways, airports and...
		C42	There are efficient and capable management
		C43	There is a regional strategy to guide investors
C5	Economic variables	C51	Proximity to large markets
		C52	Tax cuts and financial risk
		C53	Labor productivity
		C54	Inflation
		C55	Exchange rate fluctuations
C6	investment	C61	Economic variables
		C62	State variables
		C63	Legal variables
		C64	Cultural variables
		C65	Regional variables

In the second phase of the 10 experts were asked to compare the 6 criteria based on 28 sub-criteria. In the third stage of the decision-making matrix is combined 10 experts. Using the following formula and 10 expert opinions obtained by combining matrices criteria - the individual decision maker and decision maker - Options - criteria.

$$\tilde{W}_j = (\min\{\tilde{X}_{j1}^L, \tilde{X}_{j2}^L, \dots, \tilde{X}_{jk}^L\}, w_1 \cdot \tilde{X}_{j1}^m + w_2 \cdot \tilde{X}_{j2}^m + \dots + w_k \cdot \tilde{X}_{jk}^m, \max\{\tilde{X}_{j1}^R, \tilde{X}_{j2}^R, \dots, \tilde{X}_{jk}^R\}) \quad (1)$$

$$Z_{mn} = (\min\{y_{1mn}^L, \dots, y_{Kmn}^L\}, w_1 x_{1mn}^m + \dots + w_K x_{Kmn}^m, \max\{y_{1mn}^R, \dots, y_{Kmn}^R\}) \quad (2)$$

So that w_j , weight fuzzy important criteria for MS j . In the fourth stage comes before the fuzzy values based on the average value of defuzzification, fuzzy-adjusted and absolute numbers. These numbers were calculated using Excel.

Table 2: Fuzzy de-composition of the matrix of criteria - the individual decision maker and decision maker - Options – Criteria

Criteria	C1			C2			C3			C4			C5			C6												
	0.0611			0.2500			0.2167			0.0889			0.1833			0.2000												
	C11	C12	C13	C14	C21	C22	C23	C24	C25	C31	C32	C33	C34	C35	C41	C42	C43	C51	C52	C53	C54	C55	C61	C62	C63	C64	C65	C66
Weight	0.2575	0.2025	0.2425	0.4075	0.305	0.655	0.5275	0.665	0.685	0.66	0.47	0.9	0.5525	0.595	0.59	0.7325	0.2725	0.32	0.6725	0.47	0.5675	0.65	0.37	0.4875	0.68	0.675	0.86	0.405
Risk	0.4	0.5	0.3	0.4	0.4	0.4	0.5	0.5	0.3	0.2	0.4	0.4	0.4	0.2	0.2	0.6	0.6	0.5	0.6	0.7	0.5	0.6	0.7	0.5	0.4	0.6	0.5	0.5
Cost	0.5	0.5	0.5	0.5	0.5	0.4	0.3	0.2	0.4	0.5	0.5	0.4	0.4	0.4	0.7	0.4	0.5	0.3	0.5	0.5	0.5	0.6	0.6	0.5	0.5	0.5	0.4	0.6
the opportunity	0.6	0.5	0.5	0.5	0.4	0.6	0.5	0.5	0.5	0.5	0.5	0.4	0.6	0.2	0.4	0.5	0.4	0.9	0.6	0.5	0.5	0.4	0.5	0.3	0.4	0.6	0.5	0.4
Profit	0.5	0.4	0.5	0.5	0.5	0.7	0.5	0.3	0.3	0.6	0.6	0.6	0.5	0.4	0.3	0.5	0.5	0.4	0.5	0.6	0.4	0.6	0.5	0.6	0.6	0.5	0.4	0.6
Management	0.6	0.6	0.7	0.6	0.6	0.5	0.5	0.7	0.6	0.7	0.2	0.7	0.5	0.5	0.6	0.6	0.6	0.4	0.5	0.8	0.7	0.5	0.5	0.9	0.5	0.3	0.8	0.6
Political stability	0.7	0.6	0.8	0.6	0.7	0.7	0.6	0.6	0.9	0.9	0.7	0.6	0.4	0.7	0.8	0.4	0.7	0.4	0.5	0.6	0.9	0.9	0.6	0.2	0.8	0.8	0.2	0.6

In the fifth round, ideal and anti-ideal values for each criterion and the results in Table 3 below.

Table 3: Ideal and anti-ideal values criteria

sub criteria	C11	C12	C13	C14	C21	C22	C23	C24	C25	C31	C32	C33	C34	C35	C41	C42	C43	C51	C52	C53	C54	C55	C61	C62	C63	C64	C65	C66
f^+	7.0	6.0	8.0	9.0	7.0	7.0	9.0	7.0	6.0	6.0	7.0	7.0	9.0	7.0	8.0	9.0	7.0	6.0	9.0	8.0	6.0	6.0	7.0	6.0	8.0	8.0	8.0	6.0
f^-	4.0	4.0	3.0	4.0	4.0	4.0	3.0	2.0	3.0	2.0	2.0	4.0	4.0	2.0	4.0	4.0	4.0	3.0	5.0	5.0	4.0	4.0	5.0	2.0	4.0	3.0	2.0	4.0

According to the table above for each sub-criterion largest number as the ideal and is selected the smallest number of sub-criteria, sub-criteria as the amount of anti ideal. The next step is to calculate the size of the utility (S_i) and the size of the effect (R_i) of each option. The following table shows the result

$$S_i = \sum_{j=1}^m \left\{ \frac{w_j(f_i^+ - f_{ij})}{f_i^+ - f_j^-} \right\} \quad (3)$$

$$R_i = \max \left\{ \frac{w_j(f_i^+ - f_{ij})}{f_i^+ - f_j^-} \right\} \quad (4)$$

Table 4: The size utility and the size of the effect of each option

Options	S_i	R_i
Risk	11.34	0.76
Cost	12.76	0.90
the opportunity	10.42	0.76
Profit	9.94	0.68
Management	7.74	0.71
Political stability	4.90	0.86

In the seventh stage comes to Q_i values that are shown in the table below.

Table 5: Q_i values

Options	Q_i
Risk	0.59
Cost	1.00
the opportunity	0.53
Profit	0.32
Management	0.26
Political stability	0.41

In the eighth to earn the ranking options based on descending values obtained for S_i , R_i and Q_i . The following table shows the ranking options based on the amount of S_i , R_i and Q_i .

Table 6: Ranking the options based on the amount of S_i , R_i and Q_i

Options	Risk	Cost	opportunity	Profit	Management	Political stability
Rating based on S_i	5	6	4	3	2	1
Rating based on R_i	3	5	3	1	2	4
Rating based on Q_i	5	6	4	2	1	3

In the ninth step, we will review and select the best option. In this stage, to examine the conditions you want to discuss options.

The best option (at least Q_i) will be achieved under conditions to be established that the following two conditions:

The first condition (reception characteristics):

$$Q(A^2) - Q(A^1) \geq DQ \quad (5)$$

$$DQ = \frac{1}{m-1} \quad (6)$$

So that :

A^2 : The ranking is based on criteria Q , the item is placed in the position or the second position.

A^1 : the best option with the least amount for Q

m : Number of options.

The second condition (stability admission decision)

Option A^1 should also rated best in the S or (and) R is.

1) If one of the above conditions not be established, A^1 and A^2 options

2) If the first condition was not established, option A^1 and $A^2, \dots, A^m$.

A_m : Option is in position m , the correct relationship.

The first and second test condition

The first condition is not established. $0.32 - 0.26 \geq 0.2 : \times$

The best option Q_i

The second condition is not established on the basis of information obtained.

In the table below the results of the rankings.

Table 7: Results Ranking the options

Options	Rank
Risk	5
Cost	6
opportunity	4
Profit	2
Management	1
Political stability	3

DISCUSSION AND CONCLUSION

What indicators are influencing investment in high-tech industries?

In order to answer this question, researchers conducted a literature review and theoretical framework of research in this area and identify indicators that could be involved in terms of researchers, scientists and experts in investment management and economics in high-tech industries. As the conceptual model showed that effective factors on investment in high-tech industries, including the main criteria for investment (risk, cost, time, profit, management and political stability) and below investment criteria (cultural, governmental, legal, administrative, region O, economic and investment) and any of the following criterion also has the following indicators, which were identified.

What is the importance of effective measures to invest in high-tech industries to one another?

To answer the question of VIKOR fuzzy due to the uncertainty in the responses of experts was used. The importance of effective measures to invest in high-tech industries are as follows:

1. State the following criteria:

The following criteria is dedicated following among other criteria, the most important (0/25) to itself. Accordingly, it can be stated that the experts one of the following criteria is effective in attracting investment in high-tech industries. In this group are useful indicators or subsets such as: policies and government policies, tariff rates and the relative stability in prices, transparency in the production, transparency of information and statistics and lack of discrimination between the manufacturing.

2. The following legal and administrative measures:

The results showed that the second criterion important legal and administrative measures among the criteria for attracting investment in high-tech industries is weighing 0/2167. Based on factors such as stability in the rules and regulations, the administrative system facilitates smooth and flexible rules consistent relationship between science centers, reduce holidays and vacation time, etc., are effective measures to attract investment in high-tech industries.

3. The following investment criteria:

The results showed that the third sub-criteria most important investment criteria among the criteria for attracting investment in high-tech industries is weighing 0/20. Accordingly, it can be argued that economic variables, state variables, variables such as legal, cultural variables and regional variables are considered.

4. The economic criteria:

According to the results the following four criteria important measure of economic variables among the criteria for attracting investment in high-tech industries is weighing 1832/0. Accordingly, it can be stated that the following assessment criteria for attracting investment in high-tech industries, bold and undeniable role in economic variables. Therefore, this factor should be considered to be the manager.

5. The following regional standards:

The results showed that the fifth criterion under the criteria important regional variations in the criteria for attracting investment in high-tech industries is weighing 0/0889. In other words, the existence of infrastructure facilities such as roads, railways, airports, etc., are efficient and capable management and a regional strategy to guide investors is an important factor in attracting investment in high-tech industries.

6. The following cultural criteria:

The results showed that the measure cultural variables, sixth and least important criteria among the criteria for attracting investment in high-tech industries 0611/0 weight is a measure cultural variables. The following index is an indicator of cultural criteria less and less impact on attracting investment in high-tech industries.

What are the main criteria for investment in high-tech industries?

Has been providing review and analysis of data based on the criteria for attracting investment in high-tech industries based on Table 8.

Table 8: Ranking criteria

Options	Rank
Management	1
Profit	2
Political stability	3
opportunity	4
Risk	5
Cost	6

The above table shows that the management criteria is the most important role in attracting investment in high-tech industries a e0nd are ranked in order of criteria profits, political stability, opportunity, risk and cost.

The research proposal

According to the results to eliminate barriers and create the enabling environment to attract more investment and attract the presence of the high-tech industry offered the following suggestions in order of importance:

Achievement of objectives requires proper planning and determination of priorities and adopting appropriate strategies and requires a lot of time and effort will be spent. It requires a strong and efficient executive management. Therefore, it seems necessary is a need to do two steps below:

A) Maintain an efficient labor force and entrepreneur

B) attracting and attract qualified personnel and entrepreneur

2. The Director must prevent the occurrence of bureaucracy and administrative bureaucracy and take the pace of consideration of investment applications and licensing to established companies or to enter the high-tech industry. Therefore, it is necessary to put the institutions and organizations and representatives of all departments and agencies and other institutions in the category of office investment with regular practice and its integrated, managed and deployed units.

3. Management should pay more attention to supply manpower available. Cultural barriers must be taken seriously in the labor market. Also extensively in the field of IT illiteracy and lack of advanced industrial base in high-tech industry, a hurdle that must pay to fix it through human resource training and vocational training courses.

4. The success of East Azerbaijan province, according to the special geographical position depends on economic security that need to be addressed through laws and regulations. In addition to secure and reduce investment risk, motivation, and provide a good background in financial and non-financial facilities to attract investment;

5. Demystifying rules and regulations of the review and amend some of the laws and regulations, improve the methods and the rules easy and logical.

6. Funds from the provincial budget and the public, to help build and establish infrastructure facilities and infrastructure.

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