

Investigation of qualified strategy from SWOT analysis using fuzzy group decision-making techniques in the appliance industry (case study: Doonar Khazar factory in Tabriz)

Vahid Mahmoudi¹ (Corresponding author), Dr. Mehrdad Hosseini Shakib², Dr. Mohsen Mohammadi³

1. MSc student of Industrial Management, Islamic Azad University of Karaj, Karaj, Iran
2. Assistant Professor and faculty member, Islamic Azad University of Karaj, Department of Management, Karaj, Iran
3. Assistant Professor and faculty member, Islamic Azad University of Shar-e-Rey, Department of Management, Shar-e-Rey, Iran
vahid.mahmoodi110@gmail.com

Abstract: This research aims at devising the key strategies, ranking and choosing the most appropriate strategies using SWOT Analysis for strategy-making and the combination of ANP and DEMATEL and Triangle Fuzzy for group decision-making techniques. The resulting strategies are used for ranking. The research method is practical that is implemented using field research. Interviewing 45 experts as samples, the weakness, strength, and the threats and opportunities related to the factory were detected and the key strategies for the firm were devised using SWOT Analysis. The weights of Paired Comparison Analysis between factors were attained by using a questionnaire and the most appropriate strategy for Donar Khazar Factory was ranked and chosen with the combination of ANP and DEMATEL Fuzzy. It is concluded that market expansion strategy in the available regions is the most appropriate strategy for the present time of Donar Khazar Factory due to profit increase in sales.

[Vahid Mahmoudi, Dr. Mehrdad Hosseini Shakib, Dr. Mohsen Mohammadi. **Investigation of qualified strategy from SWOT analysis using fuzzy group decision-making techniques in the appliance industry (case study: Doonar Khazar factory in Tabriz).** *Researcher* 2013;5(10):33-45]. (ISSN: 1553-9865). <http://www.sciencepub.net/researcher>. 5

Keywords: Main Strategy, SWOT analysis, Group decision-making

1. Introduction:

Strategic management is a set of decisions and actions that determines the long-term performance of a company. Strategic management includes environmental review, strategy, strategy implementation and evaluation and controls it. Therefore, the monitoring and evaluation of strategic opportunities and external threats, internal strengths and weaknesses in the light focuses. (L. Violin and Hangr, 2010)

Taking a look at the importance of the concept of strategic management can be realized. According to the environmental changes that have already taken a lot of momentum, and the complexity of organizational decisions, the need to implement a comprehensive program to deal with these issues, it is more tangible than ever before. This plan is nothing but strategic plan. Strategic management based on dynamic mentality, perspective and contingency holistic solutions to many problems of today's organizations. Strategic management of the organization, allow acting in creative and innovative ways to shape their future but not in a passive act. This method makes management of the initiative and lobbying activities so they can be (not just the actions, react) and thus determine its fate and the future can be controlled. (Fred R. David, 2013)

Analysis of strengths, weaknesses,

opportunities and threats (SWOT) assessment to determine the best strategy for a business it is widely used in various studies. In many studies, the underlying cause for the ranking factors in SWOT analysis using multi-criteria decision-making methods, the ranking strategy is measured by these methods, strategic management decisions and provides a great insight (Socly et al., 2011).

In order to effectively deal with all the factors that affect the company's ability to grow profitably, managers to strategic management processes that are designed to improve their position in the firm's competitive environment facilitates. It is possible that the establishment of strategic processes, a more precise estimation of the environmental changes and responds to domestic pressures and provide a competitive more readily create (Pierce and Robinson, 2010). Thus, given the heavy reliance of enterprises to decide the future success of their current strategic issues, the decision has caused a need for careful consideration of these issues over a variety of industries and businesses.

Strategic planning involves three phases: preparation, implementation and monitoring strategy. Each of these elements of the elements of each step is presented:

Strategy includes the following steps:

- The organization's vision and mission.

- External factors (opportunities and threats)
 - Identification of internal factors (strengths and weaknesses)
 - Determination of the long term goals of the organization
 - Developing, evaluating and selecting strategies
- Modeling strategy implementation includes the following:
- The annual goal setting and policy
 - Allocation of resources

Evaluation Strategy:

In this strategy, the performance of the organization is calculated and evaluated (Fred R. David, 2013).

The Institute's mission statement includes the objectives of the organization and the specific demands of the company as an ideal institution, a general sense of direction and a clear path and what specific criteria to assess progress in reaching their destinations are the main goals of the Institute. Goals are a statement of results within a given organization wants to achieve holistic approach and overall strategy to guide activities designed to achieve long-term goals of the business offer. (Pearce and Robinson, 2010)

The main strategies can be successful in continuing efforts to understand the institution's long-term objectives. (L. Violin and Hangr, 2010) Today, the strategic management process, methods and various approaches to the analysis, evaluation and selection strategy is used. One of the most important tools for decision support is a SWOT table. This approach to internal factors (strengths and weaknesses) and external (opportunities and threats) influencing the organization's performance and to compare them with each other, it helps the decision maker to formulate your strategy based on the strengths of the weakness of opportunities to reduce or avoid the use of threats (D. Seven, R., 2004) Despite its advantages of SWOT analysis to identify strategies to prioritize the importance of these strategies and their implementation is not required. However, due to the lack of some important factors that can influence each agent's strategy is clear. The relative importance of factors and rankings in does not specify a comprehensive evaluation of the strategic decision not achieved. The researchers combined models using multi-criteria decision-making methods and SWOT analysis to rank and prioritize strategies employed are derived from SWOT analysis (Curtis et al, 2000). Donar Khazar Company in 1996 in the field of home appliances has been registered and using the latest technology and the experience of national and international experts and installation of machinery and modern equipment

to optimize energy consumption and environmental protection steps effectively removed.

Advantage in the production of high quality domestic and foreign similar products for this company is notable. Our products in addition to the national standards and ISO 9000:2000 quality certifications could also obtain authorities and international organizations. The company claims to have a large presence in the vast country of Iran and the foreign markets, relying on superior quality products and extensive after sales service and warranty, to get proof. Currently, more than six hundred and experienced legal service work throughout the country and other neighboring countries to provide after-sales service and guarantees required Donar Khazar products are valuable to consumers (www.donar.ir, 2012). In regards with the issues raised, the Institute produced its DUNAR range of activities are strategic decisions for more successful and continue to be required for its activity. Therefore, the main research question is now which of the strategies proposed by SWOT analysis, corporate strategy for Donar Khazar Company?

The research objectives are as follows:

- 1 - Identify internal strengths and weaknesses and external opportunities and threats Donar Khazar factory
- 2 - SWOT table and the main strategy for Donar Khazar
- 3 - Choose the best strategy and ranking strategies SWOT analysis extracted by using an integrated fuzzy group decision-making methods.

SWOT analysis by Andrews (1965), who became popular ideas of Peter Drucker, Philip Sells and Alfred Chandler with good combination. Drucker (1946) conducted research on the source of the company's success. He found that successful organizations recognize the need to have goals and external customers and satisfy them. On the other hand Selznick (1957) the expression "distinctive capabilities" and "environmental uncertainty" introduced. The first terms corresponds to a unique capacity and values of the organization and have them marked on it as a "competitive advantage" fixed emphasize. The second term refers to the fact that in the beginning, the firms do not respond to their environment cultural norms and values of the system or the wider society in which they are internalized. Chanldr (1962) Growth and injection process to underpin the management of multinational enterprises 4. He refers to the importance of understanding and perception of the organization's strategy. He argues that environmental variables, such as aggregate demand, supply sources, financial functions, developed technology and opponents of the strategy, including objectives, scope, environmental, market,

and vice versa, as well as affect the allocation of resources. An organization must be aware of the opportunities to develop as a result of environmental changes and have the ability to respond creatively to them. SWOT analysis of the views, Andrews argues that a firm has formulated its strategy after a careful assessment of indoor and outdoor components to build. This will allow companies to plan long-term approach based on quality instead of quantity to be predicted (Baraka, 2005; Loren, Kristiansen, Andrew, and Goss 1965).

SWOT matrix theory linking mechanism to facilitate the company's strengths and weaknesses (internal factors), and the opportunities and threats (external factors) on the market offers. It also provides a framework for identifying and formulating strategies. The hardest part of SWOT matrix matched internal and external factors and it is necessary that the person doing so is prudent. SWOT matrix helps managers can take the 4 strategies, strategy SO (strengths - opportunities), WO (weaknesses - threats), ST (strengths - threats), WT (Weaknesses - Threats). SO strategies use a firm's internal strengths to take advantage of external opportunities. ST strategies for avoiding or reducing agent are used to deal with external threats. WT strategies are defensive tactics for reducing internal weaknesses and avoiding environmental threats are used (Virich, 1982). Making SWOT Matrix has 8 stages: 1) Key opportunities for foreign firms to list, 2) List the firm's key external threats, 3) List the firm's key internal strengths, 4) List the firm's key internal weaknesses, 5) internal strengths the opportunities for foreign adoption and strategies SO resultant record them. 6) Weaknesses internal opportunities overseas adapted strategies and WO resulting from their record, 7) strengths, internal threats, external adaptation and the resultant ST strategies to record it. 8) Internal weaknesses with external threats and adapt it to record the resultant WT Strategies (David, 2007).

Fuzzy Set Theory

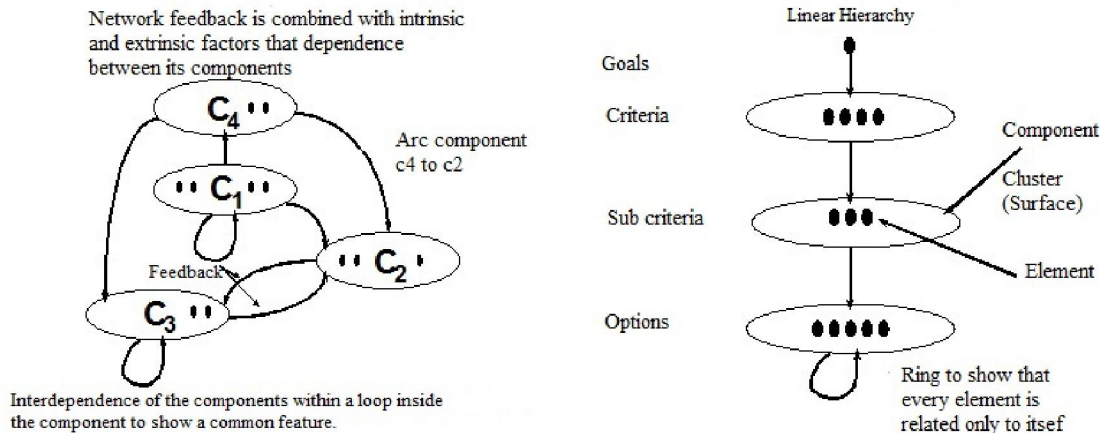
In the real world, many decision makers in the absence of clear objectives, constraints and actions that may not be explicitly introduced in [Bellman and Zadeh, 1970]. The roots of this failure returns to explicitly include non-measurable data, incomplete information, or available information

[Chen Huang, 1992]. To solve this problem, the theory of fuzzy sets by Zadeh in 1965. As a mathematical approach to deal with the uncertainty in decision making is presented. Fuzzy theory is very useful where human decisions dealing with ambiguous expressions. Decision makers tend to evaluate based on their past experiences and knowledge and most of their estimates is expressed in terms of ambiguous verbal terms. In order to integrate the experiences, opinions, ideas and decision makers, it is estimated fuzzy numbers become verbal. Thus, real-world decision-making problems, the need for fuzzy logic has been proposed [Kafman, 1991]. Making decision in strategic planning is not an exception.

Fuzzy Analytic Network Process (FANP)

So far, several tools and techniques have been proposed to solve multi-criteria problems. One of the most efficient techniques Analytic Hierarchy Process (AHP) is that was introduced by Thomas L. Saatiin 1980. Because later technique AHP, was not comprehensive enough, Saati presented in 1996 as a way to extend the analytic network process (ANP) [Time, 1996]. In comparing the two methods, and then we describe the steps of fuzzy ANP technique. According to Dr. Saati [Saati, 1998], ANP is a more general method of AHP, and to compare these two methods can include:

1. ANP allowing attachment of AHP just autonomy of the state, goes beyond. In fact, AHP is considered as a special case of the ANP.
2. ANP dependence on a set of elements (inner dependence) and the dependence of the set of elements (external dependency) is connected.
3. The network structure of ANP, which makes it possible to decide any issue without fear of what comes first and what follows, we will provide.
4. ANP is a nonlinear structure, whereas a hierarchy, with one of the highest level, and options on the lower surface, the structure is linear.
5. ANP not only the elements but also groups or clusters of elements that are often needed in the real world, in terms of priority, order.



Structural differences between a linear system and a nonlinear system

Saaty, the latest version of the ANP method is proposed as a method of twelve steps [Time, 2004]. It should be noted due to the complex calculation steps 8 to 12 computation steps are that can be performed using Super Decisions Software, so hard in fact that this is largely eliminated.

ANP approach to pricing and ranking of preferences, paired comparisons matrix uses the final numbers of the input data where the uncertainty facing the input data can not be used as the matrix. To solve this problem, grasped his colleagues unanimously Wu [Wu Cheng, 2008] have presented a

model that uses the ANP method in fuzzy environment. ANP model is different from conventional methods, the extraction of weights from pair wise comparison matrices, which are described below. Other steps are the same model with the conventional method and the ANP will refrain from mentioning it again.

Since each number in the matrix of paired comparisons shows a personal decision and it is a vague concept, to the opinions of different experts, fuzzy numbers are used.

Triangular fuzzy numbers are defined as follows:

$$L_{ij}, M_{ij}, U_{ij} \in [1/9, 9] \text{ , } L_{ij} \leq M_{ij} \leq U_{ij} \quad \tilde{u}_{ij} = (L_{ij}, M_{ij}, U_{ij})$$

$$(L_{ij} = \min(B_{ijk}) \quad M_{ij} = \sqrt[n]{\prod_{k=1}^n B_{ijk}} \quad U_{ij} = \max(B_{ijk}))$$

Which B_{ijk} represent expert judgment about the relative importance of the two C_i and C_j criteria.

Fuzzy pair wise comparison matrix \tilde{A} is as follows:

$$\tilde{A} = [\tilde{a}_{ij}] = \begin{matrix} & \begin{matrix} c_1 & c_2 & \dots & c_n \end{matrix} \\ \begin{matrix} c_1 \\ c_2 \\ \vdots \\ c_n \end{matrix} & \begin{bmatrix} 1 & \tilde{a}_{12} & \dots & \tilde{a}_{1n} \\ \frac{1}{\tilde{a}_{12}} & 1 & \dots & \tilde{a}_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ \frac{1}{\tilde{a}_{1n}} & \frac{1}{\tilde{a}_{2n}} & \dots & 1 \end{bmatrix} \end{matrix}$$

Which \tilde{a}_{12} represents a triangular fuzzy

number is used to determine the relative importance of the two C_1 and C_2 criteria. Moreover, the matrix $[\tilde{a}_{ij}]$ is represented by fuzzy numbers based on the formulas (6) to (9). There are several methods for removing fuzzy mean defuzzification mechanism centers defuzzification mechanism commonly used in fuzzy systems and fuzzy control are the reasons of simplicity, flexibility and integration is justified. As small changes occurs in y^{-l} or W_l , small changes in y^* average non-fuzzy construction sites as listed in the formula (11) is calculated by [Tanaka and Wang, 2001].

$$y^* = \frac{\sum_{l=1}^{12} y^{-l} W_l}{\sum_{l=1}^{12} W_l}$$

Fuzzy DEMATEL Method

DEMATEL method by Battelle Memorial Institute for Human Science and Programming, Geneva, was created between 1972 and 1976 to study and solve complex problems was intertwined. DEMATEL method based on oriented graphs (diagram) which could be causal factors in the two groups is separated. The diagram, dependency relationship between system elements to depict, so that the numbers on each diagram, the intensity of one element on another element. Thus, a relationship between the causes and effects of factors DEMATEL method is available to convert a structural model to understand the system [Wu, Wei Li, 2007].

Due to the DEMATEL method requires expert opinion and the opinions contained verbal expressions are ambiguous, and integral to their ambiguity, it is better that these expressions are converted to fuzzy numbers. To solve this problem, Lin and Wu [Lin and Wu, 2008] have presented a model in which the DEMATEL method is used in the fuzzy environment. The following steps describe the fuzzy DEMATEL model is presented, we will:

Step 1: Identify the cause of the decision and formed a committee to collect ideas to solve your problem. Second step: the design and evaluation criteria, fuzzy linguistic scale. Because of uncertainties in the assessment of human exposure, the scale used to compare the DEMATEL approach has ordinary matter and instead propose a fuzzy linguistic scale Li [Li, R. J., 1999] are used. Varying degrees of "impact" with five words: very high, high, low, very low, no effect is expressed as triangular fuzzy numbers and their corresponding positive in the following table and are shown in following Figure and Table:

Table 3 - Correspondence with linguistic values of linguistic expressions

Linguistic values	Verbal expressions
(0.75,1.0,1.0)	Very High
(0.5,0.75,1.0)	High
(0.25,0.5,0.75)	Low
(0,0.25,0.5)	Very Low
(0,0,0.25)	Not Significant

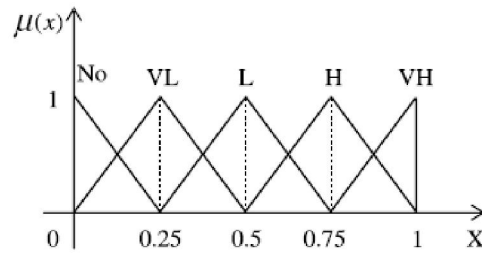


Figure 5 - triangular fuzzy numbers for linguistic variables

Step 3: Collect the assessment decision

To determine the relationship between $C = \{C_i | i = 1, 2, \dots, n\}$ criteria, a group of experts to decide, the question comes up a series of paired comparisons based on verbal expressions obtained. Hence, the number of comments for each graduate $\tilde{Z}^{(1)}, \tilde{Z}^{(2)}, \dots, \tilde{Z}^{(p)}$ is prepared using a fuzzy matrix. $k = 1, 2, \dots, p$

$$\tilde{Z}^{(k)} = \begin{bmatrix} 0 & \tilde{z}_{12}^{(k)} & \dots & \tilde{z}_{1n}^{(k)} \\ \tilde{z}_{21}^{(k)} & 0 & \dots & \tilde{z}_{2n}^{(k)} \\ \vdots & \vdots & \ddots & \vdots \\ \tilde{z}_{n1}^{(k)} & \tilde{z}_{n2}^{(k)} & \dots & 0 \end{bmatrix}$$

That $\tilde{z}_{ij}^{(k)} = (\ell_{ij}^{(k)}, m_{ij}^{(k)}, u_{ij}^{(k)})$, Fuzzy Matrix $\tilde{Z}^{(k)}$, initial correlation matrix M is called expert.

Step 3: Get the normalized correlation matrix phase.

Suppose, $\tilde{a}_i^{(k)}$ is triangular fuzzy numbers.

$$\tilde{a}_i^{(k)} = \sum_{j=1}^n \tilde{z}_{ij}^{(k)} = \left(\sum_{j=1}^n \ell_{ij}^{(k)}, \sum_{j=1}^n m_{ij}^{(k)}, \sum_{j=1}^n u_{ij}^{(k)} \right) \quad \text{and} \quad r^{(k)} = \max_{1 \leq i \leq n} \left(\sum_{j=1}^n u_{ij}^{(k)} \right)$$

The conversion scale comparable to the scales, the scales become linear normalization is used in the formula. k expert fuzzy relationship matrix normalization, ie $\tilde{X}^{(k)}$, as shown below:
 $k = 1, 2, \dots, p$

$$\tilde{X}^{(k)} = \begin{bmatrix} \tilde{x}_{11}^{(k)} & \tilde{x}_{12}^{(k)} & \dots & \tilde{x}_{1n}^{(k)} \\ \tilde{x}_{21}^{(k)} & \tilde{x}_{22}^{(k)} & \dots & \tilde{x}_{2n}^{(k)} \\ \vdots & \vdots & \ddots & \vdots \\ \tilde{x}_{n1}^{(k)} & \tilde{x}_{n2}^{(k)} & \dots & \tilde{x}_{nn}^{(k)} \end{bmatrix}$$

$$\tilde{x}_{ij}^{(k)} = \frac{\tilde{z}_{ij}^{(k)}}{r^{(k)}} = \left(\frac{\ell_{ij}^{(k)}}{r^{(k)}}, \frac{m_{ij}^{(k)}}{r^{(k)}}, \frac{u_{ij}^{(k)}}{r^{(k)}} \right)$$

As usual DEMATEL methods assume that there is at least one i for $\sum_{j=1}^n u_{ij}^{(k)} < r^{(k)}$. In practice, this assumption is well fulfilled. The formulas (1) and (2) to calculate the mean matrix \tilde{X} , are obtained by using $\tilde{X}^{(1)}, \tilde{X}^{(2)}, \dots, \tilde{X}^{(p)}$.

$$\tilde{X} = \frac{(\tilde{X}^{(1)} \oplus \tilde{X}^{(2)} \oplus \dots \oplus \tilde{X}^{(p)})}{p}$$

$$\tilde{X} = \begin{bmatrix} \tilde{x}_{11} & \tilde{x}_{12} & \dots & \tilde{x}_{1n} \\ \tilde{x}_{21} & \tilde{x}_{22} & \dots & \tilde{x}_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ \tilde{x}_{n1} & \tilde{x}_{n2} & \dots & \tilde{x}_{nn} \end{bmatrix}$$

$$\tilde{x}_{ij} = \frac{\sum_{k=1}^p \tilde{x}_{ij}^{(k)}}{p}$$

Fuzzy matrix \tilde{X} , has relationship with normal matrix. Here we show the arithmetic mean of all data integration experts to calculate the fuzzy relationship matrix $\tilde{X}^{(k)}$ in normal use. The best way to integrate the entire data correlation matrix is calculated by the experts is the initial phase.

Step 5: Implementation and analysis of structural models

To calculate the overall fuzzy relation matrix, it must first $\lim_{w \rightarrow \infty} \tilde{X}^w = 0$ ensure convergence. In the calculation \tilde{X}^w , the approximation formula (4) for the multiplication of two triangular fuzzy numbers applies. In fact, formula (4) would be according to formula (3). Thus, the elements \tilde{X}^w are triangular fuzzy numbers.

Assume that $\tilde{x}_{ij} = (\ell_{ij}, m_{ij}, u_{ij})$ is the following three definite matrix and its \tilde{X} elements are extracted, Consider:

$$X_\ell = \begin{bmatrix} 0 & \ell_{12} & \dots & \ell_{1n} \\ \ell_{21} & 0 & \dots & \ell_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ \ell_{n1} & \ell_{n2} & \dots & 0 \end{bmatrix}, X_m = \begin{bmatrix} 0 & m_{12} & \dots & m_{1n} \\ m_{21} & 0 & \dots & m_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ m_{n1} & m_{n2} & \dots & 0 \end{bmatrix}, X_u = \begin{bmatrix} 0 & u_{12} & \dots & u_{1n} \\ u_{21} & 0 & \dots & u_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ u_{n1} & u_{n2} & \dots & 0 \end{bmatrix}$$

Under certain conditions, the overall fuzzy relation matrix we define as follows:

$$\tilde{T} = \lim_{w \rightarrow \infty} (\tilde{X} + \tilde{X}^2 + \dots + \tilde{X}^w) = X \times (I - X)^{-1}$$

Theorem 5.1 - Suppose that:

$$\tilde{T} = \begin{bmatrix} \tilde{t}_{11} & \tilde{t}_{12} & \dots & \tilde{t}_{1n} \\ \tilde{t}_{21} & \tilde{t}_{22} & \dots & \tilde{t}_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ \tilde{t}_{n1} & \tilde{t}_{n2} & \dots & \tilde{t}_{nn} \end{bmatrix} \quad \text{Which } \tilde{t}_{ij} = (\ell_{ij}^'', m_{ij}^'', u_{ij}^'')$$

So:

$$\text{Matrix}[\ell_{ij}^''] = X_\ell \times (I - X_\ell)^{-1} \text{ and}$$

$$\text{Matrix}[m_{ij}^''] = X_m \times (I - X_m)^{-1} \text{ and}$$

$$\text{Matrix}[u_{ij}^''] = X_u \times (I - X_u)^{-1}$$

Now, \tilde{T} is the center average method, to obtain a fuzzy relation matrix removal and generally apply? The overall correlation matrix DEMATEL technique can be easily replaced ANP method of inner

dependence matrix of weights. (Golchin and Kazim, 2011)

A brief description of the research undertaken in the field of strategic planning using multi-criteria decision-making methods are as follows. Today, the strategic management process, methods and various approaches to the analysis, evaluation and selection strategy is used. As mentioned earlier, one of the most important tools for decision support is a SWOT table. This approach of internal and external factors affecting the organization's performance and to compare them with each other, it helps the decision maker to formulate your strategy based on the strengths of the weakness of opportunities to reduce or avoid the use of threats. [Edison, 2004]

Despite its advantages, the SWOT table outlining strategies, able to prioritize the importance of these strategies and their implementation is not required. However, due to the lack of some important factors that can influence each agent's strategy is clear. The relative importance of factors and rankings in does not specify a comprehensive evaluation of the strategic decision not achieved. Researchers from the models using Analytic Hierarchy Process (AHP) in SWOT SWOT-AHP method are presented which can be called to determine the priorities of SWOT criteria [Curtis et al, 2000]. SWOT-AHP model is only capable of ranking criteria, although this rating does not take into account the interaction between the criteria, but it also assumes that they are independent of the independence assumption may not always hold SWOT criteria. [Kortila, 2000, Shirsta, 2004 and Demiral, 2007)

Later Yoksel and Dgdevayrin [Doyregan, 2007] represented a model developed from the application of network analysis process (ANP) in a SWOT, which provide a possible interaction between the criteria SWOT also consider. Wei Wen Wu in 2008 to rate Classification and selection strategy combining the proposed strategy with the ANP and dematel SWOT (Wen Wei Wu, 2008)

In 2011, Mehmet Sokily et al. technique to reduce uncertainty in the decision-making elite, which provide the model name combined analysis SWOT analysis of a network fuzzy strategy and selection strategy, is more suitable for Turkey was

presented. (Sokily et al. 2011)

The strategy chosen in this study to improve the accuracy of the SWOT analysis to combine the two techniques and fdematel FANP triangular fuzzy environment is discussed.

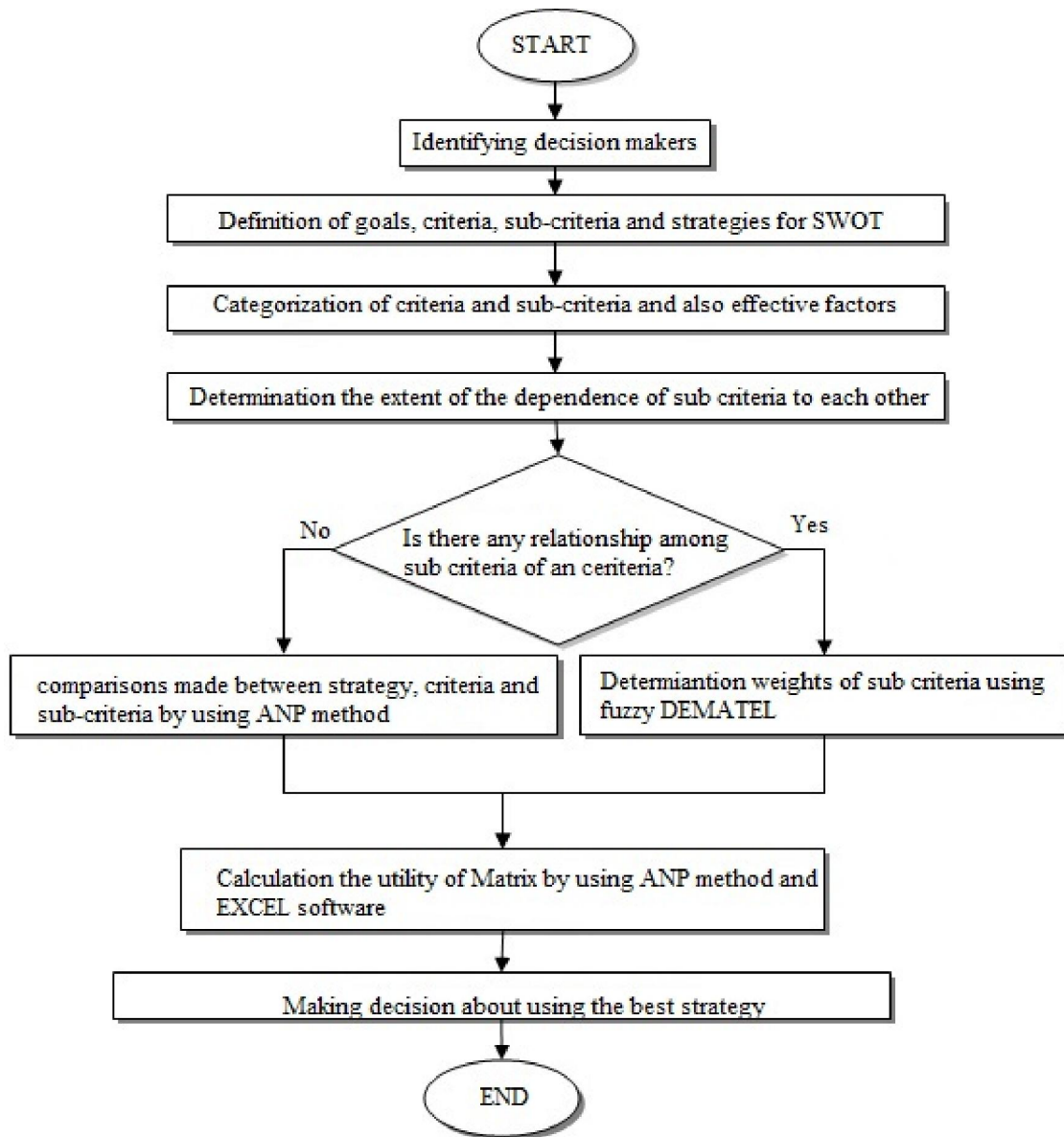
Methodology

The statistical population of this study has been extracted from thesis of Vahid Mahmoudi which represented in Islamic Azad University of Karaj. This thesis includes 45 specialists are experts in the field of strategic planning, these included 15 of the 15 senior academics East Azerbaijan Donar Khazar factories industries, factory managers at various levels as well as 15 people from Tabriz in Donar Khazar factory the strategic planning of the company.

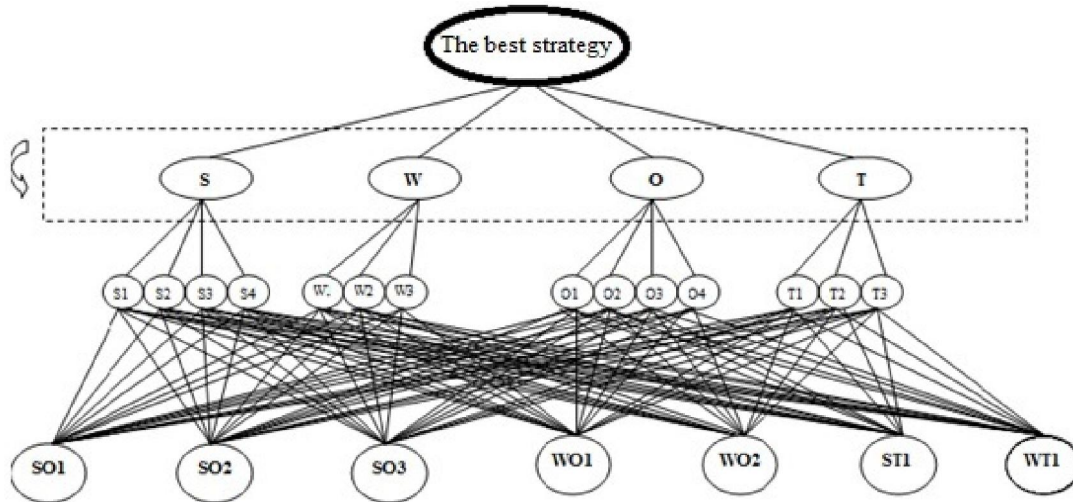
Tools and methods for collecting data and information required in the research interviews conducted during this study and documents available to the Company and registered by internal and external factors analysis SWOT, Questionnaire designed by the researcher as well as the preferences SWOT of the weights.

Implementation models and research findings

Step 1: transform the problem into a hierarchical structure, the following factors shall be determined on a case by ANP technique. The problem of selecting the best strategy for improving plant performance in the first level of the hierarchical structure is Donar Khazar. SWOT factors and sub-factors were placed in the second and third levels. The following factors are the strengths of the four factors, three factors weaknesses, threats and opportunities of the four factors, three factors are considered for the seven strategies are developed for the case study at the fourth level. By creating a matrix that summarizes the analysis of strategic factors (SFAS) combined with external factors (external analysis of the summary table = EFAS) and internal factors (internal factors analysis summary table = IFAS), the company outlined its strategic factors will. After environmental screening and internal factors EFAS and IFAS tables identified by the Supervisor of matrix synthesis summary analysis of strategic factors SFAS be formed.



Executive algorithms, fuzzy ANP-DEMATEL model



SWOT	Strengths	Weaknesses
Threats	ST Strategies	WT Strategies
Opportunities	SO Strategies	WO Strategies

Strengths:

S1- Benefit from the dedicated and skilled workforce mix Job Post a majority of the high sense of competition between employees and managers to improve the efficiency and effectiveness of duties of the institution.

S2- Move towards the implementation of a comprehensive quality management system and its tools

S3- Has an active research and development unit, which is equipped with advanced research laboratories and patented energy-saving product 3, because this claim.

S4- Seminars and visits to scientific cooperation and management companies competing for sales representatives to learn new ways to promote sales

Weaknesses:

W1- familiarity with the institution's overall management system and strategic decisions and lack of proper counseling about risk management strategies

W2- Complete lack of production of final consumer goods basket institute of Macroeconomic Management believes that the biggest disadvantage of using an appliance manufacturer, is full of green manufacturing systems

W3- Lack of technical education for staff (Using a systems disciples to teach new workers hired), and lack of performance and effectiveness of the

management system

Environmental opportunities:

O1- there is a competitive market and industry employment agency cooperation and peaceful competition Donar Khazar brand and position in the community accepted the promise of improving the company's market share.

O2- There is a growing demand for current and potential demand for other goods in the consumption basket of consumers in the market for household products, According to market research conducted by the Institute of Marketing Management Institute has created a huge incentive to develop the managers.

O3- Sales and after-sales services and a wide range of opportunities and potential long-term chain stores to open in full of all of the institution's products put consumers.

O4- In a state that is located in a strategic area (access highways connecting the continents of the world) and having neighbors that have large market potential and technology level of the country of origin are lower.

Environmental threats:

T1- Lack of proper support and cooperation of government agencies have produced and bureaucratic regulations that cause disruption of the activities of the Institute has been developed. For example: (a) - a lack of cooperation and the ability of domestic banks to open letters of credit for importing raw materials

and exporting manufactured products b - massive problems for the clearance of imported goods by customs.

T2- Despite heavy sanctions and abroad and falling purchasing power of the consumer, the pressure for lower cost products and prices of products is ready to be sold.

T 3 - There is a fairly strict condition for business enterprise in the country. Despite the limitations of such a single exchange rate in getting approved for production activities mentioned.

Selected strategies:

SO1- Use strategies available in the market, Due to potential and existing opportunities to increase profits from the sale of products

SO2- Use strategies like product development generated by Side Refrigerator

SO3- Use strategies in the field of innovative ideas in

household products (such as products with low energy consumption)

OW1-established strategy of vertical integration on consumer stores (our house)

OW2-level horizontal integration with an institution (such as a burning factory)

WT1- Use strategy expropriate part of the institution's assets and cash injections from the Institute of Development Projects

ST1- Use a variety of strategies similar (buys or merges with an electrical appliance manufacturer such as asel Turkey)

Step 2: It was assumed that there is no relationship between SWOT factors, paired comparisons of SWOT factors using triangular fuzzy numbers (TFN) is calculated. It is used to obtain the numbers of qualified personnel. This table analysis was performed using Excel software.

	L	M	U
S	0.371	0.421	0.400
W	0.129	0.132	0.166
O	0.411	0.365	0.345
T	0.089	0.082	0.089

Step (3): dependence on the internal factors of the SWOT analysis of the effect of each factor on other factors were investigated using fuzzy pair wise comparison. By analyzing the internal and external environment of the organizations defined relationship

between SWOT factors. Based on this dependency, domestic, paired comparison matrix for each criterion is obtained. Calculating the weights of fuzzy relational matrix will consist of interior SWOT factors.

	L	M	U	L	M	U	L	M	U	L	M	U
S	1.000	1.000	1.000	0.680	0.760	0.680	0.795	0.800	0.795	0.606	0.634	0.561
W	0.243	0.226	0.224	1.000	1.000	1.000	0.000	0.000	0.000	0.140	0.106	0.130
O	0.599	0.633	0.573	0.000	0.000	0.000	1.000	1.000	1.000	0.254	0.260	0.309
T	0.158	0.140	0.203	0.320	0.240	0.320	0.205	0.200	0.205	1.000	1.000	1.000

Step 4: In this stage, the inner dependence priority fuzzy SWOT factors can be calculated as follows:

0.512	0.575	0.541
0.080	0.075	0.100
0.341	0.295	0.290
0.067	0.055	0.069

Step 5: At this stage, the overall priority of the fuzzy preference dependence on multiplying factors, SWOT table inside fuzzy SWOT factors that are

obtained in the fourth step and priorities of the local phase, SWOT factors that are obtained in the fifth step. Table 7 shows the results.

Table 5.

				S1	0.386	0.261	0.75	0.192	0.15	0.404
S	0.498	0.575	0.538	S2	0.293	0.529	0.028	0.146	0.304	0.015
				S3	0.223	0.153	0.162	0.111	0.088	0.087
				S4	0.098	0.058	0.06	0.049	0.033	0.032
W	0.082	0.075	0.104	W1	0.235	0.304	0.321	0.019	0.023	0.033
				W2	0.579	0.531	0.509	0.048	0.04	0.053
				W3	0.186	0.165	0.17	0.015	0.012	0.018
O	0.352	0.295	0.289	O1	0.483	0.558	0.604	0.17	0.165	0.174
				O2	0.212	0.245	0.24	0.075	0.072	0.069
				O3	0.212	0.133	0.108	0.075	0.039235	0.031
T	0.067	0.055	0.069	O4	0.093	0.063	0.047	0.033	0.019	0.014
				T1	0.46	0.587	0.665	0.031	0.032	0.046
				T2	0.319	0.28	0.245	0.021	0.015	0.017
				T3	0.221	0.134	0.09	0.015	0.007	0.006

Step 6: At this stage, the degree of response strategies with the rest of the SWOT fuzzy factor is calculated

by the following factors. This calculation is done with the excel software that specified in the table.

Table 6

	s1	s2	s3	s4	W1	W2	W3	O1	O2	O3	O4	T1	T2	T3
SO1	0.231	0.22	0.146	0.181	0.159	0.149	0.152	0.182	0.179	0.196	0.315	0.08	0.112	0.071
SO2	0.172	0.139	0.176	0.218	0.109	0.142	0.146	0.138	0.16	0.07	0.096	0.042	0.036	0.038
SO3	0.078	0.088	0.125	0.085	0.137	0.154	0.137	0.083	0.09	0.073	0.077	0.042	0.037	0.044
OW1	0.064	0.087	0.071	0.072	0.083	0.038	0.069	0.092	0.067	0.205	0.034	0.051	0.044	0.03
OW2	0.056	0.054	0.049	0.042	0.044	0.037	0.053	0.052	0.055	0.049	0.052	0.177	0.104	0.141
TS1	0.044	0.06	0.049	0.037	0.052	0.126	0.06	0.066	0.065	0.043	0.055	0.248	0.315	0.301
TW1	0.023	0.022	0.021	0.022	0.032	0.023	0.024	0.023	0.022	0.022	0.035	0.056	0.048	0.061
SO1	0.356	0.37	0.304	0.308	0.304	0.262	0.314	0.32	0.33	0.318	0.433	0.125	0.175	0.119
SO2	0.253	0.205	0.25	0.295	0.203	0.217	0.221	0.214	0.23	0.114	0.175	0.054	0.051	0.052
SO3	0.129	0.131	0.19	0.139	0.193	0.215	0.192	0.138	0.143	0.111	0.124	0.053	0.051	0.054
OW1	0.092	0.113	0.107	0.111	0.125	0.054	0.096	0.139	0.103	0.3	0.044	0.063	0.068	0.04
OW2	0.085	0.08	0.064	0.067	0.06	0.053	0.07	0.077	0.077	0.073	0.096	0.297	0.18	0.23
TS1	0.056	0.072	0.059	0.05	0.07	0.168	0.076	0.083	0.088	0.055	0.079	0.311	0.409	0.419
TW1	0.028	0.028	0.027	0.03	0.045	0.031	0.03	0.029	0.028	0.028	0.048	0.097	0.067	0.086
SO1	0.445	0.48	0.411	0.423	0.419	0.36	0.441	0.427	0.439	0.405	0.551	0.17	0.228	0.172
SO2	0.366	0.269	0.346	0.411	0.314	0.309	0.313	0.303	0.308	0.164	0.256	0.089	0.086	0.084
SO3	0.179	0.177	0.277	0.184	0.275	0.296	0.293	0.217	0.219	0.151	0.192	0.081	0.086	0.07
OW1	0.157	0.163	0.16	0.181	0.196	0.085	0.137	0.202	0.155	0.416	0.073	0.095	0.101	0.055
OW2	0.126	0.147	0.108	0.099	0.083	0.078	0.096	0.131	0.136	0.117	0.155	0.384	0.238	0.338
TS1	0.097	0.103	0.086	0.093	0.105	0.26	0.125	0.147	0.148	0.111	0.121	0.396	0.518	0.562
TW1	0.038	0.04	0.039	0.048	0.099	0.05	0.043	0.044	0.04	0.044	0.084	0.149	0.11	0.134

Step 7: The final weights of criteria using fuzzy DEMATEL technique is obtained using MATLAB software. The overall correlation matrix DEMATEL

technique can be easily replaced ANP method of inner dependence matrix of weights. (Golchin and Kazim, 2011)

Table 7.

	L	M	U
S	0.332	0.472	0.311
W	0.150	0.150	0.133
O	0.315	0.270	0.348
T	0.202	0.108	0.209

Step 8: to obtain fuzzy preference strategy based on fuzzy ANP technique (without considering the

internal dependencies between sub criteria).

Table 8

	l	m	U
SO1	0.189	0.329	0.415
SO2	0.141	0.211	0.316
SO3	0.090	0.138	0.201
OW1	0.081	0.114	0.165
OW2	0.057	0.086	0.136
TS1	0.072	0.089	0.142
TW1	0.025	0.032	0.050

Step 9: to obtain priority strategy based on fuzzy DEMATEL and ANP fuzzy fusion techniques (with

the following criteria to consider sub criteria).

Table 9.

	l	m	u
SO1	0.170	0.313	0.379
SO2	0.123	0.201	0.273
SO3	0.087	0.139	0.189
OW1	0.075	0.109	0.159
OW2	0.069	0.094	0.167
TS1	0.106	0.108	0.196
TW1	0.030	0.036	0.065

Table 10. Step 10: To obtain the non-fuzzy priorities for each of the options:

	SO1	SO2	SO3	WO1	WO2	ST1	WT1
FANP	0.311	0.223	0.143	0.120	0.093	0.101	0.036
FANP	1	2	3	4	6	5	7
FANP-FDEMATEL	0.287	0.199	0.138	0.114	0.110	0.137	0.044
FANP-FDEMATEL	1	2	3	5	6	4	7

Results and Discussion:

The aim of the present study analyzes the strengths, weaknesses, opportunities and threats (SWOT) assessment to determine the best strategy for a business and make it out to determine the underlying factors in SWOT analysis using the methods taking a multi-criteria ranking strategy that are mined.

The results of this study are as follows SWOT analysis strategies Publications:

SO1- Use strategies available in the market, the potential and opportunities to increase profits from the sale of products

SO2- Use product development strategy such as production of Side By Side Refrigerator

SO3-use strategies in the field of innovative ideas in household products (such as products with low energy consumption)

OW1-established strategy of vertical integration on consumer stores (our house)

Ow2-level horizontal integration with an institution (such as a burning factory)

WT1-use strategy for the expropriation of part of the assets of the company and inject cash into development projects

St1-use diversification strategy similar (buys or merges with a manufacturer of household electrical appliances such as asel Turkey)

The technique is based ranking techniques FANP modulator FANP-FDEMATEL three strategies SO1, SO2 and so3 priorities are implemented. For future research, the proposed research will be carried out by a trapezoidal fuzzy model in other fusion techniques using multi-criteria decision making to more accurate ranking, and ultimately improve decision-making strategies for plant managers.

References:

- 1- L. Villon and J. Honger. Foundations of Strategic Management, translator and Dr. Mohamed Arabi Divine, Tehran, Office of Cultural Research, Sixth Edition, 2010.
- 2- John Pearce and Richard Robinson, planning and strategic management, translation Dr. Khalili S. Schwerin, Tehran, publications Memorial Book, Sixth Edition, 2010.
- 3- M. Sadeq, Ayoub Ansarinejad, Samad Ansarinejad, Sina Miri Nargesi, ranked by cause and effect relationships and critical factors for success and failure of information systems to help implement projects combined ANP and DEMATEL method of fuzzy group, in 2010.
- 4- Fred R., David, Strategic Management, translated by Dr. Ali Parsian, Ali Mohammad Arabi, Publications Office of Cultural Studies, Nineteenth Edition, 2011.
- 5- Atai, M., 2010, Multi-criteria decision making, Shahrood, Shahrood University
- 6- Nakhaee Kamal Abadi E., Amirabadi M., Mohammadipour M., selecting an optimal strategy based on SWOT analysis, and the analytic network process, the case study company Emersan, 2009.
- 7- Andrews, K. R. (1965). The concept of corporate strategy. Homewood, II: Dow Jones-IRWIN
- 8- E.kurttis, m.pesoneri, j.kangas.(2000). utilizing the analytic hierarchy process in SWOT analysis-a hybrid method and its application to a forrest certification case ,forest policy and economics, 41-52
- 9- Wei-wen wu.(2008). choosing knowledge management strategies by using a combined ANP and DEMATEL approach,expert systems with applications, 35,828-835.
- 10- Wu, C.R., Chang, C.W., Lin, H.L.; "A Fuzzy ANP-based Approach to Evaluate Medical Organizational Performance". Information and Management Sciences, 19(1), 53-74, 2008.
- 11- David, F. R. (2007). Strategic management concepts and cases (11th ed.). New York:733 Prentice Hall
- 12- Chen, S. J., Hwang, C. L., & Hwang, F. P. (1992). Fuzzy multiple attribute decision making. Lecture Notes in Economics and Mathematical System, 375.
- 13- Kaufmann, A., Gupta, M. M.; *Introduction to fuzzy arithmetic: Theory and applications*. New York: Thomson Computer Press, 1991.
- 14- Wehrich, H. (1982). The TOWS matrix: Tool for situational analysis. Long Range 793Planning, 15(2), 54-66. 794
- 15- Yuksel, I., & Dagdeviren, M. (2007). Using the analytic network process (ANP) in a 795 SWOT analysis – A case study for a textile firm. Information Sciences, 177,3364-3382. 797
- 16- Barca, M. (2005). The evolution of strategic management thought: A story aboutemergence of a scientific discipline. Yonetim Aras_tirmaları Dergisi, 5(1), 7-38
- 17- Fuzzy Control Systems Design and Analysis by Tanaka & Wang 2001
- 18- Kurttila, M., Pesonen, M., Kangas, J., & Kajanus, M. (2000). Utilizing the analytic hierarchy process (AHP) in SWOT analysis – A hybrid method and its application to a forest-certification case. Forest Policy and Economics, 1, 41-52.
- 19- M. Sevkli et al. / Expert Systems with Applications (2011)
- 20- G. Büyüközkan, G. liçi / Expert Systems with Applications (2011)
- 21- Saaty, T.L.; *The Analytic Hierarchy Process*. New York: McGraw-Hill, 1980.
- 22- Saaty, T.L.; *Analytical Network Process*. Pittsburgh: RWS Publications, 1996.
- 23- Saaty, T.L.; *Fundamentals of The Analytic Network Process*. ISAHP, Kobe, Japan, 1999.
- 24- Saaty, T.L.; "Fundamentals of The Analytic Network Process: Multiple Networks With Benefits, 25- Costs , Opportunities and Risks". Journal of Systems Science And Systems Engineering, 13(3), 348-379, 2004.
- 26- Zadeh, L. A. (1965). Fuzzy sets. Information and Control, 8, 338-353.

7/13/2013