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The implementation of the hybrid model SWOT-TOPSIS by fuzzy approach to evaluate and rank the human resources and business strategies in organizations (case study: road and urban development organization in Yazd)

Hamed Shakerian, Hasan Dehghan Dehnavi^{*}, Shima Baradaran Ghanad

Department of industrial management, Yazd branch, Islamic azad university, Yazd, Iran

Abstract

Nowadays human capital can be considered as the main asset of any organization. Companies need to invest in order to ensure the growth and survival of these assets. Therefore, the effective human resources strategies will be required in this regard. Business strategies may be influenced by human resources factors. Human resources strategies are effective by operating business strategies. Thus, to examine the methods of integrating of human resources and business strategies, it is necessary to achieve to organizational goals and develop human resource. Therefore, the most important measures for selecting the human resources strategy and an overall business strategy were identified through checking lists, experts' opinions, and previous studies. A questionnaire was used as a main instrument to classify the key measures using Delphi method in multiple step studies and an acceptable convergence. Finally, the combination of the SWOT analysis and Fuzzy TOPSIS analysis were used for indentifying the organizational environment and ranking the available organizational strategies. The model has high performance because of different combined methods.

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Keywords: Human Resources strategies, Business Strategies, Swot Analysis, fuzzy TOPSIS Analysis, Organizational Goals.

^{*} Corresponding author. Tel.: +989133589737; fax: +9835331872704.
E-mail address: h.shakerian.h@gmail.com

1. Introduction

Given the dynamics of companies and organizations, there is the need to review and examine changes such as structure, technology, strategy, culture, and other elements of an organization, and managers particularly senior managers, should identify the elements of change in their organization before attempting to do any fundamental organizational activity(Rezvani, 2011). Strategic human resources management is involved in improving business performance through human resources. Organizations in all sectors (private, public or voluntary) should have a professional attitude toward business so that they can achieve their goals effectively and efficient. Business strategy defines what should be done to gain success and human resource strategy should be complementary. Business strategy includes decision-making on issues such as the selection of certain parts of the market in where they compete and determine the position of products and services in the market(Shoreini et al, 2011). The fundamental argument is that human resources management following business strategy is a strategic area needed to develop and redefine functions and tasks(Javadin et al, 2011). Given a mentioned cases, the importance of the issue will be specified that human resources strategies in any organization be involved in operating business strategy but business strategy may consider opportunities and major limitations of human resources(Armstrong, 2012). By specifying human resources strategies, we tried to provide a combined model to evaluate and classify human resources strategies by multi-criteria decision techniques (TOPSIS) in fuzzy environment according to indicators of competitive and business strategy.

1.1. Theoretical Framework

Importance and role of human resource strategy in organizations: Strategic human resource management is a mental attitude toward doing things. It represents and achieves in the form of human resources strategies. Human resources strategies determine what an organization should do for human resources performance and policies and how they must be consistent and integrated with each other and company strategies. According to Dyer and Reeves(2010), human resources strategy is a set of human resources performance that would be consistent and harmony inside organization and according of Pytrbksal(2012), it provides a framework for fundamental means and goals. The aim of human resources strategy is to provide guidelines for development and implementation of programs and, also a device to transfer purposes of organization about how to manage human resources(Armstrong, 2012).

1.2. Importance and role of business strategy in organization

Based on EBSCO (A database of literature) term business model was introduced first time in business games used in management field. In 1971, Andrews in his book entitled company and strategy distinguished between company and business strategies. He defined business strategy as selection of product market by certain part of company and company strategy as a set of business strategies in different parts of company(Niroumand et al, 2010). Indeed business strategy shows how to achieve organizational goals. An organization without business perspective is just as a tool(Akhavan et al, 2010). Porter(2014) designed competitive and business strategies based on two categories of internal and external factors. The first category of internal factors referred to organizational disadvantages that include human and financial resources, technical knowledge, company position in market and second category of external factors include business opportunities and company, social expectations, political situation, technological value(Khalil, 2011).

1.3. Relation between human resources and business strategies

All companies have strategy to express in the form of purposes and objectives so that these strategies may distort or change. It is difficult to achieve a consolidated link between organizational strategies. Cook and Armstrong(2010) believed that one of possible ways to create such link is to find ways and means to quantify the needed human resources in the organizational level and in each element of human strategy, as well as measuring and comparing investment returns on individual elements. One can draw matrix such as table 1 in which any major element of trade strategy (business) relates to determinant element in human resources strategy (Armstrong, 2012). Given the

importance of communication and the role of human resources and business strategies for growth and survival of organization, in this study we will try to create hybrid model to rank human resources strategies according to indicators and mentioned cases.

Table 1. The conceptual attitude toward link between human resources and business strategies

| Business strategy through | | | |
|----------------------------|-----------------|---------------------|-------------------------------------|
| Market development/product | Cost leadership | Competitive pricing | Integration/other Company ownership |
| | | | Organization Employ workforce |
| | | | Human Resource development |
| | | | Performance management |
| | | | reward |

2. Review of literature

Literature about development and evaluation of organizational strategies by applying SWOT model and ANP network analysis States that for quantitative analysis SWOT and considering possible associations between factors, the process of ANP network analysis was used. The aim of this research is to give priority to organizational strategies to implement(Maleki et al, 2010). A research about a combined approach to select business strategy aimed to provide a framework to determine appropriate strategy in organizations. Using descriptive method, initially effective internal and external factors on performance were identified and matrices for evaluation of internal and external factors were established. Following it, possible strategies were identified by applying matrices of situation evaluation and strategic actions and also proposed strategies were ranked by using TOPSIS and Swot fuzzy techniques and finally the desired strategy was selected by integrating the results(Adel et al, 2010). Methodology in study about the analysis of strategic management in Mashhad with SWOT model was Descriptive and analytical and the information such as strengths, weaknesses, opportunities and threats of the experts and citizens were collected by questionnaire. Matrix of internal factors showed that Mashhad faces undesirable internal conditions sand the other hand matrix of external factors showed that urban management of Mashhad must take advantage of opportunities and avoid threats and finally the results for matrices of internal and external factors showed that strategic management has no place in Mashhad(Rahnama et al, 2012). The purpose of the research about of SWOT and AHP applications: a case study of a manufacturing company was lack of ranking and determines importance of Swot factors. On the other hand the purpose of this procedure is to plan strategically to improve the quantities. The result of study showed that a set of strategies should be replaced by it(Gorner etal, 2012). Another research about users analysis in electronic company using Swot-AHP model aimed to invest business and project and identify the internal and external factors. On the other hand the study used Swot analysis as a method of analysis in a electronic company in Turkey. Finally the study concluded that the company should give more importance to alternative suppliers and causes to reduce the costs of material(Seker et al, 2012). The purpose of a research about integrated approach to formulate human resources (case study: MDN company) was to develop human resources strategy for MDN company. The study used an integrated model that combines the concepts of rational and progressive attitude. This model is a strategic model that integrates company, human resources strategies and operational systems between them. The results of the study indicated that the best strategy is commitment for basic jobs and secondary commitment strategy is the most suitable strategy for service jobs(Gholamzadeh et al, 2013).

3. Methodology

The present study is functional, descriptive and survey in terms of orientation, purpose and strategy respectively. Product parts of organization are considered as an analysis unit and the sample, by definition, includes the number of desired elements having at least a specified attribute. Specified attribute is a common attribute between all

elements of sample and differ the sample from other one. The sample is road and urban development organization in Yazd and includes managers, assistants, and administrative units. The questionnaire and interview and observation were used as instruments. The data of the expert team either directly or indirectly based on Cochran sampling formula were collected. It is noted that team has been formed by consultation and selection of planning assistants. In order to determine the indicators weight (internal and external factors) and determine the type and severity of the links between them, in terms of the need to management knowledge and familiarity with the role and importance of effective factors on determining and ranking human resource strategy, experts' opinions were exploited directly and consensus was gained based on the Delphi method or high convergence.

3.1. Matrix of external factors evaluation (EFE)

This matrix is a tool that allows strategies to environmental, economic, social, political, cultural, law, technological factors and market condition in temporal domain be evaluated. It is applicable to public and private organizations (Arabi, 2006). Paradigm governing upon design of the matrix is mainly prescriptive and applicable to different prescriptive approaches as tools for gathering industrial and general environmental information (Ahmadi et al, 2003).

3.2. Matrix of internal factors evaluation (IFE)

This matrix is a tool to examine internal factors and evaluates strength and weakness of organizational units. To provide matrix of Internal factors evaluation, managers and employers' judgments and opinions were used. This matrix is applicable to collect internal information in strategic planning process (Arabi, 2006).

3.3. Matrix of the strategic situation evaluation (SPACE)

The matrix consists of 4 cells with aggressive, competitive, conservative and defensive. Matrix axis's and strategic action represent two internal dimensions (financial strength and competitive advantage) and two external dimensions (environment validation and industrial power) (Adel et al, 2010).

3.4. Matrix swot (SWOT)

This matrix is one of the important tools by which managers compare internal and external information and provide the possible strategies. SWOT matrix consist of a 2 dimensions coordinate table that each of quarter area shows a category of strategies (Ahmadi et al, 2003). Analysts can consider the factors contained in SWOT matrix and design 4 strategies. (1) Strengths – opportunities strategies (SO), by which organization uses its own internal strengths to exploit opportunities. (2) Weaknesses – opportunities strategies (WO), by which the organization attempts to, overcome its weakness by utilizing of external opportunities. (3) strengths – threats strategies (ST), by which organization uses internal strengths to deal with external threats. (4) Weaknesses – Threats strategies (WT), by which the organization create the ways to reduce internal weaknesses and deal with external threats (Khalil, 2011).

3.5. Fuzzy TOPSIS method

Lotfi Zadeh (2009) introduced fuzzy set theory and up to now theory and practice developments in this area has been very high (Asgarpour, 2011). In the measurement of fuzzy concepts as a numerical method, it has been tried to define the numbers as describer of compatibility to fuzzy concept. Number in fuzzy logic is considered as a fuzzy set and the other words the ordered pair of real value x and its membership degree $(X)\mu_{\bar{A}}$. The most important fuzzy numbers with high applications include: 1) triangular fuzzy numbers: the numbers is defined with 3 elements $A = (a_1, a_2, a_3)$. 2) Trapezoidal fuzzy number: the numbers are defined with 4 elements $A = (a_1, a_2, a_3, a_4)$. Geometric Display and membership function of triangular and trapezoidal fuzzy numbers are as follows. Multi-criteria decision making problem developed in fuzzy condition is called fuzzy TOPSIS. Given to the inconclusive and vague or fuzzy in group decision-making process, the linguistic variables were used to assess weights and criteria for each option

(sayadi et al, 2011). In this way, after the completion of the agreed table by each of the experts, the final table was formed:

$$\tilde{D} = \begin{bmatrix} \tilde{X}_{11} & \dots & \tilde{X}_{1n} \\ \vdots & \ddots & \vdots \\ \tilde{X}_{m1} & \dots & \tilde{X}_{mn} \end{bmatrix}$$

$$\tilde{X}_{ij} = (a_{ij}, b_{ij}, c_{ij})$$

$$a_{ij} = \min_i \{a_{ijk}\}, b_{ij} = \frac{1}{K} \sum_{i=1}^K b_{ijk}, c_{ij} = \max_k \{c_{ijk}\}$$

After the formation of the final agreed table, the above matrix was normalized. Then, by multiplying fuzzy weights of each of index in the normalized matrix R, normalized weighted matrix was obtained and according to normalized weighted matrix, ideal options A+ i and A_ were defined:

$$A^+ = (\tilde{V}_1^+, \tilde{V}_2^+, \dots, \tilde{V}_n^+)$$

$$A^- = (\tilde{V}_1^-, \tilde{V}_2^-, \dots, \tilde{V}_n^-)$$

$$\tilde{V}_j^+ = \max_i \{V_{ij3}\}, \tilde{V}_j^- = \min_i \{V_{ij1}\}, I = 1, 2, \dots, m, j = 1, 2, \dots, n$$

After the determination of the positive and negative ideals, Euclidean distances of each of positive and negative ideals were calculated. Since the most distance from the negative ideal necessarily does not mean the closest one to the ideal. Thus, a combined index of relative convergence was used based on the following equation:

$$cc_i = \frac{d_i^-}{(d_i^- + d_i^+)}, i = 1, 2, \dots, m$$

The index is between zero and one, and desirable. Therefore, the evaluation and rank of alternatives range from large to small (Chen et al, 2006).

3.6. Data collection

Initially by studying texts, search in valid scientific sites and examine available scientific texts, the literature about options to select strategy and decision-making techniques were collected. According to literature and examining the current conditions of organization, the questionnaire having items related to strength, weakness, threatens, opportunities was distributed among employers, assistants, top managers of organization.

4. Data analysis

The ultimate goal of this research was to select the desirable strategies in human resources domain and rank them using TOPSIS fuzzy techniques in terms of business strategy indices. So the desirable conditions of company i.e. tasks and missions were determined. Then the current status was described. The results of the questionnaire distributed among subjects as follows: validity of questionnaire was validated by experts' opinion and its reliability was calculated using Cronbach alpha coefficient (0.841). Given that its value is more than 0.7 so the questionnaire has high reliability.

Table 2. IFE matrix

| Strength | | | | |
|----------|---|--------|-------|-------------|
| | | weight | score | Final score |
| 1 | Internal factors | | | |
| 1 | Low level of displacement of personnel | 0.053 | 3 | 0.160 |
| 2 | Responsive of human resource to personnel | 0.086 | 3 | 0.260 |
| 3 | The specialized personnel in human resources domain | 0.053 | 3 | 0.160 |
| 4 | Computed management information system in human resources domains | 0.086 | 3 | 0.260 |
| 5 | Suitable software and hardware systems | 0.033 | 3 | 0.100 |
| 6 | The necessary equipment and resources to service when demanding. | 0.033 | 3 | 0.100 |
| 7 | High level of education of personnel | 0.12 | 3 | 0.360 |
| 8 | Presence of young people in human resource domain | 0.133 | 4 | 0.330 |

| Weakness | | | | |
|-----------------|---|-------|------|-------|
| 1 | The lack of experts | 0.046 | 2 | 0.093 |
| 2 | Presence of Personnel in non-specialize activities | 0.086 | 3 | 0.260 |
| 3 | Low motivation of personnel | 0.113 | 4 | 0.453 |
| 4 | sufficient understanding of professional expectations | 0.113 | 3 | 0.340 |
| 5 | Unsuitable activities with defined missions | 0.046 | 2 | 0.093 |
| 6 | Focus of power in parts of unit | 0.046 | 3 | 0.140 |
| 7 | Ambiguity in inter section transactions | 0.046 | 3 | 0.140 |
| sum | | 1 | | 3.053 |

After the results obtained by questionnaire, 15 internal factors and 8 external factors have been identified through mean test (T-TEST). IEF matrix was formed based on internal factors. The sum of the final scores of the studied organization in Yazd in matrix IEF in accordance with Table 2 equals 3.053, which is higher than 2.5, indicating that organization does not have any problem for using strengths and weaknesses. Also, matrix EFE was used to examine external factors. Table 3 shows matrix EFE for the studied organization.

Table 3. EFE Matrix

| Opportunities | | | | |
|----------------------|--|-------|-------|-------------|
| External factors | | weigh | score | Final score |
| 1 | Outsourcing more activities | 0.225 | 1 | 0.225 |
| 2 | Access to framework of practical pastern to do activity | 0.062 | 2 | 0.125 |
| 3 | Employ Efficient graduates | 0.225 | 3 | 0.675 |
| 4 | Tendency of technology development in society | 0.125 | 3 | 0.375 |
| 5 | Technology opportunities to promote system | 0.037 | 4 | 0.15 |
| Threats | | | | |
| 1 | Low satisfaction of service and change in knowledge level and expectation of beneficiaries | 0.125 | 2 | 0.25 |
| 2 | Unsuitable technology to process and speed of technology change in comparison to administrative obligations. | 0.15 | 2 | 0.3 |
| 3 | Lack of inefficient people in organizations | 0.05 | 2 | 0.1 |
| sum | | 1 | ... | 2.2 |

According to Table 3, the sum of final scores equals to 2.2 and its value is less than 2.5 ,indicating that the organization's performance in response to external factors (opportunities and threats) is low and more efforts should be done in this regard. The combined output of IFE and EFE matrices is SWOT matrix. This matrix is one of the important tools to compare information administrators and provide their ability to judge appropriately. Using this matrix, one can achieve a strategic balance between the opportunities (external factors) and strengths (internal factors) in terms of threats (external) and weaknesses (internal). According to above steps, possible strategies in line of great orientation were identified. To select the most effective and appropriate category of strategies required by the organization, generally, portfolio models were used that SPACE was considered to implement (one of the most useful models) this phase of the investigation. According to experts, opinion, the Delphi method with high convergence was used in organization. The points for industrial power (IS) and competitive advantage (CA) were 2+, 4- respectively that the result of these points on axis x was -2. While the points for financial strength (FS) and environmental stability (ES) were 5+, 3- respectively that the result of these points on axis Y was +2. Most of the studied strategies in matrix SPACE have been conservative. In other words, the studied organization has adequate financial resources but its performance is low in terms of competitive. The following figure shows results of matrix SPACE.

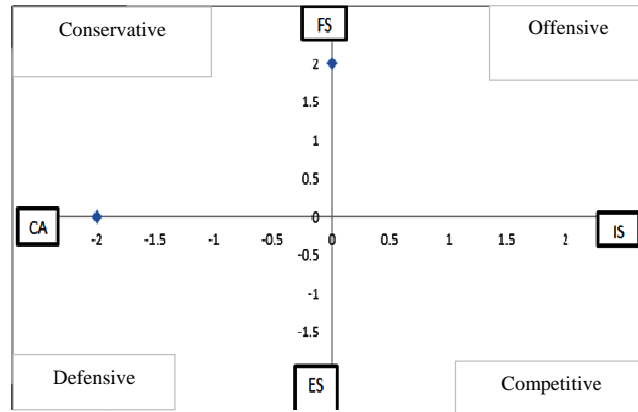


Fig1. Matrix of strategic position evaluation (SPACE)

Tables 4,5 represents the matrix (SWOT) and related strategies in this research. This matrix has 15 strategies obtained by examining internal, external factors and integrates them. According to experts' opinion, the strategy was approved by organization through the Delphi method with high convergence.

Table 4. SWOT matrix

| | |
|--|---|
| <p>Strength</p> <ul style="list-style-type: none"> -low displacement of personnel -responsive of human resources to staff -the specialized staff in human resources domain -computed management information system -suitable software and hardware systems -the needed equipment and resources to service when demanding -high level of education of service staff -the presence of young people in human resource domain | <p>Weakness</p> <ul style="list-style-type: none"> -lack of expert -focus of personnel in non-specialized activities -low motivation of staff -unsuitable understanding of professional expectations -unsuitable activities with specified missions -focus of power in parts of unit -ambiguity in intersection transaction |
| <p>Strategies(so)</p> <ul style="list-style-type: none"> -establish reward system based on performance and proper methods to compensate service and increase exploitation of organization through employment and maintain the competent and motive people -management communication using technology -promote personnel quality to technology application and enhance service level -provide electronic services and decrease the referrals | <p>Strategies (wo)</p> <ul style="list-style-type: none"> -develop transferable activities outside of system(routine activities) -concentrated decision-making through assignment -implement systems or evaluate performance of human resources -reengineering and improve the process -establish new methods of human resources management |
| <p>Strategies(st)</p> <ul style="list-style-type: none"> -increase satisfaction of clients by information system mechanism -participate the personnel in planning to do the related activities to new needs. -use electronic systems to meet clients' needs. -enable young and the educated employers and promote their efficacy. -implement program such as experiences record and trainee –trainer course | <p>Strategies(wt)</p> <ul style="list-style-type: none"> -develop individual, group and organizational abilities -screen employers and adjustment of efficient staff with low education -identify efficient employers and employ them in irrelevant jobs to provide service to other clients |

Table 5. Strategies approved by the Department of road and urban development

| SO |
|--|
| The establishment of performance-based reward system and establish appropriate methods to compensate in order to increase organization productivity through recruitment and retention of competent and motivated work force. |
| Communications of manager using technology |
| Improve the quality of employees to apply technology and improve services |
| Provide services using Internet and reducing referral to related places |
| WO |
| Develop transferable activities out of the system (routine activities),establish policy of deconcentration by devolution. |
| Implement human resources performance evaluation system (linking knowledge and benefits with its results) |
| Re-engineering and process improvement |
| Establish modern methods for human resources management |
| ST |
| Clients' satisfaction with mechanized information system |
| Participation in the planning and perform the works associated with the new requirements |
| Use Internet and simplify responsiveness to clients |
| Empowering young people with high education and improve the efficiency by programs such as recording experience and trainer-trainee course |
| WT |
| Develop and empower organizations, groups and individuals |
| Screen human resources and regulate inefficient personnel with low educational level |
| Identify inefficient staff and apply in unrelated businesses by providing services to clients and stakeholders |

Since the main purpose of the study is to evaluate and rank strategies obtained by of the matrix (SWOT) by considering competitive indicators that would be useful for business strategies. Therefore TOPSIS fuzzy techniques used. Initially 6 indicators affecting the business strategy according to experts and managers opinions of the studied organization were defined that including: establish electronic government, organize workforce, establish comprehensive performance management system, administrative health, reform the process and deconcentration, enable specialized and cultural teaching of human resources, strength management and identify ability to work, provide service and respect people, then indicators weights were determined according to table6 after that one must be derive the importance of each option relative to that indicator as triangular fuzzy number according to table6.

Table 6. The significance of each option relative to criteria

| Verbal term | Fuzzy number |
|-------------|--------------|
| Very weak | 0,1,3 |
| Weak | 1,3,5 |
| Normal | 3,5,7 |
| Good | 5,7,9 |
| Very good | 7,9,1 |

In next step, fuzzy decision matrix was formed as table 7 based on the calculation related to TOPSIS fuzzy technique and after forming decision matrix, normal and weight normal matrices were formed. Also sequential steps to rank including the distance per solution of ideal d+, d- in conjunction with relative convergence calculation of alternatives to ideal solution c_i were presented in Table 8.

Table 7. Fuzzy decision making matrix

| | The Establishment Of E-government | Organizing Human Resources | The Establishment Of A Comprehensive System Of Performance Management | Administrative Health | Reform Process And Decentralization | Empowerment Of Cultural Education And Specialized Human Resources | Strengthening Management And Expertise | Outreach To People And Client Tribute |
|----|-----------------------------------|----------------------------|---|-----------------------|-------------------------------------|---|--|---------------------------------------|
| So | (7,9,10) | (3,5,7) | (3,5,7) | (5,7,9) | (3,5,7) | (5,7,9) | (5,7,9) | (5,7,9) |
| St | (7,9,10) | (5,7,9) | (3,5,7) | (7,9,10) | (3,5,7) | (3,5,7) | (5,7,9) | (7,9,10) |
| Wo | (7,9,10) | (5,7,9) | (7,9,10) | (7,9,10) | (7,9,10) | (7,9,10) | (5,7,9) | (7,9,10) |
| Wt | (3,5,7) | (3,5,7) | (5,7,9) | (5,7,9) | (5,7,9) | (3,5,7) | (5,7,9) | (5,7,9) |

Table 8. Ranking of Options

| | d+ | d- | ci | Ranking |
|----|------|------|------|---------|
| SO | 5.18 | 3.41 | 0.40 | WO |
| ST | 5.04 | 3.56 | 0.41 | ST |
| WO | 4.51 | 4.14 | 0.48 | SO |
| WT | 5.33 | 3.25 | 0.38 | WT |

5. Conclusion

By investigating the steps of formulation of human resources strategies based on the analysis of internal factors, external factors and their integration into in the matrix (SWOT) and to determine important parameters of competition by TOPSIS fuzzy techniques, third solution (WO), which reflects the strategy of using opportunities to overcome internal weaknesses have been identified as the first priority and the remaining options (strategies)related to second ,first (so) and fourth(wt) in terms of convergence distance of ideal state. This means that the studied Organization should give priority in using the environmental opportunities to meet the organization's weaknesses. Figure 2 shows priority of strategies. Therefore the further research can find out the relationship between the strategies and severe impact of strategies using Dematel techniques or meta-heuristic methods.

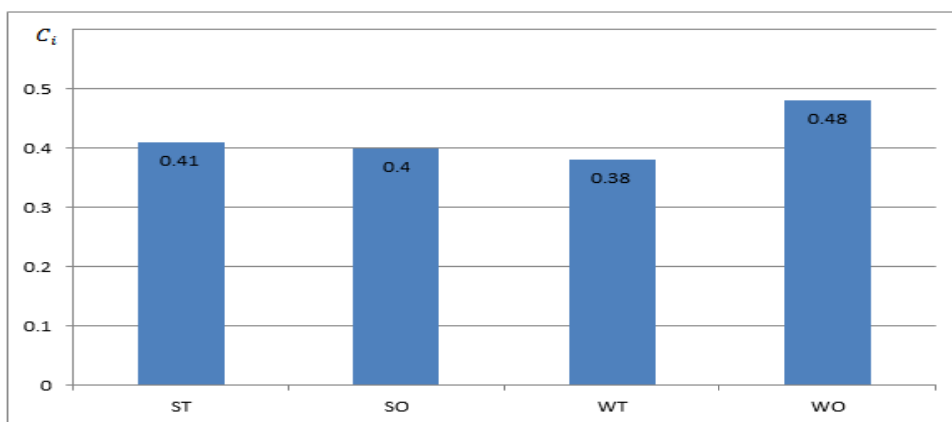


Fig2. Rankings the approved human resources strategy

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