

A development in balanced scorecard by designing a fuzzy and nonlinear Algorithm (case study: Islamic Azad university of Semnan)

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ABSTRACT

The success of each organization depends undoubtedly on the quality of its management and management quality depends on decision quality and information quality on the quality of its measurement and proportion. Therefore, its accuracy and measurement has a key role in the success of the organization and the weakness of performance evaluation and managerial control system can transfer to a barrier for the growth of organization. Performance evaluation systems are now dividable to two traditional group (performance evaluation of an individual across reminding him about his performance) and modern group (developing and improving the capacity of evaluated individual and inclined to achievement of organizational objectives and strategies). One of the most authoritative strategic models in this field is the balanced scorecard (BSC) model in which entire aspects of an organization are dominantly investigated. However, no operational trend has been introduced for utilizing it up to now.

In this paper, an operational trend is introduced to apply the foundations of BSC model and multiple criteria decision making (MCDM) techniques. The most important goal of researchers in representation of new structure for creating development and growth capacity and permanent improvement is associated by a kind of providence, such that it can develop desirable organizational and work behaviors towards achieving the objectives and strategies of the organization. In addition, the strategic planning of Islamic Azad university of Semnan was modeled by suggested structure to validate the suggested structure's capacities. The results showed that outputs were more tangible for the personnel of the organization and the results were accepted by the managers of Islamic Azad university of Semnan.

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1. Introduction

One Performance evaluation and measurement of organizational activities have long been the starting point of management scientific processes and the usual issue of researchers and managers discussion (Maltz & et. al., 2003). The five main duties of management referred to POSDCORB are decelerated as Planning, Organization, Staffing, Directing Co-Ordinating, Reporting and Budgeting in managerial literatures (Gulick & Urwick, 1973). Therefore, it is considered that performance evaluation and controlling the organization is one of the most important duties of managers, since, if the objectives are measurable, they will be achievable, manageable and controllable (Neely & Adams, 2000).

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Performance measurement systems are in fact a part of performance management systems applied as a quantifying measure for efficiency and effectiveness of an activity (Neely Andy & Platts, 1995). Evans and Lindsay (Evans & Lindsay, 2005) believe that the use of performance evaluation systems leads in the outbreak of superior features in the organization in this across. Simons (Simons, 2000) considers the performance evaluation and control systems as a factor for achievement of customer expectation.

The related literatures of performance measurement include two orders. In the first order which last until 1930, the focus of performance measurement was placed on provided financial measures by management accounting systems (Lebas, 1995) and the second order begins from late 1980 which is still improving and interest in this field is always increasing, such that many of researchers call this order as performance measurement movement (Baldwin & Clark, 1992).

Prolific studies (Prowse & Prowse, 2009; Sole, 2009; Jyoti & et.al., 2008; Hassab & et. al. , 2010; Ramstad, 2009; Lester & et al., 2010; De Waal, 2010; Agrawal, 2008; Cross & Lynch, 1988; Niven, 2002) examined and compared the performance evaluation systems and their influences on organizations, but about the best model, we can refer to studies (Kaplan & Norton, 2002; Kaplan & Norton, 1996) which eventually introduced balanced models such as BSC as the best model for performance evaluation. This model was first introduced by Kaplan and Norton as a modern system in management in 1992 by requirement and needs perception of modern organizations and effective implementation of strategy and creating a comprehensive management system as well as performance improvement. Managerial BSC was declared as a comprehensive framework of performance evaluation and strategy promotion, which leads in creating balance between short term and long term objectives, financial and nonfinancial measures, internal and external performances, inward and outward beneficiaries, ductile indexes and performance function and between strategy motives and barriers (Grigoroudis et al., 2012).

BSC is proved to be a frameworks which describe and operationalize the organization strategy (Makhijani & Creelman, 2008; Niven, 2006). Therefore, in designing balanced scorecard, the organization has to measure the vital factors, which specify the organization strategy for value creation in long term future (Kaplan & Norton, 2004). BSC is a management system, which can manage strategy implementation and measure organizational performance in customer, internal processes, growth and learning and financial aspects, and can cause transmission and realization of mission perspective and performance expectations to the external and internal beneficiaries of the organization. In other words, BSC can indicate the mission and vision of the organization in the form of causal relations in the four perspectives (Kaplan & Norton, 2000; Niven, 2006; Chen & et al., 2006). In addition, it looks to the organization as an integrated and unified figure (Achterbergh et al., 2003; Nissen, 2006; Blokdijk, 2008). These superior features of BSC are useful in different service and industrial departments (Xu & Yeh, 2012). According to Makhijani and Creelman (2008) BSC framework is composed of four interrelated component, which are as follows,

- A. Strategy map which identify and explain the relation among the strategic objectives after identifying the strategic objectives.
- B. Performance measures which indicate the improvement toward the strategic objectives.
- C. Quantitative objectives, which are specified for each measures.
- D. Selection and implementation of strategic innovations that performance links to quantitative objectives and finally the strategic objectives are achieved.

BSC innovators believe that successful implementation of organization strategy depends on the issue that organizational individuals realize the strategies. It should be mentioned that this affair, in itself require the creation of complicated processes which cause to tangible outputs (Kaplan & Norton,

2000). To do so, BSC innovators introduced the strategy map in the first component which can represent the link between the structure of organization strategy by recognizing and deriving organizational (strategic) key objectives and visualizing the cause-effect relations among them (Kaplan & Norton, 2000). In other words, by considering the strategy map as a basis and foundation for BSC, a pattern is produced where as its innovators declare leads in acceleration of successful implementation of BSC (Makhijani & Creelman, 2008). For example, there are many studies (Jassbi et al., 2011; Huang et al., 2011; Chang et al., 2011; Cebeci, 2009; Buytendijk et al., 2010; Tohidi et al., 2010a; Tohidi et al., 2010b), which accelerate the implementation of their scorecard by applying the strategy map.

Different organizations seem that they often select the aspects of strategy map and interpolated strategic objectives proportion to the given framework by the innovators of BSC without considering causal relationships between the strategic objectives and just by senior manager's ideas and consensus as well as expertise and staffs by organizational experience and across numerical management meetings. With respect to reported researches, no certain criteria or approaches are introduced for determining the structure of objectives and key measures of organization as well as creating causal relationships in terms of strategy map (Bukh & Malmi, 2005). Unfortunately, many organizations and corporations face a lot of problems in their way of BSC implementation since they make serious mistakes in their drawing of strategy map (Makhijani & Creelman, 2008).

With respect to this problem, by investigation of 12 companies implementing BSC, Quezad et al. (2009) introduced four methods for drawing of strategy map, which are as follow,

Method1: strategic process include mission and vision setting, external and internal analysis (SWOT analysis), which ultimately draws strategy map after strategic goal setting from SWOT analysis. Fig. 1 demonstrates the first method.

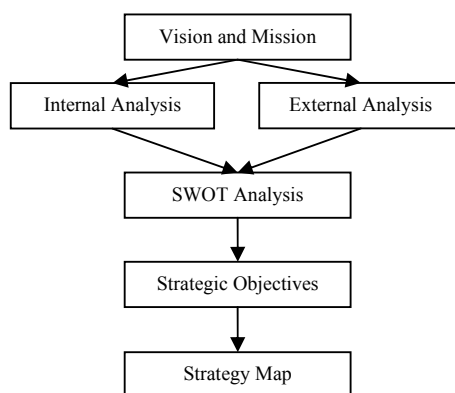


Fig. 1. Method 1 for identifying strategy maps (Quezad et al., 2009)

Method 2: this method is the same as the first one, but the difference is that two kinds of objectives, general and strategic objectives, are set. General objectives are directly set from mission and vision, while strategic objectives are driven from SWOT analysis. The advantage of this method compared with the first one is that it can convert the mission and vision to total objectives and contributes to the organizations in defining strategic directions in strategy map. Fig. 2 is the indicator of the second method.

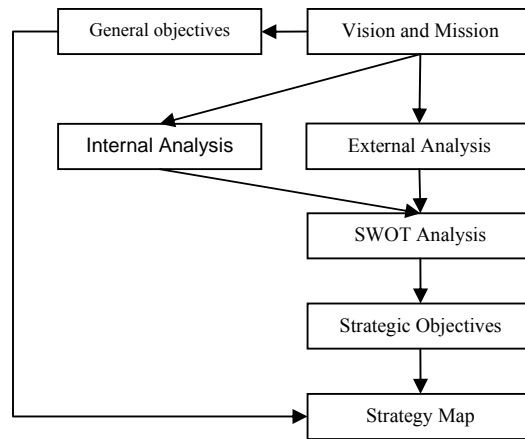


Fig. 2. Method 2 for defining strategic objectives (Quezad & et. al., 2009)

Method3: Strategic themes of organizational missions and visions, which are the bases for strategic goal setting are defined in this method. Fig. 3 indicates the strategic goal setting process according to the third method. One of the main deficiencies of this method is that expression of mission and vision builds organizational general ways, therefore, creation of strategy map, which in fact lead to the achievement of organizational strategy might be ambiguous.

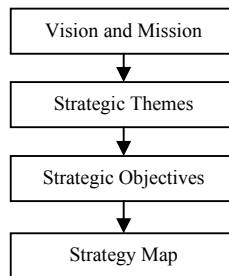


Fig. 3. Method 3 for defining strategic objectives (Quezad & et. al., 2009)

Method4: this method is a compilation of the second and the third one which is dominant in the fourth method.

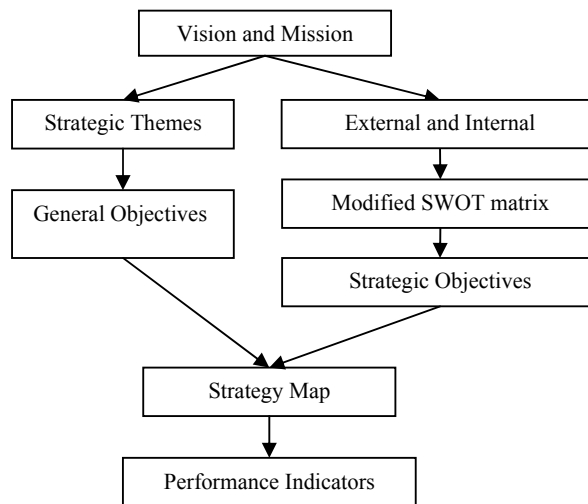


Fig. 4. Method 4 for Generation of strategic objectives (Quezad et al., 2009)

The fourth method is introduced as the best method in this paper, which could enjoy of the whole strength and advantages of the previous methods (Quezad et al., 2009).

However, as it is obvious, no point is expressed about how relations are set among them in the 4th Fig. In this respect, one can refer to studies such as Seyed-hosseini et al. (2011) and Jassbi et al. (2011) which have tried to solve this problem by application of *DEMATEL* technique. The relationships are defined in their studies by investigation of map components (strategic objectives) from expert's point of view and without considering the relational levels among macro objectives and strategic goals by the use of *fuzzy DEMATEL* technique.

BSC innovators tried to quantify the strategy levels by introducing performance measures and quantitative objectives to transfer the organizational intangible assets and investments to tangible outputs in the second and third components. Finally, they have referred to strategic innovations in the last components for creation of relationship between performance and quantitative objectives (Bunker et al., 2004; Ravi et al., 2005; Stewart & Mohamed, 2001; Clinton et al., 2002; Sohn et al., 2003; Chiang, 2005; Lee et al., 2008; Wu et al., 2009; Oh et al., 2009). Note that in order to use MCDM techniques, we need to apply a method to prioritize them (Yan & Chang-Hsing, 2012).

Therefore, by considering the problems and shortcomings of previous studies, this paper tries to cover the weakness of the previous models and the proposed model is implemented in Islamic Azad university of Semnan.

2. Methodology

In this section, we consider a set of activities performed for implementing a successful performance evaluation system based on BSC in conceptual model to modify and improve the previous plans, which would be given separately in four designing, goal setting, performance evaluation and result description sections.

2.1 Section one: Designing

The designing section is aimed to describe concepts such as strategic themes, macro objectives, strategic objectives and finally strategic map by creating an appropriate platform.

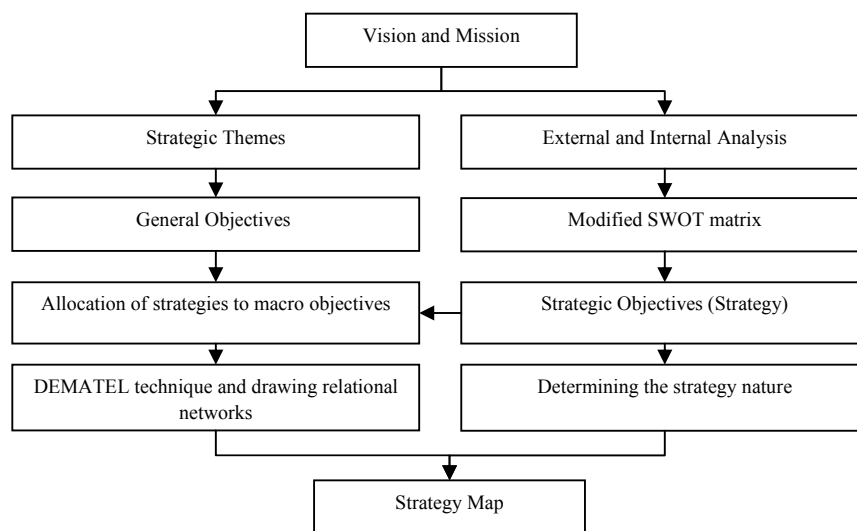


Fig. 5. A surface of the administrative trend of designing section

For raising this goal by utilizing the method given by Quezad et al. (2009) (Fig. 4) and the results presented by Seyed-hosseini et al. (2011) and Jassbi et al. (2011) and performing modification, A framework similar to the Fig. 5 is suggested.

2.1.1. Vision and mission: mission and vision statement determine the main objectives and direction of the organization. The organization should describe how and why is present in business environment.

2.1.2. The strategic themes: the important processes which are significant for creation and representation of different value to customer should be defined in this stage by considering the organization mission and vision.

2.1.3. Macro objectives: macro objectives are derived from strategic themes. We can define one or more macro objective for each strategic theme.

2.1.4. Environmental analysis and SWOT matrix: This step is suggested for investigating the internal strength and weaknesses and external opportunities and threats for derivation of expected strategies in future by the use of SWOT matrix.

2.1.5. Strategic objectives: these objectives are obtained by analyzing strength, weaknesses, opportunities and threats, which are done in SWOT matrix.

2.1.6. Allocation of strategic to macro objectives: In this step we investigate the relational levels between macro objectives and strategic objectives by the help of expert group. The aim of suggesting this step is separation of the strategies to homogeneous groups, which increase the accuracy in identification and determination of reciprocal relations.

2.1.7. Determination of strategy nature: in this level, the strategies are categorized in BSC aspects by the aid of expert group and BSC specialists. This step can be regarded as a basis for drawing the organization strategy map.

2.1.8. DEMATEL technique and drawing relational networks: with regard to the given division for the strategic objectives (categorization 2.1.6), we pay to measure the severity of relations among strategies by fuzzy DEMATEL technique. (For being familiar with foundation of fuzzy DEMATEL, references (Wu & Lee, 2007; Tseng, 2010; Chang et al., 2011; Jassbi et al., 2011; Lee et al., 2011; Zhou et al., 2011) are suggested).

2.1.9. Strategy map: the strategy map is drawn in this step by incorporation of obtained networks from 2.1.8.

2.2. The second section: Goal setting

The goal setting section aims to produce tangible objectives for organizational personnel and proctors by creating a few quantities of strategic planning theory concepts. Fig. 6 visualizes a surface of goal setting section.

2.2.1. Performance indexes: performance indexes will be identified as the indicators of short-term objectives for organization in order to achieve long term objectives in this step. It is suggested that

performance indexes to be derived from constructing components of strategy map (strategic objectives) in order to exist enough universality in performance measurement.

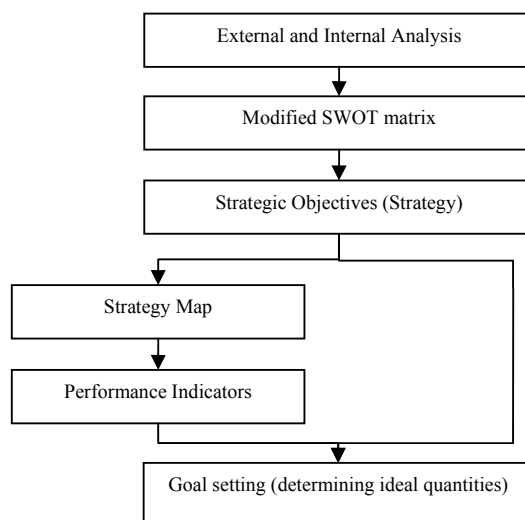


Fig. 6. A surface of administrative trend of goal setting section

2.2.2. Goal setting (determining ideal quantities): The ideal quantities of performance indexes are derived with regard to strategic objectives in this step by the assistance of organization experts and previous recorded information.

2.3 The third section: performance evaluation

The performance evaluation section aims to identify the performance gap by calculating the organization performance quantity in an especial period. The Fig. 7 indicates a surface of performance evaluation.

2.3.1. Derivation of strategy map components weight matrix (strategic goals) by fuzzy DEMATEL technique: a limit super matrix will be obtained in this step by considering the total relationships matrix of fuzzy DEMATEL technique as a non-weighted super matrix and use of fuzzy ANP technique (for familiarity with foundations of fuzzy ANP technique, the references (Chen & Chen, 2010; Kuo & Liang, 2011; Sevkli et al., 2012; Hsu et al., 2012; Özkır & Demirel, 2012) are suggested), which is suggested as the weighted matrix of strategy map components.

2.3.2. Derivation of weighted matrix of indexes by the use of fuzzy AHP technique: a proper weight is considered for indexes according to basis of fuzzy AHP technique in this step by suggesting the pair comparison of indexes with separation of strategic objectives (For familiarity with foundations of fuzzy AHP technique, references (Zheng et al., 2012; Javanbarg et al., 2012; Wang et al., 2012; Bulut et al., 2012) are suggested).

2.3.3. Derivation of status que quantities: some quantities are regarded for performance indexes in this step according to environmental analysis; these quantities are suggested as a basis for indicating the scale of goal achievement in organization (the proportion of status que quantities to ideal quantities).

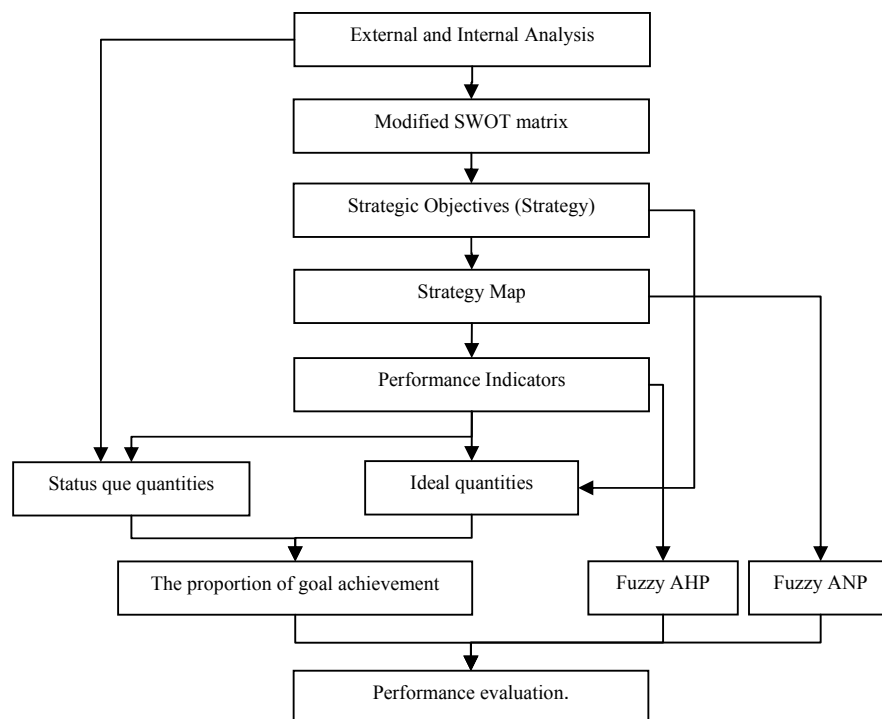


Fig. 7. A surface of administrative trend of performance evaluation section

2.3.4. Performance evaluation: quantities are obtained for each index by comparable multiple of strategies weighted quantities, performance indexes and the quantity of goal achievement (the proportion of status que quantities to ideal quantities) which by summation of quantities of all indexes, a quantity between zero and one will be obtained which is the indicator of organization performance quantity.

2.4 The fourth section: result description

The result description section is aimed to provide a proper position for organization staff for future decision making of organization by the aim of decreasing performance gaps and goal achievement by creating desire division and drawing required diagrams. It should be mentioned that the result description section can be associated by researcher's creativity in divisions and diagrams.

3. Analyzing the suggested method in Islamic Azad university of Semnan

3.1 The first step of the first section (designing section) - mission and vision statement: The mission of Islamic Azad University as a nonprofit organization is extension and promotion of knowledge, skill and fostering innovative and thoughtful people in different fields of science and technology under promoting the quality of college life. In addition, it considers one of its duties as an appropriate accountable organization to different educational expectations of society and its beneficiaries with enhancing the educational services. Islamic Azad University as a great and reliable scientific centre in state level has the responsibility to promote welfare level and economic, social and cultural growth of society and production and issuance of science.

Vision statement of Islamic Azad University existed for the year 2025. Based on this resolution, Islamic Azad University, which is entrepreneur and effective in economic growth of the state, superior in presenting educational services to different classes of society, vanguard in producing science, theory and thoughts in southwest Asia, equipped with improved research centers based on

international standards, responsible for new expectations of society and well known in international reliable communities in which alumnus will build the future human society.

3.2. *The second step of the first section (designing section) - defining the strategic themes:* the following Strategic Themes (Table1) are obtained by considering the mission and vision of Islamic Azad University of Semnan.

Table 1

University strategic implications

1	entrepreneurship and effectiveness in country economic development and growth
2	representation of different research and education services to different research and education services to different classes of society and vanguard in science production
3	accountability to new exception of society and scientific conventions

3.3. *The third step of section (designing section) - determining General objectives:* with respect to organization strategic implications and strategic team, General objectives are identified and stated in Table 2.

Table 2

General objectives of Islamic Azad university of Semnan

Strategic Themes	General Objectives
entrepreneurship and effectiveness in country economic development and growth	O ₁ : It can improve the efficient and effective relations with industries for financial dependence on student's fee by increasing hardware and software capabilities.
representation of different research and education services to different research and education services to different classes of society and vanguard in science production	O ₂ : Creating an efficient system of intellectual and moral ownership for the sale of scientific patents. O ₃ : Developing and equipping in order to promoting the university at least in one of the introduced scientific educational field in the country. O ₄ : Creating and equipment of the growth centers for converting the scientific results to saleable scientific patents.
accountability to new exception of society and scientific conventions	O ₅ : IT application and its institutionalization in key processes of the university. O ₆ : Creation of incentive points for development of software capitals (human for enabling the staffs and faculty members in universities)

3.4. *The fourth and fifth steps of the first section (designing section) - internal and external analysis and determining the strategic objectives:* the SWOT matrix of Semnan Islamic Azad university is described as Table 3.

3.5. *The sixth step of the first section (designing section) - allocation of strategic objectives to General objectives:* with respect to General objectives of the second Table and strategic objectives of the third table, the communicational levels between General objectives and strategic objectives was derived according to homogeneous groups of the fourth Table 4.

3.6 *The seventh step of the first section (designing section) - determining strategy nature:* the university strategies are categorized in BSC aspects according to Table 5 based on expert group ideas and balanced scorecard specialists.

Table 3
University SWOT matrix

Opportunities and Threats	Strengths and Weaknesses	
	Strengths	Weaknesses
	1. Significant growth of innovation registration in universities in current years. 2. Coordination of workshop, laboratory and survey facilities with professors and student's needs. 3. Possibility of applying the existing faculty boards for establishing interdisciplinary fields. And ...	1. Disproportion of pyramid structure of faculty board 2. Disproportion of pyramid structures of educational and investigational fields 3. Non mastery of deserve democracy in jobs 4. Deficiency of financial resources. And ...
Opportunities 1. Developing the possibility of higher education in different fields with respect to pyramid variation of educational grade and the ever growth of entry volunteers for higher education. 2. Change of consumption pattern and positive attitude of society to education and scientific centers orientation to research and science production. And ...	S ₁ . Identifying thee applied fields in survey scientific communities of the country. S ₂ . developing the applied fields S ₃ . Creation and development of technology and growth centers S ₄ . Enhancement of the research activities shares of universities in reliable survey scientific communities of the country.	S ₅ . Effective information and relations with industries S ₆ . Developing equipment (enhancing hardware power) S ₇ . Developing creativity and innovative culture in students and professors
Threats 1. Applied new technologies by competitors 2. Related regulation of giving equal opportunities to university graduated for providing job 3. Tying the higher education growth to employment 4. Increasing the capacity of the state and nonprofit universities And ...	S ₈ . Developing the university brand S ₉ . Enhancing the sale of scientific patents S ₁₀ . Enhancing the efficiency and security of information exchange S ₁₁ . efficiency enhancement for reducing the service price of university S ₁₂ . Enhancing the competitive advantages of university in proportion to other competitors	S ₁₃ . Updating the job training and empowerment of scientific boards (software power enhancement of university) S ₁₄ . Creating an independent and powerful legal system for university S ₁₅ . Promotion of organizational culture S ₁₆ . IT development and its application in university S ₁₇ . Enforcing the incentive points of human force

Table 4
Communicational levels between General objectives and strategic objectives

Strategic Objectives	General Objectives					
	O1. It can improve the efficient ...	O2. Creating an efficient system ...	O3. Developing and equipping in order to...	O4. Creating and equipment of the...	O5. IT application and its ...	O6. Creation of incentive points for ...
S ₁ . Identifying thee ...			√			
S ₂ . Developing the ...			√			
S ₃ . Creation and ...	√			√		
S ₄ . Enhancement of ...		√		√		
S ₅ . Effective ...	√					
S ₆ . Developing ...			√	√	√	
S ₇ . Developing ...	√					
S ₈ . Developing the ...	√					√
S ₉ . Enhancing the ...	√	√		√		
S ₁₀ . Enhancing the ...					√	
S ₁₁ . Efficiency ...					√	
S ₁₂ . Enhancing the ...						√
S ₁₃ . Updating the job ...	√		√			
S ₁₄ . Creating an ...		√				
S ₁₅ . Promotion of ...		√				
S ₁₆ . IT development ...						√
S ₁₇ . Enforcing the ...						√

Table 5
University strategies by separation of Balanced scorecard's perspectives

Balanced scorecard's perspectives	strategies
Customer and scientific credits	S ₄ . Enhancement of the research activities shares of universities in reliable survey scientific communities of the country. S ₈ . Developing the university brand
Financial	S ₉ . Enhancing the sale of scientific patents S ₁₁ . efficiency enhancement for reducing the service price of university
Internal Processes	S ₅ . Effective information and relations with industries S ₆ . Developing equipment (enhancing hardware power) S ₁₄ . Creating an independent and powerful legal system for university S ₁₀ . Enhancing the efficiency and security of information exchange S ₂ . developing the applied fields S ₃ . Creation and development of technology and growth centers
Learning	S ₁₆ . IT development and its application in university S ₁₇ . Enforcing the incentive points of human force S ₁₂ . Enhancing the competitive advantages of university in proportion to other competitors S ₁₃ . Updating the job training and empowerment of scientific boards (software power enhancement of university) S ₁₅ . Promotion of organizational culture S ₁ . Identifying thee applied fields in survey scientific communities of the country. S ₇ . Developing creativity and innovative culture in students and professors

3.7. *The eighth step of the first section (designing section) - DEMATEL technique and drawing communicational network:* relation diagram was derived by the use of fuzzy DEMATEL technique in this step with respect to performed division in the Table 6.

3.8 *The ninth step of the first section (designing section) - drawing the strategy map:* the attention is paid to drawing the strategy map by incorporation of Table 6 diagrams in this. Step and the results of existing diagram will be on the 7th Table.

3.9 *The second section (goal setting section):* performed initiations about this section are described as two performance indexes and goal setting steps, which are orderly indicated in the 4th and 6th columns of Table 8.

3.10 *The third section (performance evaluation section):* in order to reach goal achievement, this section considers 4 steps as derivation of strategy map components weighted matrix, derivation of indexes weighted matrix, derivation of status que quantities and performance evaluation. The result about Semnan Islamic Azad university are orderly observed in the 3rd, the 5th, the 7th and the 8th columns of Table 8.

3.11 *The fourth section (result description section):* the results are provided in three categorizations in the form of BSC, macro objectives and strategic objectives.

3.11.1 *Result description by description of BSC aspects:* by the summation of strategic objectives quantities by the separation of balanced scorecard, the results of the second Table 9 and diagram 1

will be derived. The results in this section show that Semnan Islamic Azad University has the minimum performance gap in financial activities and the maximum in learning and growth activities.

Table 6
The influence diagraph of strategies on each other by separation of homogeneous groups

Explanation of General Objectives	Strategies	Graphs of strategies effects on each (obtained from fuzzy DEMATEL technique)
O1. It can improve the efficient and effective relations with industries for financial dependence on student's fee by increasing hardware and software capabilities.	S3. Creation and development of technology and growth centers S4. Enhancement of the research activities shares ... S5. Effective information and relations with industries S7. Developing creativity and innovative culture in students and professors S8. Developing the university brand S9. Enhancing the sale of scientific patents S13. Updating the job training and empowerment of scientific boards	
O2. Creating an efficient system of intellectual and moral ownership for the sale of scientific patents.	S9. Enhancing the sale of scientific patents S14. Creating an independent and powerful legal system for university S15. Promotion of organizational culture	
O3. Developing and equipping in order to promoting the university at least in one of the introduced scientific educational field in the country.	S1. Identifying thee applied fields in survey scientific communities of the country. S2. Developing the applied fields S4. Enhancement of the research activities shares of universities in ... S6. Developing ... S13. Updating the job ...	
O4. Creating and equipment of the growth centers for converting the scientific results to saleable scientific patents.	S3. Creation and development of technology and growth centers S6. Developing ... S9. Enhancing the sale of scientific patents	
O5. IT application and its institutionalization in key processes of the university.	S6. Developing ... S10. Enhancing the ... S11. efficiency ... S12. Enhancing the ... S16. IT development ...	
O6. Creation of incentive points for development of software capitals (human for enabling the staffs and faculty members in universities)	S8. Developing the university brand S12. Enhancing the competitive advantages ... S17. Enforcing the incentive points of ...	

3.11.2. *Result description by describing macro objectives:* the results of the 10th Table and diagram 2 will be derived by the summation of strategic objectives quantities by the separation of macro objectives. The results of this section show that Semnan Islamic Azad university has the minimum performance gap in the second macro objective (creation of efficient system of spiritual and conceptual ownership for the sale of scientific) and the maximum in the first macro objective (the section and improvement of efficient and effective communications with industries for decreasing financial dependence on student fee by increasing the software and hardware capabilities).

3.11.3. *Result description by describing strategic objectives:* The results of the 11th Table and diagram 3 will be derived by the separation of strategic objective. The results in this section show that Semnan Islamic Azad University has the minimum performance gap in the 16th strategic objective (IT development and its application in university) and the maximum in the 10th strategic objective (Increase in efficiency and security in information exchange).

Table 7
The university strategy map

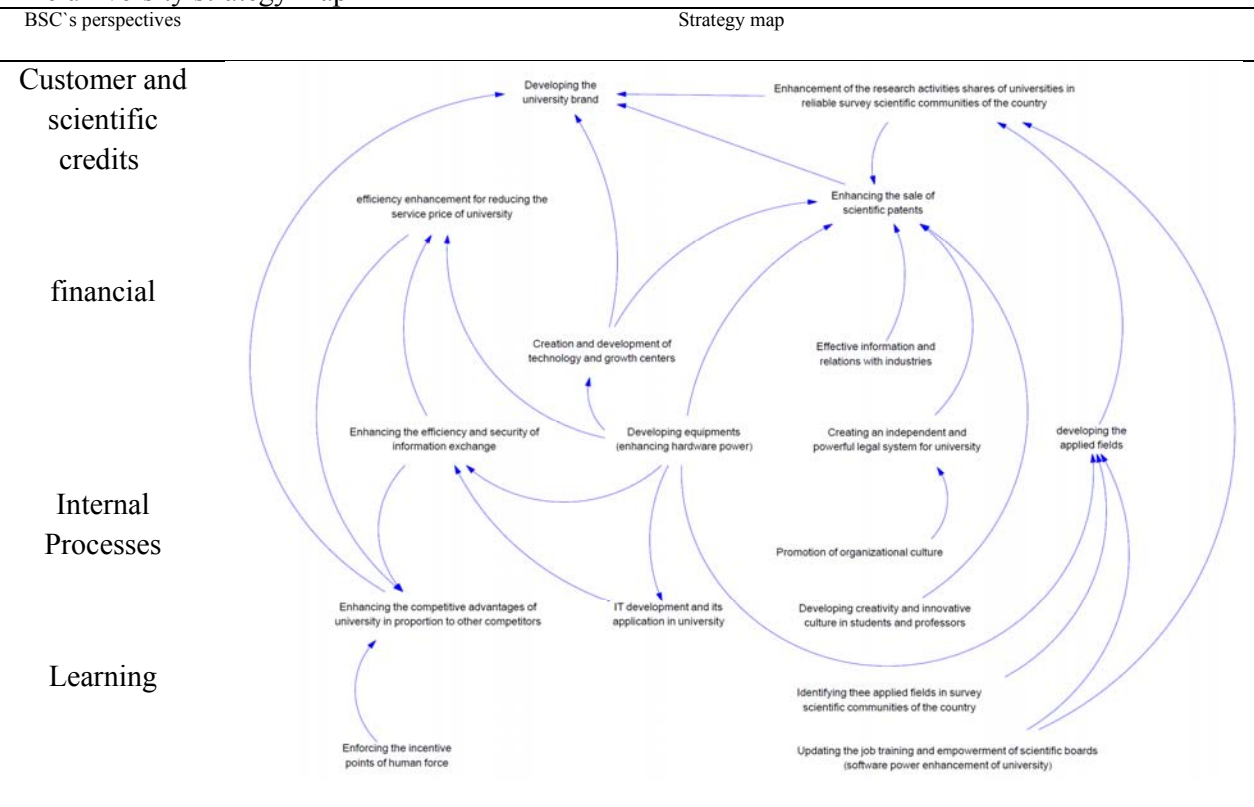


Table 8
Information analysis of Semnan Islamic Azad University in two goal setting and performance evaluation sections

Perspectives	Strategic objectives		Performance indexes				
	name	Weight (obtained from fuzzy ANP technique)	name	Weight (obtained from fuzzy AHP technique)	ideal quantities	Status que quantities	Performance evaluation
Customer and scientific credits	S ₄ . Enhancement of the research activities shares of universities in reliable survey scientific communities of the country.	0.0404	research scores	1	1000	379	0.0153
	S ₈ . Developing the university brand	0.1603	industry satisfaction (Wu et al., 2011; Tseng, 2010)	0.183	9	2	0.0065
			students satisfaction	0.143	9	1	0.0025
			customer loyalty(Wu et al., 2011)	0.169	9	1	0.003
			student loyalty	0.114	9	4	0.0081
			university rank in science administration ranking	0.191	20	no place in the ranking	0
Revenues	0.2	1	0.85	0.0273			
Financial	S ₉ . Enhancing the sale of scientific patents	0.1056	The number of sold scientific patents.	1	20	10	0.0528
	S ₁₁ .efficiency enhancement for reducing the service price of university	0.0447	the service cost (equipment productivity) (Tseng, 2010)	1	0.10%	2%	0.0022
Internal Processes	S ₅ . Effective information and relations with industries	0.0391	the number of agreements, contracts or foreign organizations	0.311	12	2	0.002
			The percentage of research production customers.	0.689	100%	10%	0.0027
	S ₆ . Developing equipment (enhancing hardware power)	0.0689	The monetary value of assets	0.308	1	0.52	0.011
			civil space (square meter)	0.692	80000	38987	0.0232
	S ₁₄ . Creating an independent and powerful legal system for university	0.0211	The number of independent and empowered legal centers in university	1	2	1	0.0106
	S ₁₀ . Enhancing the efficiency and security of information exchange	0.0604	Application of standard administrative methods in university(Wu et.al., 2011)	1	2	0	0
	S ₂ . developing the applied fields	0.0838	The rate of given new and functional service/educational package in every year (Tseng, 2010).	1	10%	0.50%	0.0042
S ₃ . Creation and development of technology and growth centers	0.0512	The number of technology and growth centers	1	3	1	0.0171	

Table 8 (Cont.)

Information analysis of Semnan Islamic Azad University in two goal setting and performance evaluation sections

Perspectives	Strategic objectives		Performance indexes				
	name	Weight (obtained from fuzzy ANP technique)	name	Weight (obtained from fuzzy AHP technique)	ideal quantities	Status que quantities	Performance evaluation*
Learning	S16. IT development and its application in university	0.0442	The capacity of university communicational networks	0.396	20 MB	8 MB	0.007
			Network security	0.267	100%	60%	0.0071
			The number of updated computers	0.045	80%	50%	0.0012
			Number of servers	0.292	8	8	0.0129
	S17. Enforcing the incentive points of human force	0.0385	The extent of courage and awards in organization(Wu & et.al, 2011)	0.192	50%	10%	0.0015
			Satisfaction audit of employees and professors(Tseng, 2010)	0.239	9	1	0.001
			The number of expert force left in organization	0.569	0	8	0
	S12. Enhancing the competitive advantages of university in proportion to other competitors	0.0934	The flexibility of service delivering system in university(Wu et al., 2011)	0.077	9	3	0.0024
			the number of student complaint to meritorious reference for the unit (central organization, governor and ...) (Tseng, 2010)	0.923	0	22	0
	S13. Updating the job training and empowerment of scientific boards (software power enhancement of university)	0.0605	educational opportunities abroad	0.936	20%	1%	0.0028
			the promotion percentage in faculty member	0.064	20%	12%	0.0023
	S15. Promotion of organizational culture	0.0313	the extent of dependency spirit in employees (pluralism)	0.394	9	4	0.0055
the extent of uncertainty in organization			0.606	1	8	0.0024	
S1. Identifying thee applied fields in survey scientific communities of the country.	0.0356	the number of performed/performing educational plans in this field	1	5	1	0.0071	
S7. Developing creativity and innovative culture in students and professors	0.0211	the number of bespoke educational terms from students and faculty members side(Wu et al., 2011)	0.037	10%	1%	0.0001	
		the amount of paid awards(Wu et al., 2011)	0.027	10%	1%	0	
		the percentage of new ideas transferrable to delivered product to the growth centers	0.936	50%	1%	0.0004	
Total	1	-----	17	---	---	0.2577	

*: by multiple of comparative quantities in the 3rd columns (the weight of strategic objectives), the 5th columns (the weight of performance indexes) and the proportion of status que quantities ideal quantities, the quantities of performance evaluation column; will be calculated. The total of this numerical column will be between zero and one.

Table 9
The result of BSC implementation

Perspectives	Performance	object
Customer and scientific credits	0.063	0.201
Financial	0.055	0.150
Internal Processes	0.071	0.325
Learning	0.054	0.325
Total	0.242	1.000

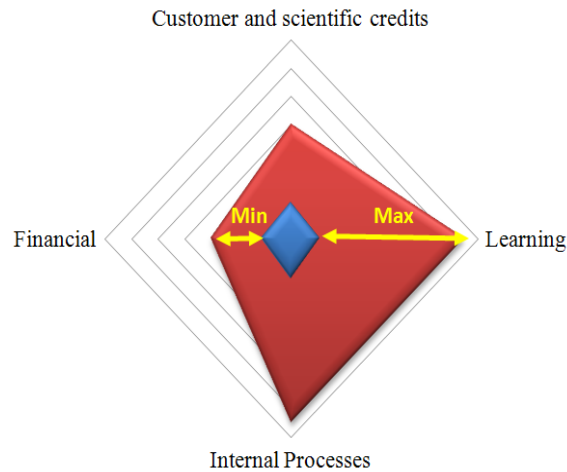


Fig. 1. The result description by describing balanced scorecard perspectives

Table 10
Result description by describing macro objective

Macro objective	Performance	object
O ₁ It can improve the efficient and effective relations with industries for financial dependence on student's fee by increasing hardware and software capabilities.	0.143	0.478
O ₂ Creating an efficient system of intellectual and moral ownership for the sale of scientific patents.	0.071	0.158
O ₃ Developing and equipping in order to promoting the university at least in one of the introduced scientific educational field in the country.	0.081	0.289
O ₄ Creating and equipment of the growth centers for converting the scientific results to saleable scientific patents.	0.104	0.226
O ₅ IT application and its institutionalization in key processes of the university.	0.067	0.312
O ₆ Creation of incentive points for development of software capitals (human for enabling the staffs and faculty members in universities)	0.052	0.292

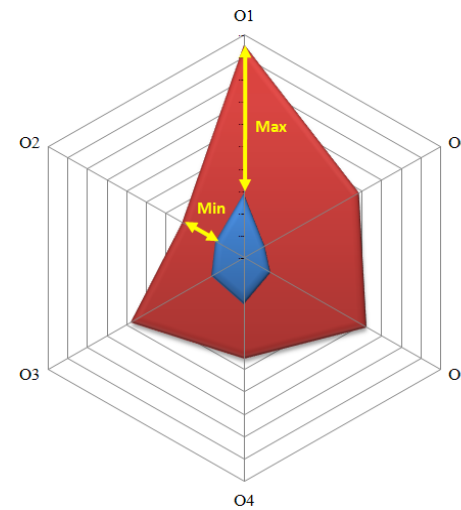


Fig. 2. The result description by describing macro objective

Guideline: blue colored levels: *Performance* red colored Levels: *objective* max: *the maximum performance gap* min: *minimum performance gap*

Table 11
The result description by describing strategic objectives

strategic objectives	Status que quantities		Ideal quantities	
	Performance	Proportion of objectives	object	Proportion of objectives
S ₁ . Identifying thee ...	0.007	20%	0.036	100%
S ₂ . developing the ...	0.004	5%	0.084	100%
S ₃ . Creation and ...	0.017	33%	0.051	100%
S ₄ . Enhancement of ...	0.015	38%	0.040	100%
S ₅ . Effective ...	0.005	12%	0.039	100%
S ₆ . Developing ...	0.034	50%	0.069	100%
S ₇ . Developing ...	0.001	2%	0.021	100%
S ₈ . Developing the ...	0.047	30%	0.160	100%
S ₉ . Enhancing the ...	0.053	50%	0.106	100%
S ₁₀ . Enhancing the ...	0.000	0%	0.060	100%
S ₁₁ . efficiency ...	0.002	5%	0.045	100%
S ₁₂ . Enhancing the ...	0.002	3%	0.093	100%
S ₁₃ . Updating the job ...	0.005	9%	0.061	100%
S ₁₄ . Creating an ...	0.011	50%	0.021	100%
S ₁₅ . Promotion of ...	0.008	25%	0.031	100%
S ₁₆ . IT development ...	0.028	64%	0.044	100%
S ₁₇ . Enforcing the ...	0.003	6%	0.039	100%
Total	0.242	24%	1.000	---

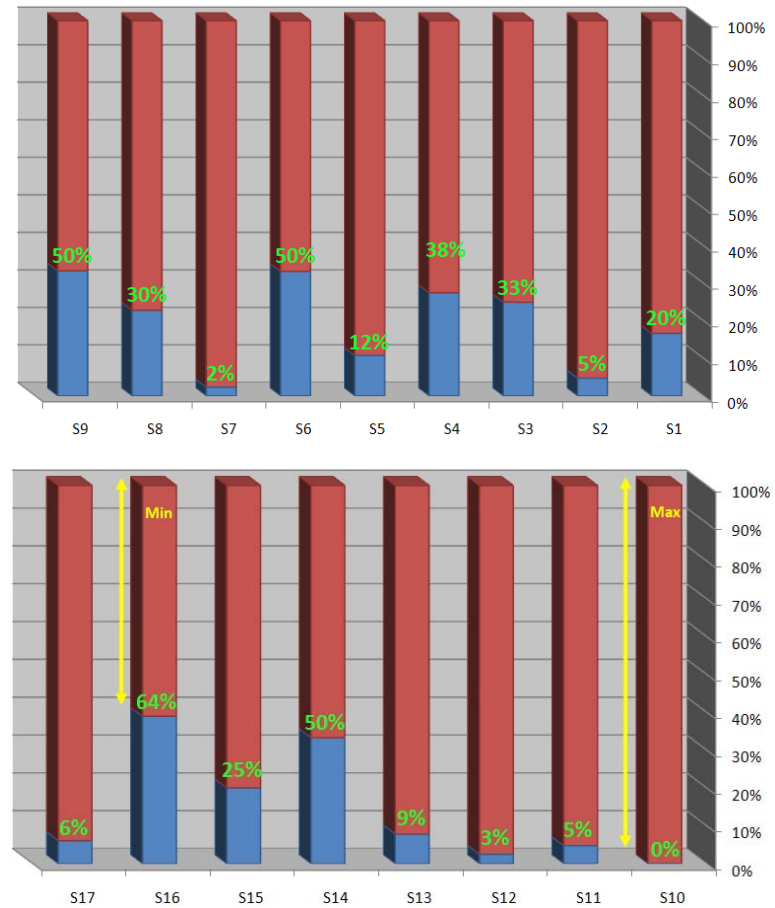


Fig. 3. The result description by describing strategic objectives

4. Conclusions

In this paper, we have presented BSC as one of the most applicable and strongest performance evaluation methods. One of the implementation levels of this successful performance evaluation system is the application of strategic innovation for system institutionalization in organization. Researchers visualized a new structure for implementation of BSC in this field by utilizing the strength of available administrative methods and the administrative power of model was proved by experimental implementation of suggested structure in an educational organization. In addition, the results of the implementation of the proposed model of his paper in Semnan Islamic Azad University showed that multi criteria decision making techniques can be applied by a systematic and structured methodology .

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