Objectives priority in university strategy map for resource allocation

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Abstract

Purpose – The purpose of this paper is to provide a model for Ferdowsi University of Mashhad (FUM) to prioritize its objectives. This will be achieved by providing strategy map using balanced score card (BSC) method.

Design/methodology/approach – This research result is based on 21 managers' opinion about relation among university objectives, gathered by questionnaire. DEMATHEL method which is a structural decision-making model is used to process data in questionnaires and discover casual relationship between university objectives.

Findings – According to this research result "Having productive competent human resource that are committed to Islamic values and professional ethic" has the highest priority among FUM objectives while "Achieving educating excellence especially in graduate programs and research" has the lowest.

Practical implications – FUM managers need to focus on their human resources and enhance their competency in order to achieve academic excellence.

Originality/value – Achieving superiority in university competitive position based on its education and research activities is FUM vision. As a non-profit organization due to resource restriction and environmental circumstances it has to fulfill this goal with higher productivity. BSC as a performance management system will help it to achieve this goal by translating vision into objectives and defining casual relationship between them. This method is rarely studied in the context of universities especially in Iranian universities. This research applied strategy map, one of BSC implementation stages, in a public university in Iran to illustrate series of objectives that leads to mission accomplishment.

Keywords University, DEMATEL, Strategic planning, Balanced score card, Strategy map

Paper type Case study

1. Introduction

Diverse changes in universities' environment such as globalization, increasing information technology, internationalization of education and research collaborations emerge the essence of competitive advantages for universities. In addition since country vision emphasizes on superiority in education and science regionally and globally, each university needs to enhance the quality of education and overall academic standard. To promote university educational quality they require performance measurement which encourages universities to improve its advantages and become a reference for student (Chen *et al.*, 2006, 2009). Universities as non-profit organization do not face pressure of survival but they should focus mostly on their mission, vision and performance management much more than financial ratios. The primary objective of non-profit performance management system is to determine how well an organization fulfills its mission (Grigoroudis *et al.*, 2012). Furthermore, government stress on thorough performance evaluation and ranking among domestic universities.

Cullen *et al.* (2003) suggest private sector model of performance measures particularly balanced score card (BSC) approach in order to manage performance with focus on strategy rather than just monitoring performance. In addition one of the important organizational failure is deficient strategic planning (Umashankar and Dutta, 2007).

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Kaplan and Norton (1996) declare that BSC is a management system aiming to focus on strategy in a way that can lead to competitive performance. It translates organization vision into operational goals and links it to individual performance, receive feedbacks, learn from them and adjusting their strategy accordingly. In order to fulfill organization visions, organizations can reach their goals by prioritizing their actions. BSC is a proper evaluation methodology to achieve this goal (Davis and Albright, 2004). This method helps universities to develop and allocate resources strategically (Chen *et al.*, 2006).

The remainder of this paper is organized as follow, in Section 2 the concept of BSC and strategy map is introduced generally and especially in universities. In Section 3 the methodology and framework of constructing strategy map with DEMATEL method is introduced. Empirical example of university strategy map including final strategy map and relationships analysis is presented in Section 4. Finally this research is concluded in Section 5.

2. Concept of BSC and strategy map

In economic age companies succeed by benefiting from economies of scale and scope. During those years financial control systems are developed in companies. In information era in last decades of twentieth century excellence merely in financial indicators is not useful anymore. In this era companies require a control system which converts intangible assets to tangible outcome (Kaplan and Norton, 1996). Traditional performance measurement systems try to control behavior, on the other hand BSC put strategy and vision, not control, on the center. It just puts goals and leaves adoption of the required behavior and actions to reach these goals to employees (Kaplan and Norton, 1992). Frigio and Krumwiede (1999) found that performance management systems using BSC are significantly more effective comparing to others.

2.1 BSC

BSC first introduced by Kaplan and Norton (1992) as a comprehensive performance measurement method evaluating organization performance in four perspective – financial, customer, internal process and learning and growth. They found that successful organizations define their goals in these four perspectives and specify measures for each goal to assess fulfillment of them. According to Niven (2003) the BSC has been broadly applied in private sector, over 50 percent of Fortune 1000 organizations are using BSC method. This method adds non-financial strategic measures to traditionally financial measures to provide more balanced perspective of organization performance for managers. It translates organization vision into goals, measures, quantitative goals and targets (Kaplan and Norton, 2001). In the other word it changes strategy into action. Four major perspectives of this method are described as follow; the number and name of BSC perspectives are not unique and so can be changed accordingly (Kaplan and Norton, 2001):

(1) Financial perspective: this perspective describes tangible achievements with financial ratios. In this perspective organization can find out what is the ultimate result of accomplishing other perspectives goals.

(2) Customer perspective: this perspective provides the way to create value from intangible assets. Organizations should distinguish their competitive advantages with competitors and define who their customers are and what the values they propose to them are.

(3) Internal process perspective: in this perspective organizations should specify process by which they can create value for customers. Achieving this perspectives goals require one or more efficient and effective operating process.

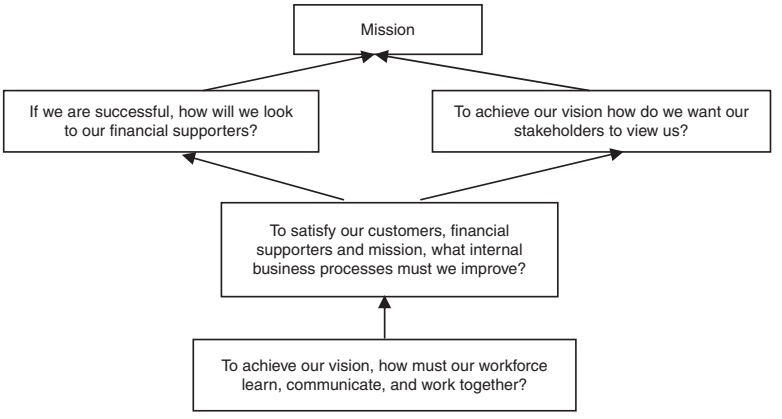
(4) Learning and growth: this perspective is the foundation of balanced evaluation method including organization intangible assets and their role in reaching organization goals. This perspective consists of human, information and organization asset. These assets fill the gap between current skills and competencies of employees and information system capabilities and what the organization needs to achieve other perspectives goals.

To apply this method in public and non-profit sector special characteristic of this sector should be considered. The social orientation of non-profit organizations is their basic difference with private sector; therefore they have no profit motives (Grigoroudis *et al.*, 2012). Most of the evaluation indices in these organizations are about operational priority. They try to reach their mission with higher productivity, hence they decrease expenses and increase operation speed while strive for process improvement (Kaplan and Norton, 2001). Therefore, non-profit organizations face problem with basic structure of BSC with financial perspective on the top. In this regard, Kaplan and Norton (2001) propose different structure for them which mission and vision are on the top of the hierarchy of perspectives. They also put both customer and financial perspective on the next level, then process and at last learning and growth perspective (Figure 1). Accordingly, Niven (2003) is redesigned basic BSC structure as follow while keeping four major perspectives unchanged:

(1) The organization mission moves to top.

(2) The customer perspective is elevated emphasizing on who is defined as customer and how the organization can create value for them.

(3) The financial perspective position is changed and the question it seeks answer for, changed to how do we add value for customers while controlling cost?



Source: Kaplan and Norton (2004)

Figure 1.
BSC approach in non-profit organizations

(4) The emphasis of other perspectives is also changes. The internal process is focussed on process excellence in order to satisfy customers while complying with budget limits. On the other part, learning and growth perspective is emphasis on ability of organization to grow and change.

2.2 BSC in universities

BSC has been applied widely in private and non-profit sector but it has been rarely applied in universities (Cullen *et al.*, 2003; Karathanos and Karathanos, 2005). O'Neil *et al.* (1999) proposed that universities could benefit significantly from utilizing scorecard approach in their strategic management. They believe that this approach is a gratifying simple multi-dimensional measure that can improve university performance. BSC bring together the aims and objectives of a university in a single structure manner (Cullen *et al.*, 2003). These researchers provide a BSC for a faculty in UK including goals and measures in each four perspective in order to explore the potential use of this approach for quality management in higher education. Chen *et al.* (2006) apply BSC method as a performance measurement and strategic management tool in Taiwan higher education. Philbin (2011) adapt BSC in operational management of a university institute and identified how it can improve the operational management. Kettunen (2006) utilize BSC to provide joint regional strategies for higher education institutes in Finland. They believe that it provides clear understanding for managers and employees in each institute of how their work contributes to network strategy. Papenhausen and Einstein (2006) propose that BSC approach offers promising and valuable tool for implementing strategic performance management system in a college of business. Table I demonstrates other studies about BSC in universities and selected goals.

2.3 Strategy map

Strategy mapping which is the most important task in BSC implementation procedure must be the first step in this process (Makhijani and Creelman, 2008; Philbin, 2011). It provides structure to demonstrate how strategies link intangible properties of organization to value creation process. Strategy map which is the missing link between formulating strategy and employing it, illustrate how goals in four perspectives combine to achieve vision (Kaplan and Norton, 2004). It helps understand the nature of university objectives by depicting series of causal relationships that results in mission accomplishment (Cullen *et al.*, 2003). Kaplan and Norton (2004) propose that there is a causal relationship between each perspective goals. Strategy map is a link creation tool between strategic objectives among BSC perspectives and illustrate objectives and related cause-effect relationships (Jassbi *et al.*, 2011). Banker *et al.*'s (2011) research result suggest that strategy map reduce the cognitive difficulty of BSC use.

University strategy map like other organizations in this sector start with vision and mission. There are few studies about universities strategy map. Chen *et al.* (2006) in their strategy map for higher education in Taiwan, put mission and vision on the first and then financial, customer, internal process and learning and growth perspective, respectively. Philbin (2011) in his strategy map for university institute keep financial perspective unchanged, though changed the name of customer, internal process and learning and growth perspective, respectively, to people development to emphasize stakeholder interest in education and training, institute capability to reflect development of internal resources available to the institute and research output to reflect primary knowledge outputs of institute. Kettunen (2006) strategy map has five perspectives: regional development,

Studies	Selected goals	
Cullen *et al.* (2003)	Financial perspective: Budget compliance Enhance commercial income Enhance franchise income Enhance research income Enhance overseas student income Customer perspective: Promote teaching companies schemes Maintain undergraduate numbers Develop partnerships with overseas college and universities Maintain quality of product Look for new overseas partners to deliverfranchise program Enhance open days Marketing of MBA and new masters program at home and abroad Engage in commercial/business partnership Raise international profile of faculty Promote university's regional profile	Internal business perspective: More focussed "business school" Integrated program of degrees Revise committee structures Revise administrative support structures Developing and expanding MBA program Develop and lunch business foundation course Maintain currency of curriculum and benchmark statements Maintain professional body accreditation Learning and growth perspective: Undertake academic research Attract research student to work in research centers Raise international profile through research publications Encourage "young" researchers Enhance teaching
Kettunen (2006)	Regional development perspective: Development of neighboring areas Internationalization of the region HEIs in the regions Innovative environment and technology transfer Cultural activities of the region Customer perspective: Social responsibility and sustainable development Social services and health care Development of SMEs and entrepreneurship Finance perspective: Funding programs of R&D Joint funding of continuing education	Process and structures perspective: Cooperation of international services Support unit of education Joint services of R&D Entrepreneurship forum International education Development of environment, industries and culture Entrepreneurship of students Learning perspective: Promotion of multiculturalism Promotion of an entrepreneurial climate Identify level and scope of technical training
Philbin (2011)	Finance perspective: Level of main program funding of the institute Demonstrate value for money through additional financial support; ascertain status of financial sustainable People development perspective: Identify number of PhD students and scope of studies Identify number of MSc students and scope of studies Identify number of summer intern students and scope of studies	Institute capability perspective: Determine academic faculty quality Determine visitor and affiliated academic quality Determine management effectiveness Determine management effectiveness and scope of equipment availability Research output perspective: Assess quantity and quality of research carried out within institute

(*continued*)

Table I.
Selected goals in other studies for universities in BSC approach

Studies	Selected goals	
Papenhausen and Einstein (2006)	Financial perspective:	Process perspective:
	Building endowment/fund raising/annual giving	Teaching excellence
	Increased grants	Excellence in developing learning and learning skills
	Develop revenue streams	Curriculum excellence and innovation
	Increased state appropriation	Introduction of new programs/ innovations
	Increased student fees	Quality faculty
	Profitable program mix	Currency of faculty and classroom material/experiences
	Increase teaching productivity	Production efficiency
	To be financially sound	Student services effectiveness, including advising
	Stakeholder perspective:	Learning and growth perspective:
	Attract high-quality student	Faculty development
	Develop high-quality students	Technology leadership (use, development, application)
	Graduate high-quality students	Teaching/learning innovations
	Student satisfaction	Measure, reward and evaluate goal attainment
	Business community	Establish broad based and continuous strategic planning process
	Faculty satisfaction	Adequate physical facilities
	Alumni	
	Parents	
	Service to the university	
	Teaching quality	
	Academic excellence	
	Quality research contributions	

Table I.

customer, finance, process and structure and learning. But none of them explore causal relationship between perspectives and also objectives. They just make strategy map using rule of thumb. In this study we intend to employ a systematic approach using DEMATEL for strategy mapping.

3. Methodology

In this research, Ferdowsi University of Mashhad (FUM) is selected as the example. The proposed framework to construct strategy map from BSC is illustrated in Figure 2. First we define four perspective based on literature review which includes financial, stakeholder, process and learning and growth perspectives. Then 11 objectives defined in FUM strategic plan divided into 20 to fit into four perspective of BSC. The appropriate place of each objective among BSC perspectives is obtained from literature review and expert opinion while mission and vision are on the top as in Figure 3. After that, a casual relationship is applied to priorities objectives using DEMATEL method. Finally the strategy map is developed based on DEMATEL analysis result. DEMATEL method is expressed in Section 3.

3.1 Data collection

After developing template of university strategy map we incorporate objectives into DEMATEL questionnaire format. Respondents are asked to indicate their opinion about direct influence of objectives on scale of 0-4, "no influence," "low influence," "medium influence," "high influence" and "very high influence," respectively.

Figure 2.
Proposed framework to construct strategy map

Figure 3.
Template of Ferdowsi University of Mashhad strategy map

They required specifying influence of row on column. The survey focussed on managers of FUM, 37 questionnaires are distributed among all managers and vice presidents, 21 are returned.

3.2 DEMATEL as a method for strategy mapping

Jassbi *et al.* (2011) believe that strategy mapping is a human-oriented procedure. In this procedure all managers' preferences, experiences and knowledge are put in place in managerial sessions to make relationships between strategic objectives. They consider strategy mapping a uniform group decision making process in which the preferences of decision makers must be integrated to reach to a set of final decisions.

In 1973 decision-making trial and evaluation laboratory is presented as a structural modeling approach for problem (Gabus and Fontela, 1973). This technique has been applied in various areas such as marketing strategies, control system, safety problems, developing the competencies of global managers and group decision making (Lee *et al.*, 2013). DEMATEL is useful for visualizing complicated casual relationships among criteria. It is an effective method for analyzing structure and relation among criteria of a system, prioritizing criteria based on their influence on others (Seyedhosseini *et al.*, 2011).

Strategy map is visualized road map to help manager priorities strategic steps based on complicated casual relationship among objectives (Wu, 2012). Hence, it requires fully understanding of casual relationship among organization objectives. Therefore, DEMATEL is best suited for strategy map building and design (Jassbi *et al.*, 2011). It uses matrix calculations to obtain all the direct and indirect causal relationships and impact strength. DEMATEL process results in a visual representation which illustrates interrelation between components and can separate them into cause and effect groups. Managers can organize their actions by using result of DEMATEL method (Chen *et al.*, 2011).

Many researchers such as Chen *et al.* (2011), Jassbi *et al.* (2011), Wu *et al.* (2011), Grigoroudis *et al.* (2012), Seyedhosseini *et al.* (2011) use DEMATEL as a decision making tool to devise a strategic plan. According to these studies DEMATEL procedure is as follow:

(1) Calculate direct relation average matrix: elements are defined via literature review or brainstorming. Then respondents are asked to indicate the degree of direct influence among elements on scale of 0-4. Average matrix D is calculated from the mean of the same elements in the different matrices of the respondents.

(2) Calculate the initial direct influence matrix: the initial direct influence matrix X is obtained by normalizing the average matrix D. The matrix X can be obtained as follow:

$$X = s.D$$

$$s = \min\left[\frac{1}{\max_i \sum_{j=1}^{n} |d_{ij}|}, \frac{1}{\max_j \sum_{i=1}^{n} |d_{ij}|}\right]$$

(3) Calculate the total influence matrix: the total influence matrix is listed as follow. I is a unit matrix and X is initial direct influence matrix:

$$T = X + X^2 + \cdots + X^k = X(1-X)^{-1}$$

(4) Analyze the result of influences and relationships: based on total influence matrix the sum of column is represented by D and the sum of rows is represented by R. They are calculated as follow:

$$D = (d_i)_{n\times 1} = \left[\sum_{j=1}^{n} t_{ij}\right]_{n\times 1}$$

$$R = (r_j)_{1\times n} = \left[\sum_{i=1}^{n} t_{ij}\right]_{1\times n}$$

The value of $(D-R)$ shows the severity of influence indicating the prioritization of factor. Positive $(D-R)$ for a factor indicates that it influences other factors more than other factor influence it. Therefore factors having higher $(D-R)$ have higher priority. These factors are called dispatchers. Negative $D-R$ for a factor means that other factors greatly influence it. These factors are called receivers. The value of $D+R$ indicates the degree of relationship of each factor with the others.

4. Results

This section includes measurement of relationship between FUM objectives. Most important objectives are emerged as the result of this method.

The total influence matrix is shown in Table II. The value of $D+R$ and $D-R$ and their ranking for university objectives are shown in Table III. According to Table III, the central role (objective with the highest $D+R$ value), main cause factor (objective with the highest $D-R$ value) and main effect factor (objective with the lowest $D-R$ value) is determined. For example, "Achieving educating excellence especially in graduate programs and research excellence in national and global environment" is the central role objective.

On the other hand, objective no. 20, "Having productive competent human resource that are committed to Islamic values and professional ethic and having optimum structure," with the highest $D-R$ value equal to 1.66 is the main cause objective which dispatches the strongest influence on others. 1.46 is the second highest $D-R$ value which is related to objective no. 15 so "Creating effective management system and continuously improve it" is the second most important cause factor in FUM objectives. Objective no. 1 is the third main cause factor with $D-R$ value equal to 1.02. "Achieving educating excellence especially in graduate programs and research excellence in national and global environment" receives the strongest influence from others objectives because it has the smallest negative $D-R$ value equal to −0.73, so it is called main effect factor. In this regard objective no. 18 is the second and objective no. 6 is the third receiving objective.

Information of Tables II and IV are utilized to develop the strategy map in Figure 3. According to Table II and threshold set in third quartile (0.2243) of total relationships, there are three objectives receiving influence from and dispatching influence to none of the other ones. The number of dispatching and receiving objectives is illustrated in Table IV (Figure 4).

Consequently, the BSC strategy map consists of 17 objectives because objective no. 4, 12 and 17 are eliminated since their values are below the threshold.

Table II.
Total influence matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1 Effective resource management	0.14	0.23	0.26	0.17	0.24	0.23	0.24	0.22	0.22	0.22	0.23	0.22	0.19	0.19	0.18	0.21	0.15	0.21	0.24	0.18
2 Attract sustainable and varied financial resources and enhancing financial independency	0.17	0.17	0.25	0.16	0.23	0.22	0.23	0.21	0.22	0.21	0.21	0.20	0.19	0.18	0.16	0.21	0.14	0.20	0.23	0.16
3 Achieving educating excellence specially in graduate programs and research excellence in national and global environment	0.16	0.23	0.20	0.15	0.24	0.25	0.24	0.22	0.22	0.23	0.23	0.21	0.20	0.15	0.15	0.18	0.14	0.22	0.25	0.17
4 Play effective role in environmental protection and achieving green university	0.09	0.12	0.13	0.07	0.12	0.12	0.13	0.11	0.11	0.12	0.13	0.13	0.10	0.09	0.09	0.10	0.08	0.10	0.12	0.09
5 Graduate high-quality experts, researchers and entrepreneurs according to society requirement	0.17	0.23	0.27	0.16	0.20	0.25	0.25	0.24	0.22	0.23	0.23	0.22	0.20	0.15	0.16	0.19	0.15	0.23	0.25	0.18
6 Increased talented and genius students	0.15	0.20	0.26	0.14	0.24	0.18	0.23	0.22	0.21	0.22	0.22	0.21	0.18	0.14	0.15	0.18	0.14	0.22	0.24	0.16
7 Enhance and expand productive and synergetic transactions with international and local academic. Cultural, social and economic institute	0.17	0.22	0.25	0.15	0.24	0.23	0.19	0.23	0.22	0.21	0.22	0.20	0.19	0.15	0.16	0.19	0.14	0.21	0.24	0.16
8 Commercializing research achievements and employing academic results in society	0.17	0.23	0.26	0.15	0.24	0.24	0.25	0.18	0.22	0.23	0.23	0.22	0.20	0.15	0.16	0.19	0.14	0.23	0.25	0.16
9 Expanding research centers	0.16	0.21	0.24	0.14	0.24	0.23	0.23	0.22	0.16	0.21	0.21	0.21	0.18	0.15	0.15	0.18	0.13	0.21	0.24	0.15
10 Enhancing teaching efficiency	0.15	0.19	0.25	0.14	0.23	0.23	0.22	0.21	0.19	0.16	0.22	0.21	0.18	0.14	0.14	0.16	0.13	0.19	0.22	0.16
11 Enhancing innovative and attractive environment	0.15	0.20	0.24	0.14	0.23	0.23	0.21	0.21	0.20	0.23	0.17	0.22	0.17	0.14	0.15	0.17	0.14	0.20	0.22	0.16
12 Improving student service according to national standards	0.15	0.19	0.23	0.15	0.22	0.22	0.21	0.20	0.19	0.21	0.21	0.16	0.17	0.14	0.15	0.16	0.14	0.19	0.21	0.16
13 Developing new programs and interdependent programs	0.15	0.20	0.23	0.13	0.22	0.21	0.21	0.20	0.19	0.20	0.20	0.19	0.13	0.13	0.13	0.17	0.12	0.19	0.21	0.14
14 Encourage group participation and social order, creating a lively and dynamic environment in academic activities	0.13	0.16	0.19	0.12	0.18	0.19	0.16	0.15	0.15	0.17	0.17	0.17	0.13	0.09	0.12	0.13	0.11	0.15	0.17	0.12

(*continued*)

Table II.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
15 Creating effective management system and continuously improve it	0.20	0.24	0.27	0.18	0.26	0.26	0.26	0.24	0.23	0.24	0.25	0.24	0.20	0.18	0.14	0.21	0.17	0.22	0.25	0.19
16 Creating standard place, supplying up to date hardware and software equipment and facilities and utilizing advanced technology	0.18	0.22	0.27	0.16	0.26	0.25	0.25	0.24	0.23	0.24	0.24	0.22	0.20	0.18	0.17	0.16	0.14	0.22	0.25	0.17
17 Fostering Islamic-Iranian culture, ethics and …	0.15	0.18	0.21	0.14	0.21	0.19	0.19	0.18	0.17	0.19	0.19	0.19	0.15	0.14	0.15	0.15	0.10	0.17	0.19	0.16
18 Raising invention registration	0.13	0.18	0.22	0.12	0.20	0.20	0.21	0.20	0.18	0.18	0.18	0.18	0.15	0.12	0.13	0.15	0.11	0.14	0.20	0.14
19 Raising academic productions and developing technical knowledge	0.16	0.22	0.26	0.14	0.23	0.24	0.23	0.22	0.21	0.21	0.21	0.21	0.19	0.14	0.15	0.18	0.13	0.22	0.18	0.15
20 Having productive competent human resource who are committed to Islamic values and professional ethic and having optimum structure	0.21	0.25	0.29	0.19	0.29	0.27	0.28	0.26	0.25	0.27	0.27	0.26	0.23	0.19	0.20	0.22	0.19	0.25	0.28	0.16

	$D_i + R_i$	$D_i - R_i$
Financial perspective		
1	7.30	1.02
2	8.00	−0.13
Stakeholder		
3	8.81	−0.73
4	5.03	−0.76
5	8.69	−0.35
6	8.37	−0.56
7	8.37	−0.45
Process perspective		
8	8.23	−0.05
9	7.87	−0.13
10	7.89	−0.46
11	7.98	−0.45
12	5.90	0.00
13	7.08	0.01
Learning and growth		
14	7.73	−0.40
15	7.44	1.46
16	7.75	0.76
17	6.09	0.74
18	7.27	−0.63
19	8.34	−0.54
20	7.89	1.66

Table III. The value of influence ($D - R$) and relation ($D + R$)

Objective no.	Receiving influence from	QTY	Dispatching influence to	QTY
1	–	0	2, 3, 5, 6, 7, 11, 19	7
2	1, 3, 5, 8, 15, 16, 20	7	3, 5, 7, 19	4
3	1, 2, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 16, 19, 20	15	2, 5, 6, 7, 10, 11, 19	7
4	–	0	–	0
5	1, 2, 3, 6, 7, 8, 9, 10, 11, 12, 15, 16, 19, 20	14	2, 3, 6, 7, 8, 9, 10, 11, 18, 19	10
6	1, 3, 5, 7, 8, 9, 10, 11, 15, 16, 19, 20	12	3, 5, 7, 19	4
7	1, 2, 3, 5, 6, 8, 9, 15, 16, 20	10	3, 5, 6, 8, 19	5
8	5, 7, 15, 16, 19, 20	6	2, 3, 5, 6, 7, 10, 11, 18, 19	9
9	5, 15, 16, 20	4	3, 5, 6, 7, 19	5
10	3, 5, 7, 8, 11, 15, 16, 20	8	3, 5, 6	3
11	1, 3, 5, 8, 15, 16, 20	7	3, 5, 6, 10	4
12	15, 16, 20	3	3, 5	2
13	20	1	3	1
14	–	0	–	0
15	–	0	2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 18, 19	12
16	–	0	2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 18, 19	12
17	–	0	–	0
18	5, 8, 16, 20	4	–	0
19	1, 2, 3, 5, 6, 7, 8, 9, 15, 16, 20	11	3, 5, 6, 7	4
20	–	0	2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 18, 19	13

Table IV. Quantity of dispatching and receiving objectives

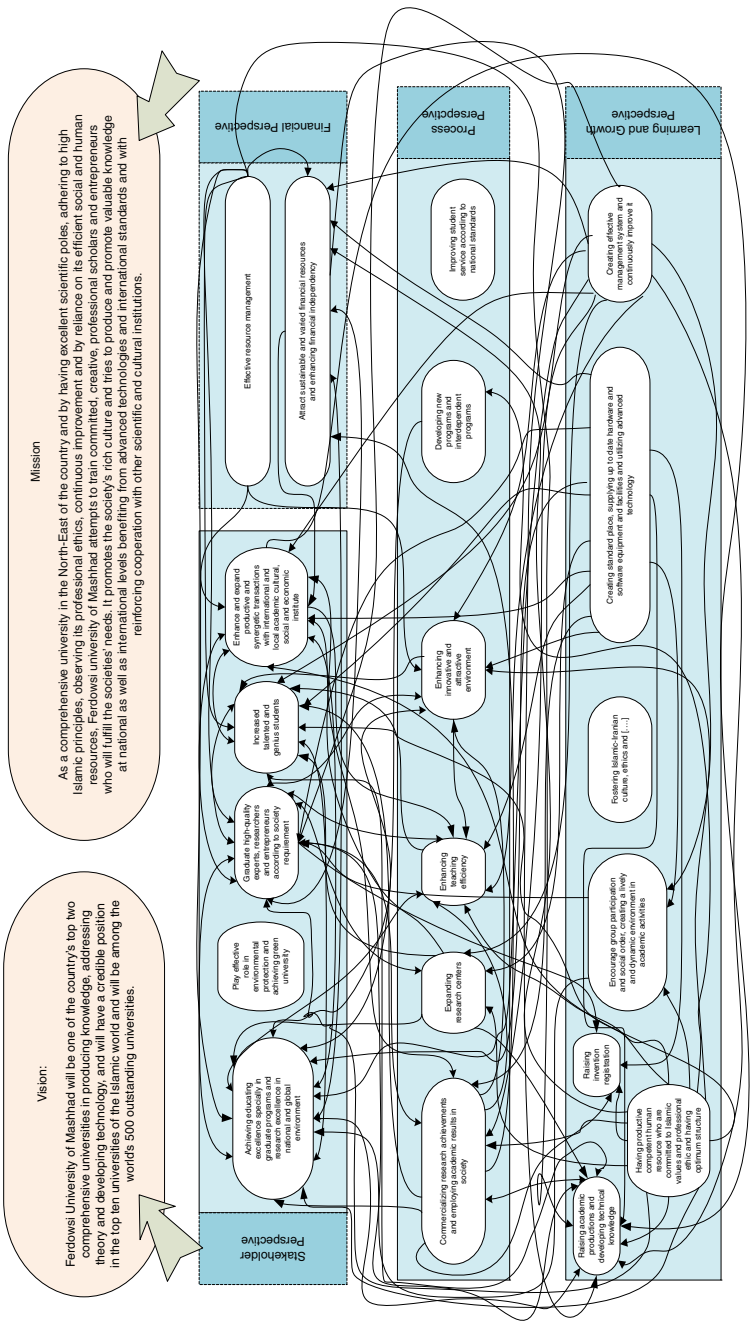


Figure 4.
Strategy map of Ferdowsi University of Mashhad

As can be seen in Table IV, objective no. 20 has the largest number of objectives dispatching influence to and it is the main cause factor while objective no. 3 has the greatest number of objectives receiving influence from and it is the main effect factor.

5. Conclusion

In this research we utilize DEMATEL method to determine causal relationship among objectives of FUM. Using DEMATEL as a structural decision-making model to develop the strategy map of university and prioritizing its objectives is the distinction of this research from previous studies. Those studies develop their strategy maps only by expert's rule of thumb. Through DEMATEL method the main cause and effect objectives of university is determined.

The analysis result reveals that objective no. 20, "Having productive competent human resource that are committed to Islamic values and professional ethic and having optimum structure," is the main cause factor in FUM. It has the highest priority among all FUM objectives and requires strongest attention from decision makers. This objective is located in learning and growth perspective of FUM strategy plan. So this result is in accordance with Kaplan and Norton (2004) theory that learning and growth perspective is the foundation of organization plan. Accordingly, the second and fourth causing factors which are "Creating effective management system and continuously improve it" and "Creating standard place, supplying up to date hardware and software equipment and facilities and utilizing advanced technology," are also belong to this perspective. In accordance to our finding, Wu *et al.* (2011) in their study mention that focussing on employees' satisfaction; capabilities and knowledge have highest priority for extension education centers. Objective no. 20 has the strongest influence on objective no. 3 and 5. In this regard the main cause for FUM to achieve educating and research excellence, and also to graduate high-quality experts and researchers is having competent human resources.

Financial and stakeholder perspectives define result of strategy. Objectives of these perspectives are lagging indicators of organization performance (Kaplan and Norton, 2004). In this regard, as we found most of objectives of these perspectives have negative $(D-R)$ value. Main and third effect objectives, objective no. 3 and 6, belong to stakeholder perspective. They both receive strongest influence from objective no. 20. However, objective no. 3 receives its second strongest influence from objective no. 15 and the third from objective no. 16. The second and fourth main effect objectives are from learning and growth perspective, objective no. 18 and 19. They both receive strongest influence from objective no. 20. Therefore, to increase invention, academic productions and developing technical knowledge, FUM need to have competent human resource. Additionally, competent human resource is also the most important cause of attracting talented students.

In conclusion, in the time of limited amount of resources FUM can use this strategy map to prioritize its objectives. Management could better invest limited resources in areas that need improvement most through the logically constructed strategy map (Wu, 2012). According to Wu *et al.* (2011) cause and effect relationships extracted by DEMATEL method are rational and provide managers with a distinct road map to plan their strategy-related activities. Therefore FUM requires to pay more attention to employees education, and provide more resources for this matter. It needs to imply performance evaluation to make sure employees performance remain in an acceptable level. It can invest more on motivation methods to elevate their performance. The second priority object is applying effective management system, so it requires to apply

process improvement, restructuring the organization, establishing management system based on information. According to strategy map, by giving priority to above mentioned plans it may achieve excellence in education and research, increase academic production and invention and also attract talented students.

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