ORIGINAL ARTICLE

DEVELOPING INFORMATION TECHNOLOGY DEVELOPMENT STRATEGY WITH COMBINED FUZZY SCREENING APPROACH AND BALANCED SCORECARD (CASE STUDY:ICT UNIT OF MUNICIPALITY OF KHOMEINI SHAHR OF ESFAHAN)

Mozhgan Zahiri1, Hamed Fallah2, Ali Morovati sharif Abadi3
1. IT Management students of Yazd University of Science and Arts
2. Assistant Professor School of Management, University of Science and Arts of Yazd
3. Assistant Professor School of Management, University of of Yazd

ABSTRACT: By increasing the strategic management programs in the country organization, the need to provide a comprehensive approach to strategy formulation is revealing more than ever in this regard, strategic planning, systematic efforts to make fundamental decisions and activities that give shape and direction of what an organization is. The purpose of this study is developing a fuzzy model to evaluate the performance using the balanced scorecard techniques and fuzzy screening for ICT municipality. The research was carried out by survey method. The samples have formed by staff and experts ICT municipal center of Khomeini shahr and including 10 individuals. At the beginning through interviews with experts of the SWOT matrix is created, and then using the fuzzy screening method based on the four perspectives of balanced scorecard, initial strategies were analyzed and finally screened strategies using expert opinions on aspects of the balanced scorecard were separated. Evidence indicates that the ICT unit of the municipality should equip and deployment of new information technology in different parts of the municipality on perspective of their work, it also shows the results of applying this heuristic model and this model can be viewed as a comprehensive framework for organizations to develop strategies to be employed.

Keywords: Strategy, Matrix SWOT, Balanced Score screening, Fuzzy screening

INTRODUCTION

Strategic planning is a systematic effort to make fundamental decisions and actions that shape the nature and direction of an organization (Braysvn and Kay Alston, 2010). All organizations are constantly changing and turbulent, even organizations that managers believe that organizations are static. People are constantly coming and going, organizational requirements, budgets, needs and expectations of stakeholders . . . constantly are changing. Strategic enterprise management, the organization that wants to reach the conditions that determined and through an action plan for future changes, manages (Kaplan and Norton, 1996). The term strategy is derived from the Greek word strategy the work has gone in about 400 BC and the art and science of directing military has said. The strategy defines the strategy is to design and manage programs to achieve results consistent with the mission and objectives of the organization are in place: strategy is a comprehensive plan, and complete units for the purpose of a special institution to deal with environmental change. Bruce Henderson, a prominent commentator and founder of the Boston Consulting Group, strategy is defined as follows:

Create a unique advantage to distinguish the organization from competitors. And the job management considers this distinction (Allen and Holmes, 2006). Strategic management can be defined thus: the art and science of formulating, implementation and evaluation of multiple decisions that enable an organization to achieve its long term goals. The strategic management process comprises three stages: the formulation of strategy, strategy implementation and evaluation strategies (David, 1999). High attention to strategic planning questions that have long occupied the minds of managers has highlighted more than ever: What about competition in the industry or industries in which we operate are going to drive it? What would be the possible actions of competitors and what is the best way to respond to their actions? What will be the industry's progress on our work? How can companies best positioned to compete in long-term contracts (Porter, 1998)?

Basically, developing a competitive strategy is meant to provide a broad formula for explaining how to compete in a business, objectives and policies are needed to determine whether the objectives are attained. In this context, due to the increasing development of information technology, considerable importance in the field

of strategic planning also worthy investment organizations and local companies in this field are doing, organizational commitment and the rapid changes occurring in the external environment, investigate and identify the factors affecting this area and Readiness Assessment to welcome the management of these projects is necessary (Nikolaou and Evangelinos 2010). Most IT organizations are faced with the surprise and the need and information systems and information technology as part of the deal. But gradually the various islands directly to design, equip, operation and support of information systems have become their own which leads to inappropriate interactions between parts of the organization, rework increases lack of harmony with the objectives and strategy of the organization and Development of information technology has become. The disadvantage of forcing organizations to think the wandering islands under a single system, organize for IT organizations planning their own (Rauch, 2007). Status of systems, methods and techniques in the body and how to communicate with each other and determine its strengths and weaknesses, and ultimately improve the performance of organizations, an issue that has attracted the attention of managers, more companies and organizations are located. Therefore, we use different methods and techniques and understand how it relates encapsulation and identification capabilities of these techniques and methods; we provide a comprehensive approach to develop strategies that deal, that this method will be presented in the form of a model.

MATERIALS RESEARCH

In this study, considering the importance and necessity of the categories of "IT" and "Strategic Management", seeks to identify strategies for designing information technology in the IT sector council Khomeini city. Research in term of practical purposes and in term of the nature of method is descriptive survey and in term of data collection component is a field research. After the theoretical studies (articles and other resources) and field (interviews with academic experts and municipal), the vision, mission and goals of IT was extracted, the IT strategies identified through the SWOT matrix and then the strategies obtained by the four-aspects balanced scorecard approach will be screened and finally screening strategies in four-aspects balanced scorecard was finally, strategies were separated by experts in the four-aspects balanced scorecard.

RESEARCH QUESTIONS

• Which are the main factors affecting the ICT strategies of ICT?
• How would be the process of using a combined approach of balanced scorecard and fuzzy screening strategy?
• Does fuzzy screening approach have the ability to assess and rank the indicator effects on IT strategy?

REVIEW OF LITERATURE

Strategy: The strategy is design and manages programs to achieve results consistent with the mission and objectives of the organization, which leads to a competitive advantage over competitors. In this study we plan our strategy for the organization (Allen & Helms, 2006) term strategy is derived of Stretegema the Greek word meaning Chief of the Army, comprised of army Ago Stratos meant to be taken literally leader. The root of the word strategy in some sense Stratum means way, path, or river bed has been considered. In some other sources this word of knowledge and art, turning it into old Greek generals called Astratgvs introduced. However, the concept of technology strategy at the beginning of the directing means, matching and synchronization of forces to achieve military objectives of the war has been handled (Kenneth, 1971).

Analysis SWOT: Analysis SWOT, strengths and weaknesses of internal as well as external opportunities and threats are analyzed to infer the next possible strategies (Rauch, 2007).

Balanced Scorecard: Balanced Scorecard performance from four aspects is including aspects of financial, customer, internal process and learning and growth measures. Assess financial and non-financial aspects of a common language to help senior executives and employees towards the organizational vision. (Han et al, 2009) balanced scorecard performance from four aspects including financial aspects, customer, internal processes and learning and growth measures. Assess financial and non-financial aspects of a common language to help senior executives and employees towards the organizational vision (Yi and Wu et al, 2009). The balanced scorecard is a strategic approach and performance management system in the organization to implement the strategy and vision of the organization can use the (Chen Hyang-2009). Balanced scorecard framework for describing strategy is to create value for us. Balanced

Scorecard framework, take a few important elements:

• Financial performance indicators are delayed, the ultimate definition of success is achieved. Strategy describes how to create sustainable growth for shareholders.

• Confiscation Success target customers, a key factor in improving financial performance. Customer funds in addition to the measurement of the output delay, success in areas such as customer satisfaction, retention and customer growth, customer value provided to the defined objective. Select the value provided to the customer is the key element of strategy.

• Internal processes people and provide value provided to customers. Internal processes to enhance the sub-leading performance indicator in the customer and financial outcomes

• Intangible assets are the ultimate source of sustainable value creation. Objectives of growth and learning, the integration of people, technology and other relevant organizations to support the strategy described. Improvement in the standards are leading indicators for growth and learning, internal processes, customer, and financial performance. The objectives of the four faces have joined together in a chain of causal relations. Progress and direction intangible assets leads to improved process performance that can be successful in attracting and retaining customers and stakeholders are satisfied. Screen fuzzy systems, fuzzy screen to select a small subset of a large class of sets has been proposed to further investigation (Yager , 1993). Yager screen approach called fuzzy screen system to select a small subset of a large class of categories proposed for further investigation.

Phase screen method using fuzzy sets for fuzzy data analysis is developed. Screening approach for decision-making by Yager presented has three advantages:

1 This method of screening options with a limited or insufficient, effective and efficient because it is based on a consensus of opinion.

2 This technique only needs to consider the decision maker's preference in the form of a linguistic scale in the range such as high, medium, low expressed.

3 This technique is based on fuzzy set theory (Wang et al, 2010). This technique is a non-

numeric scale for the evaluation and selection needs.

Information Technology Strategic Plan

Most IT organizations are faced with a surprised and the importance of information systems and information technology as part of the deal. But gradually the various islands directly to the design, equipment, operation and support of information systems have become their own which leads to inappropriate interactions between parts of the organization, increasing again, in coordination with the IT development objectives and strategy of the organization and the disadvantage of forcing organizations to think that this wandering and scattered islands under a single system, organize for IT organizations planning their own. Information Technology Strategic Plan for any organization, the document is strategic considerations in light of the information architecture of such a mission, determining the goals and priorities of the action plan for the systems and databases in the organization should be run. In other words, Information Technology Strategic Plan is Bill of large organizations and programs in the field of information technology (Ali Dousti, 2005).

Four major reasons for the trends of the IT strategic plan are as follows:

- Develop and improve technology
- Lack of skilled manpower
- Restriction of resources
- Creation of an integrated system.

RESULTS AND DISCUSSION
A) DEVELOPING ICT UNIT STRATEGY OF MUNICIPAL

Given the purpose of this study is to assess the current status of ICT, during meetings with leaders of the IT department of the central municipal of the city of Khomeini's strengths and weaknesses and the opportunities and threats were determined finally, a meeting was held with the expert strategies were identified. Then, according to the strengths and weaknesses, opportunities that organizations and threats faced by forming a matrix SWOT, Strategy First unit was designed for these strategies into four distinct WT, WO, ST, SO.

Table 1 internal factors of Municipal ICT Unit

Strengths	Weaknesses
1 associated with network infrastructure 2-position hardware municipality in the Username 3 are interested and qualified experts 4 willingness of managers and experts in the implementation and provision of electronic services 5 Create a new financing of services 6 Holding the overall shop floor feasibility and Training 7 Ability to plan and desire to improve methods 8 There are website 9-lower cost of recovery methods and standardize 10-decreasing cost of providing a service electronically 11 position of the software infrastructure for user 12 There are maps, GIS 13- Ability to pay electronically on the Web 14 Planning the electronic records 15 reviewing, evaluating and upgrading hardware and software technology.	1 lack of expertise in the IT field 2Lack of integration software for municipalities 3 lack of a comprehensive IT plan 4 The lack of statistics on municipalities 5 lack of training of IT staff 6 poor infrastructure and information security 7 failure to exploit the statistical information and research council 8 Lack of R & D 9 The lack of a strategic plan 10 Lack of Electronic Service Brokerage Offices 11 The lack of assessment and evaluation of IT professionals on a daily and seasonal activities 12 The need to educate citizens 13 lack of clear job description IT staff 14 The lack of guidelines and administrative practices codified in the development of e-services 15 The absence of Trustee and Executive Committee and guidelines for the development of electronic services 16 The lack of sponsorship and track IT issues in a municipal agencies 17-credit assignment problem 18-lack of resources (facilities, equipment, etc.) 19 Insufficient training of staff

Source: researcher's findings

Table 2: external factors of Municipal ICT Unit

Opportunities	Threats
1state network 2 There are universities and scientific centers 3 are experienced counselors 4 binding legal 5 credits 6 bed teaching of citizenship in electronic form 7 Directors welcomed urban and rural 8 allows the use of electronic equipment in the city 9 employment for youth 10 may reduce commuting 11 The possibility of teleworking 12 The increasing penetration of IT in households 13 There are training centers for IT 14 Using the experience of other cities and municipalities 15-present experienced contractors in the field of IT	1 Lack of IT professionals and lack of coordination of different departments 2 the lack of legal requirements 3 Lack of support from IT Innovators 4 Weaknesses IT culture in public 5 climatic conditions, geographic Khomeini in terms of t 6 Lack of fiber 7 Lack of information capabilities of other departments and agencies of the project 8 Lack of urban Database 9-speed changes in the IT.

Source: researcher's findings

After evaluating the current status of ICT Councils, the following strategy was proposed to improve the situation in the future by the experts :

Table 3: SWOT matrix

SO	WO
1 help preserve the environment Baa services 2 develops information technology management 3 reduce costs through improved service delivery methods and 4 standardization and integration of its IT projects 5 Trying to prepare various GIS layers 6 Trying to use the services of Urban Affairs 7 software and hardware updates 8 transfer project development services using participatory opportunities 9 training classes for staff orienting and Municipal Employees	1 shortage of man power in the field of IT 2 the need for training and evaluation of staff IT 3 efforts to implement the Electronic Municipal 4 the need to use the services of contractors in IT projects 5 prioritization of projects and efficient use of funds and resources 6 must be completed within the IT infrastructure 7 Organizing the Records of Municipal Statistics 8 Development of quantitative and qualitative Brokerage Services Electronic Services 9 Organizational entity responsible for the administration of a setting constant pursuit of Electronic Service 10 Gradual system was replaced by a system of electronic services 11 Management Problems and causes weakening of Informatics and strengthen the unit
ST	**WT**
1 Creation and development of the structure and activities of the municipality in order to overcome the shortcomings of information	1 the need to develop citizenship education in IT 2 efforts to attract public funds and private contributions 3 Create Database City 4 lack of direct investments and enter into the realm of the executive with respect to the external constraints and lack of resources

Source: researcher's findings

B) HOW IS USING TECHNIQUES LIKE FUZZY SCREEN?

As previously mentioned should seek strategies that are most beneficial for the organization, therefore, the strategy of SWOT matrix must choose strategies that are able to satisfy the organization's overall strategy. Screening strategy to phase-screen method is used. Where the strategy of SWOT as "Options / hows" and four criteria for the balanced scorecard as "release criteria / how things" could be considered. At this stage, the strategy of SWOT matrix will be reviewed individually experts in relation to the overall assessment balanced scorecard satisfy the four criteria specified by the strategy. Strategies that score less than M (medium) get deleted and strategies with a score equal to or greater than M for the execution of the work are selected. At this stage, the experts were asked to rate the importance of vision in changing linguistic criteria express

C1: the financial aspect, C2: means internal processes, C3: the client side, C4: Money Growth and Learning then each of the experts were asked to consider the possibility of satisfying criteria (C 1, C2, C3, C4) are identified by each strategy. The next step is to determine the qualification of the expert of each option (strategy) is defined as follows importance should therefore be as negative as follows:

A) $Neg(S_i)=S_7-i+1$

When the option unit (strategy) by each expert (U) is calculated as follows:

$U_{ik}=min\{Neg(I_{kj})\vee\pi_{ikj}\}$ $I=1,2,\ldots,m$ $K=1,\ldots,r$

Uik: The individual unit score k is associated with the options ith

Ikj: degree of importance of criteria j-th from expert view k

πikj: amount of ability to satisfy the criteria j th by the options k th from person view

Then, according to Neg (Ikj) and (πik) that calculated score of each individual expert (Uik) obtains for each strategy. Now it turns out that the combined evaluation by experts in order to reach an overall assessment for each option. The assessment for this unit of experts for each option now are descending into the decision-making body of the association QA (k) take into the account then, with an r = 10 (number of experts), and the (S1, S2, ..., S7) q = 7 we have:

$Q_A(k)=S_{b(k)}$

$b_k=int[1+k\dfrac{q-1}{r}]=int[1+\dfrac{3k}{5}]$

Finally, examination of the strategy is as follows:

$U_i=max\{a(j)\wedge B_{ij}\}$

Bij denotes the j-th good grade solution is i (a (j implies that the decision maker feels that it is necessary expert support at least j.

Thus, it is important that strategies are selected to be equal to or greater than the average of the results is as follows:

1 strategy to help preserve the environment by using service IP

2 strategies to generate management information technology

3 Strategies to reduce costs through improved service delivery methods

4 standardization and integration of its IT projects

5 efforts to provide multiple layers

6 GIS attempt to use the services of Urban Affairs

7 software and hardware updates

8 transfer project development services using participatory opportunities

9 The development of the structure and activities of the municipality in order to overcome the shortcomings of information

10 supply shortage of man power in the field of IT

11 The need for training and evaluation of staff IT

12 Trying to run commerce

13 necessary to use the services of contractors in IT projects

14- in the area of IT infrastructure necessary to complete

15 organize the data in the Municipal Records

16 The gradual replacement service Electronic Systems

17 Management Problems and causes weakening of Informatics and strengthen the unit

18 requirement for the development of citizenship education in IT

19 Trying to attract public funds and private contributions

20 Create Database City

21 training classes - the justification for the staff and employees of the City

A) - LOCATING STRATEGIES FUNDS BALANCED SCORECARD

After phase screening strategies, each of the strategies according to the experts on aspects of the balanced scorecard (financial, customer, key processes, welding capability) is allocated. The next feature is the ability to change and improve the instruments and how to analyze the following key processes process excellence for customer satisfaction and customer after customer expectations of the organizations studied. The financial aspect of financial strategies to achieve the mission and vision should be noted, are expressed. In Table 5 strategies of each of the dimensions shown.

Table 5: Locating Strategies Funds Balanced Scorecard

Dimension	Areas	Strategy
Reliability of instruments	Institutional Investors	Development of the structure and activities of the municipality in order to eliminate the shortcomings of information
	Investors information	Software and hardware updates
		Gradual replacement service Electronic Systems
	Human Capital	IT staff training and evaluation of them
Key Processes	Innovation processes	Help preserve the environment by using services
		Established management
		Recorded Statistics system in the municipal
		Create Database City
	Customer management processes	Reduce costs through improved service and delivery methods
	Operational management processes	Standardize and integrate its IT projects
		Using the services of Urban Affairs
		Preparation of GIS layer
		Create-commerce
		Use of advisory services contractors in IT projects
		Management problems and factors leading to impaired function of Informatics and strengthen the unit
	Social and legal processes	-
Customer	People and organizations are	Culture and the development of citizenship education services
	Personnel and Municipal Employees	Training classes - the justification for the staff and employees of the municipal
Financial	Financial	Transfer of executive development services using participatory opportunities
		Shortage of man power in the field of IT
		Trying to attract public and private funding
	Mission	Completed in the area of IT infrastructure

CONCLUSIONS

This study clarified the ability of the various techniques involved in strategy formulation and explains their relationship to one another, a comprehensive model for proposed strategy and the combination of these techniques and tools to address the weakness that has helped lead the way with the fewest weaknesses. The overall model is proposed to develop a strategy to

provide a model for ICT Unit of Khomeini city municipal discussed and the analysis of this model; we identified strategies for these units. The important thing is to show the ability of this model is instead of using the balanced scorecard are four criteria that were used in the model and another example would be the criteria for screening strategies used their own criteria therefore recommended considering this is a new model with a new measure is presented.

REFERENCES

John M. Brayson and Farnom Kay Alston, the creation and implementation of strategic plans, Arabs and Mustafa Muhammad Taqi Zadeh. Tehran, Mahkameh.2010.

Khorshid P. Performance Evaluation Model for IT companies based on the balanced scorecard techniques, screen-phase process of fuzzy network analysis and multi-criteria optimization and compromise solution. Agricultural fifth year. (17), Fall 2012: 51 82.

Ali Dousti SA. Key factors affecting the full extent of IT usage in the industrial departments of government agencies in Iran (Case Study: Fars Province). PhD thesis, Systems Management, Tehran University2005.

Kaplan RS, Norton DP. Using balanced scorecard as a strategic management system , Harvard Business Review, January – February, 1996: pp 75-85.

Kenneth RA. The Concept of Corporate Strategy. Dow Jones Irwin Inc. Homewood, Illinois, 1971: 26-27.

Allen RS, Helms MM. Linking strategic practices organizational performance to Porter's generic strategies . Business Process Management Journal, 2006: Vol. 12 No. 4, pp 433-454.

David FR. Strategic Management (7th Ed), Prentice – Hall, Inc ,(Chapter1). 1999.

Chen Huang H. Designing a knowledge-based system for strategic planning: A balanced scorecard perspective. Expert Systems with Applications 2009: 36 , 209- 218.

Porter ME. Competitive Strategy: Techniques for analyzing industries and competitors with an Introduction. New York: Free Press. 1998.

Nikolaou IE, Evangelinos KI. A SWOT analysis of environmental management practices in Greek Mining and Mineral Industry. Resources Policy, 2010: 35 , pp 226–234

Rauch P. SWOT analyses and SWOT strategy formulation for forest owner cooperations in Austria. Eur J Forest Res 2007: 126, pp 413-420

Hung-Yi W, Gwo-Hshiung T, Yi-Hsuan Ch. A fuzzy MCDM approach for evaluating banking performance based on Balanced Scorecard, Expert Systems with Applications, 2009

: NO. 36, pp 10135-10147.

Wong WK, Zeng XH, Au WMR, Mok PY, Leung SYS. A fashion mix-and-match expert system for fashion retailers using fuzzy screening approach. Expert Systems with Applications. 2009: 36, 1750–1764.

Yager RR. Fuzzy Screaning Systems, in: R.Lowen and M.Roubens eds.Fuzzy Logic: State of the Art, Kluwer, Dordrecht, 1993: pp 251-261.