The Relationship between Information Systems Strategic Management Based on Balanced Scorecard and Information Systems Performance

Maryam Ebrahimi[1], Alireza Hassanzadeh[1], Shaban Elahi[1] & Mahshid Ebrahimi[2]

[1] School of Business and Economics, Tarbiat Modares University, Tehran, Islamic Republic of Iran

[2] School of Management, University of Tehran, Tehran, Islamic Republic of Iran

Correspondence: Maryam Ebrahimi, School of Business and Economics, Tarbiat Modares University, PO Box 14115-111, Jalal Ale Ahmad Highway, Tehran, Islamic Republic of Iran. Tel: 98-21-8806-3104. E-mail: mar.ebrahimi@gmail.com

Received: April 15, 2013 Accepted: June 26, 2013 Online Published: July 2, 2013

doi:10.5430/ijba.v4n4p35 URL: http://dx.doi.org/10.5430/ijba.v4n4p35

Abstract

In the present study, the model of information technology balanced scorecard (ITBSC) was used, because of the importance of information systems (IS) performance evaluation. Moreover, information systems strategic management based on systems performance was considered in order to formulate the information systems strategy based on the results of the systems performance. The information systems strategic management was analyzed on the basis of balanced scorecard maturity model. The research aims to answer this question that "is there any significant relationship between information systems strategic management based on balanced scorecard and information systems performance?" To do this, a sample group including 30 organizations in Tehran - the capital city of Iran - was selected and the maturity status of IT balanced scorecard and the performance degree of their information systems were studied. It was concluded that increase (decrease) in the level of information systems strategic management based on balanced scorecard cause to increase (decrease) in performance of information systems and vice versa.

Keywords: balanced scorecard, strategic management, IT, information system

1. Introduction

Nowadays, the growth of IT role in achieving organizational goals brings some questions into mind about effectiveness of IT department of the organization, success of IT programs and profitability of investments in different IT areas. It shows that all organizations are involved in measuring value of IT and assessment of information systems performance (Martinsons et. al., 1999).

Lee and Menon (2000) insisted on the positive relationship between investment on IT and organization productivity. In addition to productivity, investment on IT has made a great value for customers (Mingfang and Richard Ye, 1999). Shao and Lin (2001) have discussed about the positive effect of information technology on technical efficiency of production processes.

Despite of its benefits, a sense of dissatisfaction has been created about investment on IT some of which was because of limitations in defining measurement criteria for the value added to the organization by IT (Stewart and Mohamed, 2003).

It is very difficult and complicated to measure benefit of IT. Keen (1991) has introduced some reasons for this complexity.

1) Investment on the IT field usually doesn't lead to benefit directly. Similar to research and development and human resources management, the benefits of IT are rarely related to obvious costs of the same area in a direct way. The benefits resulted from such investment is not easily recognizable, especially when investments are made in areas such as organizational effectiveness and culture.

2) The same amount of investment on the same technology may cause to different results, as it is the management processes in the organization that indicate quality and quantity of achieved benefits through technology.

3) In traditional accounting system, many benefits and added values resulting from IT are not showed.

Typically, investing on IT is related to organization strategy and the relationship between IT and organizational performance should be studied in the strategic management framework (Bharadwaj et. al., 1993; Sircar et. al., 1998; Balanced Scorecard Institute, 2004).

Assessment of IT performance depends on its true execution. There are several methods of assessing IT performance some of which are rate of return on investment, net present value, etc. But since it is necessary for IT to be in line with the business, consistent control and assessments and regarding intangible capitals, the balanced scorecard of IT is used to assess IT performance in the present study, and then, a comprehensive model for IT balanced scorecard extracted from existing researches is delivered (Martinsons et. al., 1999; Stewart and Mohamed, 2003; Epstein and Rejc, 2005; Kaplan and Norton, 1993, 1996, 1996, 2004; Martinsons, 1992; Stewart, 2002, 2007; Watts, 2003; Van Grembergen and Saul, 2001; Van Grembergen, 2000; Van Grembergen and Van Bruggen,1997; Van Grembergen et. al., 2003).

Additionally, the balanced scorecard performance management tool has been offered by Kaplan and Norton (1996) as "...the cornerstone of a new strategic management system..." (Atkinson, 2006). In the other words, the strategic management of information systems is needed to make a strategic advantages of information systems and the alignment of investments on IT and organization strategy. In addition, strategy formulating of information systems based on the results of information systems performance causes to always-up-to-date strategies. Therefore, the present study about strategic management of information systems considers the performance of information systems and analyzes information systems strategic management based on balanced scorecard through using the balanced scorecard maturity model (Luftman, 2001).

2. Problem Statement

Investment on IT is broadly developing and in the same time, the managers concern whether the advantages will be as expected. This is called the paradox of investment on IT or black hole of IT. In the other words, bulk money is expensed for IT, whereas it is expected that the bulk money is swallowed by the big black hole without any value return. The IT/ information systems balanced scorecard is utilized amongst other methods of measuring IT.

There are two different presumptions in researches made until now about the balanced scorecard which are as follow (Ghaeni, 2006):

1) Similar to total quality management (TQM), the balanced scorecard as a measurement instrument follows improvement of organization performance.

2) The balanced scorecard as a strategic management instrument using which the organization tries to remove obstacles in the way of executing the organizational strategy such as translating organizational strategy to goals.

Until now and regarding the existing researches, the balanced scorecard is viewed more as a performance measurement instrument, whereas it can also be an instrument of strategic management in each industry, even IT industry. Despite existing researches, this study is to view the balanced scorecard from both aspects, especially in IT industry which differs from other industries by difficulty of its effectiveness control.

The present study aims to answer this question that "is there any significant relationship between information systems strategic management based on balanced scorecard and information systems performance?" On this basis, the hypothesis of the research is as follows: "there is a significant relationship between information systems strategic management based on balanced scorecard and the performance of information systems.

"Information systems strategic management based on balanced scorecard" and "information systems performance" are two variable of the research. To study strategic management of information systems, the model of balanced scorecard maturity was used. Also, the model of comprehensive balanced scorecard of IT was utilized for studying information systems performance.

3. Theoretical Basics of the Research

The framework of the IT balanced scorecard is structurally similar to the model introduced by Kaplan and Norton. Although this model with four aspects: financial, internal processes, customer satisfaction and growth and learning, has been judged suitable in different companies and industries, these four aspects should merely be considered as a primary framework, not a general one. In the other words, these aspects should be adopted according to situation and special activities of IT (khanlari & mohammadi, 2006).

In this paper, to propose a comprehensive model including aspects and indicators for assessment of information systems performance, several models have been studied. In the proposed model, four aspects as financial, internal processes, user satisfaction, and growth and learning were used which are based on primary framework presented by

Kaplan and Norton and existing models.

Epstein and Rejc, 2005, indicate goals and criteria for the IT balanced scorecard as following figure:

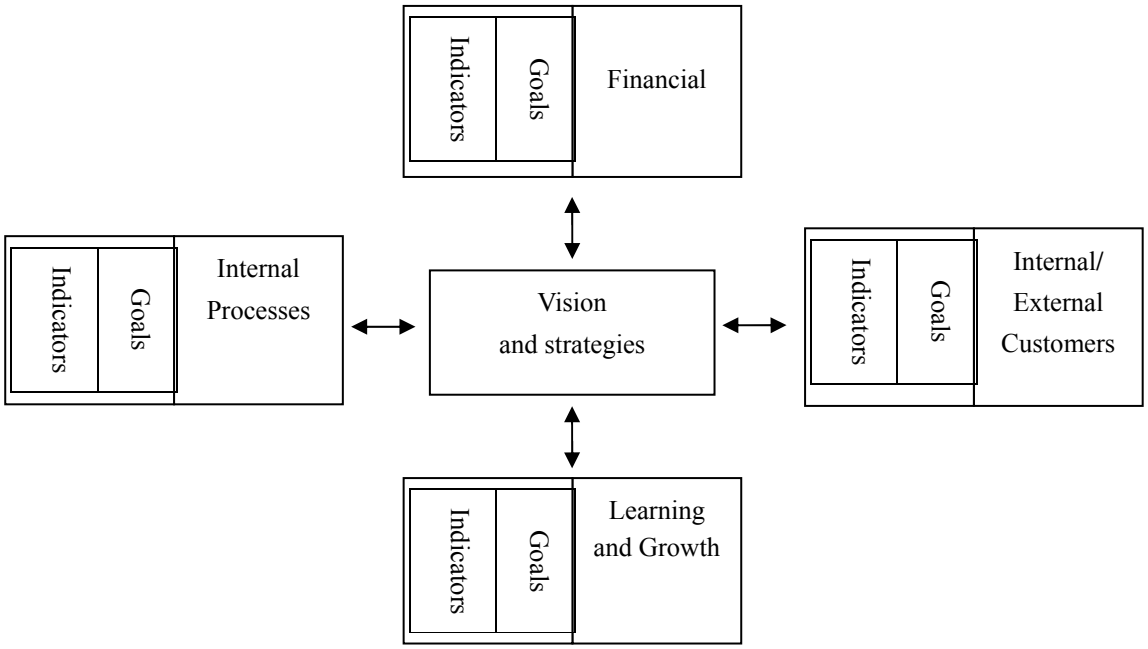

Figure 1. IT balanced scorecard (Epstein and Rejc, 2005)

Four aspects of the IT balanced scorecard are as follows:

a) Financial: financial indicators are very important in most organizations. Such organizations struggle to increase income, to decrease costs and risks, to use of properties most-effectively and boost the productivity (Kaplan and Norton, 1993, 1996, 1996, 2004). In this model, the goal of financial aspect is profitability and includes following indicators: the percentage of changes in stock price through IT initiations, the income growth and the percentage of total decrease of costs (Epstein and Rejc, 2005).

b) Customer: the managers must be aware of this issue- whether the organization can satisfy its customers' needs. To do this, all value transferring to the customer should be indicated and measured (Kaplan and Norton, 1993, 1996, 1996, 2004). In this model, customers are divided into two groups: internal and external. The internal customer is used in circumstance in which the organization refers to its departments or divisions to receive some IT services. Customer loyalty, adding value, absorbing customer, improving quality and increasing productivity are goals of this aspect which consist of indicators such as: customer's profit average, profit resulting from IT projects, customer satisfaction from IT activities, customer longevity percentage, the percentage of new visitors who revisit, the percentage of returning customer for revisiting the website, the number of customers absorbed via IT innovations, the percentage of website visitors who make a purchase too, the number of cooperation with the customer, the percentage of saving because of redundancy reduction, the percentage of reducing customers' complains, the percentage of saving because of quality improvement, the percentage of increase in customer's processed orders and the percentage of increase in the rate of production in respect of personnel (Epstein and Rejc, 2005).

c) Internal processes: measuring the degree of value producing and the way of relating processes can help managers to understand the works. Thus, it is necessary to identify the processes which are required to achieve the goals related to customers, shareholders, etc. and to investigate them (Kaplan and Norton, 1993, 1996, 1996, 2004). Improving processes, products and services of IT, increasing security, standardizing IT infrastructures and return of the resources are goals of this aspect which consist of indicators such as: the number of new presented products and services, the average time required for answering customers' requests via IT, the percentage of information systems failures, the number of applications not completely integrated with the whole system, the percentage of standardization of the software, databases and applications, and the percentage of return of IT costs dedicated to company units (Epstein and Rejc, 2005).

d) Growth and learning: capability of an organization for innovation, improvement and learning is directly connected

to its value as an organization. An organization can get growth and innovation only when it is able to develop its skills and leadership, get the lessons of its and other organizations' faults and mistakes and establish its own new methods (Kaplan and Norton, 1993, 1996, 1996, 2004). Measuring the performance and development of skills and knowledge of IT personnel are the goals of this aspect which consist of indicators such as: the percentage of assessing projects according to the rate of return on investment, the percentage of IT personnel who gets rewards based on performance, the percentage of documented and measured IT processes, the percentage of investments on skills and knowledge of IT personnel, stability of IT personnel and the proportion of IT professionals in respect of personnel (Epstein and Rejc, 2005).

In addition to strategy, Martinsons et. al., 1999; Martinsons, 1992, suggests in its proposed information systems balanced scorecard, four aspects of "business value", "internal processes", " future readiness" and " user orientation". The "business value" aspect which is to increase business value, achieve organization goals and such goals as gaining management commitment and controlling costs of information systems, includes criteria entitled as "cost control", "risk control" and "IT value". These criteria respectively consist of indicators such as: IT-based products and services income, inability for interacting IT departments with other departments of the organization, the problems of interacting between human beings and computer, the percentage of time spent by IT division with executive managers and finally IT in the mind of managers.

Also, the "internal processes" aspect consists of three criteria of "planning", "developing" and "implementing" which respectively mean the percentage of resources dedicated to planning and reviewing of information systems activities, development of applications and resolving users' problems. The aspect of "future readiness" consists of two criteria of capability of information systems experts and researches on modern technologies which include the budget of teaching and researching in IT area. The "user's orientation" means to create and retain relationship with users, satisfying user's information requirements and the effect of information systems on efficiency and effectiveness increase (Martinsons et. al., 1999; Martinsons, 1992).

In addition to strategy, Stewart and Mohamed, 2003; Stewart, 2002, 2007, suggests in its information systems balanced scorecard, four aspects briefly as follows: "operational perspective" which insists on the effect of IT on productivity, e.g. the effect of IT on improving processes, communications and decision making. "Benefits perspective" which considers the relationship between implementation of IT and tangible (monetary) and intangible (non-monetary) benefits e.g. saving money and time. "System/technology perspective" which refers to performance, reliability, accessibility, security of system/technology and analogy between applications and processes. And finally "user orientation perspective" which consists of using technology, teaching, technical support and satisfaction with IT.

In addition to strategy, Watts, 2003, suggests in its information systems balanced scorecard, four aspects as below: "financial" aspect such as: estimated costs for IT projects against actual costs or estimated benefits of IT projects against actual benefits; "customer" aspect such as customer satisfaction with benefits of IT projects; "internal processes" such as the percentage of sources which are dedicated to IT support; "growth" aspect indicates e.g. contractor personnel vs. official permanent personnel, the management staff to total employees, and the education time.

In addition to strategy, Van Grembergen and Saul, 2001; Van Grembergen, 2000; Van Grembergen and Van Bruggen, 1997; Van Grembergen et. al., 2003, suggest in the information systems balanced scorecard, four aspects as follows: "corporate contribution" with such goals as reaching value of IT projects, managing investments on IT; "customer orientation" with such goals as cooperation of IT division with other divisions of the organization, improvement of information systems and services performance; "future orientation" aiming to staff management effectiveness, organization architecture upgrade and access to modern technologies; and "operational excellence" aiming to the best processes.

Therefore, it is possible to indicate general criteria for evaluating IT performance as shown in Tables 1 and 2.

Table 1. The IT balanced scorecard proposed in the present research

Financial	Source	User satisfaction	Source
mission: increasing business value and achieving organization goals	Martinsons et. al., 1999	**Mission:** providing products and services in accordance with users' requirements	Martinsons et. al., 1999
Goals: Gaining managers' commitment	Martinsons et. al., 1999	**Goals:** Establishing and maintaining satisfactory relationship with users	(Martinsons et. al., 1999; Epstein and Rejc, 2005)
Controlling IS costs	Martinsons et. al., 1999	Satisfying users' requirements	Martinsons et. al., 1999
Managing IT investments	Grembergen and Saul, 2001	Utilizing IT opportunity	Martinsons et. al., 1999
Achieving IT value	Grembergen and Saul, 2001	Gaining users' commitment	Martinsons et. al., 1999
Earning profit	Epstein and Rejc, 2005	Participation between business and IT	Grembergen and Saul, 2001
		Improving services performance level	Grembergen and Saul, 2001
		Improving IS performance	(Grembergen and Saul, 2001; Epstein and Rejc, 2005)
Internal processes	**Source**	**Growth and learning**	**Source**
Mission: creating, delivery and maintaining IT products and services effectively and efficiently	Martinsons et. al., 1999	**Mission:** consistent improvement and getting ready to come across future challenges	Martinsons et. al., 1999
Goals: Increasing efficiency of planning, developing, implementing and maintaining IS	Martinsons et. al., 1999	**Goals:** Getting ready to come across IS problems	Martinsons et. al., 1999
Cost-effective training to satisfy training needs of users	Martinsons et. al., 1999	Consistent improvement of staffs' skills through training and development	(Martinsons et. al., 1999; Epstein and Rejc, 2005)
Effective management of IS problems	Martinsons et. al., 1999	Consistent improvement of software and hardware	Martinsons et. al., 1999
Operation excellence (improving processes, performance quality, speed and cost)	(Grembergen and Saul, 2001; Epstein and Rejc, 2005)	Conducting effective research with appropriate cost per business for modern technology	Martinsons et. al., 1999
Securing and deleting critical issues from auditory reports	(Grembergen and Saul, 2001; Epstein and Rejc, 2005)	Improvement of services capability (internal processes, technology renewal)	Grembergen and Saul, 2001
Managing non-completed works	Grembergen and Saul, 2001	Effective staff management	Grembergen and Saul, 2001
		Organization architecture improvement	Grembergen and Saul, 2001
		Achieving modern technologies	Grembergen and Saul, 2001

Table 2. Indicators for the IT balanced scorecard proposed in the present research

Financial	Source	User satisfaction	Source
1. cost control	(Martinsons et. al., 1999)	1. establishing and maintaining relationship with users	(Martinsons et. al., 1999)
The ratio of IT costs to company costs	(Watts, 2003)		
The ratio of estimated costs to actual costs	(Watts, 2003)	The degree of cooperation of IT unit with the customer	(Grembergen and Saul, 2001; Epstein and Rejc, 2005)
The ratio of Estimated advantages to actual advantages	(Watts, 2003)	The number of website visitors	(Epstein and Rejc, 2005)
Income resulting from IT-based products and services	(Martinsons et. al., 1999)	The number of customers absorbed through IT innovations	(Epstein and Rejc, 2005)
The percentage of total decrease of costs	(Epstein and Rejc, 2005)		
2. risk control	(Martinsons et. al., 1999)	2. satisfaction degree	
the inability degree to integrate business and IT units	(Martinsons et. al., 1999)	Comparing customers satisfaction respecting before	(Grembergen and Saul, 2001)
the difficulty level of the interaction between human beings and computer	(Martinsons et. al., 1999)	Satisfaction degree from IT training	(Stewart and Mohamed, 2003)
the degree of using inappropriate hardware and software	(Martinsons et. al., 1999)	Satisfaction degree from IT support	(Stewart and Mohamed, 2003)
3. value management			
the percentage of time spent by IS managers in meetings with executive managers	(Martinsons et. al., 1999)	Satisfaction degree from IT projects benefits	(Watts, 2003)
evaluating accountability to customer	(Martinsons et. al., 1999)	Satisfying user's requirements	(Martinsons et. al., 1999)
quality of services and products	(Martinsons et. al., 1999)		
evaluating the degree of innovation	(Martinsons et. al., 1999)	3. performance level	
managers' understanding of IS	(Martinsons et. al., 1999)	the degree of performance improvement of IS and the quality presented (time and budget)	(Grembergen and Saul, 2001)
		the level of services performance (accessibility and performance)	(Grembergen and Saul, 2001)
		comparing the status with industry standards for services	(Watts, 2003)
		the degree of IS effect in effectiveness and efficiency increase	(Martinsons et. al., 1999)

Internal processes	Source	Growth	Source
1. Planning excellence	(Martinsons et. al., 1999)	1. experts' capabilities	(Martinsons et. al., 1999)
The percentage of resources dedicated to planning and investigating IS activities	(Martinsons et. al., 1999)	The ratio of IS training budget to total IS budget	(Martinsons et. al., 1999; Epstein and Rejc, 2005)
The time required for planning	(Grembergen and Saul, 2001)	The degree of increase in staffs' computer literacy	(Stewart and Mohamed, 2003)
The ratio of IS planning costs to total costs	(Watts, 2003)	The ability to absorb more customers	(Stewart and Mohamed, 2003)
2. Developing excellence	(Martinsons et. al., 1999)		
the percentage of resources dedicated to IS development	(Martinsons et. al., 1999)	The amount of training hours	(Watts, 2003)
		Staffs' productivity	(Martinsons et. al., 1999)
The percentage of programs codes of which are reusable.	(Martinsons et. al., 1999)	2. effectiveness of staff management	(Grembergen and Saul, 2001)
		The ratio of contractor staffs to official permanent staffs	(Watts, 2003)
The time required for IS development	(Martinsons et. al., 1999)		
The time spent for resolving IS mistakes and errors	(Martinsons et. al., 1999)	The ratio of management staffs to all staffs	(Watts, 2003)
Comparing estimated time with actual time for development	(Watts, 2003)	The percentage of staffs who accomplished development programs	(Grembergen and Saul, 2001)
		The percentage of voluntary replacement according to performance level	(Grembergen and Saul, 2001)
3. Implementing excellence	(Martinsons et. al., 1999)		
The ratio of the number of maintenance staff to total staffs	(Watts, 2003)	The percentage of staffs who received rewards based on their performance	(Epstein and Rejc, 2005)
The ratio of support budget to total budget	(Watts, 2003)	The ratio of illness per day for each person	(Watts, 2003)
The degree of decrease in flaws and faults	(Stewart and Mohamed, 2003)	3. researches on modern technologies	(Martinsons et. al., 1999)
The average time required to answer customers' requests	(Martinsons et. al., 1999; Epstein and Rejc, 2005)	the ratio of research budget to the total budget	(Martinsons et. al., 1999)

The percentage of unplanned IS Idling	(Martinsons et. al., 1999; Epstein and Rejc, 2005)	satisfaction degree of senior managers about reports on modern technologies	(Martinsons et. al., 1999)
The degree of decrease in unnecessary visits	(Stewart and Mohamed, 2003)	4. organization development	(Grembergen and Saul, 2001)
The percentage of standard infrastructures	(Epstein and Rejc, 2005)	internal processes improvement	(Grembergen and Saul, 2001)
The ratio of integrated systems to total systems	(Epstein and Rejc, 2005)	IS renewal	(Grembergen and Saul, 2001)
		Adopting systems on IT standards and the architecture of organization	(Grembergen and Saul, 2001)
4. The degree of improvement	(Stewart and Mohamed, 2003)		
The degree of processes improvement using IT	(Stewart and Mohamed, 2003)	Developing the architecture plan of the organization	(Grembergen and Saul, 2001)
The degree of communication improvement using IT	(Stewart and Mohamed, 2003)		
The degree of decision making improvement using IT	(Stewart and Mohamed, 2003)	The percentage of documented and measured IT processes	(Epstein and Rejc, 2005)
The degree of improvement in the speed of reporting and getting feedback	(Stewart and Mohamed, 2003)		
The number of new products and services provided by IT unit	(Epstein and Rejc, 2005)		

To study and analyze IS strategic management based on the balanced scorecards, the maturity model of IT balanced scorecards was used. According to IT balanced scorecards maturity model (Luftman, 2001), the maturity model of IT balanced scorecard is divided into five levels each of which has unique characteristics. These five levels are as follows:

1) initial/ad hoc process
2) committed process
3) established focused process
4) improved /managed process
5) optimized process

Table 3. The leveling base of organizations for implementation of IS strategic management based on balanced scorecards (Luftman, 2001)

characteristics		Level 1	Level 2	Level 3	Level 4	Level 5
communications	The familiarity degree of IT unit with business	Minimum	Limited	Limited to senior and middle managers	Familiarity extends to lower levels too	Comprehensive
	The familiarity degree of business units with IT	Minimum	Limited	Preliminary familiarity	In the organization level	Comprehensive
	The degree of intra-organization or inter-organization learning	Temporary, sometimes	Informal	Regular and clear	Integrated	Structured
	The degree of participation in knowledge exchange	Temporary	Semi-structured	Structured	Institutionalized	Beyond the organization
Value Measuring	IT indicators based on ITBSC	Technical and not related to business	Efficiency based on cost	Traditional, based on financial issues	Effectiveness and the cost	Extended to external participants
	Business indicators based on BSC	Temporary and not related to IT	in functional organization	Traditional, based on financial issues	Customer oriented	Extended to external participants
	The degree of consistent improvement of indicators	None	Minimum	Primary improvement	Too often	Repeatedly
	Official review and evaluation of indicators	None	In the event of problems	Officially	Officially	Repeatedly
	The relation between	Not related	Not related	Related	Related	Business, IT and

	IT indicators and business					shareholders are related
Participation	The degree of perception of IT value by business	Cause of cost	As a property	As a property	As a facilitator	As a factor in line with business
	The role of IT in business strategic planning	None	Facilitating organization processes	Facilitating organization processes	A factor in business strategy	Be in alignment with business
	The degree of consistent improvement in IT plan management	Temporary	Indication of standards	Cohesion of standards	Improvement of standards	Cohesive improvement
	The degree of innovation and entrepreneurship	No incentive	Related to functional organization	Capable of risk bearing	IT managers, shareholders and organization	Become a norm
	Management style	Order-based	Common-sense-based	Result-oriented	Based on profit and value	Relation-oriented
	The degree of readiness for change	Resistance against change	Related to functional organization	Realizing need for change	So much	So much
Skill	Staffs substitute	None	Minimum	Related to functional organization	Related to functional organization	In the level of organization
	Education	None	Minimum	Related to functional organization	Related to functional organization	In the level of organization
	Political, social and trust climate	Minimum	Based on exchanges	Creating valuable services	Creating valuable services	Making valuable participations
Administration	The degree of business strategic planning	Temporary	Planning in functional level	Intra-organization planning	In the level of organization	Integrated intra and inter organization
	The degree of IT strategic planning	Temporary	Functional tactical planning	Focused on intra-organization planning	In the level of organization	Integrated intra and inter organization
	Budget control	Cost based	Based on cost in functional level	Based on costs and investments	Based on investments	Based on investment and profit
	Management of IT investments	Cost based	Based on cost and focused on maintenance and operation	Traditional, and process improvement	Cost effectiveness	Business value and extended to business participants
	Committees	Informal and irregular	Periodical organization	Clear and regular relations	Official and effective	Participation
	Priority process	Reactional	Often reactional	Planned	Planned to increase value	To increase value for shareholders
	Architectural flexibility	None	Limited	Focused on communications	In the level of organization	In the level and out of organization
	Standards definition	None	Defining standards	Emerging organizational standards	organizational standards	organizational standards
Architecture	Used systems	Traditional like accounting	Operational	Extended to facilitate business process	Revising business processes	To connect with outside of the organization
	Intra and inter organization integration	None	Primary efforts for integration	Integration in the level of organization	Integration with shareholders	Integration with all shareholders

Six major variables of "measurement", "participation", "administration", "skill", "communication" and "architecture" and other minor variables (Table 3) were used in IT balanced scorecard maturity model. The higher (lower) scores for related variables in the selected organizations, the implementation of IS strategic management based on balanced scorecard in the organization will be higher (lower).

Since measurement means to define, document and implement IT criteria based on IT balanced scorecard and to relate IT criteria to business, some criteria such as availability of evaluation system for IT department of the organization, official revision of criteria for evaluation of IT performance were utilized in IS strategic management in the organization. Participation means IT value perception by business and improving management of IT plans. To measure this feature, such criteria as the role of IT in business strategic planning and perception of IT value by the organization as a competitive advantage have been used.

Administration means the IT strategic planning, budget control and IT investments management. To measure administration, some criteria have been considered as follows:

Defining IS vision and mission in the organization, alignment of investment priorities, incentive systems and budget control by IT scorecard.

To measure skill which means innovation, entrepreneurship and the position of IT management in decision making, such criteria as persistence of the organization on innovation and entrepreneurship, staffs' readiness for accepting changes, availability of political, social and trust climate in the organization to run IT balanced scorecard have been indicated. Communication feature means learning intra- and inter-organization. Architecture feature means the flexibility of the structure due to technology changes. To measure these features, criteria such as intra- and inter-organization integration and changes in the structure due to technology changes have been used.

4. Research Methodology

In this study, in terms of data collection methods, the descriptive method was used. Because in this way, the features found in the organizations can be aware. In terms of research aim, this study is applicable one which can be used for solving the problems of different companies and studying the solutions. In this study, scientific methods and procedures to define the problem, define hypotheses, data collection, classification, analysis, conclusions and recommendations are used.

Data collection of this research was performed in two field and library methods:

1) Field research: it is to get the idea of organizations which have executed information systems strategic management or information technology balanced scorecard.
2) Library research: it is used to review the literature and research theories.

Statistical population of the present study is organizations in Tehran which have executed information systems strategic management or information technology balanced scorecard.

In this research, sampling is executed using non-probability sampling (convenience sampling) and (purposive sampling) from organizations in Tehran (30 organizations).

The following hypothesis is studied and tested in this research:

"There is a significant relationship between information systems strategic management based on balanced scorecard and information systems performance.

As mentioned above, the hypothesis of the research is a null hypothesis and as a result, there is no basis for showing the direction of hypothesis.

The variables for this hypothesis are "information systems strategic management based on balanced scorecard" and "information systems performance".

Table 4. Variables used for assessing information systems strategic management based on balanced scorecard - ITBSC maturity model in this research

Features	Sub features
Communications	The level of inter and intra organization learning
	Indicators based on ITBSC
Value measurement	Official review and evaluation of indicators
	The relationship between IT and business indicators
	The business perception of IT value
Participation	The role of IT in business strategic management
	The degree of consistent improvement of IT program management
	The degree of innovation and entrepreneurship
	Management position
Skill	Readiness for changes
	The political, social environment and trust climate
	Education
	The degree of IT strategic planning
Administration	Budget control
	IT investment management
Architecture	Architecture flexibility

Table 5. Variables used for assessing IT performance in research

Features	Sub features
Financial	Cost control
	Risk control
	Value management
Internal processes	Planning excellence
	Developing excellence
	Implementing excellence
	Improvement level
User's satisfaction	Creating and retaining relation with users
	Satisfaction level
	Performance level
Growth	Capability of experts
	Effectiveness of staff management
	Researches on modern technologies
	Organization development

5. Validity and Reliability of Questionnaire

By validity of questionnaire, it means the accuracy of indicators and criteria which have been produced for measuring intended phenomenon. Determining validity means answering to this question whether the research measured what it had to measure (Danaei Fard et al, 2004).

In addition to mentioned literature review, 30 experts of information systems strategic management and balanced scorecard were discussed about the veracity of variables selected for questionnaire. To measure the reliability of the questionnaire, the Cronbach's Alpha coefficient was used and the necessary corrections were applied in the questionnaire according to achieved results.

The experts' opinions suggest that Cronbach's Alpha are 0.91 and 0.92 respectively for 33 questions and 30 samples of the first questionnaire (information systems strategic management based on balanced scorecards) and 48 questions and 30 samples of the second questionnaire (information systems performance assessment), which are considered as a good rate.

The organizations' opinions suggest that Cronbach's Alpha are 0.95 and 0.96 respectively for 33 questions and 30 samples of the first questionnaire and 40 questions and 30 samples of the second questionnaire, which are considered as a good rate.

6. Statistical Analysis Techniques

Since the questionnaires have been created in ordinal scale, the nonparametric statistical techniques were used in the statistical analysis. Regarding the hypothesis situation, nonparametric tests such as spearman correlation test and U mann withney test were used in this research.

6.1 Correlation Test

By the null hypothesis, it is assumed that there is no correlation. The fact is of course that explanation and interpretation of Spearman is more difficult than Pearson, perhaps as a result of data nature. When data is quantitative and is converted to qualitative data, the spearman correlation coefficient is a criterion for measuring the linear relationship between ratings (Azar, Momeni, 2001).

6.2 Signed Test

The goal of this test is to answer this question whether samples are chosen from "equal" contiguous society (have equal averages) or not (have different averages).

If the goal is to decide on samples drawn from two societies, the U-test, sometimes called "Wilcoxon" or "Mann Whitney" test, is used (Azar, Momeni, 2001).

Since organizations studied in this research were selected from both public and private groups, Mann-Whitney was used to compare averages for both IT performance and the level of IT balanced scorecard maturity.

7. Hypothesis Test

7.1 Correlation Test

Table 6. Hypothesis test using spearman correlation coefficient

		PERFORM	
Spearman's rho	LEVEL	0.71	**

** Correlation is significant at the .01 level (2-tailed).

As it is shown in above table, the maturity level of ITBSC in organizations is directly related to IT performance. The ** mark shows that the hypothesis is approved at 0.99 level of confidence.

7.2 Comparison Test between Two Public and Private Groups According to ITBSC and Performance Level

Since both public and private organizations were used in this research, it is required to compare these two sections. On the one hand, as the ranking scale was used for this hypothesis and also samples are independent, Mann Whitney U test was used result of which is as Table 7.

Table 7. Mann Whitney U test for comparing public and private organizations

	LEVEL	PERFORM
Exact Sig. [2*(1-tailed Sig.)]	0.54	0.4 6

Therefore, there is no significant difference between public and private groups. Because organizations have not actually and completely implemented ITBSC in their organizations.

8. Conclusions

According to results of the present research, it is possible to state that decrease (increase) in the level of information systems strategic management based on balanced scorecard, decreases (increases) the performance of information systems. In other words, improving level of information systems strategic management based on balanced scorecard is a basic factor effective on information systems performance. In this regard, it is concluded that non-improvement of major features effective on the level of information systems strategic management based on balanced scorecard (value measurement-administration-participation-skill-communications-architecture) leads into inactivity of ITBSC aspects (financial-growth and learning-user's satisfaction-internal processes).

The chart (1) shows that private organizations have better status in measurement and administration features, while the public organizations are in a better situation in other features (skill, communications, participation and architecture).

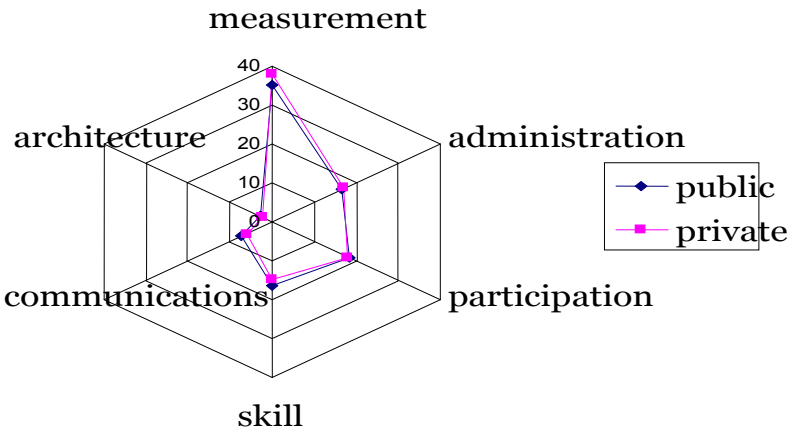

Chart 1. The comparison between features of ITBSC maturity model in public and private organizations

Also, Chart (2) compares public and private organizations in respect of ITBSC criteria. As it is shown, the private organization has better score in financial aspect, while the public organization has better score in other aspects (growth and learning, internal processes and user's satisfaction). However, the difference between public and private organizations is a little in internal processes aspect.

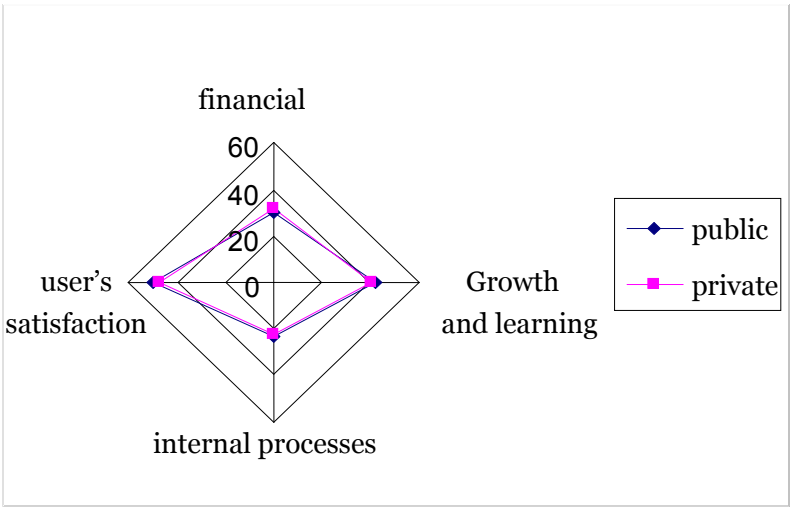

Chart 2. The comparison between aspects of ITBSC in public and private organizations

9. Suggestions

Following suggestions are provided for this research:

1) Changing and conducting information systems strategic management based on the results of information systems performance evaluation:

Making information systems strategies based on information systems performance results in always up-to-date strategies. Hogarth and Markridarkis (1981) refer to the fact that "a long time (for two years or more than it) forecast is obviously incorrect and inaccurate". Mintzberg (1987) declares that making strategy requires acceptance and recognition of factors which influence the future strategic direction of the organization.

According to Clark (2007), it is also indicated for information systems, because forecasting a repetitious pattern or foreseeable incidence is not the important matter in making strategies for information systems, but it is the effective factors for changing the information systems strategy to be forecasted. As it was studied in this research, information systems performance is one of these factors.

2) Substantial reviewing of current criteria for performance evaluation:

The main subject in performance improvement is setting out and using performance criteria. Performance criteria should be the best indicator of improvement in matters related to customers, organizational operation, and financial affairs. A comprehensive set of criteria or indicators related to customers or performance requirements of organization, makes a clear ground for setting all activities in line with organizational goals. Therefore, it is required to implement a system including comprehensive criteria for performance evaluation in the organization.

3) Consistency between information technology performance evaluation system and other systems:

Basically, each performance evaluation system such as balanced scorecard should be able to coordinate and conform to other systems in use such as reward system. According to the statement ‘‘you get what you pay for’’, Ogden et al. (2002) states that employees responsible for objectives will try to maximize their benefits and strive to avoid punishment (Wagner and Kaufmann, 2004). This link is critical for motivation and commitment.

4) Insisting on comprehensive performance evaluation:

What many organizations use as performance evaluation is the evaluation of the program which has fundamental differences with comprehensive performance evaluation. The most important difference between program evaluation and comprehensive performance evaluation is non-generality, while, in the current competitive environment, futurism requires understanding and assisting long and short-term factors that impact on the business and the position of the organization. It means that despite of benefits of program evaluation such as making experience, valid comparison between programs and providing information, the comprehensive performance evaluation should be considered as a valuable method.

Additionally, significant concerns have been expressed regarding perceived problems in achieving congruence between the balanced scorecard and other organizational control systems. In this case (Atkinson, 2006) argues that there are different viewpoints in order to overcome difficulties such as replacement of BSC with other controls rather than compliment (Ahn,2001) and combination of the BSC with long established systems (Otley, 2001).

5) Employing committed managers and motivated staffs:

It is not easy to achieve certain qualitative and quantitative goals of the organization and requires support of managers and motivated staffs. In some aspects of balanced scorecard, such as financial aspect (value management) and growth and learning (capability), commitment and motivation of managers and staffs are broadly insisted on. Similarly, it is insisted on communications and skill features which are amongst criteria affecting balanced scorecard. That is to say, it will only be successful when the people who develop and work with them are motivated and convinced that the effort is worthwhile (Wagner and Kaufmann, 2004). In this case, there are several reasons why the commitment of the people may be low and decline over time. First, nearly two-thirds of the firms underestimate the required efforts at the beginning of a BSC project. Second, if misunderstood and not properly communicated, many executives and especially employees may perhaps consider the BSC concept another fashionable management tool that they discard. Sometimes, bad experiences with unsuccessful management methods and tools lead to a general resistance against new concepts (Wagner and Kaufmann, 2004).

6) Consistency of used balanced scorecard with organizational culture

Cultural differences affect both balanced scorecard development and its acceptability. The balanced scorecard is developed and implemented in a different way in each country. Even each job has its own culture which includes unofficial rules and laws. For instance, resistance against change included in culture of some organizations, affects the balanced scorecard. The key to good performance is to have a strong culture (Mujeeb and Ahmad, 2011).

7) Availability of performance data

Processing (collection, analysis, and interpretation) performance data and the adequate IT system knowledge is one of the challenges for effective use of BSC (Franco and Bourne, 2003). The full level of integration between performance management and other key management processes can only be activated with the support of information technology by providing data warehouses and integrated applications with business intelligence capabilities.

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