



Reliability and Validity of the Balanced Scorecard in Iranian Organizations

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ABSTRACT: In this study using the Balanced Score card in Iranian organizations, we try to examine coefficient of 55- item instrument validity by descriptive method. The results of this study show that the balanced scorecard questionnaire in a sample of 547 subjects, which were randomly selected between employees and customers of Gas Company from 30 provinces, coefficients are favorable. The mean coefficient of internal consistency reliability coefficient using Cronbach's alpha method was 0.73 and fortnightly reliability coefficient was 0.85. Validity of coefficient shows an agreement of 0.74 between referees. Moreover the instrument is capable enough to predict the membership of employees and customers in Gas Company and diagnostic coefficient of 0.86 confirm this item. Also, expected utility factor structure is another evidence for the construct validity (evaluation function) that is designed to measure.

Keywords: Balanced Scorecard, Reliability, Validity.

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INTRODUCTION

Many scholars know this are as information and knowledge based economy, in which organizations are faced with dynamic and changing environments increasingly, and are forced to adapt their organizations with these environmental factors. Management of all large organizations, more than attention to the competition, are following organizational strategies and visions and using them and also counting the rate of realization of those strategies and this function is very crucial for them. Complex environment competitive business world and customer expectations increase made it clear to know about weaknesses and strengths of organizations and improvement of productivity.

Consequently managers are seeking a comprehensive solution that is reliable and flexible in order to evaluate the function of their organizations and ensure the implementation of their strategies and moreover seek adequate and accurate information of their current status and take a look to the future to provide promotion and improve their organizations. In other words, thinking of the past and putting the future and strategies goals of the organizations aside are always criticized. An evaluating method must be able to present overall situation of organization in accordance to organizational goals (in terms of distance to the goal) at any time and also to determine the status of the organization in relation to the environment (market, competitors, and other organizations). Furthermore. It should indicate the

rate of effectiveness of all activities in that organization. Researches has shown that managers are faced with the following key issues in assessment leadership and performance management (PM) in their organizations: Lack of appropriate strategies and strategic objectives of the organizations; lack of knowledge and understanding of the organizations strategy and lack of staff's time associated with hand and empathy towards employees of the landscape. In the era of knowledge-based economy value creator activities in organizations are not only based of tangible asset but intangible assets such as knowledge and capability of today's employees, relationship with customers and suppliers, product's quality and services, information technology and organizational culture assets are for more valuate than physical and tangible assets.

The Balanced Scorecard approach was first proposed in 1992 by Kaplan and Norton as a tool for translating strategies to operational levels of the organization and was designed to remove disadvantages of financial and qualitative evaluations and stops designing internal competing criteria and replace them with a balanced blend of different perspectives, all of them have their own set of criteria (Human Resources Empowerment Foundation, 2011). A frame work to achieve demands of the business strategy and operations and as a performance management system, adopt organization's vision and mission with customer needs and daily work, and

evaluate business strategy, and monitor effectiveness of operation and make organizational capacities and relate all programs to employees, this is balanced scorecard. A balanced scorecard can make a two-dimensional concept that firstly can be a system for managing organization strategy and also can be used as a measuring system. Balanced scorecard can make relation with all measuring templates of operation and uses the experiences of those methods and reduces management concerns of industrial organizations in choosing and using the best method and establish a convergence between organization's goals and processes in accordance with organization's strategic goals and plans. This model is very easy to use and understandable for every one and economical for maintaining and preserving for industrial organizations.

On the other hand, focuses on customers and gives power to process owners for improving their operations and facilitate relations and accelerate cultural changes in an organization. Balanced measuring helps organization overcome two main problems: effective measurement of organizational performance and successful implementation of strategies (Niven, 2003). Balanced Scorecard and strategic maps helps companies to translate, transfer, and measure their strategies. Strategic map offers a visual framework for unity of organization's goals in four perspectives of BSC. More over strategic map depict causal relationship that relates expected results of customers and financial dimensions to desirable functions of important internal processes (operational management, customer management, innovation and social and legal processes).

In the early 1996, Robert Kaplan accompanied with Norton started a research plan to survey the causes of successfulness of twelve top American companies and study methods of function evaluation in these companies. The results of this survey were published in an article named (The ones that are driving performance) in (HBR) journal in Jan 1992. Kaplan and Norton announced that for a complete and successful evaluation of an organization function four dimensions should be considered: 1. Financial dimension. 2. Customers dimension. 3. Internal processes dimension. 4. Learning growth dimension.

Kaplan and Norton findings confirm that successful companies, in each of the four dimensions have selected measures and define quantitative goals for each these measures for evaluation periods. Then executive innovations and implementations to achieve these goals are organized and done.

According to above mentioned notes, balanced scorecard is known a desirable tool to evaluate organization's functions, but this tools validity and

reliability should be surveyed to be able to use in Iranian sample, which would be our goal in this study. Studying foreign researches (Adriana, 2006; Kaplan and Norton, 2004), that shows good coefficients of validity and reliability, in national researches (Mozaffari, 2010; Bagheri, 2007) they often surveyed coefficients of validity beside organization's function and sampling is disregarded, so this study would be necessary to be done

MATERIALS AND METHODS

This research that aims to study psychometric properties of BSC questionnaire in an organization has an applied goal and is descriptive according to the way of gathering data. Given that minimum size of studies is 10 times the number of scale questions and questionnaire has 55 items, sample volume was considered 550 persons, that to avoid loss of examinees increased up to 600 persons, among these 300 persons were national Gas Company clerks and managers and 300 persons were subscribers of Gas Company in 2013. Sampling method was random stratified. At the beginning the clerks of Iranian National Gas Company were separated by 30 provinces. The sampling ratio for each category was determined and this ratio was observed for subscribers, too. In the table 1, sample volume, society and sampling ratio are determined.

In order to avoid loss of sampling, the number of questionnaires sent to the provinces was more than those written in table. Between Sent questionnaires, 261 were related to clerks and 286 related to subscribers of Iranian national gas company, which were analyzed.

Tools used in this study are: Balanced Score Card; this 55 item questionnaire has 45 item in 3 nonfinancial (each of which 25 item) and 10 financial items. Scoring method of this questionnaire for nonfinancial is a 5-range scale of likert (high 5 to low 1).

Reliability of the Survey Questionnaire:

The questionnaire has 6 questions that are designed by the researcher and desirability of every item in Likert scale is from (1) very low to (5) very high. Reliability of this tool using coefficient of Cronbach's alpha means that coefficient of internal unity of items on first implementation on 10 instructors is 0.92 and on final implementation on two groups of instructors of management and psychometric is 0.95, that is desirable. Moreover two- week Test-retest of this tool shows a Reliability of 0.86 in this study for analyzing data and counting validity and reliability descriptive and inferential statistics are used, such as values, means, standard deviation, coefficient of questions with total score, alpha coefficient, agreement between

reviewers, test- retest correlation between values, clean analysis factor to separate between employees and customers.

Reliability is one of technical characteristics of measuring tool. This means that, how much similar conditions give similar results. Usually, coefficient of reliability is from Zero (no correlation) to +1(perfect correlation).

The reliability coefficient indicates how much measuring tools measure properties of testable or other changeable characteristics. The coefficient of reliability of measurement tools are used in different ways. In this study coefficient of alpha validity as a coefficient of internal item and coefficient of consistency of two week test- retest are important.

Validity means that measuring tool should be able to measure special characteristic and not another one. The importance of reliability is that inappropriate measuring makes every scientific research useless and worthless. In this study, we used coefficient of agreement between judges, and discrimination coefficient between research groups and factor analysis for study validity.

RESULTS

Among 30 provinces, data from 25 provinces have reached to researcher and from a total of questionnaires distributed. 261 clerks and 286 subscribers of national gas company answered the questions. 57 persons of sample group were female and 204 persons were male. Average age of them was 31.45, and among subscribers 85 persons female and 201 persons were male, Average age was 30. 05 .Finally validity of BSC for measuring company function using Cronbachs' alpha for all questionnaire in two groups was 0.73 and for growth and learning dimension (15 items), internal process (15 items), customer (15 items) and financial (10 item) are shown in the table 2.

More over removing any of the questions doesn't increase total and subscale alpha value, so all 55 items have a desirable internal unity. Studying 50 subscribers Tehran Gas Company showed a two-week consistency of 0.85 that is desirable.

To assess this questionnaire, opinions of experts of management and performance evaluation are gathered. This questionnaire was given to two groups of management and measurement instructors and was asked to specify their agreement with the content of in a 5 degree scale in a way that number 1 shows low agreement and 5 high agreements, finally

coefficient of judges agreement was counted as an index of content validity equal 0.74 that was desirable. So to the experts this questionnaire has a content validity and questions cover all4 dimensions of BSC.

Another proof for validity of tool to measure and evaluate organization application is it is capability to recognize or discriminate between research groups. Results of analyzing are shown in the table 3 that shows BSC is able to separate gas company clerks and it is subscribers.

According to table 3 it can be seen that average of total score of BSC in managers groups is 2.95 and is more than average of subscribers which is (1.74). ANOVA results are shown in the above table and says that research groups have a significant in BSC average ($F(1.545) = 57.28, P < 0.01$). Moreover result of recognition analysis shows that learning metaphor can predict membership in clerks and subscribers well ($X^2 = 34.46, DF = 1, p < 0.001$). Totally diagnostic function cans predict 0.63 of dependent variable of being clerk or subscriber, using BSC. So 0.69 for clerks and 0.75 for subscribers were predicted.

Another method for studying tool validity, is using factor analysis, using exploratory factor analysis and using principal component factor correlation matrix between the 55 questions, BSC are extracted.

Also chi-square statistics (11580) of the test Bartlett at the level 0.001 is meaningful that shows a matrix consistency is not that used in this research (a matrix with 1 main diagonal and other diagonals). And questions are desirable to enter factor analysis. On the other hand using varimax rotation analysis, using factors rotation after 7 rotations relation between questions in factor was maximum and finally 4 factors were taken of questions that will be presented in the table 4 that is related to weight factor, value and variance.

According to Table 4, it is seen that value of the first factor (learning and growth), 12.16 and 48.66 of the total variance respectively. Also the value of the second factor (internal processes) is the 3.51 and 6.14 of the total variance respectively. The third factor (client) and forth factor (financial) value is 2.31 and 1.62 and 9.22 and 6.48 of the total variance respectively. Correlations between four factors are identified in the table 5.

Correlation coefficient between dimensions is positive and direct, and at the moderate and strong level shows a desirable factor structure and instrument reliability for measuring and evaluating Iranian function.

Table 1. Society and sample distribution in research according to ratio sampling

Row	Regional gas companies	Total Number of Employees	The sample	Separate sample of employees	Subscribers to the separation of the sample
1	East Azarbaijan	370	0.05	15	15
2	West Azarbaijan	210	0.03	9	9
3	Ardabil	161	0.02	6	6
4	Isfahan	779	0.10	30	30
5	Eilam	75	0.01	3	3
6	Tehran	1152	0.15	45	45
7	Qom	129	0.02	6	6
8	Qazvin	134	0.02	6	6
9	Charmahal Bakhtiari	159	0.02	6	6
10	Razavi Khorasan	463	0.06	18	18
11	North Khorasan	104	0.01	3	3
12	Khuzestasn	508	0.06	19	19
13	Zanjan	134	0.02	6	6
14	Semnan	144	0.02	6	6
15	Fars	543	0.07	21	21
16	South Khorasan	69	0.01	3	3
17	Kurdistan	130	0.02	6	6
18	Kerman	202	0.02	6	6
19	Kermanshah	146	0.02	6	6
20	Kohgloye & Boyerahmad	114	0.01	3	3
21	Golestan	211	0.03	9	9
22	Gilan	402	0.05	15	15
23	Lorestan	156	0.02	6	6
24	Mazandaran	450	0.05	15	15
25	Markazi	209	0.03	9	9
26	Hamedan	285	0.04	12	12
27	Hormozgan	27	0.005	1	1
28	Yazd	153	0.02	6	6
29	Systan & Baluchestan	29	0.005	1	1
30	Boosheher	71	0.01	3	3
	Total	7719	100%	300	300

Table 2. Cronbach's alpha values for the resolution of questions and research groups

Dimensions Questionnaire	Learning and development	Internal process	Customer	Financial
Research groups	0.78	0.70	0.72	0.65
Gas company employees (261 people)	0.79	0.75	0.73	0.67

Table 3. The results of research groups to Balanced Scorecard score

Balanced Scorecard	Staff (n=261)		Subscribers (n =286)		λWilks	Equivalent (1,545) F	The average for the group	
	M	SD	M	SD			Staff	Subscribers
	2.95	0.63	1.74	0.54	0.86	57.28**	0.43-	0.36
	**P<0.01							

Table 4. Presents descriptive statistics and correlations of 4 Triple Balanced Scorecard (DF = 545, n = 547)

Statistics Variables (dimensions)	Mean M	Standard deviation SD	1	2	3
1- Learning and growth	2.34	0.61			
2- Internal processes	2.17	0.49	0.73**		
3- Customer	2.17	0.52	0.61**	0.64**	
4- Financial	2.06	0.66	0.55**	0.59**	0.48**

Table 5. The weight factor value and the variance factor

Index	First factor	Second factor	Third factor	Fourth factor			
Especial Value	12.16	3.51	2.31	1.62			
variance Explained	48.66	14.61	9.22	6.48			
Question	Weighting factor	Question	Weighting factor	Question	Weighting factor	Question	Weighting factor
2	0.84	1	0.75	11	0.87	10	0.62
3	0.74	6	0.81	13	0.77	9	0.89
4	0.66	8	0.79	15	0.82	7	
5	0.83	14	0.68	14	0.85	8	
7	0.83	15	0.63	12	0.80	1	
9	0.62	2	0.84	10	0.72	5	
10	0.69	4	0.65	1	.74	3	
15	0.68	7	0.66	3	0.77	24	
1	0.94	11	0.92	6	0.65	4	
6	0.95	2	0.95	4	0.61	6	
8	0.61	3	0.85	5	0.67		
11	0.70	9	0.81	7	.93		
12	0.72	12	0.74	8	0.94		
13	0.69	13	0.61	9	0.81		
14	0.75	5	0.63	2	0.86		

DISCUSSION

Kaplan and Norton presented a new management strategy which is able to convert gridline to operational words and cause development. They believe BSC convert organization's mission and strategy in to a set of criteria to evaluate the performance and provide a comprehensive framework for managing and strategic assessment.

During long years, managers thought that the key to success lies in achieving physical and tangible assets; and for centuries thought measuring financials as a factor to be a successful organization. But those financial factors have for gotten organizational elements that will help organization to be successful. But today managers and researchers recognized the importance of non-tangible assets as a key factor for success. In the era of knowledge-based economy, capability of employees, relation between customers and suppliers, quality of goods and services, information technology and organizational culture are more valuable assets than physical ones. In tangible assets as knowledge that exist in an organization makes a distinct advantage or company's employees capability to provide customers' needs is another advantage.

In fact, the need to develop a formal method for the evaluation of the organization's resources made Kaplan and Norton to introduce BSC. Due to the fact that the business prospects of the agricultural to industrial should be confirmed tried to develop reports and measurements to get new view and can answer non-beneficial an intangible questions. So Kaplan and Norton introduced BSC for dynamic needs of new business.

Use of a tool to evaluate the performance of the operational definition may be important and the

results of this study showed that 55 item questionnaire in a sample of 547 subject, BSC has a good validity, internal consistency coefficient, that is, 0.73 and reliability, that is, 0.85 and if repeated in any time and place, like Iran, will provide satisfactory results.

Validity coefficient from the juries agreement (0.74) and is suitable value. Also the instrument is capable to predict membership of clerks and subscribers successfully, that coefficient (0.86) confirms this issue. Also the factor structure of the expected utility is another evidence for the construct validity (evaluation function) that shows it's validity that is designed to measure.

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