Evaluating the Indicators of Efficiency and Performance with Balanced Scorecard Approach (Case Study), in Special Region for the Metal Mining Industry

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ABSTRACT

Balanced scorecard is one of the modern evaluation systems of performance which is introduced by Kaplan and Norton for the first time as a multidimensional system and companies had to modify with evaluating the organization performance and its control by the view of customers, internal process, learning and growth and studying its effect for financial issues. This study tries to study the feasibility and indexing the organizational efficiency and performance from different perspectives in the special region of mine and metal industry. The data was collected through the questionnaire distributed among the managers and staff of the company. Population of the study includes all the staff working at the special region of mine and metal industry. Research hypotheses where based on the main question of the research about the indexing of organizational efficiency and performance with the approach of balanced scorecard special region of mine and metal industry. The hypotheses were studied by the t-student test and all the main and secondary hypotheses were approved. The results of the study can be summarized as below. The possibility of indexing efficiency and performance by balanced scorecard approach exists in special mine and metal region. In addition, the possibility of indexing in terms of finance, internal process, learning and customer satisfaction exists with balanced scorecard approach in special mine and metal industry region.

INTRODUCTION

In recent years, fast development of technology and serious competition in markets has changed the issue of gaining a proper position in market and maintaining the position as a main challenge for the managers. In such an economic environment, there is an increasing emphasize on efficiency, effectiveness and economy of the organization operations.

Modern organizations are not static units. Furthermore, the value systems are changing and so, organizations has to accompany with the effective forces of technological changes and global competitions.

Organizations which cannot accompany with these forces would not be able to survive in long run. The necessity of this accompaniment is to be informed about the condition and predicting the future. So, it is necessary for the organizations to be evaluated continuously and in specified intervals.

Now, in order to evaluate the organizational performance, financial factors are used in most of the cases. Although using the financial factors has a great help for evaluating the organizational performance but the factor does not provide a comprehensive view of the issues and so in order to evaluate the organizational performance, it is necessary to consider:
- the financial factors along with non-financial ones
- a collection of qualitative and quantitative factors
- The short-time and long-time goals of the organization.

so, the comprehensive tool for evaluating the organizational performance was provided based on these factors and this tool evaluated the organizations in four aspects of learning growth, internal process, customer-
orientation and financial aspect. It also provided a comprehensive view of the most important areas and had an effective help in efficiency, effectiveness and economy of the organizational performance. This research is organized in five chapters including the general points, literature review, research method, findings, conclusion and suggestions for next researches. Chapter one deals with the theoretical bases of the study. In this chapter, issues of research title, methodology, area, sampling method, data gathering instruments and definition of terms are provided.

Statement of the problem:

Today, due to different reasons and limitation, organizations do not have the productivity and this cause unused capacities of organizations. So, organizations had to have an ordered planning and use modern technology for reaching the goal. Different definitions are provided for efficiency the common point of which is to define efficiency as effectiveness of an activity.

Based on part A of the 5th article of the 4th plan of social, political and economic development of the country, all the organizations have to determine the share for improving the efficiency and select the ways for meeting the foals of an efficient economic system. Based on the privatization policies of the industry by the government and in order to meet the goals, according to this article all the organizations of producing steel have to establish the efficiency systems and continuing the system can guarantee their survival (Efficiency Site).

Emergence of information era specially last decades of the 20th century, have abolished most of the basic theories of competition and led the productive and service organizations to gain new capabilities for survival and success in competition.

Leading an organization toward the future in which the main factor of success is the organizational ability and technology and where competition is intensifying all the time, is not possible by applying the classical monitoring methods. In most ideal form, accounting models have to develop in a way to include the evaluation of hidden and intellectual assets of the organization which are more vital than physical and visible assets in organizational achievements.

Although determining the financial value of the assets such as staff skills, motivation, feasibility and customer loyalty and data bases and also recognizing them and mentioning them in balance sheets of organizations is not simply possible but there are still assets for success and future of competition.

A lot of attempts have been done in order to face the lack and weak points of the measuring system. Balanced scorecard method is one of the most recent methods of accounting in 20th century which as an evaluation system evaluates the classical financial aspects of organizational performance added three other aspects of internal process of business, customers, learning and growth.

Balanced scorecard system considers the invisible assets of the organizations and gives them the possibility of considering it in evaluation model through monitoring, supervision and awareness of invisible assets quality and if necessary, it recovers the weak points and lacks.

Balanced scorecard is a system for evaluating the performance the axis of which is strategy which can be used in every organization with any width for modifying the view with the needs of the customers, daily official routines, organization strategy, controlling the improvement of operation efficiency, creating the organizational capacities and relational plans for all the staff.

This system was first introduced by Kaplan and Norton in 1992. We can define the balanced scorecard method as a collection of precisely selected indices of organizational strategy.

In this system the factors of evaluating the customer performance, internal process, learning and financial indices are used. In other words, BSC provides the possibility to study the financial factors of the customers and organizational capacities at the same time which in turn increases the efficiency of the organization [15].

Significance of the study:

One of the most important organizations in every country is the service organizations. Service organizations act as the support for the productive organizations and play an important role in success or failure of a productive system. If the productive organizations have better performance and high quality, the performance level and quality of the organizations will be increased compared to other organizations and so it is necessary to establish an evaluation system in organizations. Considering the technological development and global competition, being informed about organizational performance is necessary. Evaluating the performance has many advantages for organizations and the most important of them are increasing the effectiveness and efficiency of the organizations.

Evaluating the performance helps the organizations to organize the plans and organizational costs and improve the quality of the services. The most important goals of performance evaluation are:

- continuous control of work process in the organization and establishing the efficiency management cycle
- recognizing the strong and weak points of the organization
- improving the decision making about the field and depth of the future activities and plans
- increasing the effectiveness and efficiency of the organization
considering the importance of the issue and the stated topics in statement of the problem, this study tries to improve the efficiency and decrease the costs in needed times in order to increase the productivity of the sources in organization and determining the proper indices for evaluating the performance and improving the policies and common methods to meet the goals and evaluating the indices by help of BSC in special regions of mine and metal industry.

Productivity:
Productivity is an economic term which is able to evaluate the performance of economic agencies including productive and service agents and show their results for people specially owners and managers and human force. It is also able to finde the negative points of the economic agents from different aspects of profitability, chance costs, incomes, the effect of inflation on products and their selling in the market.

History and definitions of productivity:
Improving productivity have an issue which is consdiered from the beginning of human history and in all political and economic systems. But study about how to imporve the eproductivity and systematically based on scientific and analytical issues has been considered by the scholras since 230 years ago [13]. The word productivity was first used by Franscois Quesnay the mathematicain and economics. Quesnay proposed the economic chart (Tableau economic) and considered the power of each country as dependent on increasing productivity in agriculture sectiorn.

In 1883, another French called Littre defined productiviy as as science and technology.
In 1950, the European organization of economic corporations defined productivity as: a fraction which is obtaine dby dividing the value of equity of the prodyct on the value of one of the production factors. So, one can speak about asset productivity, basic materials and work force.
International labour organization (ILO) defined productivity as: it is the ratio of input to one of the production factors (land, asset, work force and manageemnet).
In 1958, the Europe productivity agent (EPA) defined productivity as the degree and intensity of effective use of each production factors.
In the communique of productivity cnter in Japan, in 1955, it is stated about productiviy and effective use of production factors:
Maximum use of physical, human and other sources in scientific way so that productivity is imporved and leads to cost reduction for production, development of markets, increasing employment and improving the life level of all people.
Calculating the productivity in organziations is one of the important indices of studying and measuring their performance. Kendrick is one of the modern writers about productivity and stated that organizations and companies with faster corporate productivity compared to their rivals will have higher margins. But the companies with lower productivity compared to their rivals will have less margin and finally will be bankrupt [15].

Definitions of productivity:
Literary, productivity means the power of producing and being productive and in persian literature it mean being beneficial.
It is maximum use of soruces and facilities scientifcally in order to reduce the costs and creat satisfaction of the beneficiaries.
It is a reasonable viwe about work and life or smarting the activities for a better and improved life (cultural view).
The ration of production to the consumed soruces which is compared to a fixed ration in a specified period of time.
It is the relationship between aproduction system with the used data such as land, asset, workforce, energy and others which are used for production (Technical view)
(output is what is produced including a product or service.
Input: it is the product factor ( materails, huamn force, asset, energy and others).
Productivity is defined as efficiency ( doing the works correctly) and effectivness of an activity.
According to what has been mentione above, it can be said that:
Classical view about productivity was to emphasize on management of the existed soruces while the modern view is based on suggesting new ideas and new products and having a variety of custormes and focusing on market and riavls and using the potential abilities for using the chances and threats which finally leads to creatinga smart and feasable organization with environmental awarness.
Productivity indices:

Productivity indices are mostly used for measuring and development of organization and determining the strong and weak points of an organization. Analysis of the indices related to productivity shows where it is possible to use the chances and facilities.

Different measuring indices for productivity:

Productivity indices are usually stated as one of the forms below [13]:

Partial productivity indices:

Partial productivity is the ratio of product or output to one class of the input. For example labour productivity, asset productivity, material productivity the equations of which are present below: (output is the value of the product or added value):

1) Person-working hours/ output (product value or added value) = work productivity
2) Asset/ output = asset productivity
3) Energy cost / output = energy productivity
4) Value of the materials/ output = material productivity

General productivity index:

General productivity is the ratio of the gross product or added value to the total input value consumed by asset and work force. General productivity index is calculated as below:

5) General productivity = (work force + asset) / gross output (added value)

General productivity index:

General productivity is the common and simultaneous effect of all the inputs including human force, material and pieces, asset, energy and something like them related to the amount of output. General productivity index is calculated as:

6) General productivity = output/ (information+energy+asset+material+ workforce)

Total general productivity index:

In 1987, Sumanth provided a definition about productivity related to the organization or companies as:

Total comprehensive productivity index = total productivity index * abstract elements index

This index is one of the most complicated index of productivity which develops the meaning of productivity.

In this model the index of abstract elements is calculated including all the abstract inputs and outputs. This is a quantitative scale which can relate the product quality, timing of the process, customers’ satisfaction and ten other important performance indexes and help the management at any level to consider different effects on quality, cost, time and something like that.

Some examples of abstract factors in the model:

Factors related to process:
1. Time, efficiency, order, effectiveness, awareness and considering the environmental elements.

Factors related to staff
2. Job satisfaction, sharing efficiency, staff loyalty, increasing the income, security, moving the staff

The factors related to the customer:

Product quality, service quality, customer loyalty, product durability, competitive costs, condition and market stability, market saturation, general image of the organization.

Industrial organizations and companies which want to stay in the market and have the success in the competition should improve their efficiency over and over. Benefit alone is not enough for competition and staying in the market. In most of the cases production is mistaken as productivity. Great numbers due to inflation would be mistaken as the product growth and most of the advertising actions are mistaken by productivity. Most of the information and data created by the companies is for financial accounting and is not formed as a management information system. The most important ways for improving efficiency is to manage the human force, organize the work force and technology management.

Evaluating the performance:

When you can measure what you are talking about and show it with numbers and digits, then you can claim that you know something about it but when you cannot measure it and show it with numbers and digits then your information about it is little and dissatisfying.

Official use of evaluation systems goes back to the 19th century. It can be said that performance evaluation has been developed along with the management thoughts. In our country, in 1960, the state organizations were
evaluated in management and controlling the tasks for the first time. But history shows that after 30 years, there are no determined and organized systems for evaluation. Studying different approaches for evaluating the performance indicates that evaluation system should be compatible with organizational development and respond to different dimensions.

Technological development has a vital role in internal competition and global competition, the advantage of organization position, services and materials, market and customers are the factors which have to be considered in evaluations, today. Experts of management believe that evaluation systems should be reviewed periodically [14].

**Balanced scorecard or importance and role of it in advancing the organizational objectives:**

**Relationship between growth and learning with other aspects:**

**Johnson:**
he believes that an organization will be able to provide best services for its customers if, the investments are done under the supervision of the staff.

A: investment in employment and teaching the staff
Investing in information systems to support the decisions
Investment in creating motivation in personnel to create a common view

He believes that when these tasks are done, personnel satisfaction will be more and this in turn increases the human force.

**Birldi and others** studied 1798 workers in America and concluded that there is a close relationship between job satisfaction and training at work.

Ang and Soh studied the issue and found that creating effective and efficient informational system is one of the effective factors on personnel satisfaction.

Kappleman and Guyens concluded that staff cooperation in creating informational systems can increase their job satisfaction.

Oliver studied 100 companies at average level and found that if the workers are satisfied the efficiency will be more.

**Relationship between internal process and other aspects:**

Rust and others concluded that if there is a system for answering the customer’s complaints, efficiency of organization will be improved.

Ittner and Larcher concluded that there is a relationship between service level given to the customers and maintain them.

Ittner and Larcher showed a positive relationship between customer service quality and financial factors.

**Relationship between customer and other aspects:**

Mittal and Lasser studied a relationship between customer satisfaction and two factors of attracting and keeping the customers. They believe that a satisfied customer will be back and bring other people, too.

Ittner and Larcher showed a positive relationship between customer satisfaction and share efficiency.

Malina and Selto studied 100 companies in 24 different industries and found that customer attraction can make the company more profitable than keeping the old customers.

**Review of Local Literature:**

In 9192, Kaplan and Norton introduced BSC as a new technology of balanced scorecard. This is based on observing 12 big companies in America including Apple Computers and General Steel.

But using BSC gradually went further than mere use by the companies and evaluating the managers’ performance. Based on the findings of Kaplan and Norton in 1996 about 100 big and famous companies in America in different industries, BSC was introduced as a strategic management system. In 2001 BSC improved and was used as framework for changing the organization [17].

BSC has been used since introduction in countries and even non-state countries. For example Kaplan and Norton studied its use in 100 companies. For example, Rock Water is an international engineering and construction company and used BSC was used to determine the strategic views and four main elements of evaluation system. Company can tolerate the intense international competition by BSC.

The company of Advanced Macro Device which is a company of making pieces has used BSC. The BSC system of the company has seven parts: 1) financial index, 2) customer index, 3) internal process index, 4) testing and controlling products, 5) creating new products, 6) technological development, 7) and quality factors. In addition, organizational comprehension is measured by the ratio of correcting the factors including product time cycle and production efficiency [15].

Sears company is one of the biggest chain stores which had 3,9 billion dollars loss and 52.3 billion dollars selling. In order to solve the financial problem of the company, the organizational cultural changes are created.
Sears discovered that staff perception about the relationship between the jobs and strategic goals of organizations will have a positive effect on organizational performance. Furthermore, staff’s beliefs can affect the staff loyalty and giving the proper services to the customers. The findings caused the company to increase the income level. For example there was 5% improvement in staff beliefs, 1.3 % improvement in customers’ satisfaction and 5% improvement in income. The result of using this value chain was that the company became one of the most profited companies in 1993 and the higher order managers understood that the internal culture of the organization should be changed in long run and be based on BSC.

Recent studies have shown that BSC has been efficient even in state and non-profit organizations. For example, in Harvard Management magazine (2000, p. 4) it is reported that the BSC has not only helped the oil Mobile company to reach the first rank in its industry but also has helped the post and package organization of America to increase the 30 to 40 % benefit. This technology has been also applicable for academic strategic planning.

Today a large number of subway companies in industrial countries have applied BSC and the most significant experience of them includes:
- BSC in Barcelona subway
- BSC in London subway
- BSC in Madrid subway

Efficiency indices and performance evaluation with BSC approach:

BSC indices are the tools which have been used in order to make sure about meeting the goals and moving toward successful implementation if a strategy. Indices can be defined as the standards which are used in order to communicate information related to performance and evaluating it compared to the expected results. However, if the indices are correctly determined and communicated in an organization, they will be a powerful source which no definition can be used for explaining them. Indices communicate the information related to validity in a way that it is not manageable by the higher order managers. Indices are tools for advancing the expected activities. So that all the staff follows the way that should be passed in order to advance the expected activities. So, all the workers follow the way that should be followed to meet the general objectives of the organization and put advanced tools at the hand of managers.

Common indices of financial aspects:

All the selected indices should be related to each other through a collection of cause and effect of the strategic story. Financial aspect as the final goal has provided necessary fields for determining the indices in three aspects. In other words, financial indices express the results of successful implementation of objectives.

Indices of customer aspect:

Indices which are defined in this aspect reflect the actions which have ever been done in the organization and so they have been called performance-related indices.

Indices of growth and learning aspect:

Indices of growth and learning are in fact the advancing factors for other objectives. Motivated staffs that have a good combination of skills and tools and act in a proper organizational condition are the necessary tools for meeting the needs of the customers and finally having access to financial efficiency.

Indices of internal process aspect:

At primary stages the performance indices are translated to determine financial goals and proper indices and then customers and the way of providing services for them are defined. In order to meet the pre-determine goals for customers and finally the financial objectives of an organization, the performance indices should be determined to support and monitor the internal process.

The studies done inside the country:

There have been limited studies in the field of BSC in Iran. One of the companies which has acted toward feasibility and applying BSC is the Oil product Company of Iran which formed 9 work groups in order to implement the system, the results of which is the future plan of the company.

A number of other studies in the field of BSC in Iran are explained below:

1) In 2008, Hamid Allahyari Abhari in his M.S thesis studied the use of BSC in measuring the performance of the firms accepted in Tehran Exchange Market. In this thesis, the most important financial factors which the firms accepted in Tehran Exchange Market had used for different sections and company managers include: 1) net profit, 2) performance profit and total income.
In addition, 92.6 percent of the studied companies did not use BSC techniques. But these companies have use following non-financial factors for evaluating the performance of different section and managers of the company.
1) Customers’ satisfaction
2) The number of customers’ complains
3) The staff training hours and hearing the opinions and suggestions of the staff.
1. In 2007, Esma'at Sadat Kamali Shahri studied the feasibility of BSC in companies which were active in home appliances industry in Tehran Exchange Market. The results of the study indicated that the indexing financial aspect, customer aspect, internal process aspect and learning and growth aspect, all is possible and so there is feasibility of using BSC in home appliances companies accepted in Tehran Exchange Market.
2. In 2004, Mohamad Namazi and Amirreza Ramezani in an article titles as BSC in accounting management studied the BSC and concluded that BSC is one of the most important and modern evaluation techniques in organizational performance and can be used as a framework for strategic and military management in organizational changes and complement the present techniques of accounting management (considering the cost and benefit).

Research Hypotheses:

Main hypothesis:

There is the possibility of indexing the efficiency and performance by BSC in the special region of mine and metal industry.

Secondary hypothesis:

1. There is the possibility of indexing the efficiency and performance by BSC in the special region of mine and metal industry from financial perspective.
2. There is the possibility of indexing the efficiency and performance by BSC in the special region of mine and metal industry from internal process perspective.
3. There is the possibility of indexing the efficiency and performance by BSC in the special region of mine and metal industry from learning and growth perspective.
4. There is the possibility of indexing the efficiency and performance by BSC in the special region of mine and metal industry from customers’ perspective.

Research Method:

In this research, the descriptive-survey method is used. In this type of study, the aim is to present the objective, real and ordered description of a condition or an issue. In other words, the researcher of this type of study tries to report what is the fact without any subjective thoughts in mind. The present study has used a questionnaire to collect the data through a survey method (Azar, 1999). In this study, the staff of the special region of mine and metal industry of Hormozgan was considered as population, the number of which was 517 people. In order to calculate the sample size, since the population is limited, the following formula was applied:

\[ n = \frac{N^2 \cdot pq}{d^2(N-1) + \frac{pq}{N}} = \left(\frac{517(0.96)(0.05)(0.5)}{0.15(516)(0.96)(0.05)(0.5)}\right) = 39/5 \approx 40 \]

Since when \( p = 0.5 \), the sample size is maximum, so for the qualitative variables in the formula the sample size of \( p \) and \( q \) equal 0.5. \( d \) that is deviation is 0.15 and \( z \) is at the 95% level of confidence and the table has a normal distribution of 1.96 and \( N \) is the size of the statistical population which equals 517.

After determining the sample size using the random stage method based on financial affairs, business, technical and other experts, the participants complete the questionnaire.

The data was gathered in library to determine th literature and the collection instruments included:
1. Demographic information about age, gender, education, profession and experience.
2. Second part includes 26 questions. The questions are suggested based on the literature in the second chapter. The strategy of Kaplan and Norton and the suggested views were taken into account for the related hypotheses, as it is presented below:
Questions 1 to 9 are related to 1st hypothesis that is learning and growth aspect
Questions 10 to 15 are related to 2nd hypothesis that is internal process aspect
Questions 16 to 21 are related to 3rd hypothesis that is learning and growth aspect
Questions 22 to 26 are related to 4th hypothesis that is customer satisfaction aspect

Answers are rated in a Likert scale from very low, low, a little, much, very much with the scores of 1 to 5 respectively.

The content validity of the questionnaire was measured by a group of experts and the professors who were acquainted with BSC. They approved the content validity of the questionnaire.

In order to study the reliability the four aspects and general reliability of the questionnaire was calculated by SPSS software using Cronbach Alpha, the results of which are presented in table 1. The alpha is at a proper
level for all the aspects and total reliability is 0.83 which shows a relatively high internal correlation which is higher than acceptable level.

### Table 1: the results of Cronbach Alpha.

<table>
<thead>
<tr>
<th>aspect</th>
<th>Questions</th>
<th>Number of questions</th>
<th>Cronbach Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning and growth  process</td>
<td>1-9</td>
<td>9</td>
<td>0.77</td>
</tr>
<tr>
<td>Internal process</td>
<td>10-15</td>
<td>6</td>
<td>0.81</td>
</tr>
<tr>
<td>Customer</td>
<td>16-21</td>
<td>6</td>
<td>0.92</td>
</tr>
<tr>
<td>Financial</td>
<td>22-26</td>
<td>5</td>
<td>0.774</td>
</tr>
<tr>
<td>Total</td>
<td>1-26</td>
<td>26</td>
<td>0.83</td>
</tr>
</tbody>
</table>

### Data Analysis:

After collecting the data, they have been analyzed. The average age of the respondents was 35 years old. The educational level of the participants can be described as below:

20 percent of them had diploma degree, 20 percent had college degree, 52.2 percent had bachelor’s degree, 5 percent had master degree and 2.5 percent had Ph.D. considering profession, 37.5 percent were at financial affairs, 25 percent had business and 17.5 percent had technical profession and 20 percent had other professions.

The participants were asked about their experience and 50 percent of them had 10 years, less than 45.5 had 11-20 years and 7.5 percent had 21 to 30 years of experience.

One way t-test is used to study the normality of all the aspects of the questionnaire. One of the methods is Schapiro-wilk and Kolmogorov-Smirnov tests. The present study has used Kolmogorov-Smirnov test. In studying the normality of the hypotheses were observed as below:

<table>
<thead>
<tr>
<th>H0: Observations follow normal distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1: Observations do not follow normal distribution</td>
</tr>
</tbody>
</table>

The results of Kolmogorov-Smirnov test for studying the normality of the different aspects based on table 4-6.

### Table 4-6: One-Sample Kolmogorov-Smirnov Test

<table>
<thead>
<tr>
<th>Normal Parameters</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Kolmogorov-Smirnov Z</th>
<th>Asymp. Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>40</td>
<td>3.2583</td>
<td>3.4000</td>
<td>3.5887</td>
<td>0.289</td>
</tr>
<tr>
<td></td>
<td>40</td>
<td>3.4500</td>
<td>0.897</td>
<td>0.4967</td>
<td>0.287</td>
</tr>
<tr>
<td></td>
<td>40</td>
<td>3.4243</td>
<td>0.773</td>
<td>0.3728</td>
<td>0.476</td>
</tr>
</tbody>
</table>

Table 4-6 presents the results of Kolmogorov test for normality of all aspects of learning and growth, customer, internal, and all the scores of the questionnaire. It is observed that the significance level of all the variables is higher than 0.05. In other words the Kolmogorov test is not significant and it is concluded that the null hypothesis cannot be rejected. So, all the variables follow the normal distribution and one-way sample t-test is used for studying the research hypotheses.

### Results of testing the 1st hypothesis:

H1: the possibility of indexing the efficiency and performance with BSC approach in special mine and metal region from financial perspective.

H0: there is no possibility of indexing the efficiency and performance with BSC approach in special mine and metal region from financial perspective.

Hypothesis Against: there is the possibility of indexing the efficiency and performance with BSC approach in special mine and metal region from financial perspective.

In order to test the hypothesis, the mean scores were calculated using one sample t-test the hypothesized value is 3 and the results are given in table 4-8.

### Table 4-8: the results of comparing the mean with a special value for efficiency and performance from financial view.

<table>
<thead>
<tr>
<th>Number</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Mean Standard error</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>3.588</td>
<td>0.51021</td>
<td>0.08067</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>T</th>
<th>Df</th>
<th>Test Value = 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Sig. (2-tailed)</td>
</tr>
<tr>
<td>7/298</td>
<td>39</td>
<td>.000</td>
</tr>
</tbody>
</table>

In table 4-8 the results of one way sample t-test are shown and it is seen that the average of the financial aspect scores has the mean of 3.588 with standard deviation of 0.51 so that the mean is bigger than the hypothesized value of 3 and this is statistically significant (sig=0.000). In other words hypothesis 1 is approved.
Results of testing the 2nd hypothesis:
H2: the possibility of indexing the efficiency and performance with BSC approach in special mine and metal region from internal process perspective.
H0: there is no possibility of indexing the efficiency and performance with BSC approach in special mine and metal region from internal process perspective.
Hypothesis Against: there is the possibility of indexing the efficiency and performance with BSC approach in special mine and metal region from internal process perspective.
In order to test the hypothesis, the mean scores of questions 9 to 15 were calculated using one sample t-test the hypothesized value is 3 and the results are given in table 4-10.

<table>
<thead>
<tr>
<th>Number</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Mean Standard error</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>3.4500</td>
<td>.49671</td>
<td>.07854</td>
</tr>
</tbody>
</table>

Table 4-10: the results of comparing the mean with a special value for efficiency and performance from internal process view.

<table>
<thead>
<tr>
<th>T</th>
<th>Df</th>
<th>Sig. (2-tailed)</th>
<th>Mean Difference</th>
<th>95% confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/730</td>
<td>39</td>
<td>.000</td>
<td>0/45000</td>
<td>0/2911</td>
</tr>
</tbody>
</table>

In table 4-10 the results of one way sample t-test are shown and it is seen that the average of the internal process aspect scores has the mean of 3.45 with standard deviation of 0.497 so that the mean is bigger than the hypothesized value of 3 and this is statistically significant (sig=0.000). In other words hypothesis 2 is approved.

Results of testing the 3rd hypothesis:
H2: the possibility of indexing the efficiency and performance with BSC approach in special mine and metal region from learning and growth perspective.
H0: there is no possibility of indexing the efficiency and performance with BSC approach in special mine and metal region from learning and growth perspective.
Hypothesis Against: there is the possibility of indexing the efficiency and performance with BSC approach in special mine and metal region from learning and growth perspective.
In order to test the hypothesis, the mean scores of questions 1 to 9 were calculated using one sample t-test the hypothesized value is 3 and the results are given in table 4-12.

<table>
<thead>
<tr>
<th>Number</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Mean Standard error</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>3/2583</td>
<td>0/53871</td>
<td>0/08518</td>
</tr>
</tbody>
</table>

Table 4-12: the results of comparing the mean with a special value for efficiency and performance from learning and growth view.

<table>
<thead>
<tr>
<th>T</th>
<th>Df</th>
<th>Sig. (2-tailed)</th>
<th>Mean Difference</th>
<th>95% confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/033</td>
<td>39</td>
<td>.004</td>
<td>0/25833</td>
<td>0/0860</td>
</tr>
</tbody>
</table>

In table 4-12 the results of one way sample t-test are shown and it is seen that the average of the learning and growth aspect scores has the mean of 3.26 so that the mean is bigger than the hypothesized value of 3 and this is statistically significant (sig=0.000). In other words hypothesis 3 is approved.

Results of testing the 4th hypothesis:
H4: the possibility of indexing the efficiency and performance with BSC approach in special mine and metal region from customer perspective.
H0: there is no possibility of indexing the efficiency and performance with BSC approach in special mine and metal region from customer perspective.
Hypothesis Against: there is the possibility of indexing the efficiency and performance with BSC approach in special mine and metal region from customer perspective.
In order to test the hypothesis, the mean scores of questions 12 to 16 were calculated using one sample t-test the hypothesized value is 3 and the results are given in table 4-14.
Table 4-14: the results of comparing the mean with a special value for efficiency and performance from customer view.

<table>
<thead>
<tr>
<th>Number</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Mean Standard error</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>3.4000</td>
<td>0.3725</td>
<td>0.05902</td>
</tr>
</tbody>
</table>

Test Value = 3

<table>
<thead>
<tr>
<th>T</th>
<th>Df</th>
<th>Sig. (2-tailed)</th>
<th>Mean Difference</th>
<th>95% confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.778</td>
<td>39</td>
<td>0.000</td>
<td>0.04000</td>
<td>0.2806</td>
</tr>
</tbody>
</table>

In table 4-14 the results of one way sample t-test are shown and it is seen that the average of the customer aspect scores has the mean of 3.4 so that the mean is bigger than the hypothesized value of 3 and this is statistically significant (sig=0.000). In other words hypothesis 4 is approved.

Results of testing main hypothesis:
Main Hypothesis:
the possibility of indexing the efficiency and performance with BSC approach in special mine and metal region from.

H0: there is no possibility of indexing the efficiency and performance with BSC approach in special mine and metal region from
Hypothesis Against: there is the possibility of indexing the efficiency and performance with BSC approach in special mine and metal region from
In order to test the hypothesis, the mean scores of 26 questions were calculated using one sample t-test the hypothesized value is 3 and the results are given in table 4-15.

Table 4-15: the results of comparing the mean with a special value for efficiency and performance from customer view.

<table>
<thead>
<tr>
<th>Number</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Mean Standard error</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>3.4243</td>
<td>0.37287</td>
<td>0.05896</td>
</tr>
</tbody>
</table>

Test Value = 3

<table>
<thead>
<tr>
<th>T</th>
<th>Df</th>
<th>Sig. (2-tailed)</th>
<th>Mean Difference</th>
<th>95% confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.196</td>
<td>39</td>
<td>0.000</td>
<td>0.42427</td>
<td>0.3050</td>
</tr>
</tbody>
</table>

In table 4-14 the results of one way sample t-test are shown and it is seen that the average of the customer aspect scores has the mean of 3.424 and standard deviation of 0.37, so that the mean is bigger than the hypothesized value of 3 and this is statistically significant (sig=0.000). In other words the main hypothesis is approved.

Conclusion:
The results of the hypothesis suggest that there is the possibility of productivity and performance of the Balanced Scorecard approach, in the particular area of mining and metal industries. According to the results of the Company and potential benefits of Balanced Scorecard, it is recommended that companies use the four financial perspectives, internal processes, learning and growth, customer satisfaction and acting to increase their efficiency in the implementation of this system. Suitable indicators were prepared in order to achieve our strategy based on our organization's strategic plan (Considering the cost benefit analysis).

According to the results of this research and scorecard benefits, it is possible to investigate and perform this kind of research in other companies.

REFERENCES