Evaluating IT Performance Using Combined Model of Balanced Scorecard & Fuzzy Analytic Hierarchy Process

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Abstract:
Performance evaluation is a main task in every organization and it is one of the perspectives in management which conducted through applying financial indices in the past. As in economic era based on knowledge, value-adding activities are not just based on tangible assets, absolute attention to financial perspective for performance evaluation will face difficulties and insufficiencies. Therefore applying multidimensional evaluation models such as Balanced Scorecard (BSC) which evaluates performance in different perspectives has been developed.

In this research, a performance evaluation model applied based on four perspectives (financial, customer, internal processes and growth & learning) along with Analytic Hierarchy Process and Fuzzy logic to evaluate IT performance of Sistan & Baluchestan Province Governor-general. In this regard, to evaluate performance, perspectives, IT strategies and indices related to each perspective of IT BSC determined firstly. As the second step, weight of indices, perspectives of BSC and strategies determined based on Fuzzy AHP using elites’ views. At the third step, sores were given to each index based on views of experts and finally IT performance of Sistan & Baluchestan Province Governor-general computed based on weighted-indices and scores calculated by One-sample t Test. Results showed that this performance has a desirable status.

Keywords: Performance evaluation, Balanced Scorecard, Analytic Hierarchy Process, Fuzzy logic, IT.

1. Introduction:
Performance evaluation is a main task in every organization and it is one of the perspectives in management which conducted through applying financial indices in the past (Stewart & Sharif, 2006, P. 417). In two recent decades, issues such as Organizational Learning, Knowledge Creation and Innovation Capacity have been considered as determining factors in Competitive advantage and this concentration has been due to emergence of globalization, intensifying competition and unprecedented development of technology especially in communications and information (Herbert & Golet, 2002, P. 582). Therefore, organizations are under pressure to find pervasive performance indices especially that there is more emphasis on norm performance index because mentioned indices are in relation with human and processes, i.e. issues whose weakness and powers are not shown in balance sheet (Vian et al. 2004, P. 182). BSC1 which attracts many attentions, is not only an integrated and pervasive performance evaluation instrument, but it is a managing system with modern approach of strategic management which introduced by Robert Kaplan and David Norton 90s. Although system of BSC takes the performance in different levels from the organization and surveys from business level to individual level but there are defects and traps in their application. Neither relatively nor absolutely BSC offers a technique to estimate turnout of each perspective. Even it does not estimate relative importance of each index under one perspective. In practice, BSC users should conduct this assimilation intuitively. To solve such a problem, Analytic Hierarchy Process could be compound with BSC (Chin & Lian, 2006, P. 85). Those who decide according to AHP, should state hierarchies reflexing criteria which goals are obtained based on them. As BSC completely estimates business performance regarding four perspectives, a compound of BSC and AHP could properly remove problems in performance (Haghshenas et al. 2007, P. 21). Regarding that ambiguity and fuzziness is global particulars of many decision-making issues and as decision-makers often submit uncertain and ambiguous answers instead of exact methods and figures, applying common AHP is not proper and enough and uncertainty should be considered in all or some paired comparison values. Therefore, in practice where there is paired comparison, Fuzzy AHP is more applicable than common AHP (Haghshenas et al. 2007, P. 40).
One of the fields under study, is IT status in organizations. Some questions which are asked frequently by organizations’ managers are when is investment in IT/IS valuable? Does present performance status have the required capacity to conduct new projects of IT/IS? And Does performance of IT/IS department have been associated with productivity? (Wing et al. 2006)

Qualified answer to these questions is possible only when correct performance evaluation carry on for these organizations or departments so performance evaluation in IT/IS section is one of the most important issues for these managers (Stewart & Sharif, 2003, P. 420).

Therefore, regarding to the problems of performance evaluation in units and projects of information technology in organizations and due to powerful theoretical bases of Balanced Scorecard, the present research seeks to evaluate IT using IT-BSC based on Fuzzy Analytic Hierarchy Process.

- Review of Literature

2-1- Balanced Scorecard

Balanced Scorecard (BSC) which attracts many attentions, is not only an integrated and pervasive performance evaluation instrument, but it is a managing system with modern approach of strategic management introduced by Robert Kaplan and David Norton 90s. BSC offers a complex of performance indices in four groups including financial performance indices, customer relationship indices, internal process indices and learning & growth indices. From when BSC has been introduced, many companies have accepted it as a basic structure for their strategic management system and this help managers to line up their business with modern strategies in order to achieve development chances based on more flexibility, value-added of products and services and costs reduction (Azar & Darvishi, 2007).

Kaplan & Norton also emphasizes that BSC is just a sample and should be modified regarding to determining factors of a company or industry. Regarding to the subject which a business acts and also based on selected strategy, numbers of perspectives could be increased or one perspective could be replaced by another. In addition, concept of BSC (Balanced Scorecard) could be applied for assessing, evaluating and conducting activities in specific functional areas of a business, even at the level of a single project (Nion, 2003). Figure 1 Shows elementary structure of Balanced Scorecard.

![Figure 1- elementary structure of Balanced Scorecard](image)

2-2- Fuzzy Analytic Hierarchy Process (FAHP)

Analytic Hierarchy Process is a flexible and powerful decision-making process which helps decision-maker to determine priorities and to make the best decisions. Also it could be applied when simultaneous consideration of quality and quantity perspectives of decision is required. AHP techniques decreases complexity of decisions through paired comparison and compounding results, therefore not only help decision makers to make the best decisions but it offers a rational and clear explanation that why it is the best decision (Rao et al. 2008, P. 2).

Chang (Chang, 1996) introduced a sample for Fuzzy Analytic Hierarchy Process which has been used in many researches as a basis of computation in Fuzzy Analytic Network Process. Some of those researches are researches conducted by Youksel & Dogderion (2010), Tiseng (2010), Sebsi (20090 and Lin et al. (2009). The method of computation in the present research which conducted Fuzzy Analytic Network Process, is similar to the method of...
Chang who conducted Fuzzy Analytic Hierarchy Process. In this method if complex of subjects is defined as \(X = \{x_1, x_2, x_3, \ldots, x_n\}\) and if target complex is defined as \(G = \{g_1, g_2, g_3, \ldots, g_m\}\), then according to Chang analytical method, each subject for each target analyzes according to the order which is done. Therefore, set of triangular fuzzy numbers \(M\) valuate for each target which obtains through relation 1:

\[
M_{i}^{1}, M_{i}^{2}, M_{i}^{3}, \ldots, M_{i}^{n}, i = 1, 2, \ldots, n
\]

\(M_{i}^{j}\) (\(j = 1, 2, \ldots, m\)) are triangular fuzzy numbers. A triangular fuzzy number is shown as \((l, m, u)\) which parameters \(l, m\) and \(u\) are the least likely value, the most likely value and the most value respectively. Steps of Chang analysis are as follow (Youksel et al. 2010).

**Step 1:** Fuzzy compound value regarding to \(i^{th}\) case explains as relation 2:

\[
S_{i} = \sum_{j=1}^{m} M_{i}^{j} \bigotimes \left[ \sum_{j=1}^{n} \sum_{j=1}^{m} M_{i}^{j} \right]^{-1}
\]

To obtain \(i^{th}\) , operation of adding values for a certain Matrix explains as relation 3.

\[
\sum_{j=1}^{m} M_{i}^{j} = \left( \sum_{j=1}^{n} l_{j}, \sum_{j=1}^{n} m_{j}, \sum_{j=1}^{n} u_{j} \right)
\]

To obtain expression \(i^{th}\) , Fuzzy sum operation of values \(M_{j}^{i}\) (\(j = 1, 2, \ldots, m\)) computes with relation 4.

\[
\sum_{j=1}^{n} M_{i}^{j} = \left( \sum_{j=1}^{n} l_{j}, \sum_{j=1}^{n} m_{j}, \sum_{j=1}^{n} u_{j} \right)
\]

And then inverse of the above vector computes by relation 5:

\[
\left[ \sum_{j=1}^{n} \sum_{j=1}^{m} M_{i}^{j} \right]^{-1} = \left( \frac{1}{\sum_{j=1}^{n} u_{j}}, \frac{1}{\sum_{j=1}^{n} m_{j}}, \frac{1}{\sum_{j=1}^{n} l_{j}} \right)
\]

So that \(1, m, u > 0\).

Finally to obtain \(S_{i}\), multiply operation performs as relation 6:

\[
S_{i} = \sum_{j=1}^{m} M_{i}^{j} \bigotimes \left[ \sum_{j=1}^{n} \sum_{j=1}^{m} M_{i}^{j} \right]^{-1} = \left( \sum_{j=1}^{n} l_{j} \cdot \frac{1}{\sum_{j=1}^{n} u_{j}}, \sum_{j=1}^{n} m_{j} \cdot \frac{1}{\sum_{j=1}^{n} m_{j}}, \sum_{j=1}^{n} u_{j} \cdot \frac{1}{\sum_{j=1}^{n} l_{j}} \right)
\]

**Step 2:** If \(M_{1} = (l_{1}, m_{1}, u_{1})\) and \(M_{2} = (l_{2}, m_{2}, u_{2})\), probability degree of \(M_{1}=(l_{1}, m_{1}, u_{1}) \leq M_{2}=(l_{2}, m_{2}, u_{2})\) explains with relation 7.

\[
\forall (M_{1} \leq M_{2}) = \sup_{y \in \mathbb{R}} \min \left( \mu_{M_{1}}(y), \mu_{M_{2}}(y) \right)
\]
This relation could also be explained as relation 8.

\[ \tilde{m}_1 - l_1 \]  \hspace{1cm} (8)

Figure 1 of relation 8 shows that \( d \) is extent of intersection point \( D \) in horizontal axis between \( \mu_{M1} \) and \( \mu_{M2} \). To compare \( M_1 \) and \( M_2 \) both values of \( V(M_1 \geq M_2) \) and \( V(M_2 \geq M_1) \) are required.

**Figure 2 - intersection of \( M_1 \) and \( M_2 \)**

**Step 3:** Probability degree when a Fuzzy number is greater than \( k \) Fuzzy numbers \( M_i \) \((i = 1, 2, \ldots, k)\) explains with relation 9:

\[ V(M \geq M_1, M_2, \ldots, M_k) = V(M \geq M_1) \land V(M \geq M_2) \land \ldots \land V(M \geq M_k) = \min V(M \geq M_i), i = 1, 2, \ldots, k \]  \hspace{1cm} (9)

Suppose that \( d(A_i) = \min V(S_i \geq S_k) \) is for \( k = 1, 2, \ldots, n \) and \( k \neq I \), then weight vector obtains through relation 10:

\[ W' = (D'(S_1), D'(S_2), \ldots, D'(S_n))^T \]  \hspace{1cm} (10)

Which has \( n \) elements \( S_i \) \((i = 1, 2, \ldots, n)\).

**Step 4:** Applying normalization, normed weight vector computes with relation 11:

\[ W = (D(S_1), D(S_2), \ldots, D(S_n))^T \]  \hspace{1cm} (11)

Here \( W \) is a defuzzy number.

**3- Methodology & Research Model**

In order to design model of performance evaluation of IT, the following steps should be taken:

1. Determining perspectives of Information Technology (IT)
2. Determining IT strategies
3. Determining perspectives of Balanced Scorecard (BSC) and evaluation indices of each perspective
4. Drawing model of Analytical Hierarchy Process (AHP)
5. Determining weights of strategies and perspectives and Balanced Scorecard indices: In this stage weights of strategies and perspectives and Balanced Scorecard indices are obtained by FAHP method of Chang (Chang, 1996). Paired comparison matrixes are determined by experts to obtain local weights. To obtained importance of each criteria in relation with other criteria, Fuzzy sets with linguistic scale is used according to figure 3 and table 1.
Figure 3- Linguistic scales to state level of importance
Table 1- Linguistic scale to state level of importance

<table>
<thead>
<tr>
<th>Linguistic scales for level importance</th>
<th>Triangular fuzzy numbers</th>
<th>Inverse scales</th>
<th>linguistic inverse Triangular fuzzy numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Just equal</td>
<td>Just equal</td>
<td></td>
<td>Just equal</td>
</tr>
<tr>
<td>Equally important</td>
<td>Weakly more important</td>
<td></td>
<td>Just equal</td>
</tr>
<tr>
<td>Weakly more important</td>
<td>Relatively more important</td>
<td></td>
<td>Relatively less important ( \frac{1}{2}, \frac{2}{3}, 1 )</td>
</tr>
<tr>
<td>Strongly more important</td>
<td>More important</td>
<td>( \frac{3}{2}, \frac{2}{3}, \frac{5}{2} )</td>
<td>Less important ( \frac{2}{5}, \frac{2}{3}, \frac{1}{2} )</td>
</tr>
<tr>
<td>Very strongly more important</td>
<td>Very strongly more important</td>
<td>( \frac{2}{5}, \frac{5}{2} )</td>
<td>Very strongly less important ( \frac{1}{2}, \frac{2}{3}, \frac{5}{2} )</td>
</tr>
<tr>
<td>Absolutely more important</td>
<td>Absolutely more important</td>
<td>( \frac{5}{2}, \frac{3}{2}, \frac{7}{2} )</td>
<td>Absolutely less important ( \frac{2}{7}, \frac{2}{3}, \frac{1}{2} )</td>
</tr>
</tbody>
</table>

6. Evaluating performance indices: In order to evaluate indices, status of each performance indices evaluates in a definite period of time by questionnaire. To determine status of indices, Fuzzy sets with linguistic scale (in figure 4 and table 2) in questionnaire is used.

Figure 4- Linguistic scales to survey in performance indices
Table 2- Linguistic scales to survey in performance indices

<table>
<thead>
<tr>
<th>Linguistic scales for evaluating performance indices</th>
<th>Fuzzy number's mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very high (VH)</td>
<td>1</td>
</tr>
<tr>
<td>High (H)</td>
<td>0.75</td>
</tr>
<tr>
<td>Medium (M)</td>
<td>0.5</td>
</tr>
<tr>
<td>Low (L)</td>
<td>0.25</td>
</tr>
<tr>
<td>Very low (VL)</td>
<td>0</td>
</tr>
</tbody>
</table>

7. Evaluating Company’s Information Technology performance: In order to evaluate general performance of IT, One-sample t Test is applied. This test is used to survey mean of a society. If there is a hypothesis about mean of a statistical society, Statistical hypothesis testing could be used to determine correctness of the hypothesis in meaningful level of α (Adel Azar & Mansour Momeni, P. 101).

4- An application of Research Model
General-governor of Sistan & Baluchestan Province has used the introduced model in the present article in order to evaluate IT performance. It should be mentioned that required data are achieved through interview and questionnaire of managers and experts.

4-1- Determining Perspective, Strategies and Perspective Indices of Balanced Scorecard

A- Determining Perspectives
Perspective of IT in General-governor of Sistan & Baluchestan Province is defined as follow through brainstorming meetings held with presentation of experts.
“Developing to a superior Governor-general in IT to offer desirable information and services through proper methods”

B- Determining Strategies
With presentation of the experts in brainstorming meetings, IT strategies of General-governor of Sistan & Baluchestan Province to achieve perspective obtained as follow:
Strategy 1: Integrating and developing informational, managing, decision-making and operational systems
Strategy 2: Increasing productivity through mechanization and transparency of work process
Strategy 3: Quantitative and qualitative expansion of services for beneficiaries and visitors of organization apart from the spatial domain
Strategy 4: Maintaining and renovating existing infrastructures of organization’s IT in order to be coordinated with the latest updated technologies

C- Determining Perspectives of Balanced Scorecard and Evaluation Indices of each Perspective
Perspectives of Balanced Scorecard in IT unit are based on “Kaplan & Norton” model including financial, customer, internal processes and learning & growth perspectives. In order to determine evaluation indices of each of these perspective, introduced indices in “Stewart & Sharif” model is used. Then, this indices surveyed with experts of the company in brainstorming meetings and after some required modifications and adding or removing some indices according to conditions and goals of IT in General-governor of Sistan & Baluchestan Province, indices of each of these perspectives introduced as follow:

A- Indices of Financial Perspective
- Index 1: Amount of economization in costs due to productivity

B- Indices of Customer Perspective
- Index 1: Improving image of the organization
- Index 2: Development in quality of servicing
- Index 3: Reduction in numbers of request for information
Index 4: Customer Satisfaction
Index 5: Users’ satisfaction of IT instruments and systems

C- Indices of Internal Processes Perspective
- Index 1: Facilitating documentations transfer and management
- Index 2: Improving the time to respond requests
- Index 3: Coordination and integration between organizational process
- Index 4: Progress and develop in decision-making process in the organization
- Index 5: Progress and develop in reporting process and submitting feedback
- Index 6: Improving to identify errors and contradictions
- Index 7: Reduction in organizational errors

D- Indices of Learning & Growth Perspective
- Index 1: Developing knowledge of IT in organization
- Index 2: Increasing qualifications and work quality of employees to carry out their duties
- Index 3: Transferring & disseminating knowledge among employees
- Index 4: Developing communications and relations among employees
- Index 5: Decreasing confliction between employees and visitors and colleagues
- Index 6: Increasing suggestions to improve renovation by employees

4-2- Drawing Model of Analytical Hierarchy Process (AHP)

In order to draw model of Analytical Hierarchy Process, clusters of the model should be determined.
Cluster 1: Perspective
Cluster 2: Strategies
Cluster 3: Perspectives of Balanced Scorecard
Cluster 4: Indices of performance

Regarding to the Balanced Scorecard model of Kaplan & Norton, each of the clusters of perspective, strategies, perspectives of Balanced Scorecard and indices of performance has respectively hierarchical relation from top to bottom. Research model is as figure 1-3.

Figure 5- Model of Analytical Hierarchy Process in Governor-general of Sistan & Baluchestan Province
4.3- Determining Local Weight

A – Determining local weights of strategies:
Regarding to the table of paired comparison and using Chang method (1996), local weights of strategies is as vector 1.

\[
\begin{bmatrix}
ST_1 \\
ST_2 \\
ST_3 \\
ST_4 \\
\end{bmatrix} = \begin{bmatrix} 0.78 \\ 0.1 \\ 0.06 \\ 0.06 \\ \end{bmatrix}
\]

Local weights of strategies = (1)
So that strategy 1= ST1, strategy 2= ST2, strategy 3= ST3, strategy 4= ST4

B- Determining local weight of perspectives according to strategies
Regarding to the table of paired comparison and using Chang method, local weights of perspectives according to is as matrix 2.

\[
\begin{bmatrix}
fl & fl & fl & fl \\
\text{cu} & \text{cu} & \text{cu} & \text{cu} \\
\text{pr} & \text{pr} & \text{pr} & \text{pr} \\
\text{le} & \text{le} & \text{le} & \text{le} \\
\end{bmatrix} = \begin{bmatrix} 0.56 & 0.15 & 0.12 & 0.25 \\ 0.29 & 0.40 & 0.35 & 0.27 \\ 0.16 & 0.35 & 0.40 & 0.26 \\
\end{bmatrix}
\]

So that fi=financial perspective, cu=customer perspective, pr=internal processes perspective, le=learning & growth perspective

C- Determining local weight of perspectives’ indices
Regarding to the table of paired comparison and using Chang method, local weights of indices of financial, customer, internal processes and learning & growth perspectives is respectively as the following vectors:

\[
\begin{bmatrix} kp_1 \\ kp_2 \\ kp_3 \\ kp_4 \\ kp_5 \\ kp_6 \\ \end{bmatrix} = \begin{bmatrix} 0.25 \\ 0.24 \\ 0.05 \\ 0.22 \\ 0.24 \\ 0.47 \\ \end{bmatrix}
\]

So that kpi represent ith index.

4.4- Computing Overall Weight of Perspectives
Local and overall weights of strategies are equal as they are independent. To obtain vector of overall weight of BSC perspectives, at first, local weights of BSC perspectives obtains through multiplying local weights’ matrix of each perspective based on each strategy to vector of local weights of strategies according to the following relation:

\[
\begin{bmatrix}
fl \\
cu \\
pr \\
le \\
\end{bmatrix} = \begin{bmatrix} 0.56 & 0.15 & 0.12 & 0.25 \\ 0.29 & 0.40 & 0.35 & 0.27 \\ 0.16 & 0.35 & 0.40 & 0.26 \\
\end{bmatrix} \times \begin{bmatrix} 0.78 \\ 0.10 \\ 0.06 \\ 0.06 \\ \end{bmatrix} = \begin{bmatrix} 0.47 \\ 0.30 \\ 0.03 \\ 0.20 \\ \end{bmatrix}
\]
After obtaining overall weights for BSC perspectives, to obtain overall weights of indices of each perspective, overall weight of each perspective should multiply to local weight obtained for each index of that perspective. Therefore:

\[ 0.47 = kp_1 = \text{Overall weight of financial index} \]  \hspace{1cm} (4)

\[
\begin{align*}
kp_1 & = 0.30 \\ kp_2 & = 0.24 \\ kp_3 & = 0.05 \\ kp_4 & = 0.22 \\ kp_5 & = 0.24 \\ km_1 & = 0.13 \\ km_2 & = 0.15 \\ km_3 & = 0.15 \\ km_4 & = 0.03 \\ km_5 & = 0.26 \\ km_6 & = 0.07 \\ km_7 & = 0.06 \\
\end{align*}
\]

\[ \begin{bmatrix} 0.25 \\ 0.05 \\ 0.22 \\ 0.24 \\ 0.13 \\ 0.15 \\ 0.03 \end{bmatrix} \times \begin{bmatrix} 0.075 \\ 0.015 \\ 0.066 \\ 0.072 \\ 0.0039 \\ 0.0045 \\ 0.0039 \end{bmatrix} = \text{Overall weight of customer index} \]  \hspace{1cm} (5)

\[ \begin{bmatrix} 0.03 \\ 0.26 \end{bmatrix} \times \begin{bmatrix} 0.0078 \\ 0.0060 \\ 0.021 \\ 0.018 \end{bmatrix} = \text{Overall weight of internal processes index} \]  \hspace{1cm} (6)

\[ \begin{bmatrix} 0.23 \\ 0.19 \\ 0.04 \\ 0.21 \end{bmatrix} \times \begin{bmatrix} 0.049 \\ 0.032 \\ 0.000 \\ 0.046 \end{bmatrix} = \text{Overall weight of learning & growth index} \]  \hspace{1cm} (7)

\[ \frac{87/0}{26/0} \leq \frac{29/0}{029} \leq \frac{66/0}{12/0} \leq \frac{19/0}{332/0} \leq \frac{014/0}{066} \]

4-6- Performance evaluation of IT in General-governor of Sistan & Baluchestan Province

In this stage of the research, weight coefficients obtained for indices multiplies in reported performance for indices by sample respondents, so performance of General-governor obtains in view of each respondent. Results obtained from descriptive and deductive analysis of data are as following.

A- Descriptive Analysis of Data

In Table 3, performance dispersion distribution of financial, customer, internal processes, growth & learning variables and general performance of General-governor of Sistan & Baluchestan Province IT studies descriptively considering responses’ maximum limit, minimum limit, variance, mean.

Table 3- Descriptive study of variables

<table>
<thead>
<tr>
<th>Perspective</th>
<th>Maximum limit</th>
<th>Minimum limit</th>
<th>Variance</th>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial</td>
<td>0/47</td>
<td>0</td>
<td>0.0086</td>
<td>0.332</td>
</tr>
<tr>
<td>Customer</td>
<td>0/26</td>
<td>0/08</td>
<td>0.0016</td>
<td>0/19</td>
</tr>
<tr>
<td>Internal processes</td>
<td>0/029</td>
<td>0/012</td>
<td>0.000012</td>
<td>0/02</td>
</tr>
<tr>
<td>Learning &amp; knowledge</td>
<td>0/158</td>
<td>0/06</td>
<td>0.0006</td>
<td>0/12</td>
</tr>
<tr>
<td>General IT</td>
<td>0/87</td>
<td>0/326</td>
<td>0.014</td>
<td>0/66</td>
</tr>
</tbody>
</table>
B- Deductive Analysis of Data

In order to obtain performance of General-governor, the researcher deals with performance of General-governor of Sistan & Baluchestan Province applying statistical One-sample t test. Amount of the test considers 0.5 and if computed t for performance is more than t in the table (1.671), performance of the General-governor is satisfactory desirable status, in otherwise this performance is not satisfactory. Results obtained from this test are shown in table 4.

Table 4- Obtained results from t test for performance of General-governor of Sistan & Baluchestan Province

<table>
<thead>
<tr>
<th>T of the table in level x=0.05</th>
<th>Degree of Freedom</th>
<th>Computed t</th>
<th>Amount of test</th>
<th>Standard deviation</th>
<th>Mean</th>
<th>Numbers</th>
<th>Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>63</td>
<td>11/018</td>
<td>0/5</td>
<td>0/1184</td>
<td>0/6631</td>
<td>64</td>
<td>Performance of the General-governor</td>
</tr>
</tbody>
</table>

As table 4 shows, performance mean is 0.6631 which is more than amount of test (0.5). As computed t (11.018) is more than T of the table (1.971), therefore, in confidence level of 95% it could be said that the performance of General-governor of Sistan & Baluchestan Province is in satisfactory status.

5- Research Conclusion

The present research is similar to researches conducted by Youksel and Dagderion (2010) and Rav et al. (2005) due to using Balanced Scorecard as an instrument to evaluate strategy and also using network and hierarchical analysis to determine weight of indices. Of course, these researches evaluate performance of the whole organization while the present research evaluates performance of IT.

The present research is also similar to researches conducted by Bigliardi & Dormio (2010), Benker et al. (2004), Asha’ari (2008), Heidari & Rahimi (2008) and Mansouri (2007) due to applying Balanced Scorecard to performance evaluation; however this research is different with mentioned researches regarding that it evaluates IT performance and applies Fuzzy Hierarchical Analysis to determine weights.

This research and research conducted by Shawn, Yu and Lee (2003) are alike due to applying Balanced Scorecard and Fuzzy Hierarchical Analysis for evaluating performance but as the present research used Fuzz method and also as it has been conducted in IT area, is different with mentioned research.

The present research is similar to researches conducted by Stewart & Sharif (2001), Mahamed Pour & Saghafi (2008), Abdollahi (2007), Manian & Shokoofi (2006) and Jafari et al. (2008) due to using Balanced Scorecard for IT performance evaluation but it is newer than mentioned research as this has applied Fuzzy Hierarchical Analysis to weight perspective.

The present research is similar to the research conducted by Zandi & Tavana (2011) due to using Balanced Scorecard and Fuzzy method in IT but their research applied multipurpose Fuzzy method while the present research applied Fuzzy Hierarchical Analysis.

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