THE USE OF ANALYTIC HIERARCHY PROCESS IN THE BALANCED SCORECARD: An Approach in a Hotel Firm

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ABSTRACT

There are some problems during the determining process of the size of the scorecards and their rates. These rates are determined with the own words of the top manager or the manager who is responsible for the scorecard determination process in many applications or all of the rates of the size and strategies are regarded as identical with each other. But the size of the scorecards and the importance of every strategy determined with the scorecards couldn’t be identical for the company. The aim of this study introducing the application usage of the method of analytic hierarchy process during the determining process of the strategies and the rate of the scorecards’ size in the balanced scorecard method. In this context, a balanced scorecard of a hotel firm is formed and later the size of the scorecards and strategical rates are determined by means of using the analytic hierarchy process.

Keywords: Balanced scorecard, analytic hierarchy process, hotel firm, strategy, size, importance.

1. INTRODUCTION

In today’s world, businesses are in search of alternative management systems in order to have an effective performance system. This search makes the strategic management systems and the systems that integrate those systems even more important. One of the strategic management tools used in the name of a effective performance management called balanced scorecard (BSC) method is proposed by Kaplan and Norton in 1992. BSC method has been developed since it was put forwarded till today, especially the addition of strategy maps to the system increased the interest to that method. When the practitioners and academics have applied the method in different firms, they encountered some problems and suggested different alternative methods.

What makes BSC method different from other performance measurement and evaluation methods is its expressing the strategies of the company in a variety of score card size and thus it achieves the elimination of the strategies that do not serve any purpose (useless) in the upper size. However, in order to apply BSC successfully, all the sizes and strategies must be balanced with suitable rates. There is no consensus on the score card sizes and rate level of the strategies identified in each level and which method to be used to rate in practice.

The inventors of BSC method, Kaplan and Norton (1993) state that BSC must not be considered as a stereotypical way that can be applied for each industry and firm and they also emphasize that not all the firms have to apply the four sizes (finance, customer, internal company functions, learning and development) which were put forwarded (Kaplan and Norton, 1996) by them. Only two or three of these sizes can be used and also according to the conditions of the firm and the strategies, one or more sizes can be added. For this reason, the sizes of the BSC must be determined taking into account the conditions of the firm. In addition, in one of his studies, Norton (2000) stresses that the order of the finance, customer, internal company functions, learning and development sizes must be 22%, 22%, 34% and 22%. However, the scorecard sizes, strategies and rates can differ according to the sector and internal and external environmental conditions of the firm.

There are many studies that rates the scorecard sizes stable in practice as suggested by Kaplan and Norton. Thus, the score card sizes are assumed as stable regardless of the firm structure and other conditions. However,
the same score card sizes are not used for each firms and even if the sizes are the same, the rate of the sizes and the importance of the strategies that are identified in each sizes may not be the same for each firm. For this reason, the importance level of score card sizes and strategies (rate) for the firm must be identified. However, in many studies, the size and rate of the strategies must be determined on the subjective judgments of the managers. In this process, the objective results are much more important than the subjective judgments. Another method that can be used for this aim is Analytical Hierarchy Process (AHP) method.

2. CONCEPTUAL FRAMEWORK
2.1 Balanced Scorecard (BSC)
BSC is a tool to create a framework for strategic performance management transforming mission and strategies of the firms into understandable performance measurements (Kaplan ve Norton, 1996) and provide a wider point of view about the performance of the firm to the top management. In other words, BSC is the transformation of the strategies that are set to reach the goals of the firm covering all the employees.

In a study sponsored by Nolan Norton Institute started in 1990 and lasted more than one year, 12 company representatives gathered once a month and they tried to develop a new performance evaluation method. Kaplan and Norton shared the result of their study as an article in January-February issue of Harvard Business Review (HBR) in 1992 under the title of “The Balanced Scorecard: Measures That Drive Performance” (1992) and BSC concept is first mentioned in this article and accepted to the business literature. BSC concept is based on the research “Performance in the Organization of Future” by Robert S. Kaplan, the Arthur Lowes Dickinson Professor of Accounting at the Harvard Business School and David P. Norton whose professional field is performance measurement and restructuring of firms, the head of an international consulting firm called Renaissance Solutions Inc.

After the publication of the article Kaplan and Norton applied BSC application to many firms at the request of them. In this process, they discovered that the most important failure of the firms was having problems in adjusting BSC measurements to the strategies of the firm. Because, in practice while the managers have focused on increasing the performance of the methods used in the firm, they could not identify the things that would help the strategies of the firm to success. In this context, authors published their article about BSC measures must be compatible with strategies of firm in September-October issue of the same magazine in 1993.

Kaplan and Norton expressed in their article “Using Balanced Scorecard as a Strategic Management System” issued in the same magazine in February, 1996 that they used BSC not only to describe and explain the strategies of the firm but also to manage the strategy and thus BSC becomes a basic management system rather than a developed management and measurement system (Kaplan and Norton, 1996).

Kaplan and Norton (1996) stressed that performance measurements in the firms should be done in four sizes. They named these sizes as finance, customer, internal company functions and learning and development. BSC claims that customer, internal company functions and learning and development are the ones that will make the measurements/ indicators meaningful as well as financial criteria/indicators of the strategic management process of firm. Kaplan and Norton have evaluated the criticism against the method and considered the problems they encountered during the application and reorganized the strategy maps in their study in 2000. Strategy Map is one of the most important turning point in BSC and describes the cause effect relationship between BSC sizes. While a purpose in learning and development serve a purpose in internal company functions, internal company functions serves a purpose to another purpose and a purpose in customer size serves a purpose in finance size. Thus, BSC sizes are linked as a chain. Therefore, the purposes that do not serve a purpose in one level up are eliminated and each purpose must create a value in the financial structure of the firm directly or indirectly.

Kaplan and Norton introduced BSC as a strategic management model rather than performance evaluation method after their publications in 2001. Previously, this model has been proposed for profit businesses but in recent years it is started to be used by governmental organizations and public sector institutions and organizations. Thus, the parties try to use the best strategies to reach their goal using sources that are collected or allocated. BSC is renewed by the studies of Kaplan and Norton and also the other researchers interested in this subject. However, the basic framework of the system is limited to the study conducted by Kaplan and Norton in 1992. When the studies examined, it is seen that most of the studies are about establishing relationship between various fields and BSC.

When the usage of BSC method is considered, it is seen that firms give much more importance to this method. It is also seen that companies such as Electronic Circuits Inc. (Kaplan and Norton, 1992), General Electric (Davis, 1996), Rockwater, Metro Bank, National Insurance, Kenyon Stores, Pioneer Petroleum, FMC Corporation,
AHP was first suggested by Myers and Alpert in 1968 and Saaty has developed it in 1977 and he has achieved to make it to be used at solving the decision making problems. AHP can be described as a multi-criteria decision making and forecasting method that is used at decision hierarchy and it gives the percentage distribution of decision points in terms of factors that affect the decision. AHP is based on comparisons that are used to define the importance value of the decision points in terms of the factors that affect the decision using a predefined comparison scale. As a result, decision differences turn into percentage distribution on decision points (Yaralioglu, 2001). Saaty realized that in order to be successful at decision problems, accurate mathematics is needed instead of complex mathematics and he has developed AHP as a result of analysis for complex situations and decision making for complex problems. AHP configure hierarchical and visualize the problems which are complex, multi-personal, multi-criteria and multi-period. For this reason, AHP is used effectively in solving the problems faced in many sectors and countries by managers (Kecek and Yildirim, 2010).

The application process of AHP consists of five steps. On the first stage, the purpose of AHP usage is defined and the hierarchical structure related to the purpose is put forth. This hierarchical structure includes main and sub-criteria and alternatives with the purpose. “The main aim of creating a hierarchy is to put forward the basic elements of the problem” (Wind and Saaty, 1980) and reflect the relationship between the purpose of the comparison and the result that is desired to be obtained. The second step of AHP is creation of binary comparison matrices. At this stage, the main and sub-criteria and alternatives are compared with each other. While the mutual comparison of the factors are done, the evaluation scale recommended by Saaty (1994) shown in Table one is used. This scale consists of importance scales that are defined from 1 to 9. Every two factors are enumerated mutually with one of these numbers. While creating comparison matrices, it is questioned that how much important the factor on the row when compared the one on the column. For example, If the criteria M is less important than the criteria F, the comparative value of 3 is given, if they have an equal importance, the comparative value of 1 is given. In this case, the criteria F takes the value 1/3 or 1 when compared to M. Because the reverse of the same criterias are the reverse of the same point according to multiplication. The intermediate values defined in Table 1 are the values that can be chosen by the decision maker if he is in dilemma between two main values.

<table>
<thead>
<tr>
<th>Table 1: Evaluation Scale in AHP</th>
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The third stage in AHP is creation of the normalized matrices and defining the importance level of the factors. Normalized matrix is obtained by dividing the each column values of comparison matrix created at the second stage into the sum of related column separately. The value for each row is summed using normalized matrix and the average value of each is counted. The obtained value is the priority vector and it gives the importance level (rate) of the criteria on the row (Dagdeviren et al., 2004; Palaz and Kovanci, 2008).

The fourth stage in AHP is to determine whether the matrixes are consistent or not. The main purpose is to determine how much the importance values (relative priority) reflect the reality (Ecer ve Kucuk, 2008). In order to consider AHP valid, matrices must be consistent. In order to determine whether the matrix is consistent or
not, the defined importance level for each factor at the third stage and the comparison matrix of related column created at the second stage are multiplied and summed and the rate vector is obtained. Consistency index (Consistency Index - CI) is calculated as:

\[ CI = \frac{\lambda_{\text{max}} - n}{n - 1} \]

The max value is obtained by dividing the rate vector into the relative importance values (Aydin, Oznehir and Akcali, 2009) and the largest latent value is called the basic value. After that, Consistency Rate must be calculated in order to see whether decision maker was consistent during making comparison or not (Palaz ve Kovanci, 2008). Consistency ratio (CR) is calculated with:

\[ CR = \frac{CI}{RI} \]

equation. Here, RI (Random Index) is the indicator for random. Random indicator varies according to n value (the length of comparison matrix). The random indicators developed for the matrices between 1 and 15 are given in Table 2.

Table 2: Random Indicators

If the consistency rate (CR) calculated by dividing the consistency indicator into random indicator related to n criteria number is bigger than 0.10, it means that decision makers are inconsistent or there is an error in AHP calculation. If CR value is smaller than 0.10, decision makers can be considered as consistent. For that reason, CR value less than 0.10 is the expected value.

The fifth and the last phase of AHP application is the determination of the priorities. Here, the rates of main and the sub-criteria are multiplied and rates of all criteria are counted. The total of these values is equal to 1. If the alternatives included to hierarchical structuring, the rates of important alternatives are also included. Thus, the alternative with high value gives the best alternative for the decision ((Palaz and Kovanci, 2008).

3. APPLICATIONS OF BSC and AHP

Although their common use in different industries there are very few studies discussing BSC centered approach at hotel administrations. In Turkey there are nearly scarcely any studies concerning BSC relations at hotels in Turkey. So we can say that there is a big gap in the literature about BSC practices at hotel firms (Bertan, 2009). Below some information have been given about the studies in the literature concerning BSC practices at hotels:

Bertan (2009) in his work by stating that BSC can be applied at hotel administrations narrated how a sample practice period should be. The writer focused on the formats of the BSC at hotel administrations and causality relationship between the sample strategies however he was not interested in the significance of the strategies and the size. Kilinc et al. (2008) in their work researched the applicability of the BSC applications at four star and five star hotels in Alanya (Turkey). Authors, although they didn’t refer specific importance, indicated that sample firms gave importance to prior financial criteria and besides they didn’t care about the customer satisfaction.

Chen et al. (2011) in their study, developed a new model using a BSC approach for evaluating the performance of hot spring hotel for more accurately reflecting the dependence and feedback problems of each factor in real world situations. They proposed that the model they developed was adopted to solve the dependence and feedback problems, while establishing a performance evaluation and relationship model. Celik (2006) in his work formed the BSC of a hotel firm. The writer determined different aims, monthly and annual targets and performance indicators at 4 scorecard sizes. There had been no studies about the importance of sizes and strategies.

Phillips (2007) in his work presented the relation between the BSC and the strategic control with a sample event work at a hotel enterprise. The writer analyzed practice steps at five different sizes and their possible help on hotel firm. But he didn’t do any study to determine sizes and strategies related with the scorecard. Agea and Tuncer (2006) in their study, formed the BSC of a shopping mall and accommodation centre. Authors analyzed results determining the objective and occurred values consisting within the scope of 4 sizes and 16 strategic aims. But they didn’t make an analysis related with the scorecard rate and strategic aims. Emekli (2006) in his work performed a BSC practice. The writer determined performance indicators at 4 scorecard size for each company function and compared objectives and occurred values. In this work also there had been no studies related with significance of the tables and strategies.
In the literature, there are some studies applying different areas of integration of BSC and AHP. Below the information about the studies have been given:

Sharma and Bhagwat (2007) in their works, developed an integrated BSC and AHP approach for supply chain management evaluation. They developed in this paper based on an extensive review of literature on supply chain management performance measures, supported by AHP analysis. It also suggests from the view of different decision levels and overall performance measurement that is the best BSC perspective. Lee et al. (2008) aimed to construct an approach based on the fuzzy AHP and BSC for evaluating an IT department in the manufacturing industry in Taiwan. In this study, the BSC concept is applied to define the hierarchy with four major perspectives (i.e. financial, customer, internal business process, and learning and growth), and performance indicators are selected for each perspective. A fuzzy AHP approach is then proposed in order to tolerate vagueness and ambiguity of information. A fuzzy AHP information system is finally constructed to facilitate the solving process. The results provide guidance to IT departments in the manufacturing industry in Taiwan regarding strategies for improving department performance.

Leung et al. (2006) used the AHP and its variant the analytic network process (ANP) to facilitate the implementation of the BSC. They show in their study that the AHP and the ANP can be tailor-made for specific situations and can be used to overcome some of the traditional problems of BSC implementation, such as the dependency relationship between measures and the use of subjective versus objective measures. Chiang (2005) in his study, the AHP method was modified to a dynamic approach in the period of analytic cycle for solving the dynamic condition problem of vendor selection. In this study, BSC is used to define the 4 major frameworks of supplier selection including customers, financial, internal business processes, and innovation and learning. The 16 attributes are extended from major frameworks. The main character of proposed method is the scores of attributes and alternatives from the estimation of commander’s trade-off can be changed in time axis under the changeable and conjecturable business environments. Xu (2007) in his study, he suggested to apply BSC and establish a series of assessment indices in the following four aspects: finance, customer, internal operation, learning innovation. He aims that overcome the shortcomings of the traditional methods in performance assessment of professional sports clubs. In this study, AHP can be applied to evaluate the performance of professional sports clubs.

Huang (2009) in his study, proposed an integrated approach for the BSC tool and knowledge-based system using the AHP method, and then develops an intellectual BSC knowledge-based system for strategic planning that sets or selects firm management or operational strategies based on the following perspectives: learning and growth, internal/business process, customer and financial performance. This system can help determine specific strategy weights. He asserts that the intellectual BSC knowledge-based system facilities efficient automated strategic planning. Reisinger et al. (2003) proposed the AHP as a mechanism to prioritize the measures of a BSC for an organization. They illustrate an application of the methodology for a European services firm.

Chan (2006) proposed to apply the AHP to hospital scorecards in performance assessment using BSC in his study. Although AHP could be a time-consuming exercise, it allows participative input in determining a comprehensive measure for comparing performance of healthcare organizations. Wang et al. (2006) in their study, confirmed the weight of variables which building the system of the performance evaluation in the informatization situation on the basis of BSC theory using AHP. Then they took the Harbin Boiler-making limited company as the example to validate this system.

Pan (2006) proposed AHP as the effective and efficient method in identifying the key performance indicators when attempting to adopt BSC in his study. Then he takes a hospital as an example of adopting the AHP to show the appropriateness of such an application. The result bares the critical factors of the hospital performance and the appropriateness of proposed actions perceived by management. Aravamudhan and Kamalanabhan (2007) in their study, investigated the critical factors and subfactors that determine the adoption of the BSC in the Indian manufacturing and service sectors. The AHP employed to prioritise the relative importance of the four critical success factors and 15 subfactors among the Indian organisations. In this study, the results suggest a generic hierarchy model for Indian organisations to prioritise the critical factors and formulate strategies for implementing the BSC in their organisations.

Yuan and Chiu (2009) in their study, developed a case-based reasoning system to assist in assigning the suitable weights. Based on the BSC design, this study proposed a three-level feature weights design to enhance case-based reasoning’s inference performance. For effective case retrieval, a genetic algorithm mechanism is employed to facilitate weighting all of levels in BSC and to determine the most appropriate three-level feature
weights. In this study, the proposed approach is compared with the equal weights approach and the AHP approach.

Xiaoli and Guangbin (2008) presented a combined method which applies the BSC, the AHP and fuzzy comprehensive assessment methods into measuring the performance improvement resulting from IT by a construction organization. A performance evaluation framework with two tiers (i.e: enterprise and project tiers) were built according to the characteristics of construction enterprises in this study. At each tier, a group of performance indicators and measures are given. The proposed framework applies the AHP to facilitate aggregating the obtained diverse performance measurements. Varma et al. (2008) in their study, suggested a method to evaluate the performance of one process supply chain, namely the petroleum industry supply chain. They used a combination of AHP and BSC for evaluating performance of the petroleum supply chain. The choice of factors determining supply chain performance under the four perspectives of BSC has been validated using opinion from subject matter experts (SMEs). In order to determine relative importance of criteria opinion of SMEs has been collected in the form of pairwise comparisons. Using these comparisons, the AHP technique has been applied to determine the relative weights of various perspectives as well as the factors under each perspective. The importance of four perspectives with respect to petroleum supply chain performance in descending order of importance comes out as: customer, financial, internal business process, innovation and learning. Last, within these perspectives, the following factors seem to be most important respectively: purity of product, market share, steady supply of raw material and use of information technology.

Huang et al. (2011) presented the use of the AHP to prioritize all of the measures and strategies in a BSC framework in their study. They proposed that this study has found related strategies and objectives from four perspectives of BSC. This case illustrates selection or design of the most appropriate and helpful measures of the BSC in the pharmaceutical firm in an emerging market. Liao et al. (2010) in their study, combined BSC with AHP to help Taiwanese TV company managers make better decisions in new program projects selection. Moreover, in this study, the practical application of the proposed approach is generic and also suitable to be exploited for Taiwanese TV companies.

In business literature, there are some studies that identify the rate of size, strategy and performance indicators in BSC application using AHP method. For example, in his study, Alptekin (2008) has selected the performance indicators of BSC using the AHP method. The author determined the rates of 4 score card size and 12 performance indicators. Kim and Kim (2010) in their works, determined the elements to be found at the web sites of the tourism and accommodation firms and their importance degrees according to AHP and based on the BSC. Writers determined 23 indicators at 4 formats and they determined the significance degree of these indicators. Jovanovic and Krivokapic (2008) have used AHP method in selection of the potential performance indicators that are suitable for the firm. Using AHP method in BSC makes the quantitative data important during decision period and this also contributes to produce objective results rather than subjective judgments. In other words, BSC means to change the strategies that are determined by the firm to reach the goals into an action that will cover all the employees in the firm. Hereafter a model related to BSC and AHP integration has been designed and practiced at a hotel firm.

4. APPLICATION FOR BSC and AHP INTEGRATION

The model for the use of AHP in BSC is applied at a 5-star hotel in Antalya, Turkey. An interview arranged with the company managers and information about the conducted performance management systems is obtained. Before the application it is seen that the strategies used in the company are not related to each other because BSC method is not used. In addition, the performance evaluation process has been based on classical methods. This study has helped to determine and eliminate the useless (unnecessary) strategies that have no connection with each other. Furthermore, there have been no studies about the importance level of the pre-defined strategies in the company. By the help of this study, the importance level of the score cards that include pre-defined strategies and strategies are determined.

An analytical method is needed to calculate the rates of the strategies in each size and sizes for that reason AHP method is decided to be used in calculating the score card sizes and strategic purposes, in this context modeled application process is defined as seven stage.

First Stage – Vision, Mission and Determination of Core Principles: At this stage, a comprehensive situation analysis is made in the inner and outer environment of the firm. At this stage that based on the strategic plan study, the vision and mission of the firm are revised and the core principles of the firm determined. In order not to deviate from the aim, the information of this process is not mentioned.
Second Stage – Identification of Main Business Strategies: At this stage, main business strategies are identified regarding the vision and mission of the firm. No information about strategies that focus on the increase of the profit and reduce the costs is given.

Third Stage – Determination of Score Card Sizes: Some meeting are held with the company managers and four score card sizes application is decided to be used. These are: Finance, Customer Internal Company Functions, Learning and development. The defined score card sizes and numbers may differ for other companies. The main reason of this difference is related to the structural situation and condition of the firm.

Fourth Stage – Determination of the Strategies: At this stage, the strategies of the company have been determined based on the vision, mission, main principles, main strategies of the firm and score card sizes. The strategies of the firm identified in four score card sizes using the strategy map. In this context, 18 strategies have been determined; finance: 3, customer: 4, internal company functions: 6 and learning and development: 5. In order to explain the main theme of our study, only the strategies related to customer size is given. The strategies of customer size are shown in Figure 1 in the way it has been placed to firm’s scorecard.

Fifth Stage – Identification of Performance Objectives and Performance Indicators: The identification of the performance objectives requires changing the medium and long-term strategy definitions into short-term tactical actions in order to be more concrete. This stage including the definition of short-term objectives provides a basis for identification of needed activities, projects and source needs to reach the strategies. Also, at this stage, the performance indicators are identified to measure and evaluate whether the strategic purpose is achieved or not. While the performance objective number is 28 for the firm, performance indicator number for each scorecard size is respectively 5, 5, 6 and 5 in total 21. The work systems of seven stages are given in Figure 2.

Sixth Stage – Identification of Rates of Scorecard Sizes: At this stage, AHP method is used in order to determine the score card sizes and importance level of the strategies and by this way the hierarchical structure of the problem is identified. This hierarchic structure is given in Figure 3.

After the organization of the hierarchical structure, it is time for the comparison of main criteria (score card sizes) and strategies. For this comparison, AHP evaluation scale developed by the recommendation of Saaty (1994) has been used. The evaluation scale used in this evaluation is shown in Table 3.

At this stage, each score card size is considered as main criteria and then compared. Based on the comparison matrix created by the views of 14 managers in the firm, the managers are asked to define the importance level of each score card size than the other one. As there has been more than one manager during the decision process, the answers given by the managers in accordance with the evaluation scale are calculated in order to get geometric mean and the result got is transformed into a number. The matrix about the comparison of main criterias are shown in Table 4.

After creating the matrix related to comparison of main criterias, normalized criteria comparison is done and scorecard size rates are identified. Normalization is done through estimating the points for each size to the column total of the points. The row averages of the points related to normalized scorecard sizes give the rate (importance level) of scorecard size rate. Normalized scorecard sizes and the rate of each scorecard is given in Table 5.
In order to calculate the consistency rate of the matrix related to the comparison of score card sizes in Table 4, the matrix in this table is multiplied with the priority vector (size rate) in Table 5.

\[
\begin{bmatrix}
1.0000 & 0.2000 & 1.0000 & 0.3333 \\
5.0000 & 1.0000 & 2.0000 & 3.0000 \\
1.0000 & 0.5000 & 1.0000 & 0.5000 \\
3.0000 & 0.3333 & 2.0000 & 1.0000
\end{bmatrix} \times \begin{bmatrix}
0.11 \\
0.49 \\
0.15 \\
0.25
\end{bmatrix} = \begin{bmatrix}
0.4435 \\
2.0901 \\
0.6313 \\
1.0467
\end{bmatrix}
\]

New vector elements are divided into priority vector.

\[
\begin{align*}
0.4435 / 0.11 &= 4.0874 \\
2.0901 / 0.49 &= 4.2965 \\
0.6313 / 0.15 &= 4.0989 \\
1.0467 / 0.25 &= 4.1694
\end{align*}
\]

The average of these values give the biggest real value the basic value ($\lambda_{\text{max}}$).

$$\lambda_{\text{max}} = 4.1631$$

After finding out the basic value, Consistency Indicator (CI) is calculated.

$$\text{CI} = \frac{\lambda_{\text{max}} - n}{n - 1} = \frac{4.1631 - 4}{4 - 1} = 0.0544$$

In order to calculate the matrix consistency rate, consistency indicator (CI) is divided to standard correction called random indicator. As it is shown in Table 2, for the calculation of a 4 factors comparison, the random indicator (RI) must be 0.90.

$$CR = \frac{\text{CI}}{RI} = \frac{0.0544}{0.90} = 0.0604$$

For a result of 0.0604 < 0.10, it can be said that the feedbacks of the decision makers are consistent.

The importance level of score card sizes are calculated as 49% for customer size, 25% learning and development size, 15% internal company functions size and 11% finance size. After the calculation of rates of score card sizes, next stage is calculating the rates of the strategies.

**Seventh Stage – Identification of Strategy Rates:** At this stage, the rates of 18 strategies defined are identified. In order to explain the application, only the strategic rates of customer size and its calculating are mentioned. 14 managers of the company are asked about the importance of 4 strategies of the customer size, which one is more important than the other one. While creating the comparison matrices, the evaluation scale shown in Table 3 is used. As there were more than one manager during decision making process, geometric means of the answers given by the managers in accordance with the evaluation scale has been averaged and only one number obtained. The matrix related to comparison of customer size is shown in Table 6.

**Table 6: The Comparison of the Strategies of Customer Size**

After creating the matrix related to comparison of 4 strategies of customer size in balanced scorecard as sub-criteria, normalized criteria comparisons are done and by this way the rate of the strategy of customer size is identified. The normalized comparison of customer size strategy and the rate of each strategy in each size is shown in Table 7.

**Table 7: The comparison of Normalized Sub-Criteria (Strategies) and The Rate of Each Strategy in the Size.**

In order to calculate the consistency rate of the matrix related to strategy comparison of customer size in Table 6, first of all, the matrix given in this Table is multiplied with the priority vector (internal size rate of the strategy) in Table 7.
New vector elements are divided to priority vector.

\[
\begin{pmatrix}
1.0000 & 0.2000 & 3.0000 & 3.0000 \\
0.2000 & 1.0000 & 2.0000 & 0.3333 \\
0.3333 & 0.5000 & 1.0000 & 0.5000 \\
0.3333 & 3.0000 & 2.0000 & 1.0000
\end{pmatrix} \times \begin{pmatrix}
0.51 \\
0.13 \\
0.12 \\
0.24
\end{pmatrix} = \begin{pmatrix}
2.2368 \\
0.5448 \\
0.4717 \\
1.0376
\end{pmatrix}
\]

The average of these values give the basic value (\(\lambda_{\text{max}}\)).

\[\lambda_{\text{max}} = 4.2294\]

After finding out the basic value, consistency indicator (CI) is calculated.

\[CI = \frac{\lambda_{\text{max}} - n}{n - 1} = \frac{4.2294 - 4}{4 - 1} = 0.0765\]

In order to calculate the consistency rate, consistency indicator (CI) is divided to random indicator. As it is seen in Table 2, for the calculation of a 4 factors comparison, the random indicator (RI) must be 0.90.

\[CR = \frac{CI}{RI} = \frac{0.0765}{0.90} = 0.085\]

For CR result of 0.085 < 0.10, it can be said that the feedbacks of the decision makers are consistent.

The importance level of 4 strategies in customer size is calculated as \(M_1\) 51%, \(M_4\) 24%, \(M_2\) 13% and \(M_3\) 12%.

After calculating the rates of strategies in the size of customer size, the rate is identified in all the strategies. The importance level (rate) of a strategy in all the strategies is found out multiplying the rate of the strategy in the size with the rate of the size. In Table 8, the rate of each strategy in customer size that is a basic for performance measurement and evaluation process is calculated in all strategies.

Table 8: The Rate of Each Strategy in Customer Size among All the Strategies

As it is shown in Table 8, while the rate of customer size in 4 sizes is 49%, 4 strategies in customer size is calculated in all the strategies. According to this, strategy \(M_1\) is 25%, strategy \(M_2\) is 7%, strategy \(M_3\) is 5% and strategy \(M_4\) is 12%.

5. RESULT

In this study, usage of AHP method that will produce objective results is recommended instead of the subjective judgments of the managers and this method is applied at a hotel. In our study, a seven stage process for usage of AHP method in BSC is recommended. At the first stage of this application, the vision and mission of the firm are revised and the core principles of the firm determine, at the second stage, main business strategies are identified; at the third stage score card sizes are determined. At the fourth stage, total 18 strategies are identified in four score card sizes (finance, customer, internal company functions, learning and development) and two strategic priorities using strategy map. At the fifth stage, 28 performance objectives and 21 performance indicators are identified relating the strategies. At the sixth stage, for four scorecard sizes and at the seventh stage for 18 strategies the importance levels are identified using AHP method. In order to explain the main theme of the study, only the scorecard sizes and the rates of strategies in customer sizes results are given.

The importance level of scorecard sizes in the firm is identified as 49% for customer size, 25% for learning and development size, 15% for internal company functions and 11% for finance size. The importance level of 4 strategies in customer size are 51% for \(M_1\), 24% for \(M_4\), 13% for \(M_2\) and 12% for \(M_3\). The importance level of
In order to conduct performance measurement and evaluation process effectively, identification of importance level of score card sizes and strategies must be identified using quantitative data and techniques is really important. If the importance level is identified with analytical methods, the measurement and evaluation process will obtain meaningful and acceptable input. The integration of two strategic management tools (BSC and AHP) are important for using the strategies and sources in tourism sector effectively.

REFERENCES


### FIGURES

<table>
<thead>
<tr>
<th>SIZES</th>
<th>STRATEGIES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FINANCE</strong></td>
<td>[Diagram of strategies: Increasing the Customer Loyalty, Increasing Customer Profitability, Reducing Customer Complaints, Increasing the Number of New Customers]</td>
</tr>
<tr>
<td><strong>CUSTOMER</strong></td>
<td></td>
</tr>
<tr>
<td><strong>INTERNAL COMPANY FUNCTIONS</strong></td>
<td></td>
</tr>
<tr>
<td><strong>LEARNING AND DEVELOPMENT</strong></td>
<td></td>
</tr>
</tbody>
</table>

#### Figure 1: Customer Size of the Firm in Balanced Scorecard

- Vision
- Main Principles
- Mission
- Main Business Strategies

1. Stage
2. Stage
3. Stage
4. Stage
5. Stage
6. Stage
7. Stage

- Strategy 1: Increasing customer loyalty
- Strategy 2: Increasing customer profitability
- Strategy 3: Reducing customer complaints
- Strategy 4: Increasing the number of new customers

- Performance Objective 1 and Performance Indicator 1-2
- Performance Objective 2 and Performance

Identification of Rates of Scorecard Sizes

Identification of Strategy Rates

#### Figure 2: The Data Preparation Process for the Usage of AHP Method in BSC
OBJECTIVE: Determining the sizes of scorecards and the importance level of the strategies

Figure 3: The Hierarchical Structure of Problem

TABLES

<table>
<thead>
<tr>
<th>Importance Levels</th>
<th>Value Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Both factors have equal value.</td>
</tr>
<tr>
<td>3</td>
<td>1. factor is more important than the 2. factor</td>
</tr>
<tr>
<td>5</td>
<td>1. factor is much more important than the 2. factor</td>
</tr>
<tr>
<td>7</td>
<td>1. factor has a very strong importance when compared to 2. factor</td>
</tr>
<tr>
<td>9</td>
<td>1. factor has a superior importance when compared to 2. factor</td>
</tr>
<tr>
<td>2,4,6,8</td>
<td>Intermediate Values</td>
</tr>
</tbody>
</table>

Table 1: Evaluation Scale in AHP
Source: Saaty, 1994: p. 55

<table>
<thead>
<tr>
<th>n</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Random Indicator</td>
<td>0</td>
<td>0</td>
<td>0.58</td>
<td>0.9</td>
<td>1.12</td>
<td>1.24</td>
<td>1.32</td>
<td>1.41</td>
<td>1.45</td>
<td>1.49</td>
<td>1.51</td>
<td>1.48</td>
<td>1.56</td>
<td>1.57</td>
<td>1.59</td>
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</table>

Table 2: Random Indicators
Source: Saaty, 1980: 21
<table>
<thead>
<tr>
<th>Importance Level</th>
<th>Definition</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Equally important</td>
<td>First scorecard size / second scorecard size with strategy / strategy is equally important.</td>
</tr>
<tr>
<td>3</td>
<td>Less important</td>
<td>First scorecard size/ strategy, second scorecard size / a little bit more important than the strategy.</td>
</tr>
<tr>
<td>5</td>
<td>Strongly important</td>
<td>First scorecard size/ strategy, second scorecard size / strongly important than the strategy.</td>
</tr>
<tr>
<td>7</td>
<td>Very strongly important</td>
<td>First scorecard size/ strategy, second scorecard size /very strongly important than the strategy</td>
</tr>
<tr>
<td>9</td>
<td>Absolutely important</td>
<td>First scorecard size/ strategy, second scorecard size / absolutely important than the strategy.</td>
</tr>
<tr>
<td>2,4,6,8</td>
<td>Intermediate values</td>
<td>It is expected to be chosen when the expert is doubtful.</td>
</tr>
<tr>
<td>Adverse</td>
<td>Adverse Comparisions</td>
<td>The adverse evaluation of the same criteria, adverse of the same point under multiplication</td>
</tr>
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</table>

Table 3: AHP Evaluation Scale Used in Comparison
Source: Saaty, 1994: adapted from p. 55

<table>
<thead>
<tr>
<th></th>
<th>Finance</th>
<th>Customer</th>
<th>Internal Company Functions</th>
<th>Learning and Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finance</td>
<td>1</td>
<td>1/5</td>
<td>1</td>
<td>1/3</td>
</tr>
<tr>
<td>Customer</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Internal Company Functions</td>
<td>1</td>
<td>1/2</td>
<td>1</td>
<td>1/2</td>
</tr>
<tr>
<td>Learning and Development</td>
<td>3</td>
<td>1/3</td>
<td>2</td>
<td>1</td>
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Table 4: The Comparison of Main Criteria (Scorecard Sizes)

<table>
<thead>
<tr>
<th></th>
<th>Finance</th>
<th>Customer</th>
<th>Internal Company Functions</th>
<th>Learning and Development</th>
<th>Size Rate</th>
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<tbody>
<tr>
<td>Finance</td>
<td>0.10</td>
<td>0.10</td>
<td>0.17</td>
<td>0.07</td>
<td>0.11</td>
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<tr>
<td>Customer</td>
<td>0.50</td>
<td>0.49</td>
<td>0.33</td>
<td>0.62</td>
<td>0.49</td>
</tr>
<tr>
<td>Internal Company Functions</td>
<td>0.10</td>
<td>0.25</td>
<td>0.17</td>
<td>0.10</td>
<td>0.15</td>
</tr>
<tr>
<td>Learning and Development</td>
<td>0.30</td>
<td>0.16</td>
<td>0.33</td>
<td>0.21</td>
<td>0.25</td>
</tr>
</tbody>
</table>

Table 5: The Comparison of Normalized Criteria (Scorecard Sizes) and The Rate of Each Scorecard

<table>
<thead>
<tr>
<th></th>
<th>M_1</th>
<th>M_2</th>
<th>M_3</th>
<th>M_4</th>
</tr>
</thead>
<tbody>
<tr>
<td>M_1</td>
<td>1</td>
<td>5</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>M_2</td>
<td>1/5</td>
<td>1</td>
<td>2</td>
<td>1/3</td>
</tr>
<tr>
<td>M_3</td>
<td>1/3</td>
<td>1/2</td>
<td>1</td>
<td>1/2</td>
</tr>
<tr>
<td>M_4</td>
<td>1/3</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 6: The Comparison of the Strategies of Customer Size

<table>
<thead>
<tr>
<th></th>
<th>M_1</th>
<th>M_2</th>
<th>M_3</th>
<th>M_4</th>
<th>RATE IN THE SIZE OF STRATEGY</th>
</tr>
</thead>
<tbody>
<tr>
<td>M_1</td>
<td>0.54</td>
<td>0.53</td>
<td>0.38</td>
<td>0.62</td>
<td>0.51</td>
</tr>
<tr>
<td>M_2</td>
<td>0.11</td>
<td>0.11</td>
<td>0.25</td>
<td>0.07</td>
<td>0.13</td>
</tr>
<tr>
<td>M_3</td>
<td>0.18</td>
<td>0.05</td>
<td>0.13</td>
<td>0.10</td>
<td>0.12</td>
</tr>
<tr>
<td>M_4</td>
<td>0.18</td>
<td>0.32</td>
<td>0.25</td>
<td>0.21</td>
<td>0.24</td>
</tr>
</tbody>
</table>

Table 7: The comparison of Normalized Sub-Criteria (Strategies) and The Rate of Each Strategy in the Size.
<table>
<thead>
<tr>
<th>SIZE</th>
<th>SIZE RATE</th>
<th>STRATEGY</th>
<th>RATE IN THE SIZE</th>
<th>RATE AMONG ALL THE STRATEGIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>FINANCE</td>
<td>0.11</td>
<td>M_1</td>
<td>0.51</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M_2</td>
<td>0.13</td>
<td>0.07</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M_3</td>
<td>0.12</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M_4</td>
<td>0.24</td>
<td>0.12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TOTAL</td>
<td>1</td>
<td>0.49</td>
</tr>
<tr>
<td>CUSTOMER</td>
<td>0.49</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTERNAL COMPANY FUNCTIONS</td>
<td>0.15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LEARNING AND DEVELOPMENT</td>
<td>0.25</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TOTAL 1

Table 8: The Rate of Each Strategy in Customer Size among All the Strategies