Performance measurement instruments
– Balanced Scorecard
- strategy valuation and optimization –

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I. The Balanced Scorecard concept

The Balanced Scorecard concept was first developed during a one year multi company study – “Measuring Performance in the Organization of tomorrow” sponsored by Nolan Norton Institute, the research arm of KPMG. The study was motivated by the need to investigate if that time existing performance-measurement approaches, primarily relying on financial accounting were preventing the organizations to create a real economic value.

The group discussions and the case studies about innovative measurement systems already implemented in other companies (Analog Devices, 1987) led to the development of a new supervision method called “Balanced Scorecard”. Later on, as the importance of connecting indicators with a certain strategy or to find the suitable indicators for a strategy was noticed, the concept extended its applicability to the strategic management field.

The Balanced scorecard system analyzes the company from four different perspectives: the financial perspective, the client perspective, the internal processes perspective and the learning and development perspective.

The financial perspective helps to correlate the long term vision of the company with its financial objectives. In a correct built system each indicator should be a part of a cause – effect relationship that will result in improving the financial perspective.

The client perspective is necessary for identifying potential consumers and the market segment on which the company should compete. An important criterion for measurement in this perspective is the market segmentation according to regional preferences. Nowadays, the customer satisfaction is one of the mandatory requirements for successful sales.

The internal processes perspective identifies the critical processes for meeting the stockholders and the clients’ requirements. The objectives and measurements are defined after the first two perspectives are created in order to be subordinate to these ones. Important steps in this perspective are innovation, operational process and the post sales services.

The efficient usage of BSC forth perspective offers the infrastructure for obtaining excellent results in the other three perspectives. Kaplan and Norton consider that this perspective is best defined by three categories of factors: the employees’ abilities, the information systems capacity and the motivation.
To better understand how the four perspectives are linked to the company’s vision and strategy we can use the map below:

![Image: Balanced Scorecard Diagram]


A Balanced Scorecard should be created when the organization needs a new performance management system, when a new strategy is necessary or the goals of the employees and the improvement initiatives should be aligned. The proper organizational unit for a BSC to be created and implemented is, according to Kaplan and Norton (1996), a business unit, a unit where we can track and monitor activities related to all value chain: operations, marketing, services and sales.

In time, a lot of controversies where engaged over this concept. Its maintainers praise the BSC ability to:

- improve organizational alignment;
- improve external and internal communication in an organization;
- link the operations to strategy;
- to integrate the planning faze with the strategical management principles;

The challenges generated by developing and implementing these systems are considered to be the following:

- the lack of an involved management;
- measuring what really matters;
- the belief that BSC is a short term project; it is not – it’s implementation will change the organization radically on the long run;
- the lack of strategic thinking;
- not taking into account the whole organizational structure when projecting the system;

The criticism on the concept can be fought against by using its popularity and Kaplan and Norton’s (1996) arguments. There only is one aspect, in my opinion, that isn’t quite well documented: how can we evaluate the results of a BSC and check its correctness? The authors suggest that we should use the strategic feedback feature of the scorecard developed in the forth perspective in order to track what it’s going wrong and what should be changed. Yet they don’t offer us any receipt to do that.

II. Techniques used for evaluating the strategy

The proposed solution will use multicriteria decision methods to hierarchically arrange the perspectives and the indicators according to their importance in the eyes of a carefully selected audience. Then we’ll calculate the utility function for each period of time and each factor by using the results in the timeframes selected. The next step is to picture the factors in an importance – performance diagram that we’ll help us see if we have issues, where the issues are located and what should we do in order to improve the strategy.

The method used for the hierarchical arrangement is called **AHP – Analytical Hierarchical Perspective.** This method offers a rational framework for structuring a decision problem, for the representation and quantification of its elements and for linking these elements to the goals. The problem is decomposed in sub problems which can be analyzed and evaluated separately. The evaluation can be done using real values (like quantity, for example) or subjective decisions. These decisions are then converted into numerical values. A priority – weight is calculated for each element of the hierarchy, allowing us to compare elements that differ in signification and measurement method consistently. The scale used for comparison is the following:
AHP proves its efficacy especially when large teams are involved in solving complex issues that implies hard to quantify elements and long term consequences.

The method used for calculating utility is called **Successive Weighting Method**. This method is used to calculate and differentiate the utilities when we know the weight of each criterion. This decisional problem is characterized by a consequence matrix:

<table>
<thead>
<tr>
<th>Nature conditions</th>
<th>N1</th>
<th>N2</th>
<th>N3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alternatives</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td>a111</td>
<td>a1n1</td>
<td>a112</td>
</tr>
<tr>
<td>C2</td>
<td>a211</td>
<td>a2n1</td>
<td>a212</td>
</tr>
<tr>
<td>..</td>
<td>..</td>
<td>..</td>
<td>..</td>
</tr>
</tbody>
</table>

In order to calculate the utilities we should transform the matrix of consequences into a utilities matrix. The next step is to normalize the matrix:

$$ r_{ij} = \frac{a_{ij}}{\sum_{i=1}^{m} \sum_{j=1}^{n} a_{ij}}, \quad i=1..m, \quad j=1..n $$

Each decisional alternative is associated with a utility function:

$$ f: V \rightarrow \mathbb{R}, \quad f(V_i) = \frac{\sum_{j} \pi_j \cdot r_{ij}}{\sum_{j} \pi_j} \quad i = 1..m $$

The alternatives are then ordered in the descending order of the utility functions.

The graphical representation of factors in relation with their weight and score (utility) is done by using the Performance – Score analysis. The technique is based on constructing a score importance diagram split into four quadrants:

<table>
<thead>
<tr>
<th>Importance</th>
<th>Quadrant 2</th>
<th>Quadrant</th>
<th>Quadrant 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Concentrate here</td>
<td>Keep up the good work</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>Quadrant Low</td>
<td>Quadrant 4 Possible</td>
<td></td>
</tr>
</tbody>
</table>

Depending on the quadrant the indicator will fall in, we’ll have to follow one of the four indications.
III. Balanced Scorecard in organizations. Applying the strategy and evaluating the results.

In this case study we’ll describe the strategy applied in a department of Hewlett-Packard and how it’s quantified through the BSC concept. We’ll then use the techniques presented in the last chapter to investigate the efficiency of the strategy on 2008 timeframe.

The strategic objective at corporation’s level is to establish HP as the world’s leading Technology Company. The strategic framework prepared to sustain this objective is:

- Invent and develop technology solutions for customers;
- Drive select industry trends;
- Become the best-in-class in the industry.

The operating framework has as objectives: efficiency, targeted growth and capital strategy.

The Volume Operations department is a global structure designed to support the business units on daily basis. The department vision and mission are aligned with the overall vision and mission. The strategy objectives split among the four perspectives of the BSC are the following:

Financial perspective:

- Cut costs;
- Improve the efficiency of key elements: risk assessment, documentation;
- Simplifying the business programs by introducing standardized promotions;
- Periodic analysis of prices related to profitability;
- Support growth on emergent markets and new business initiatives.

Client perspective:

- Automatisation of orders and reducing the time to process the order;
- Improving delivery time;
- standardized procedures for global accounts;
- increase customer satisfaction;
- reduce the number of disputed invoices.

**Internal processes perspective:**

- standardization and alignment at global level for configuration, call-center, catalogues and prices;
- using Six Sigma to optimize costs;
- reducing the amount and value of field inventory;
- increasing the number of orders delivered in the negotiated period of time;
- Reducing the number of claims.

**Learning and growth perspective:**

- improving management communication;
- specialized trainings;
- Diversity.

By applying AHP technique on the indicators chosen to represent these objectives we obtained a weight for each perspective and for each indicator:

<table>
<thead>
<tr>
<th>Perspective</th>
<th>The weight in BSC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial Perspective</td>
<td>0.48</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>The weight in perspective</th>
<th>The weight in BSC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employee number</td>
<td>0.04</td>
<td>0.02</td>
</tr>
<tr>
<td>Sales turnover</td>
<td>0.54</td>
<td>0.26</td>
</tr>
<tr>
<td>Expenses</td>
<td>0.26</td>
<td>0.12</td>
</tr>
<tr>
<td>% of time worked per employee</td>
<td>0.16</td>
<td>0.08</td>
</tr>
<tr>
<td>Client Perspective</td>
<td></td>
<td>0.23</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>The weight in perspective</th>
<th>The weight in BSC</th>
</tr>
</thead>
</table>
By applying the Successive Weighting Method, we then determined the utility functions for each of the timeframes selected: Q1, Q2, Q3 and Q4 for 2008 for overall strategy and each indicator.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>The weight in perspective</th>
<th>The weight in BSC</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of electronic orders</td>
<td>0.07</td>
<td>0.02</td>
</tr>
<tr>
<td>Time of completion</td>
<td>0.64</td>
<td>0.15</td>
</tr>
<tr>
<td>Disputed invoices</td>
<td>0.28</td>
<td>0.06</td>
</tr>
</tbody>
</table>

**Internal Business Perspective**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>The weight in perspective</th>
<th>The weight in BSC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standardised procedures</td>
<td>0.10</td>
<td>0.02</td>
</tr>
<tr>
<td>Six-sigma certificates</td>
<td>0.05</td>
<td>0.01</td>
</tr>
<tr>
<td>Field inventory</td>
<td>0.18</td>
<td>0.03</td>
</tr>
<tr>
<td>% standard agreed time</td>
<td>0.42</td>
<td>0.07</td>
</tr>
<tr>
<td>% claims</td>
<td>0.26</td>
<td>0.04</td>
</tr>
</tbody>
</table>

**Learning and development perspective**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>The weight in perspective</th>
<th>The weight in BSC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trust in management</td>
<td>0.27</td>
<td>0.04</td>
</tr>
<tr>
<td>Carrier plans</td>
<td>0.12</td>
<td>0.02</td>
</tr>
<tr>
<td>Specialized trainings</td>
<td>0.61</td>
<td>0.08</td>
</tr>
</tbody>
</table>

**Utility functions**

\[
\begin{align*}
  f(Q1) &= 0.523724997 \\
  f(Q2) &= 0.592609384 \\
  f(Q3) &= 0.589100354 \\
  f(Q4) &= 0.661348188
\end{align*}
\]

The indicators were represented in an Importance – Score analysis diagram:
According to the result on this diagram we recommend that the time of completion which is located in quadrant 1 should be carefully supervised. Also the sales turnover should be carefully checked because of the economic conjuncture and of their decrease in the last couple of months. For better results, the cutting costs policy should also be continued.

The proposed methods can be used in strategy valuation exercises as well as in projects designed for optimizing different processes, systems or procedures.
IV. Bibliography:

23. www.balancedscorecard.org