Balanced score card for evaluation of the efficiency of e-learning

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Abstract: The balanced scorecard (BSC) is used more and more widely for efficiency evaluation of organizations performance. Initially, it was used for the evaluation of success in private industry – from the point of view of meeting financial and non-financial indicators. A number of universities and other institutions use the balanced scorecard for efficiency evaluation. In the last years, the idea of applying BSC for the evaluation of the efficiency of e-learning is being discussed.

The present paper discusses the main areas of application of BSC in higher education and e-learning. A strategic card based on the cause-effect relationships between the strategic goals has been developed of e-learning and its prospective applications. Using a specialized software and on the basis of actual data, a model BSC has been made with the purpose of performing an evaluation of e-learning efficiency. This model may be used for the study of efficiency during different periods in a specific university and for comparing the efficiency of teaching-learning between different universities.

Keywords: Balanced Scorecard, E-learning, Efficiency

I. Methods of efficiency evaluation. Review of BSC

Contemporary management applies various methods and tools to evaluate the efficiency activities in an organization. These methods can be classified in three groups.

• methods based on financial activity indicators;
• methods oriented toward the internal environment and the internal processes in the organization;
• methods oriented toward the organization’s external environment

These methods are related to specific aspects of the organization performance (from the point of view of finance, quality, customer satisfaction, optimization of business processes, etc.) They are applied when there are activities in the organization showing low efficiency, for example: loss of competitiveness threat or growth rate that is too high, both leading to lower quality. In many cases, it is possible to achieve the strategic goals of the organization and to solve the existing problems only by using several complementary methods from the list of those mentioned above.

• Systemic methods consider the activity of the organization as an integrated system and are applied in order to attain new quality of operations.

The successful development of e-learning in universities depends to a great extent on the possibility of coordinating strategic, operational, and tactical management. Balanced Scorecard (BSC) is a management method allowing universities to implement their strategy. BSC was created in 1992 by Robert Kaplan and David P. Norton.

The traditional BSC model is presented in Figure 1 (Kaplan and Norton)

Nowadays, BSC is characterized by Harvard Business Review as one of the major ideas in business for the last 75 years [1]; it now a system used for management of the activity of both private and public organizations, as well as for efficiency evaluation.

The notion of balance “underlines the balance between short-term and long-term goals of the organization, between financial and non-financial indicators, between current and target values of efficiency indicators” [2].

BSC includes the strategic goals of the organization and provides an opportunity to apply a set of indicators to evaluate efficiency. The success of the organization is measured
along four perspectives: financial, customers, business processes, training and growth (Figure 1).

![The Balanced Scorecard diagram]

_Figure 1. BSC – classical scheme._

The four perspectives are bound together by cause-effect relationships and the purpose is to reach a balance between them.

This scheme can be summarized using the table below:

<table>
<thead>
<tr>
<th>Area of evaluation</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>financial activity</td>
<td>Main indicator of the organization’s success</td>
</tr>
<tr>
<td>connecting with consumers</td>
<td>The main condition for improving financial results are customers – strategic partners, employers.</td>
</tr>
<tr>
<td>internal business processes</td>
<td>The result of internal processes indicates possible future improvements in the parameters of customers’ and financial perspectives</td>
</tr>
<tr>
<td>intellectual resources</td>
<td>Main source of value. Investment in this resource is imperative.</td>
</tr>
</tbody>
</table>

_Table 1. Source [14]._

The Common Assessment Framework (CAF) document is a result of cooperation between the ministers of public administration of the European Union. CAF is recommended as an instrument to help the activity of organizations from the public sector in the EU with the purpose of ensuring high quality management in public administration. It is appropriate to use it for self-evaluation of organizations in the public sector. In the document, BSC is placed at the same level as ISO [3, p. 9]. “Implementing CAF facilitates the use of management instruments like BSC...” [3, p. 49], and “the use of BSC in the public sector in Europe is increasing”.[3, p. 57]. In the light of the above, the question is no more whether to implement BSC in the education system, but how to implement it.

The results are obtained after introducing history and current values of the explored indicators. The minimum possible values for the given perspective are shown within the green line, the maximum values are in red, and the current values of the indicators are in blue.
Using BSC has the following advantages:

• it allows to define priorities
• it provides the possibility of identifying non-financial indicators along with financial ones, which is necessary when intellectual resources play a leading role in creating unique educational services.
• it ensures the timely reaction to changes in business environments and processes, the correction of any negative influence on the key success factors for universities in a highly competitive environment.

A disadvantage of BSC is that the explored data are influenced by processes which have started, developed, and ended a long time ago and it is possible for the findings not to be up-to-date in a market situation, which is subject to everyday change.

II. Research: Application of BSC to evaluate efficiency of e-learning

Since it was created, the BSC has been used to evaluate efficiency of non-commercial organizations and universities. As e-learning is applied on a larger scale, BSC is being used to evaluate its efficiency. However, efficiency evaluation using BSC is still at an initial stage. Some universities in USA, Great Britain, Australia, and Russia are quite successful in applying BSC for management and evaluation of both traditional education and e-learning.

The models of different universities reflect the works of Kaplan, Norton, Niven and other authors, taking into account the specific conditions of the individual high education institution.

In the University of Edinburgh [4], BSC was first introduced in 2002. The objective was to implement the strategy through a coherent set of performance measures. The selected indicators fully cover the university mission. The development strategy is evaluated using four main perspectives: customer satisfaction, enhancement of internal processes, staff training; and finance.

The Texas Education Agency [5] was facing the task of ensuring high quality education to more than 4 million pupils and training 280 thousand teachers. The efficiency of each of the 1200 public schools was evaluated using 300 indicators. The complexity of the efficiency assessment system interfered with the necessary emphasis on priority education goals. At a conference, a decision to use BSC was taken and the following perspectives were included: education policy implementation (instead of financial), student success and
achievements (instead of customers), business process, education, and growth. The number of indicators was cut down to 60.

**University of Newcastle** [6]: the strategic perspectives defined by the University with BSC include: education and growth, business processes, customers and finance.

The examples used are related mainly to the application of BSC in traditional education.

**Purdue University** [7]. The University strategic map includes the following perspectives: financial, customers, staff, business processes. BSC is used to evaluate efficiency of e-learning management.

In **quality-driven universities** [8], e-learning is evaluated by including the following perspectives: education policy implementation (instead of financial); student success and achievements (instead of customers), business process, education and growth.

Based upon the study that has been carried out, we can summarize the scenarios of combining strategic perspectives in the cards developed by universities.

- the classical model, developed for companies by Kaplan and Norton;
- exchanging the places of customer and financial perspectives [9, p. 283];
- moving the financial perspective to the lowest place in the hierarchy of the cause-effect relationship;
- replacing the customer perspective by “orientation toward relationships” or “society” perspective [9, p. 283].

In most of the practical models, there is a trend towards preserving the classic strategic map developed by Norton and Kaplan in defining BSC content for the strategic development of public and non-commercial organizations.

Nevertheless, there are some differences related to exchanging the places of different perspectives in BSC strategic map. These differences are due, on one hand, to the flexibility of the system, on the other – to the fact that different universities have different priority objectives and BSC is tailored in a way to achieve them. Nevertheless, if we pay attention to similarities, it is easy to notice that the used set of perspectives is the same, which means that, in general, they share the same values.

The following issues were taken into account in using BSC to evaluate efficiency in universities:

- the specific characteristics of BSC in the public sector regarding the choice of perspectives and their hierarchy in the strategic map
- the modification of strategic goals and key indicators for the successful activities in universities

### III. Methodology of developing a map of balanced indicators for the evaluation of e-learning efficiency

In developing the BSC, it is necessary first to define the university mission, which includes the main reason of existence for the university. In commercial organizations, the mission reflects the orientation of shareholders towards higher profits. The idea of profit is not present in non-commercial and public organizations. The mission statement describes the true purpose of the university and its correct definition is meaningful for the performance of the university. The strategy can be fulfilled and the goals may be achieved, but the mission is never attained. Paul Niven compares it to a lighthouse which the organization is striving to attain [9, p. 106].

Once the mission is defined, it is necessary to determine the strategic priorities of the university. The main priorities related to e-learning are:

- Attaining high quality level in the learning process
• Creating conditions and possibilities for lifelong learning
• Leadership in high technologies
• Development of dynamic scientific environment and integration with real sectors of the economy
• Creating corporate culture in the university.

After the mission and the strategic priorities are defined, and after performing the analysis of the internal and external environments, a strategic map of BSC for e-learning is drawn up (Figure 2).

In most of the considered models of BSC application in universities, the customers (or society) perspective is placed at the top of the hierarchy. This is not entirely appropriate for e-learning, as the development of the electronic course is the largest financial cost for the educational organization and including revenue-generating activities is necessary for universities offering e-learning.

The BSC perspectives for the evaluation of e-learning efficiency in universities were defined with a view of their mission, strategy, and specific characteristics. We selected the following 4 perspectives based on the classical model of Kaplan and Norton: financial activity, customers, learning process, research and development.

The goals of the four interrelated perspectives form a chain of cause-effect relationships. The efficient use of intellectual resources in fulfilling strategic tasks contributes to the improvement of indicators in the “business process” perspective, which on its turn leads to better image of the organization among customers and investors, meaning also increased income.

The main goal of using BSC is to bring the developed strategy of the university to the staff supposed to implement it, using understandable language. To achieve this a strategic map is applied as a tool; the map may be developed for the institution as a whole or for its faculties and departments.

Initially, the goals which are expected to contribute to the realization of the mission and strategy are defined within the hierarchy of “financial”, “customer”, “internal process”, and “learning and growth” perspectives. It is recommended for the number of goals not to be higher than 25-30. It is also possible to develop separate maps for each of the perspectives.

The following goals are selected within the different perspectives in order to evaluate the efficiency of e-learning.

1. **The financial perspective** is at the top of the strategic map. Two main goals were selected for universities with e-learning in their curricula.
   • increasing revenues from different sources (budgetary, tuition fees, income from sponsorship and contracts).
   • decreasing e-learning costs depends to a great extent on higher numbers of enrolled students and the optimization of processing costs of electronic courses.

2. **Customers perspective** – one of the main principles of universities with e-learning is customer orientation. The customers are students, employers, strategic partners of universities, as well as the state and society as a whole. The main goals of the university under this perspective are:
   • improving the social image of universities;
   • increasing student’s satisfaction;
   • improving the image of the universities in business circles
Figure 2. Strategic map.
3. The **internal process perspective** – it determines the competitive advantages of a university vis-à-vis other organizations, which make customers to seek this university instead of any other. The goals are:

- improving the quality of the learning process
- optimization (organization of the learning process)
- innovative characteristics of education activities.

4. The **“Education and growth” perspective** – highly qualified staff interested in good performance is needed for the practical implementation of the defined goals. The indicators for the evaluation of e-learning efficiency are related to:

- better staff motivation
- higher staff qualification

The cause-effect relations illustrate well the interdependency between strategic goals and help crossing over redundant links. A strategic goal tree is made (on the principle “if…then”). The usage of such tools allows to simplify the analysis by way of visualization in management decision-making (Table 2).

If the organization has the appropriate staff, sufficiently trained and qualified, actively participating in processes and oriented to achieving the desired result (specific level in the business process), then the customer will be satisfied (sufficient level with respect to the customer perspective), and the university will achieve its financial goals (sufficient level with respect to the financial perspective).

<table>
<thead>
<tr>
<th>Goal map</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Financial perspective</strong></td>
</tr>
<tr>
<td>Process</td>
</tr>
<tr>
<td>Growth of revenues</td>
</tr>
<tr>
<td>Attracting students</td>
</tr>
<tr>
<td>Cost optimization</td>
</tr>
</tbody>
</table>

| **Customer perspective** |
| Process | Goal |
| Customer satisfaction | • Improving the social image of the university |
| | • Increasing student satisfaction |
| | • Improving the image of the university among companies and business organizations |

| **Learning process** |
| Process | Goal |
| Innovation | • Improving the quality of the learning process – materials and conditions |
| | • Optimization/organization of the learning process |
| | • Innovative character of the learning process – new specialties and courses. |

| **Staff** |
| Process | Goal |
| Motivation | • Staff motivation |
| Development | • Staff qualification |

*Table 2. Goal map. Adapted from: [10, 12]*
Key Performance Indicators (KPI)

The measurability of BSC goals is achieved through the selection of KPI for presentation of performance. These are quantitative or qualitative indicators demonstrating the degree to which goals are reached. The present study deals with the indicators for evaluation of efficiency of both traditional education and e-learning - KPI, including Kirkpatrik [13].

All BSC indicators are limited within [0; 1] by the formula:

\[ bsc\_val = \left( \frac{val - \text{min}}{\text{max} - \text{min}} \right) * w \] or \[ bsc\_val = \left( \frac{val - \text{max}}{\text{min} - \text{max}} \right) * w \]

Where:

bsc\_val – value in the model;  
val – value of the indicator, for example number of people, score, etc.;  
\text{min} – minimal value during the period of the considered indicator  
\text{max} – maximal value of the considered indicator during the period  
w – Weight of the indicator, usually \(1/(\text{number of indicators})\), but it can be changed using expert assessment.

Source: [14].

The formula (1) is used to calculate the value of an indicator when we want to maximize it, and formula (2) is used when we want to minimize the value of the indicator.

Organizations use KPI in order to determine the degree of attainment of their strategic or tactical goals. KPI are also frequently used for the evaluation of activities that are difficult to measure: satisfaction of stakeholders, staff motivation, competitiveness of the offered service, etc. KPI are connected with the organization strategy and are coherent with the Balanced Score Map.

According to [11], the following criteria are to be taken into account in the selection of KPI. The latter should:

• take into account the university values
• be reasonable and easy to measure
• make possible the comparison between different universities
• be based on data collected regularly and for a long period of time

In the methodology for developing a system of BSC indicators for e-learning, we had to observe additional criteria as:

• quantitative characteristic of the indicators (or at least “yes” or “no” response)
• accessibility – the use of the indicators should be fast and easy, without additional costs
• clarity – their quantitative values should be clear and understandable: which value has a positive meaning (how to determine the min. and max. values), etc.
• balanced character – it is not worth improving one indicator while worsening the situation with respect to another one (for example higher quality, leading to excessively high price)

Target values of the indicators. Quantitative characteristic of the indicators. The target values can be defined using formulas, or extracted from different data sources.

Strategic initiatives. Projects or programmes (orders, instructions, etc.) assisting in the attainment of the strategic goals.

The implementation of the balanced score card in a university can be completed using the cascade principle. This means that knowledge of strategic priorities and goals should be transmitted to all levels in the organization. An expanded version of BSC is developed involving a goal map and KPI, and preparing initiatives for the individual structural divisions (cascading). As a result, a strategic BSC map is drawn up in each structural division.
**BSC implementation**

The process of application of BSC includes mobilizing resources, planning, implementation, and sustainable performance. The timing of these phases is: three to six months for mobilization, six months for planning and implementation, and twelve to twenty-four months for sustainable performance[12].

<table>
<thead>
<tr>
<th>Goal</th>
<th>Indicator</th>
</tr>
</thead>
</table>
| **Increasing revenues** | • Budget↑  
• Revenues from scientific projects↑  
• Revenues from tuition fees↑  
• Sale of electronic learning materials↑ |
| **Decreasing costs** | • Cost for one student during his/her education↓  
• Costs of developing an electronic course↓  
• LMS purchase/amortization costs ↓  
• Staff salary costs ↓ |
| **Improving the university image in society also with respect to e-learning** | • The university place in the national top list↑  
• Candidates for first place↑ |
| **Higher student satisfaction** | • Average scores at MA program admission exams ↑  
• % students satisfied with their education↑ |
| **Better image of the university among companies and business organizations** | • Revenues from sponsors↑  
• Number of students, whose tuition fees/stipends are paid by businesses↑ |
| **Improving the quality of the learning process – materials and conditions** | • Students per teacher↑  
• Average time spent for e-learning per student ↑  
• Number of external links to the e-courses↑ |
| **Optimization/organization of the learning process** | • Hours spent in traditional meetings between participants↑  
• Number of messages↑  
• Average number of tests (control during the term)↑ |
| **Innovative character of the learning process – new specialties and courses** | • Number of new specialties↑  
• Number of e-courses↑  
• Updated e-courses ↑  
• Degree of interactivity of the learning courses |
| **Staff motivation** | • % satisfied professors  
• Number of publications  
• Number of those, who have attained academic rank  
• Number of conferences organized by the university  
• Number of PhD/Doctor of sciences degrees obtained each year  
• Participations in conferences (number of participants) |
| **Staff qualification** | |

*Table 3.*

**IV. Conclusions**

As a significant part of the financial resources of universities come from master degree students, developing solutions for excellent quality education at attractive prices is obviously very important. On the other hand, the target audience of Master degree programs is quite limited by the fact that not every student wishes to continue his/her education after completing his Bachelor’s degree, as the tuition fee to be paid is not negligible – the state provides limited funding for this educational degree.

In the light of the above, e-learning presents new challenges for state-funded universities. On one hand, the competition between state-funded and private institutions is intense, on the other – the number of students willing to enrol and capable of paying for it is
insufficient universities look for new cheaper alternatives of large-scale education programs, not always comparable in their efficiency with the traditional forms (see the article of USA Education Institute). Moreover, the recently graduated students have higher quality education, which gives them better chances of benefiting from their knowledge investment.

The BSC idea is simple, but very powerful, if it is developed and implemented in a way that is suitable to the individual organization, namely:

- defining a unique strategy and visualizing the cause-effect relationships in the balanced score card.
- restructuring the organization is such a way that its business processes and goals correspond to the goals in the strategic map;
- developing key indicators for efficiency evaluation;
- using the indicators to improve the decision-making process.

**Main findings:**

- On the basis of research and analysis, a classification is done of the main types of application of Balanced score cards in universities.
- A methodology of implementing BSC in universities was developed, including: perspectives, goals, tasks, indicators.
- A strategic map of the cause-effect relations between perspectives and goals in e-learning was developed.

**Acknowledgement**

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**V. References**

2. The balanced scorecard: translating strategy into action by Robert Kaplan, Norton, 2006, p. viii
13. Donald L. Kirkpatrick, James D. Kirkpatrick, Evaluating training Programs The Four Levels, Third edition, 2009,
14. http://www.iit.bas.bg/esf40/phd-seminar-16-02-10/P_Halachev/P_Halachev_ppt.pdf