ASSESSMENT OF THE ECONOMICAL EFFECTIVENESS OF APPLYING AUDITING SOFTWARE

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Introduction

Fast developing information technologies have a positive impact on the ongoing and more complicated business processes. In the last 10 years innovative decisions have been offered also to Bulgarian auditors’ activity through auditing software. Applying these decisions has a number of advantages such as: improved effectiveness, low costs, time saving, increased labor productivity and better quality of auditing procedures. Selecting suitable auditing software is a difficult and continuous process. It is necessary to gather information on the functional capabilities of existing programming products. In the after-crisis period the price of the investment is of great importance. Auditors need clear methodology for assessing auditing software. To solve this issue it is suggested to calculate the indicator of economic effectiveness through estimating the benefits and costs of the investments. They should be carefully considered, because they are crucial for the future development of the auditor’s business.

This article aims to develop a methodology for assessing the economic effectiveness of applying auditing software. In respect to achieving this goal, tasks as part of the article have been formulated, such as:

1. Defining the concept “effectiveness” in auditing;
2. Methodological assessments of the effectiveness of software products;
3. Experimenting with the suggested methodology.

1. Defining the concept “effectiveness” in auditing

The concept effectiveness is interpreted in economic, social, ecological, investment and other types of aspects. In general, by using it one compares input resources and end results. The latter can be qualitatively and quantitatively measured, positive and negative. For the objectives of the article an emphasis is put on the results that have financial dimension.

There are various opinions about the criteria for assessing effectiveness:

1. Katz and Kahn (1991, p.35) share that effectiveness is achieved in:
   - increasing the limit of return on investment with all possible means;
   - increasing individuals’ incomes and the contribution for increasing the company abilities as a whole;
   - ability of the company to exist and continue its activity and regulating its external environment.

2. Kast, Rosenverg and Wingandi (1992, p.186-187) define effectiveness as:
   - ability of the company to achieve and pursue its goals;
- increased sales volumes;
- satisfying the needs of clients and employees
- company growth and bigger profits;
- progress in the quality of human resources.

3. According to the legal definition in Bulgarian legislation (additional regulations in the Act for the National audit office (2014)), effectiveness is the degree of achieving the goals of the audited unit in comparing the real and expected results from its activity.

4. “Generally speaking, the activity of an organization is effective when it ensures the definition, setting and achieving particular objectives which interfere with the strategic goals and priorities of the respective organization”. (Hrisoskulova et al, 2012, p. 6).

The best effectiveness is achieved when reaching high usefulness with possibly the most economical use of resources. It answers the questions whether the set goals have been achieved and at what price.

There are various types of effectiveness.

Table 1

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Types of effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depending on the level</td>
<td>National, branch and sector, company effectiveness of departments, branches</td>
</tr>
<tr>
<td>Depending on factors</td>
<td>Effectiveness of capital, effectiveness of investment, effectiveness of long-term and short-term tangible assets</td>
</tr>
<tr>
<td>Depending on costs (resources)</td>
<td>Resource effectiveness, cost effectiveness</td>
</tr>
<tr>
<td>Depending on the nature and content of effectiveness</td>
<td>Economic, social, ecological effectiveness</td>
</tr>
<tr>
<td>Depending on options</td>
<td>Absolute (general) for an option; comparative (relative) for two or more options</td>
</tr>
<tr>
<td>Depending on time</td>
<td>Project, planned, real effectiveness</td>
</tr>
</tbody>
</table>

Source: Georgiev, Velin, *Methods for reporting the effectiveness of implementing the method of competences*.

A variant of effectiveness is economic effectiveness. According to Marin Galabov (2007, p. 209), it can be defined as the quantity of the economic effect (useful result) which is created with the participation of a unit of costs or a unit of resources. This indicator is important for determining the financial condition of the enterprise and is calculated as a ratio between revenues and costs.
2. Methodological assessments of the effectiveness of software products

Introducing new technologies is always accompanied by making extra costs and risk taking; however, on the other hand, it incurs taking benefits. Benefits differ in respect to employees’ responsibilities. For assistant-auditors technologies result into less mistakes and efforts in processing client’s data and preparing the working documents. For the auditor who leads the team – the result is better organization of the working process and control over the auditing work. For the owner of the audit company or the independent auditor using auditing software boils down to the fact whether revenues from the activity will increase, thus a bigger profit will be made.

According to the Unified theory for adopting and using technologies (UTAUT), there are three factors for determining the intention to use new technologies: expected performance, expected efforts and social impact (Venkatesh et al., 2003).

Expected performance is the degree to which the individual gathers that using the technology will lead to an advance in the working process. Expected efforts are the degree of difficulty in using the technology: easy or difficult to apply. The social impact is the assessment of the society how important it is to use new technologies.

To assess the effectiveness of auditing software it is suggested to use the indicator economic effectiveness in two of its variations: prognostic and factual economic effectiveness. According to Assoc. Prof. Hristo Hristov, *economic effectiveness* characterizes inexpensiveness and traditionally is defined as the ratio between end results and the costs that predetermine them or vice versa.¹ From this definition one can conclude that it is necessary to reach an end result, valuated by the size of the factual revenues and calculating the costs really made.

In the process of making a decision for adopting a new technology, as is the auditing software, it is appropriate to estimate the prognostic economic effectiveness.

The prognostic economic effectiveness can be estimated as the correlation between potential revenues and software costs, having in mind that the process of adoption has not started and revenues and costs are not real.

\[
\text{Prognostic economic effectiveness (PEE)} = \frac{PR}{SC},
\]

PR – potential revenues
SC – software costs

In this particular case the concept software includes future costs for implementing software, technical maintenance, training and depreciation costs.

The expected result from applying auditing software for the owner is a less labor-consuming auditing process. This would mean that, by keeping the number of audits unchanged, the hours necessary for completing assigned tasks will be less. We use SH for designating the number of saved hours.

With available free resources it is necessary to use them with the aim to make economic benefits. To tap into saved hours one should attract new clients, which will contribute to increasing revenues. Expected future revenues are the potential revenues.

Estimating potential revenues is based on the saved hours and the average auditing fee per hour for the period of implementing the software.

\[ PR = SH \times FH_0 \]

There arises the question how to define saved hours. Evaluating the number of saved hours is the result of working with the provided Demo version of the programming product. To be able to compare the assessment of economic effectiveness of the various auditing software products, it is necessary that the process is done by the same person in the course of the whole task assigned. The auditing software with the highest prognostic economic effectiveness will create the largest future benefits from applying it.

The factual effectiveness is estimated after achieving the end result, namely – implementing the auditing software. It is recommended to estimate the indicator after the one-year period from adopting the software, so that one can calculate the values of the extra costs and the extra benefits.

The extra real revenues are estimated on the basis of the working hours for completing the assigned new tasks and the average auditor’s fee per hour for the period after implementing the software.

\[ ERR = FH \times WH_1 \]

In order to determine the impact of the time factor (hours) on revenues as a consequence of using the specialized software, it is necessary to accept as a constant the average auditor’s fee per hour. To calculate the extra real revenues, one will use the average auditor’s fee per hour for the period before implementing the software.

\[ ER = IH \times FH_0 \]

In defining extra real costs one has to take into account the fact that some costs go up and others fall. For example, the costs for depreciation, training and implementation go up. The decreasing costs are those for transport and keeping data. It is more difficult to determine the change of costs that have no direct link to the auditing software. Such are the costs for transport and keeping data.

Transportation costs depend on the number of audits done, the average quantity of fuel used for an audit and the fuel price. To estimate the change of these costs, we will accept the first and the last factor as constant.

\[ ECtr = Nbr. \ audits_0 \times Av. Quan. Fuel_1 \times av. Price fuel_0 - Nbr. \ audits_0 \times Av. Quan. Fuel_0 \times av. Price fuel_0 \]

Therefore, the formula for factual effectiveness looks like this:
Factual economic effectiveness (FEE) = 
\[
\frac{ERR}{ERC} = \frac{WH \times FH}{C_{dep} + C_{tr} + C_{im} + C_{Ctr} + C_{Ckd} + OCC}
\]

- **ERR** – extra real revenues
- **ERC** – extra real costs
- **WH** – working hours for new assignments
- **FH** – average auditor’s fee per hour
- **C_{dep}** – costs for depreciation
- **C_{tr}** – costs for training
- **C_{im}** – costs for implementation
- **C_{Ctr}** – changed costs for transportation
- **C_{Ckd}** – changed costs for keeping data
- **OCC** – other changed costs, indirectly linked to the auditing software

**Period 0** – period before implementing the auditing software
**Period 1** – period for implementing the auditing software

Comparing the prognostic to the factual economic effectiveness gives the owners information about the expected and really achieved results from implementing the auditing software. The comparison is made by use of comparing mathematically the resulting coefficients.

Three variations are possible:
- PEE > FEE;
- PEE = FEE;
- PEE < FEE

A good indicator for managing auditor’s activity is to achieve factual effectiveness that is higher or at least equal to the prognostic one. This indicates that the right choice was made among the existing competing specialized programming products in the field of auditing.

### 3. An experiment with the suggested methodology

An example for a methodology for estimating the economic effectiveness in implementing auditing software is presented in Table 2. In it there is an estimation of the prognostic economic effectiveness of auditing software, without comparing it to existing alternatives. The experiment aims to show that the suggested methodology is really applicable and easy to understand.

In the example above the following factual circumstances are presented:
- The auditing company has 7 employees – auditors and assistant auditors;
- The average auditor’s net payment per hour amounts to BGN 10;
- The average auditor’s fee per hour is BGN 50;
- The duration of the working week is 40 hours;
- The potential costs for auditing software is BGN 38 795;
- The hours an auditor saves monthly are 37. This judgement is made on the ground of real application of the auditing software through its demo version.

After the estimations using the methodology in Table 2, the following results appear:
## Table 2

Methodology for estimating the economic effectiveness in implementing auditing software

<table>
<thead>
<tr>
<th>Types of costs</th>
<th>Costs for auditing software in BGN</th>
<th>Stages</th>
<th>Processes in auditing</th>
<th>Hours saved by an auditor per month</th>
<th>Saved costs per month</th>
<th>Saved hours per year</th>
<th>Saved costs per year</th>
<th>% saved hours</th>
<th>Potential revenues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Licenses</td>
<td>21 374</td>
<td>Taking auditing assignment</td>
<td>Preliminary risk assessment</td>
<td>3.0</td>
<td>210</td>
<td>252</td>
<td>2 520</td>
<td>1.73%</td>
<td>12 600</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Assessment of independence</td>
<td></td>
<td>2.0</td>
<td>140</td>
<td>164</td>
<td>1 380</td>
<td>1.11%</td>
<td>6 900</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Writing a letter for taking the auditing assignment and contract for auditing</td>
<td></td>
<td>0.5</td>
<td>35</td>
<td>42</td>
<td>420</td>
<td>0.29%</td>
<td>2 100</td>
</tr>
<tr>
<td>Technical maintenance</td>
<td>5 281</td>
<td>Planning</td>
<td>Studying the client</td>
<td>1.0</td>
<td>70</td>
<td>84</td>
<td>840</td>
<td>0.58%</td>
<td>4 200</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Plan, Schedule</td>
<td></td>
<td>3.0</td>
<td>210</td>
<td>252</td>
<td>2 520</td>
<td>1.73%</td>
<td>12 600</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Assessment of the auditor’s risk</td>
<td></td>
<td>3.0</td>
<td>210</td>
<td>252</td>
<td>2 520</td>
<td>1.73%</td>
<td>12 600</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Preliminary analytical procedures</td>
<td></td>
<td>2.0</td>
<td>140</td>
<td>164</td>
<td>1 380</td>
<td>1.15%</td>
<td>6 900</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Materiality level</td>
<td></td>
<td>3.0</td>
<td>210</td>
<td>252</td>
<td>2 520</td>
<td>1.73%</td>
<td>12 600</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Assessment of the going-concern principle</td>
<td></td>
<td>1.0</td>
<td>70</td>
<td>84</td>
<td>840</td>
<td>0.58%</td>
<td>4 200</td>
</tr>
<tr>
<td>Training</td>
<td>Performance</td>
<td>Sample</td>
<td>Tests</td>
<td>Checking the annual financial report</td>
<td>Checking the account of the activity and publication</td>
<td>Working documents</td>
<td>Auditor’s report</td>
<td>Other</td>
<td>Total</td>
</tr>
<tr>
<td>----------</td>
<td>-------------</td>
<td>--------</td>
<td>-------</td>
<td>---------------------------------------</td>
<td>-------------------------------------------------</td>
<td>------------------</td>
<td>-----------------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.0</td>
<td>5.0</td>
<td>1.0</td>
<td>5.0</td>
<td>5.0</td>
<td>0.5</td>
<td>0</td>
<td>35.795</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>110</td>
<td>428</td>
<td>64</td>
<td>420</td>
<td>420</td>
<td>42</td>
<td>0</td>
<td>3,104</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>1380</td>
<td>4200</td>
<td>340</td>
<td>4200</td>
<td>4200</td>
<td>420</td>
<td>0</td>
<td>31,260</td>
</tr>
<tr>
<td></td>
<td>Economic effectiveness</td>
<td>$40,058,415.33</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

55
The possible saved hours per year as a result of the applied auditing software are 3,108;
Potentially saved costs are BGN 31,080;
Potential revenues from adopting the auditing software are BGN 155,400;
The calculated prognostic economic effectiveness is 4.00, in other words it is expected that from costs of one lev per auditing software there will be generated revenues of approximately four levs, on the condition that new auditing assignments are taken for the saved hours.

In order to select the most suitable auditing software, it is necessary to estimate the prognostic economic effectiveness of the other existing alternatives.

Conclusion
Auditing is a time-consuming process requiring good qualification, organized activity and provision of methodology, teamwork and time. A considerable part of the work boils down to processing data technically and filling in working documents. These processes can be made easier by applying auditing software. It saves time and office space, helps professionals in making important decisions. Taking into account its positive sides, one should have in mind that auditing software is an expensive investment. Each auditor or specialized audit company must decide whether it wants to apply this innovation, and the desire for this should be a consequence of the effectiveness of the innovation. Estimating economic effectiveness is an important indicator for making the decision exactly which auditing software to implement or whether it should be implemented in auditors’ work. The specifics of the methodology suggested above for estimating the indicator is the usage of the prognostic economic effectiveness based on potential revenues and potential costs for implementing the auditing software. In applying this methodology it is necessary to reassess possible saved hours in order to use them for working on other auditing appointments.

Selecting the right (economically effective) auditing software would be a great advantage in the competitive business of auditing.

References
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Abstract

The purpose of the present article is to propose a methodology for assessing economic efficiency before and after the implementation of auditing software in order to facilitate the process of choosing the most suitable specialized software application in the activity of auditors. The specificity in assessing the indicator is the use of projected economic efficiency, based on the potential revenues and the potential costs of introducing auditing software. In its applicability it is necessary to make an estimation of the possible saved hours, which will be used for taking on new commitments. In the article there is presented an actual example of the proposed methodology.

Keywords: auditing software, methodology, assessment, economic efficiency.