

Process performance measurement system for financial statements audit process in BPMS environment

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Abstract—Financial statements audit process is a key business process of each audit firm. In order to improve the business performances, audit firm should develop an adequate system of audit process performance measurement. In the first part, this paper defines performance measures for audit financial statements process, indicate to the problems and possible solution in order to create an adequate performance measurement system for audit process. The assumption of development an adequate system for measuring performance of audit process is the application of business process management concept into audit firm and development business process management software (BPMS) for the audit financial statement process. Furthermore, this paper presents the architecture of performance measurement system for audit process based on ODBC, MS Excel and BPMS. This kind of performance measurement system of audit process provides adequate and reliable information to managers for decisions making.

I. INTRODUCTION

The aim of financial statements audit is to provide an opinion whether the financial statements are stated in accordance with financial statement regulation. Financial statements audit is a very important service which is provided by audit firms. According to the characteristics of financial statements audit such as a large number of activities, segregation of duties among the members of audit firm, defined document system etc. it can be concluded that the financial statements audit meets the definition and criteria of the business process. Business process is defined as a set of activities which use input and generate output creating value to the customer [5]. In the financial statements audit, auditors use the information about the audit client in order to obtain the evidence which will be use to create an audit opinion as the output of the audit process. The audit opinion in the form of audit report creates value for business decisions makers through increasing the reliability of financial statements as based for decision making.

Audit financial statement represents the crucial process for every audit firm, because more than half of revenue audit firm is realized by providing this service. The main objectives of the establishment of audit firms, in terms of the owners, are long-term business and profit. Competition in the audit market creates a special attention for audit firms to measure the performance of individual audit process. Performance is defined as an accomplishment of a given task measured against

presently knows standards of accuracy, completeness, cost and speed [11].

The main objective of measuring process performance is gathering comprehensive and timely information on the performance of audit process. This information can be used to communicate goals and current performance of a business process directly to the process team, to improve resource allocation and process output regarding quantity and quality, to give early warning signals, to make a diagnosis of the weaknesses of a business process, to make a decision whether corrective action are needed and to assess the impact of action taken [12].

This paper focuses on performance measurement systems of financial statements audit process. Furthermore, this paper presents a set of performance measures of audit financial statements, the problems of development process performance measurement system for the purpose of audit process and possible solution for creation an adequate performance measurement system for audit process in BPMS environment.

II. PERFORMANCE MEASURES OF AUDIT FINANCIAL STATEMENTS - THEORETICAL APPROACH

Performance measures are the vital signs of the organization which quantify how well the organization achieves a specified goal [8]. When we are talking about specific types of performance indicators for business process there are no unified set of performance measures, because there is so many differences between business process among different organization. Every organization has to define the performance measurement system as a set of metrics which will be used to quantify efficiency and effectiveness of business process. Performance measurement system for business process can be characterized as an information system which:

- gathers information about the business process through a set of relevant performance indicators
- compares the current values against historical or target values
- provides the results (current value, historical or target value, gap, trend etc.) to managers for purpose of decision making in order to improve business process performances [13].

Adequate process performance measurement system shall involve the key indicators which will measure and describe the quality, time, flexibility and cost of business process [9]. For the audit firm it is necessary to define a

set of performance indicators at the level of audit process. Based on the results of performance measurement of audit process, the management of audit firms can take action for business process improvement in order to achieve a specified goal or even better business results. There are no unified adopted indicators to measure performance of audit process. The best indicators of performance audit process are those that indicate whether and how the implementation of the audit process contributes to the achievement of the objectives of the audit firm and whether it creates value for the audit firm.

International audit organizations propose various performance indicators of audit process in their frameworks and recommendations. According to the Audit Commission in London, performance indicators of audit process should include:

- measures of compliance of audit process with regulatory framework,
- the time required for the implementation of the audit process, the relationship between the planned and actual time spent on the implementation of the audit engagement,
- quality of audit staff (professional degrees and training) [1].

According to the Audit Committee Leadership Network in North America, audit process performance measures include:

- the costs of conducting the audit engagement,
- measures of assessing whether the audit procedures carried out in accordance with the plan of audit activities and regulatory framework,
- the time required for the implementation of the audit process,
- revenue per audit engagement,
- quality of audit process, which can be measured based on the time of engagement of every group of auditors (assistant, auditors and certified auditor) which are involved in the audit process [2].

III. SOLUTION OF PROCESS MANAGEMENT SYSTEM FOR AUDIT PROCESS

A. Problems and possible solution for development adequate and reliable process management system for audit process

Nowadays, realization of audit process in an efficient way is not possible without the use of IT/IS support. Auditors in order to conduct their activities are using various software, such as generalized audit tools, that are used to automate audit test, as well as software for document processing, communications etc. The use of different software solutions that are not integrated with each other, can lead to distortions of data integrity and integrity of audit process. In such circumstances it is not possible to adequately set and measure performance indicators for audit process, because the different software solutions are not integrated and do not follow audit process from start to end activity. For example how to ensure adequately measuring the time of the audit activities when the auditor works in the office of the audit firm as well in the office of audit client?

In order to create reliable system of performance measurement for audit process, implementation of BPMS in audit process will provide an adequate solution. BPMS can be defined as "a (suite of) software application(s) that enables the modeling, execution, technical and operational monitoring, and user representation of business processes and rules, based on integration of both existing and new information systems functionality that is orchestrated and integrated via services"[6]. The implementation of BPMS in audit process is possible because financial statements audit is business process according to the definition and criteria of business process [3]. The BPMS provide a wide range of benefits such as increasing the productivity and quality of business process. Furthermore, BPMS provide appropriate organization and storage of data about process through data warehousing. In order to gathered information about business process to become useful, it is important to create adequate system for measurement business process performance and reporting according to process performance indicators. BPMS is often applied technology for business process management, primarily because of their flexibility. The flexibility which BPMS offer can be noticed in several aspects. These systems provide a very simple way of creating business process model, which is later used to execute particular instances. On that occasion there is no need for any coding, so even the person without any programming experience is able to define and change the model [4].

B. The architecture of ODBC

The data about the realization of business process using BPMS are stored in appropriate database (MySQL, PostgreSQL, Microsoft SQL Server, Oracle etc.). The raw data about the conducted audit process should be transformed to information about the business process performance according with the defined set of performance indicators. The information of conducted audit process, or performance indicators of audit process, should be distributed to the management for the further analysis. The system for measuring and reporting on the performance indicators of audit process in the BPMS environment can be developed using the ODBC and MS Excel application.

ODBC (Open Database Connectivity) is defined as a standard programming language middleware API which is use for accessing database management systems (DBMS). ODBC provides a readymade layer between database and client side application (for example: MS Excel) [14]. How to connect the database of BPMS and client side application via ODBC? In order for ODBC to work, an operating system-specific Driver Manager needs to be utilized. A Driver Manager dynamically determines which ODBC driver to use for a program to access a database that is ODBC-compliant. The ODBC driver takes the request from the calling program, translates it to a native format that the database can understand, and the database performs the request [5]. ODBC architecture has four components:

- Application. Performs processing and calls ODBC functions to submit SQL statements and retrieve results.
- Driver Manager. Loads and unloads drivers on behalf of an application. Processes ODBC function calls or passes them to a driver.

- Driver. Processes ODBC function calls, submits SQL requests to a specific data source, and returns results to the application.
- Data source. Consists of the data the user wants to access and its associated operating system, DBMS, and network platform (if any) used to access the DBMS [10].

Fig. 1 shows the architecture of ODBC.

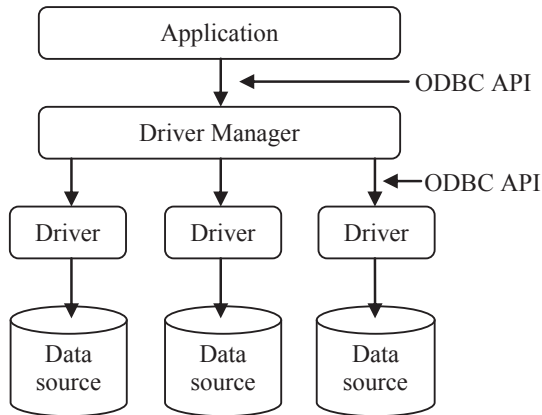


Figure 1. The architecture of ODBC [7]

For the purpose of audit firm "X" from Serbia, business process management software for audit financial statement was developed with open source solution ProcessMaker. Process performance measurement system was developed using ODBC and MS Excel application according to previous defined architecture. BPMS ProcessMaker are using MySQL database, so mysql connector odbc was used to make connection between database and MS Excel workbook (PMS Financial Statement Audit.xls). A simplified representation of architecture for performance measurement system for audit process is showed on following figure.

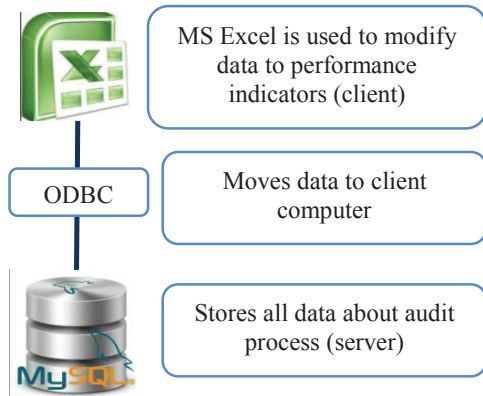


Figure 2. The architecture of data transfer from database to process management system created in MS Excel.

C. Performance indicators (measures) of audit process - practical review

Developed database of BPMS for audit process collects about 2,000 data of each audit process (on average). These data refer to general information about audit process, audit client, contract status, audit fee (income), the type of audit activity, time for realization every audit activity, data about audit stuff etc. According to these data, the following group of performance indicators was set:

- performance indicators of audit process efficiency,
- performance indicators of audit process quality,
- performance indicators of audit team quality,
- performance indicators of revenue from audit process.

Performance indicators of audit process are presented in tables in absolute or relative unites (depends on the type of indicator). Furthermore, performance indicators indicate to trends and gap (as a different between current value and target or average value). Also, in order to ensure simple and reasonable reading and analyzing, performance indicators are presented in graphs.

The group of performance indicators of audit process efficiency involves following indicators: the time of realization of audit process and audit activities, the time of work of each auditors. Fig. 3 shows report about performance indicators of time of realization audit process.

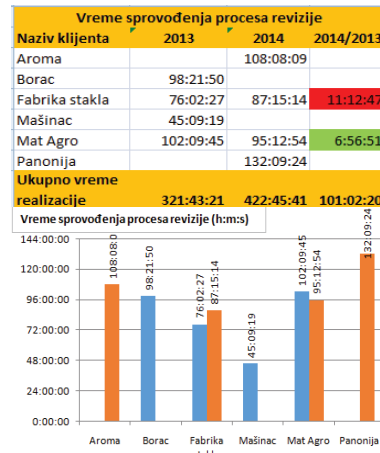


Figure 3. Performance indicators of audit process - time of realization of audit process

The time of realization of audit process can be present for one year or during the selected period. If managers of audit firm select presentation of time of audit process during the years, these performance indicators will also present the gap between two years. If the time for realization of audit process in 2014 (for example) is for 10% higher than in previous year, a red flag will be appear. On the other hand, if the time for realization of audit process is lower than in previous year, a green flag will be appear.

For each audit activity and audit task which is realized, the time of realization according to user (auditors) can be measured. If some auditors spent more than 110% of average time for realization some task, a red flag will be

shown. If some auditors spent less than 90% of average time, than the green flag will be appear (see fig. 4)

Vreme realizacije aktivnosti po izvršiocima			
A04 - Popunjavanje upitnika o prihvatanju klijenta			
Izvršilac	Odstupanje od proseka	Odstupanje od proseka	Odstupanje od proseka
Krpic Jovana	0:22:16	0:10:25	
Lakovic Ljubinka	0:36:19	0:03:38	
Malesevic Dusan	0:38:03	0:05:22	
Radovic Marko	0:34:05	0:01:24	
Prosečno vreme realizacije aktivnosti	0:32:41		

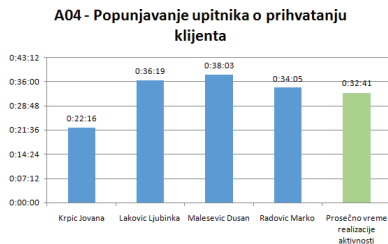


Figure 4. Performance indicators of audit process - the time of realization of specific audit task according to users (auditors)

The group of performance indicators of audit process quality include: the number of missing documentation per audit process, number and type of audit task which is realized but it auditors do not have an obligation to do. Next figure shows the number of missing audit documentation. If there is only one missing document, a red flag will be appear, because this is indicator that audit process was not implement totally according to audit regulation.

Nedostajuća dokumentacija 2013 godina			
Naziv klijenta	Izjava o nezavisnosti	Ugovor o reviziji	Ukupno
	Borac	0	1
Fabrika stakla	0	0	0
Mašinac	0	0	0
Mat Agro	1	1	2
Ukupno	1	2	3

Figure 5. Performance indicators of audit process - the number of missing documents

The quality of audit teams can be measured according to structure of audit team, time of engagement of each single auditor, and time of engagement of group of auditors. The information about the structure of audit team and the time of engagement of auditor in audit process are presented on the fig. 6 and fig. 7.

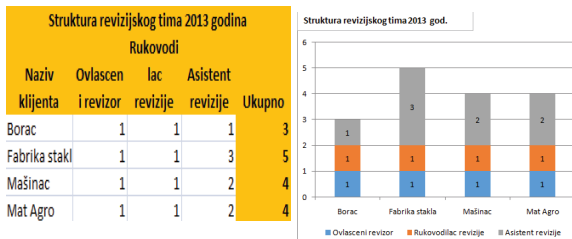


Figure 6. Performance indicators of audit process - the structure of audit team

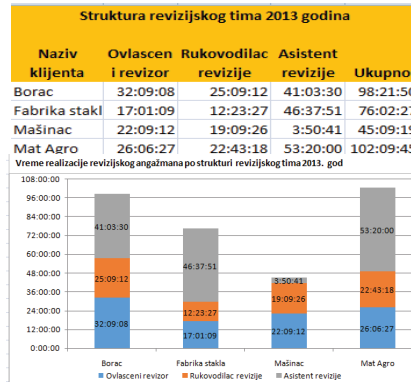


Figure 7. Performance indicators of audit process - the time of engagement of auditor in audit process

According to data about the audit fee, management of audit firms can easily measure contribution of single audit process to total revenue (see fig. 8)

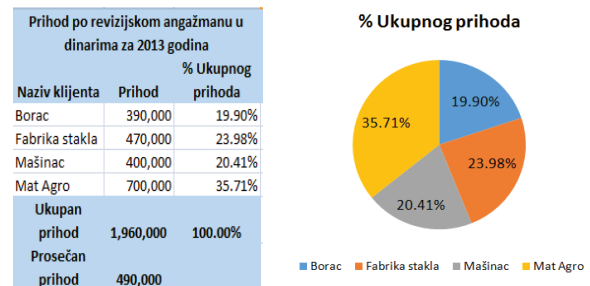


Figure 8. Performance indicators of audit process - audit fee

Comparative analyze between audit processes and some target value, as trend analyze of realization of audit processes, shall provide the timely and reliable information to managers of audit firms in function of decision making and business performance improvement.

These are some crucial performance indicators for audit process developed for audit firm in Serbia. Beside of these groups of performance indicators, which were defined by management of audit firm, also some other indicators were developed based on general information about audit processes. For example for managers of audit firm it is important to track the status of audit processes, and this can be done with audit processes dashboard (see fig. 9).

Status revizija na dan 31.03.2014.

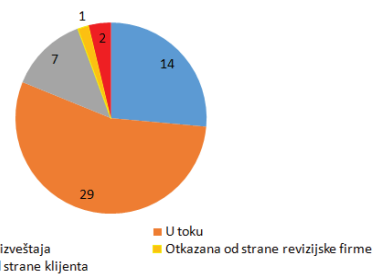


Figure 9. Performance indicators of audit process - the status of audit processes

CONCLUSION

Financial statement audit is a key business process of each audit firm, because the revenue of audit process presents more than half of total revenue. Regard to the specific characteristics of audit process, development of BPMS for audit process create opportunity for development of adequate performance measurement system. The BPMS for audit process management is developed by using open source BPMS solution. In order to create reliable, simple and low cost performance measurement system for audit process in BPMS environment, it was used ODBC and MS Excel application. This paper present architecture of performance measurement system for audit process developed by using ODBC and MS Excel, according to previous defined performance indicators. This kind of performance measurement system involves more than 20 audit process performance indicators, as well indicators according to recommendation of professional audit organizations. Also this system is very easily to be used and provide all necessary information about audit process to management for analyze the contribution of audit process in achievement organization goals and decision making.

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