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Determination QAD in Audited and Unaudited Companies

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Abstract: *Based on QAD (quality of accounting data) information it is possible to determine how the company is able to manage its economic activities. The basic element is the level of QAD perceived by users of accounting information. This article describes using the analytic hierarchy process (AHP) to get an overview to the quality of accounting information. Then there is used statistical methods T-test and Kolmogorov-Smirnov test to set the differences between QAD in audited and unaudited companies. The first step is to define the various criteria which adversely affect the quality of accounting data and then their assignment to groups according to the context. Subsequently, on the basis of Saaty´s method determine the weights of the criteria in each group and then by using the AHP method determine their importance. Then the quality of accounting data in 71 companies is determined and the differences between accounting data quality of audited companies and accounting data quality of unaudited companies are detected.*

Keywords: Analytic Hierarchy Process · Saaty´s Method · Criteria Quality of Accounting Data · Audited and Unaudited Companies

JEL Classification: C44, M41

1 Introduction

The QAD (quality of accounting data) allows measuring the business performance and financial position. Accounting is in the most professional accounting literature defined as a structured system of information that is captured in monetary terms and shows the process of the business. Accounting is (or based on accounting legislation should be) a description of reality in which the characteristic accounting principles and methods are used. Base on the quality of financial information coming from accounting, it is possible to measure business performance, financial position, calculate the expenses and revenues, incomes and expenditures and profit or loss to manage and make decisions. The quality of accounting information also depends on the quality of management and on the presentation of financial data and their conformity with the reality and applicable laws. It should be said that quality financial data reduce the risk for potential investors, for the management and their decisions and also increase the ability of companies to raise finance at a reasonable cost of capital.

2 Literature Review

The main goal of this paper is based on a survey determining the criteria that affect the quality of accounting data and have impact to enterprise management. The concentration of interest is to determine the quality of the financial data of enterprises on the basis of established criteria and then determine whether there is a correlation between the quality of accounting data in audited and unaudited enterprises. Looking into the quality of accounting data should demonstrate the impact of negative criteria on financial accounting and decision making in business management.

The role of accounting is organizing, maintaining, analyzing, identifying and interpreting financial information. Accounting specialists interpret accounting information so that others can use that information and they facilitate the identification and assessment of the financial situation (Eisen, 2000; McLaney and Atrill, 2005). Accounting is defined as a system which is characterized by using the accounting principles and methods. Nenadál, Noskievicová, Petříková, Plura and Tosenovsky (2002) like Easton and Jarrell (1998) have the opinion that if the quality control is carried out effectively the company can have considerable results especially from the financial point of view. The first attempts to improve the quality of accounting data fall into the 70s of the last century when they were e.g. under the auspices of the OECD or later IFAC launched the debate and prepared the first accounting policy for the public sector (Kaplan, Padman and Peters, 2004).

Enterprises that have successfully established management systems achieve higher performance and better financial results. Accounting system (depending on the size of the company) is designed as a process of

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collecting information and creating accounting reports. These activities are called as a cycle management accounting information by Short (1990).

Donnelly et al. (2008) argue that the more quality information the managers have the more the level of risk and uncertainty in their decisions are reduced. Companies should follow the accounting data on the base of accounting standards. Increased emphasis on compliance with the financial discipline and internal control of accounting data can significantly contribute to improving the quality of accounting information, especially with regard to making decisions. For certain decisions, some financial information may be available but the same information may be insufficient for different decisions (Neely and Cook, 2011).

Baba (2009) says that the behavior of economic agents in order to improve quality are generally conducted at three levels:

- on the technical level - aim to eliminate the causes of non-quality and errors,
- at the level of human know-how - the quality and efficiency of the production of financial information must constantly grow, experienced employees should be rewarded,
- at the level of the organizational plan - higher quality of a company can be achieved by a better organization of accounting practices, its simplification and adjustments.

According to Robbins & Coulter (2004) companies have to control the process of monitoring activities to determine whether all activities in accounting have been carried out according to the legislation and then correct variations. Internal control of data from accountants and managers at all levels of management causes the feedback which provides the possibility of a reality.

3 Methods

The method AHP (Analytic Hierarchy Process), which was used to determine the significance of individual weights of negative criteria is a method that solves tasks of multi-criteria decision making. This method uses the decomposition of complex unstructured situation into simpler components that will be arranged to a hierarchical structure. At each level of the hierarchical structure, pairwise comparisons method is used in a way that each component is compared with the other components. The result of this mutual comparison is the weights of individual criteria. These weights determine which criteria have the biggest influence on the quality of accounting data (Saaty, 2006). The method used in pairwise comparisons follows a nine-point scale from 1 to 9.

The decision makers decide about the preferences by the pairwise comparison and the results should be written to the matrix subsequently:

$$W = \begin{bmatrix} w_1/w_1 & w_1/w_2 & \cdots & w_1/w_n \\ w_2/w_1 & w_2/w_2 & \cdots & w_2/w_n \\ \vdots & & \ddots & \vdots \\ w_n/w_1 & w_n/w_2 & \cdots & w_n/w_n \end{bmatrix} \quad (1)$$

where:

w_{ij} Saaty´s matrix element, $w_{ii} = 1$ and $w_{ij} = 1/w_{ji}$

Weights of the criteria can be calculated based on the normalized geometric mean lines of Saaty´s matrix. It is a logarithmic method of the least squares given by:

$$b_i = \sqrt[n]{\prod_{j=1}^{n} w_{ij}}, \quad (2)$$

where:

b_i geometric mean of the i-th row
n number of rows

By normalization of b_i is then calculated weights according to the following:

$$v_i = \frac{b_i}{\sum_{i=1}^{n} b_i} \quad (3)$$

where:

$v_i = (0, 1)$

Consistency index - this index should reach a maximum value of 0.1 and it is calculated by the following equation.

$$I_S = \frac{\lambda_{max} - n}{n-1} \quad (4)$$

where:

λ_{max} maximum number of inherent matrix
n number of rows

For statistical analysis is used T-test and Kolmogorov-Smirnov test. The T-test assesses whether the means of two groups are statistically different from each other. This analysis is appropriate to compare the means of two groups. The Kolmogorov-Smirnov test tries to determine if two datasets differ significantly (Hendl, 2012).

The formula for the T-test is:

$$t = \frac{(\overline{X}-\mu)/(\frac{\sigma}{\sqrt{n}})}{s} \tag{5}$$

where:
$\overline{X}$ sample mean from a sample X_1, X_2 of size n
s ratio of sample standard deviation over population standard deviation
σ population standard deviation of the data
μ population mean

The formula for the Kolmogorov-Smirnov test is:

The empirical distribution function F_n for n iid observations X_i is defined as:

$$F_n(x) - \frac{1}{n}\sum_{i=1}^{n} I_{[-\infty,x]}(X_i) \tag{6}$$

where:

$I_{[-\infty,x]}(X_i)$ indicator function, equal to 1 if $X_i \leq x$ and equal to 0 otherwise

The Kolmogorov-Smirnov statistic for a given cumulative distribution function F(x) is:

$$D_n = \sup_x |F_n(x) - F(x)| \tag{7}$$

where:

$\sup_x$ supremum of the set of distances.

Standard deviation - standard deviation is the square root of the variance and dispersion rate of returns to scale of the original data.

$$s = \sqrt{s^2} = \sqrt{\frac{\sum(x_i-\bar{x})^2}{n-1}}, \quad \bar{x} = \frac{\sum_{i=1}^{n} x_i}{n}. \tag{8}$$

4 Research results

A survey is aimed at uncovering incorrect accounting, discovering the quality of accounting data in audited and unaudited companies and their comparison.

Based on the study of professional and scientific literature, but also based on consultations with experts like auditors and managers, the groups of data quality in financial accounting were compiled and within these groups the various negative criteria which have the biggest impact to the quality of accounting and on the management as well were created. After combining these two perspectives and understanding their relation the items can be divided to the following groups and criteria:

Table 1 The groups and criteria of accounting data quality

Group F1 **Errors and fraud**	**Group F2** **Accounting Methodology**	**Group F3** **Influence of IS**
F11 - Accounting fraud by management, unethical behaviour of managers **F12** - Accounting fraud by employees, unethical behaviour of employees	**F21** - Methods of depreciation **F22** - Methods of valuation **F23** - Methods of accounting organization, processing technique **F24** - Internal directive **F25** - Internal control	**F31** - Lack of information, poor internal communication **F32** - Legislation - too wide or narrow, confusion, frequent changes **F33** - Requirements for managers

F13 - Creative accounting **F14** - Accounting errors arising out ignorance, human mistakes of accounts		in the enterprise's information system

Source: Own processing

For the purpose of this article it is necessary to divide the aspects that affect the quality of accounting data deficiencies that cause poor quality data. If these deficiencies in the company failed to have been removed the accounts could not be used to manage the company and it would become a tool of not only unintentional, but deliberate interference.

F11 – An attempt to reduce the positive income in order to minimize the tax or the concealment and distortion of information for users of financial statements, e.g. banks or owners may cause this fraud.

F12 - The theft of property and fraudulent financial reporting occur the most common frauds (Müllerová, 2007). The opportunity of employees to thieve the property is where there is no comprehensive internal control system; there is no responsibility or the liability is unchecked. For the ethical behavior of employees in accounting, managers can adopt many measures such as employing accountants with high ethical values, to issue codes of ethics, and to insist on compliance, define targets, conduct training in ethical behavior, social audit, etc.

F13 - Creative accounting is presented as a technique reporting financial data base on which primarily the balance sheet and profit and loss account look favorably or based on which the profit is minimized (due to covering achievements).

F14 - Basic accounting errors due to negligence or ignorance include the risk of failure to recognize all accounting transactions, the risk of bad charging (to the wrong accounts, on the wrong side of the accounts) nullity of operations, inaccurate evaluation of assets and liabilities, charging to the wrong accounting period, incorrect presentation of accounting data and information.

F21 - In many businesses it is possible to encounter the fact that companies do not make differences between account and tax depreciation and within a certain simplification they charge the tax depreciation. Tax depreciation, however, does not provide precise information of property amortization and fixed assets do not follow the principle of true and fair view. Tax depreciation is often different from the economic reality.

F22 – The historical price evaluation has many advantages but also disadvantages. According to these reasons it is possible to assume that in the near future, there will be more and more pressure to use the fair value. Law of Accounting now only lists the titles, which can be evaluated by fair value, and this is usually where the value is relatively easily identifiable and verifiable. Evaluation significantly affects the principle of prudence in accounting, which leads to the fact that in the event of the recoverable amount of an asset being lower than book value, then the historical price of the asset is reduced. This difference is then recorded as a loss.

F23 - Accounting work can be managed in a centralized or decentralized way. During the centralized processing, accounting works are concentrated in the central accounting office, which summarizes all the evidence of economic operations and subsequently cleared them. In other departments of the company, only primary documents are transmitted to the central accounting office for further processing. The advantage of this method is that it allows them to use efficient accounting and computing. During the decentralized processing, the accounting departments which charge on all accounts and prepare all financial statements are set up.

F24 - Internal accounting directives standardize accounting practices and help automate these processes. They are a communication tool that eliminates ambiguities and for the external auditor it means at least a sign that the company has set limits based on the current legislation.

F25 - The task of internal control is to detect variances between actual and desired course of economic processes. Another task is to help with protection of a company property and prevent possible theft, fraud and embezzlement, as described in the F1 criteria. The basic principle of internal control is that the responsibility for the implementation of business operations must be divided between two or more people.

F31 - Managers need relevant and complete information for management. The problem arises when the amount of information is insufficient and conversely, when managers are overwhelmed with useless information or some information is withheld.

F32 - For accountants and managers as well, too frequent changes in legislation are not suitable. These changes increase costs, e.g. a software update security, staff training, purchase of laws and literature, and it also brings many challenges to information system setting.

F33 - The managers requirements for the enterprise information system differ primarily by company size, line of business and the complexity of the manufacturing process.

A survey of financial accounting conducted on the basis of structured interviews with 71 managers, CFO´s and accounting leaders. Interviewed respondents identified the importance of individual ratios of criteria within each group; these ratios were then compiled to Saaty´s matrix (3 matrix for each respondent) and points and weights for the criteria were designated. Thus 234 Saaty´s matrix were compiled. In next step, the AHP method was applied. On the basis of structured interviews with auditors (mainly from KPMG and private external auditors) 12 Saaty´s matrix were compiled. For more information you can see Vlčková (2014).

By applying the AHP method, there the model of the quality of accounting data was proposed:

$$QAD_{FA} = 0{,}3955 * (0{,}2756 * F11 + 0{,}1787 * F12 + 0{,}4641 * F13 + 0{,}0816 * F14) + 0{,}4278 * (0{,}2072 * F21 + 0{,}3391 * F22 + 0{,}1135 * F23 + 0{,}0818 * F24 + 0{,}2584 * F25) + 0{,}1767 * (0{,}5021 * F31 + 0{,}1344 * F32 + 0{,}3635 * F33) \quad (9)$$

where:

QAD_{FA} Quality of accounting data for financial accounting

F11…F33 individual criteria within the specified categories

This model was used for 71 companies; 37 companies are audited and 34 companies are unaudited. There were companies from South Bohemian Region, with number of employees from 10 to 1999, with annual sales from 10 to 1000 mil. CZK and principal activity in according to CZ NACE was Section C – Manufacturing. The higher the value of accounting data quality is the worst quality of accounting date in the company is. It is on base that the criteria have negative position in the company. The results of their data quality are in the following table.

Table 2 Quality of accounting data in audited and unaudited companies

Audited companies						**Unaudited companies**					
Comp.	**QAD**	**Comp.**	**QAD**	**Comp.**	**QAD**	**Comp.**	**QAD**	**Comp.**	**QAD**	**Comp.**	**QAD**
1	1,6247	14	0,955	27	1,4238	1	1,6493	14	1,135	27	1,4955
2	0,5524	15	1,1245	28	1,8849	2	1,5143	15	0,3649	28	2,7436
3	1,3112	16	1,2731	29	1,1481	3	0,915	16	1,731	29	1,833
4	1,6738	17	0,7589	30	0,6858	4	1,1777	17	1,3222	30	1,5658
5	1,3207	18	1,3675	31	1,8876	5	0,6871	18	1,9307	31	1,5845
6	2,1511	19	1,649	32	1,2591	6	1,5454	19	1,7632	32	1,6916
7	1,7852	20	1,3132	33	1,2794	7	1,5722	20	1,5526	33	0,925
8	0,6071	21	1,2264	34	0,9444	8	1,3012	21	1,2406	34	2,1717
9	1,2063	22	0,5857	35	1,7875	9	1,3027	22	0,6012		
10	1,4035	23	0,6639	36	1,1263	10	2,1254	23	0,6791		
11	1,7034	24	1,1697	37	0,9886	11	1,9013	24	0,5534		
12	1,2765	25	1,3035			12	0,9816	25	1,4328		
13	2,0351	26	1,2674			13	2,209	26	1,6628		

Source: Own processing

In the next step, range for accounting data quality was compiled:

0 – 0,8 very good quality,

0,81 – 1,6 good quality,

1,61 – 2,4 average quality,

2,41 – 3,2 bad quality,

3,21 – 4 very bad quality,

and the quality of accounting data in audited and unaudited companies were evaluated. The results are in the following table and graph.

Table 3 Evaluation of accounting data quality in audited and unaudited companies

Range QAD	Audited company - number	Audited company - %	Unaudited company - number	Unaudited company - %
Very good quality	6	16,22%	5	14,71%
Good quality	21	56,76%	17	50,00%
Average quality	10	27,03%	11	32,35%
Bad quality	0	0,00%	1	2,94%
Very bad quality	0	0,00%	0	0,00%
Total	**37**	**100%**	**34**	**100%**

Source: Own processing

In this table, it is seen that unaudited companies have worse quality of accounting data than audited companies. To verify this, in the next step, the statistical method T-test was used. A T-test is a statistical hypothesis test in which the test statistic follows a Student's t-distribution if the null hypothesis is supported. It is used to determine if audited and unaudited companies data are significantly different. It was also found out maximal and minimal value, average of accounting data quality and standard deviation. The results are in the following table.

Table 4 Statistic analysis of accounting data quality in audited and unaudited companies

	Audited companies	Unaudited companies
Max value	2,1511	2,7436
Min value	0,5524	0,3649
Number of companies	37	34
Average	1,2898	1,4371
Standard deviation	0,4106	0,5261

Source: Own processing

The results of T-test are as follows:

t = -1,32087

DoF = 69

p = 0,190907

F = 1,641652

p dispersion = 0,147970

For audited companies versus unaudited companies the T-test shows statistically insignificant differences between them. P value is 0,19 at the significance level $\alpha = 0,05$.

For the results verification there was used the Kolmogorov–Smirnov test. K-S test is a nonparametric test of the equality of continuous, one-dimensional probability distributions that is used to compare two samples. The Kolmogorov–Smirnov statistic quantifies a distance between the empirical distribution functions of two samples. The null distribution of this statistic is calculated under the null hypothesis that the samples are drawn from the same distribution. The results and differences are in the next table and figures.

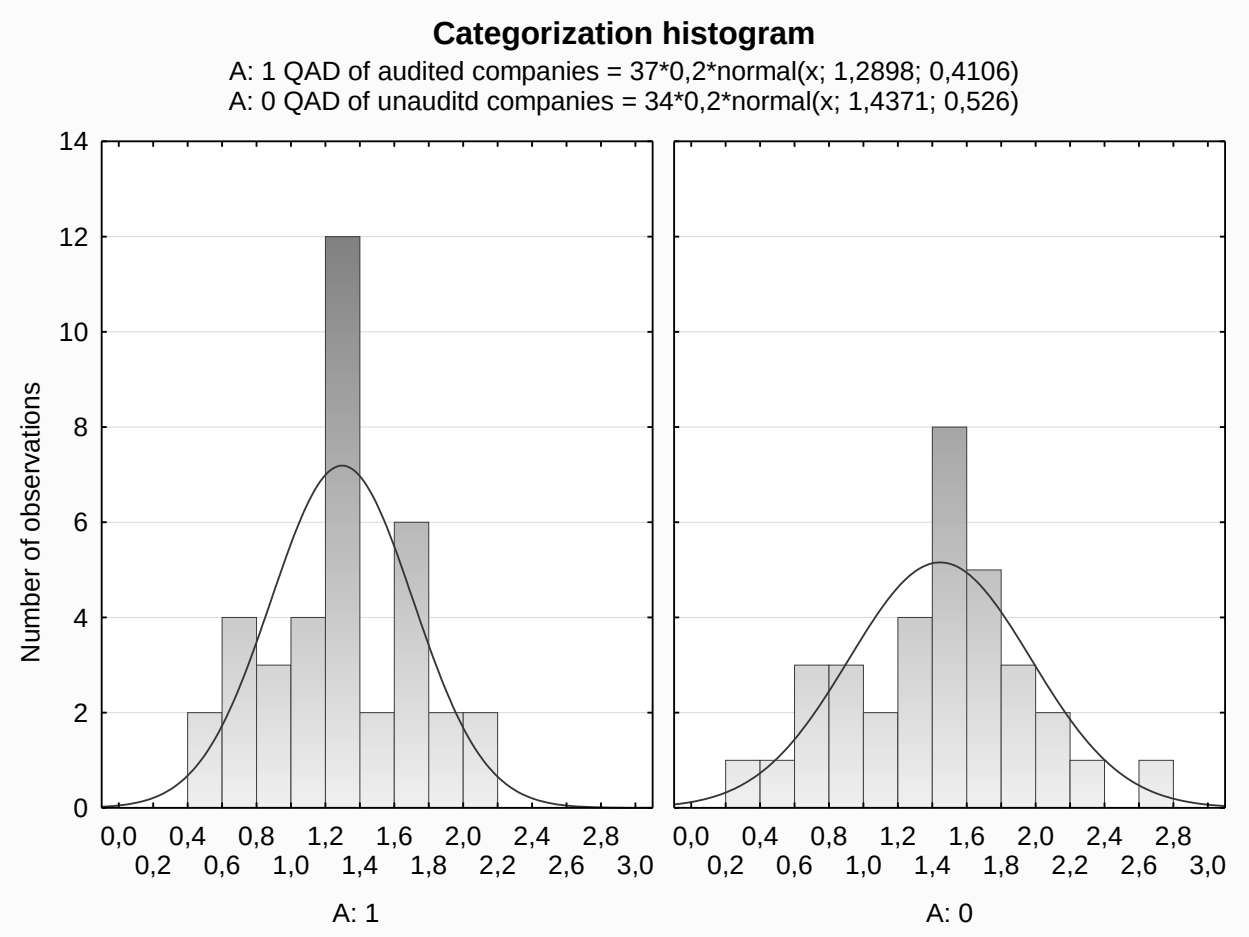
Table 5 Kolmogorov-Smirnov test

Maximum negative difference A1	Maximum positive difference A0	P-value	Average A1	Average A0	Standard deviation A1	Standard deviation A0	Number A1	Number A0
-0,317965	0,043720	p < 0,10	1,289846	1,437129	0,410569	0,526050	37	34

Source: Own processing

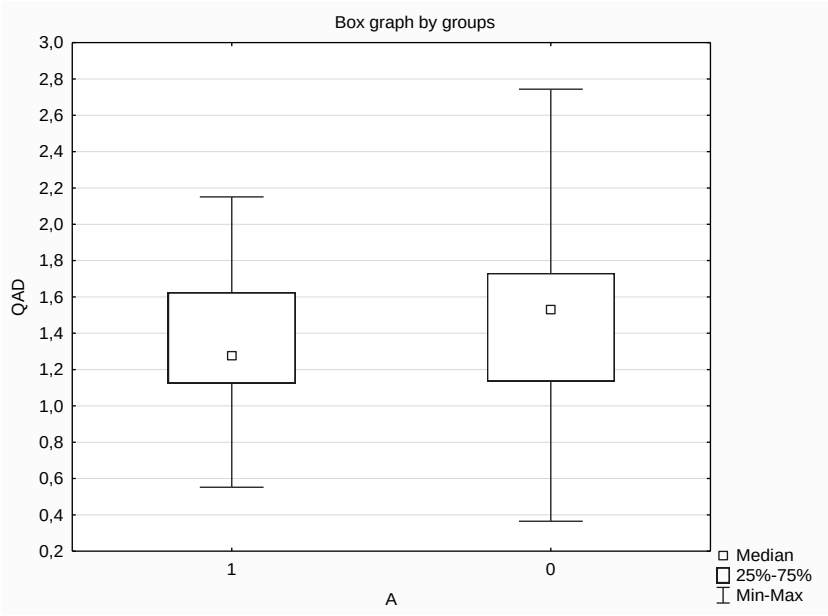
This test for audited companies versus unaudited companies shows statistically more significant differences between them. P value is less then 0,10 at the significance level $\alpha = 0,05$. This test at the significance level $\alpha = 0,1$ shows that there are statistically significant differences in quality of accounting data between audited and unaudited companies.

Figure 1 Categorization histogram of audited and unaudited companies



Source: Own processing

Figure 2 Box graph of audited and unaudited companies



Source: Own processing

5 Conclusions

The article is primarily concerned with comparison of the accounting data quality in audited and in unaudited companies. In the first step the criteria were determined, they were assessed and the quality determination model was compiled. Consequently, the values of the accounting data quality in 71 companies were determined and divided into two groups – audited and unaudited companies. In the next step the values were compared and evaluated. It was found that average value of accounting data quality in audited companies is on better level than average value in unaudited companies (1,29 and 1,44). Unaudited companies have also higher maximal value of accounting data quality than audited companies (2,74 and 2,15) and it means that the higher this value is the worst accounting data quality in a company is. Even this, by the statistical T-test was found out statistically insignificant p value 0,19. By the Kolmogorov-Smirnov test at the significance level $\alpha = 0,1$ was found that there are statistically significant differences in quality of accounting data between audited and unaudited companies.

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