Detecting Hidden Losses in the Financial Statements – Case of Serbia

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Summary

Detection of hidden losses versus gains in the financial statements of the Republic of Serbia (RS) is the primary task in the process of joining the EU. Officially disclosed, the financial statements for the multi-year period do not provide an objective and truthful picture of economic performance in Serbia. This raises the key question for investors to determine the actual healthy companies (real gainers) of the actual loss, and the methods applied in the order of their determination. The aim of the paper is a methodological detection of actual profit-loss vs the application of qualitative and quantitative methods. In this paper, we tried applying qualitative and quantitative methods (Data Mining) to show the ways of discovering hidden losses, suggesting methods to manipulate financial results, citing in particular, the advantage of qualitative methods in detecting hidden losses, and the advantage of quantitative methods in the field of predicting hidden losses.

Keywords: hidden losses in the financial statements, creative accounting, financial ratios, qualitative methods, quantitative methods-Data Mining

1. Introduction

The official announcement disclosed [1] on the operations of the economy for the period since 2010. by 2012. in the Republic of Serbia with comparative indicators point to a dramatic decline in overall domestic economic activity. It is accompanied by: a reduction of industrial production, growth of the trade deficit, little growth in exports, strong inflation, chronic nedostatatkom necessary accumulation, financing unfunded spending and investing through a lot of borrowing[2]. Comparative indicators with a selected group of countries clearly point to a weakening economy [3]. Namely, Serbia is among the countries with the highest unemployment rate, a leading in Europe with the highest cumulative inflation rate, and the lowest rate of total investment. Losses of Serbian economy recorded growth of 12. 260 million in 2010. over the projected loss of up to 4. 716 million in 2012. However, if disclosed data are reported actual losses, precisely the effects of business ie. Positive or negative financial performance (loss or gain), certainly requires a special research. The reason for this lies in the fact that positive or negative financial results, ie,.

[1] Press the economy Fi2010,2011 i2012, Comparative review of the financial statements in 2012 and 2010 Press and 2011 NBS disclosed on the NBS website by the end of the year.
[2] www.radmilovicstanko.com/srbija nema samoodrživu privredu.
[3] Data source: IMF World Economic Outlook Database, April i May 2013 i WB DataBank.

Hidden losses depend not only on macroeconomic factors (market, business environment and legal framework) and from the micro-economic factors (resources, quality of production, organization, motives management, business environment, political environment, etc.). The paper will try to detect loss factors, which are not visible, more precisely, which are hidden in the financial statements, which affect the presentation of operating results (net profit or net loss -net loss-making). Starting from the fact that the financial statements represent the network feedback, where expenditure (liabilities) in a single economic entity may represent inflows (receivables) for other businesses. Following their dominant practices that Serbia "usual" report negative operating results, the fact to explain what are the real causes of loss, and how are business enterprises (hereinafter referred to as the company) with positive results in essentially companies with hidden losses. This endemic practice has left significant consequences on the assessment of trends in economic activity Serbia. It is known that in the economic transformation of the Republic of Serbia financial deregulation substantially economic entities operating losses and caught large assets are summarily executed, and in most cases, creditors were left damaged.The proof of this claim are the liquidation proceedings are terminated frequent bankruptcies. The phenomenon of continuous creation of losses, the evaluation of the cause of the loss was not sufficiently expert analyzes. Contribution to just deal with detecting hidden losses and signirajući manipulative (qualitative) and quantitative (Data Mining-DM) techniques for the detection of hidden losses.

Attachment is divided into four sections. Introduction, which is assigned to the significance of the problem of concealing losses in Serbia. The second part, based on official data disclosed qualitative analyzes how manipulation of financial statements. The third part is analyzed quantitatively identical data through data mining.

2. Research Methodology

2.1. Data

Our sample of research has obtained 2010., 2011., and 2012., and contains 48.77% of small, 31.89% medium and 19.07% large enterprises. The organizational form of the company is represented in percentage with 78.17% limited liability companies, joint stock companies 17,55%, 2.5% public enterprises and other forms 1.78.[4]. Significance of the sample in relation to the integrated data at the level of the Republic of Serbia [5] are given in Schedule 1.

[4] Announcement of the economy Fi2010,2011 i2012, Comparative review of the financial statements in 2012 and 2010 Press and 2011NBS disclosed on the NBS website by the end of the year.

[5] www.apr.gov.rs.

Schedule 1/ Data:	*Gainer* Type of indicators	Year 2010	2011	2012
For Economy	Number of enterprises in Serbia who have submitted and registered financial statements	95002	107363	106539
At the level of the sample	Sample number	508	501	501
	% Equity sample	0,53%	0,47%	0,47%
For Economy	The total financial value of business profits in Serbia with the submitted reports in millions of euros	3.054 €	4.382 €	3.803 €
At the level of the sample	Presented by gains in millions of euros	2.203 €	2.471 €	2.776 €
	% Equity sample	72,13%	56,38%	73,01%
Losser				
At the level of the sample	Sample number	500	500	503
	% Equity sample	0,53%	0,47%	0,47%
For Economy	The total financial value of the business loss in Serbia in millions of euros financial statements in millions of euros	4.016 €	3.572 €	3.476 €
At the level of the sample	Presented by gains in millions of euros	544 €	2.813 €	3.310 €
	% Equity sample	13,55%	78,76%	95,21%

2.2. Variables

Financial indicators -Attribute with whom we operated on in this analysis were divided into two groups. The first group consists of data that were disclosed in the financial statements: the balance of the account, in which we are due to more precise analysis of losses include the total turnover, namely: other income, other expenses, financial income, financial expenses, summarized material costs, as well as non-productive costs.The second group of variables make the results obtained ratio analyzes such as EBIT, return on equity, the rate of net pre-tax result, the number of days of payment, reduced liquidity ratio, margin and other contributory.

2.3. Methods

Detection of hidden losses in the financial statements, we analyzed using two methods: qualitative and quantitative. Qualitative methods are based on expert judgment, acquired several decades of practice in the field of commercial and public sectors, as well as forensic accounting and auditing. Method of judging was done by the commitment of key account balances and traffic indicators, which are crucial for the detection of hidden losses in reports. The application of quantitative methods based on the application of finding the hidden knowledge or drowned in the data (Data Mining). Typical of this method is the technique of classification, which is implemented through supervised machine learning and classification of relevant attributes that determine losses versus gains of companies.

2.3.1. Qualitative Analysis of Losses

As we noted above, qualitative methods of determining losses are based on an estimate of researchers, and the procedure is no different from the auditor's judgment, which is based on practice and experience. In the process of qualitative analysis is dominant normative and descriptive data analysis and descriptive statistics, which are based on determining the structure of losses, as well as the validity of the structure of income and expenditure, which is the subject of further work attachments.

2.3.1.1. Structure Loss

In the process of analyzing the structure of losses, we started from the macro level of losses versus gains calculation of the difference between the total reported profit or loss. The resulting negative effect operations of 850 million euros in 2010. were not rehabilitate but is optimistic after 2011. in the year 2012 recurred negative effect operations of 552 million euros (Review No.2).

Height loss by company size and type of organization Loss Description / year	*Review No.2* In millions of euros / 2010	2011	2012
1.Neto loss	3.851	3.778	4.355
2.Neto gain	3.001	4.391	3.803
Results Effects (1-2)	*(850)*	*613*	*(552)*
– Small	1.285	1.314	1.460
– Medum	680	666	648
– Large	1.886	1.798	2.248
Total loss per company size:	3.851	3.778	4.355
– Limited Liability Company	2.501	2.292	2.434
– Joint stock companies	901	1.259	1.284
– Public Companies	327	160	536
– Other	123	67	101
Total loss of their legal form:	3.851	3.778	4.356

It should be noted that the comparison of loss by enterprise size shows that the greatest losses recorded large enterprises, then small businesses, while the smallest loss in medium-sized enterprises. According to the organizational form of the greatest losses are expressed limited liability companies, joint stock companies and then lately and public companies.

2.3.1.2. Handling the Effects of Financing

The net financial effect	In mill. eur/Review No.3 2010	2011	2012
Small	*(290)*	*(13)*	*(398)*
Medum	(49)	68	72
Large	(305)	558	(226)
Results Effects	(645)	613	(552)
Limited Liability Company	(1.372)	751	271
Joint stock companies	756	(62)	(303)
Public Companies **	(29)	(72)	(479)
Other		-3	-41
Results Effects	(645)	613	(552)

Agency Serbian economy registers (APR) has announced that the negative effect of financing for small businesses for a given period (Box 3) amounted to 290 million euros in 2010. year, while in 2012. were 398 million euros. In large enterprises negative effect of funding ranged from 305 million to 226 million in 2012. The cause of such negative effects of financing the difference between the given and received, interest and exchange rate depreciation of the loan debt and interest for late payment of liabilities and receivables. Limited liability companies had a negative effect of funding in 2010. 372 million, while in 2011. and 2012. demonstrated a positive effect of financing. According to a statement APR (4 Preview.) For 2010. year made bankruptcy and liquidation of 2. 483 companies to that number in 2012 rose to 4. 719 companies.

Annually, an average of openings from 400 to 600 bankruptcy[6]. The largest number of liquidated companies and closed the bankruptcy of companies with limited liability. The obligations of the company conducting the bankruptcy or liquidation of (long-term, short-term and PVR-deferrals) ranged from 4. 042 million in 2010. year to reduce to 2. 722 million in 2012. (Review No.4)

Number of established and liquidated enterprises in Serbia .[11]	*Review No.4*		
	2010	2011	2012
Newly established enterprises	7792	7260	6936
Liquidated commercial enterprises	**2483**	**2852**	**4719**
	In millions of Euros		
* Total claims of companies that are liquidated:	**530**	**517**	**1.413**
- Of which from financial investments:	330	320	560
Total liabilities of the company liquidated:	**4.042**	**3.725**	**2.722**

Looking at what makes the structure of financial income in companies with normal business continuity, we have not found anywhere that there was a write-off financially by issued loans companies which are subject to liquidation proceedings. Suppress investments in companies that are liquidated creates additional negative implications in financial reporting. In our case -chosed sample in the financial statements write-off of short-term financial investments in companies that are not liquidated in its entirety recorded in the financial statements. This phenomenon represents a manipulative moment that affects the validity of financial statements. Business entities in the financial statements posted the write-off of financial investments for the company data only when it is the effect of financing leaving space for displaying positive financial results. From our analysis it was found that in the event that the company -gainers carried out the write-off would be losers, which would be a signal to creditors from taking measures to protect their claims. This means that the company, which had responsibilities in terms of financing they had previously to initiate bankruptcy or liquidation. *The main reason why claims of liquidated companies are not entered into the financial effects of the business is shown in the Summary No. 4 (where you can see that it is the amount of 530 million euros in 2010, 517 million in 2011. year, and 1. 413 million euros in 2012) is to deprive creditors of information about the real estate business. In this way it was done postponement of bankruptcy because the losses were covered up through artificial positive effects of business. Difference negative effects of financing would certainly increase the above claims that were not recorded in the financial statements. The implication of this trend is that the structures of the negative effects of the financing of limited liability companies (in our case) are not recorded. Joint stock companies and public companies in 2012. demonstrated the negative effects of funding but in a far smaller amount of 303 million euros than for public companies (open and closed), while the negative effects of funding for public companies, on the order of 479*** (Overview No.3) millions of euros.*

The tested sample was found to be at Gainers income from investments increased by 1. 000 million in 2010. year. 1. 030 million in 2012. The same tendency was observed with financial expenses. The growth dynamics of financial expenses is greater than the value of financial income, which creates a negative effect of financing (Review No. 5) both for gainers and the lossers. The financial effects are at the profit-and loss-negative. Bearing in mind that in 2012. Gainers were not in their financial expenditure expressed write-off of receivables arising from placements to the negative financial effects of 233 million euros increased to 1. 012 million. This simply means that you are in fact Gainers potential losers.

[6] See the portal Public information and promotion of transparency and good practice in the conduct of insolvency proceedings:-ahttp://www.alsu.gov.rs/bap/code/navigate.jsp Id=200.

View the amount of loss in the observed sample and effects	Gainer			In millions of EUROS/*Review 5*		
				Lossers		
Description of position / year	2010	2011	2012	2010	2011	2012
Financial income:	1.000	1.071	1.030	194	669	825
Financial expenses:	1.353	1.080	1.263	762	1.409	2.037
The effect of funding:	**-353**	**-9**	**-233**	**+568**	**-740**	**-1.212**
– The amount that is not in financial expenses for companies with limited liability:			**-303**			
– The amount that is not in financial expenses for joint stock companies			**-479**			
Adjusted effect of funding	**-353**	**-9**	**1.012**			

In brief, to summarize, the elements of manipulation in this case are not expressed through the recording of write-offs of financial investments in companies that were liquidated. In our case it is the amount shown in Schedule 5 through correction of funding.

The effect of these manipulative transactions is endangering the continuity of operations (on going concern). Regardless of the method of accounting, recording placements remained accounting nares indicating manipulation effects of financing.

2.3.1.3. Handling the Effects of Extraordinary Income and Expenses

The next segment of detection of hidden attribute losses based on the effects of extraordinary income and expenses (Preview 6). Although the correction of business results through extraordinary income or expense is always present, its significance depends mainly on policy leadership including the frame of national regulations, which means that the difference between realized gains from the previous and current period was not sufficient to cover the total reported negative effects of business in the current year in which they participate and other losses of other entities. However, this phenomenon is also a characteristic of gainers. In our sample has shown the negative effect of operating results in the amount of 787 million euros (*Review No. 2* ;=(-850 mill. euros from 2010.)+(615 mill euros from 2011.) + (-552 millions of euros from 2012), which represents 6.7%. total realized income, while at the level of the entire economy Serbia effect of funding represented 3.5%[7].

Effects of other expenditures of the economy. Review 6	In millions of Euros		
	2010	2011	2012
– Small	(231)	(206)	(402)
– Medum	(17)	(95)	(95)
– Large	**(359)**	**(182)**	**(957)**
IN TOTAL:	(607)	(483)	(1.454)
– Limited Liability Company	**(512)**	**(255)**	**(235)**
– Joint stock companies	3	(131)	(120)
– Public Companies	(88)	(95)	(87)
– OTHER	(10)	(3)	**(1.012)**
In total:	(607)	(483)	(1.454)

At the level of the economy analyzed the effects of extraordinary income and expense summary of gainers and losers. The negative effect of extraordinary income and expenses (Overview 6.) Is expressed in the financial statements of large companies in the amount of 359 million euros in 2010. year, while in 2012, was 957 million euros. For small businesses the negative effect of extraordinary income and expenses ranged from 231 million euros and was reduced in 2012 to 402 million euros. Limited liability companies had a negative effect of extraordinary income and expenses in 2010. year from 512 million in 2012. year have demonstrated that information fell to 235 million euros. In 2012. year effects of extraordinary income and expenses have increased substantially in other entities in the amount of 1. 012 million. The implications of these effects is invisible to social enterprises, which have been liquidated or are open insolvency proceedings. Extraordinary income and expenses have become an apparatus that can affect the outcome of business performance management. This way of manipulation can not be directly observed, but the data we have analyzed this phenomenon as marked all finds frequent and conscious activity manipulation of financial statements.

[7] Announcement of business economy in the Republic of Serbia in 2010. , 2011. And 2012. was published by the National Bank of Serbia.

Through them can be conducted in any direction will effect the results to be. To illustrate this, we started testing the simulated subject, which shows how to manipulate through conditional decisions about what will be recorded as extraordinary income and expense as what. In our data (Survey No. 7) that we analyzed, in the case of profit-makers are negative effects of financing. The most important item in extraordinary revenue write-off of liabilities to suppliers, although the supplied goods or services, which are recognized in revenue and reported in regular financial reports (creative accounting). This procedure we marked all finds as "creative" with the reason that manipulate the outcome of the financial operations and to the imposition of the results, which differ from the objective situation. Removing ie. write-off of liabilities to suppliers we received a negative effect business with profit-and loss arising from extraordinary income, which tend to increase. Simply put, made a manipulative action of removing data on extraordinary income. The resulting negative impact statement for 2010. year from 487 million euros in 2011. 1 year. 755 million euros indicate that in the coming years will be known loss of a minimum of 2. 261 million EUR. In this case, the profit from operations in 2010 with one. 137 million will be increased to 2. 043 million which causes a negative effect operations of 487 million euros for 2010. year that he was realistic in 2012. 2. 261 million. *The analysis of the sample by removing scrapped obligations of extraordinary income, we get the situation that we are the effects of operating results were negative just for the amount of extraordinary income.*

View the correction effect of the results on the basis of stepping out of extraordinary income in the observed sample and effects	Gainer			*In millions of euros Overview 7* Lossers		
Description of position / year	2010	2011	2012	2010	2011	2012
Operating income	21.822	21.755	23.369	2.953	9.351	12.347
Operating expenses	19.669	19.638	20.384	3.248	10.222	13.403
Operating profit	2.203	2.274	3.017	90	147	178
Operating loss	50	157	32	384	1.018	1.235
Financial income	1.000	1.071	1.030	194	669	825
Financial expenses	1.353	1.080	1.263	762	1.409	2.037
Other incomes	Other income from the review 4 who was removed					
Other expences	663	843	708	1056	2280	3093
Profit from ordinary activities before tax	**1.137**	**1.265**	**2.043**	4	-	-
Loss from continuing operations before tax	0	0	57	1624	3020	4304
The effect results				(487)	(1.755)	(2.261)

2.3.1.4. Manipulation of the Payroll Payments of Employees

Review 8. The average salary and number of employees in the economy	In dinars 2010	2011	2012
– The average gross wage:	47.450	52.767	57.430
– The average net earnings:	34.142	37.976	41.377
Enterprises by size and number of employees		Number of employees	
– Small	362306	375226	363285
– Medum	219456	217134	207936
– Large	420151	426357	433115
In total	1001913	1018717	1004336
Number of employees in enterprises by legal form		Number of employees	
– Limited Liability Company	636671	669972	680938
– Joint stock companies	197916	206922	231193
– Public Companies	113930	96703	98531
– OTHER	53396	45120	
In total	1001913	1018717	1004336

Material expenses on behalf of employees earning the item on which can be directly seen in the way of manipulating financial statements in the domain of salary (public sector) and earnings (private sector).

The first indicator for the manipulative actions with salaries is large deviations from the average salary in public enterprises and companies organized by various statutory forms. They started from official data on how many shares has the money supply in the name of profit in relation to total income from operations. This is the reason that in statements that revealed APR for 2010-2012. year and annual statistical data bulletins nowhere financial indicators of this type. Based on our analysis, we derived the percentage share of wage income in the business and come up with data that are the same on both the sample and the level of the economy (representative sample). Explanation ways of manipulating the display payroll explained in terms of three approaches, as follows:

The first approach. We have found the actual average salary per employee and percentage of earnings in business income. In the Review 9 it was noted that the average gross wage per employee in the overall economy for 2010-2012. year (APR) are respectively in 2010 amounted to 47. 450 dinars, while in 2012. year were 41. 377 dinars**.** The number of registered persons employed according to official reports in 2010. 1 year was. 001. 913, 2012 and in. 1 year. 004. 336 employees. The cause of the fall of the average gross income per employee stops working enterprises (*annually from 400 to 600 the company is liquidated*). The money supply, which is registered in the name of accrued employee benefits 5. EUR 485 million in 2010. year to one in 2012. totaled 6. 125 million. The percentage share of wages in the business income ranged from 8.6% in 2010. year to 2012. this percentage was 7.91%.

The second approach. Performs the determination of the state of earnings and percentage of a sample of 1. 000 companies for each year. In a sample of 1. 000 companies that are categorized as 500 companies Gainers and losers as 500 companies, number of employees ranged from 313. 780 persons in 2010. year to 2012. the year was 328. 122 persons. The average income of employees in 2010. year was 45. 499 dinars in 2012. 57 years. 430 dinars. Most people work in (sample) companies with limited liability, then in public enterprises (see Overview 9).

Overview 9. View employed on a selected sample of 1000 financial statements	In dinars		
	2010	2011	2012
The average gross wage per announcements	**47.450**	**52.767**	**57.430**
Average net earnings per announcements	34.142	37.976	41.377
The average gross wage in the sample	45.499	55.136	57.199
Average net income from a selected sample	32.759	39.698	41.184
Enterprises by size and number of employees	*Number of employees*		
– Small	113.467	116.687	121.405
– Medum	68.729	69.283	72.187
– Large	131.583	178.678	134.530
Number of employees in total	**313.780**	**364.648**	**328.122**
Broj zaposlenim u predu. Po prav. Formi	*Number of employees*		
– Limited Liability Company	199.393	211.496	216.561
– Joint stock companies	61.984	80.223	59.062
– Public Companies	35.681	54.697	39.375
– OTHER	16.723	18.232	13.125
Number of employees in total	313.780	364.648	328.122
% Share of employees in the sample of the total number of employees at the level of the economy	31,32	35,79	32,67
Total accrued earnings in millions of RSD in a sample of 1,000 companies	171.319	241.262	225.220

What is missing in the official statement by the APR for 2010-2012. year to determine the average gross earnings based on the criteria of legal form of organization of business entities. On the sample is observed that the highest average wages in public enterprises. Pad: Average earnings in the public sector were created when we started to implement measures of rationalization and savings in the public sector by the Government of the Republic of Serbia. Mali average wages in the private sector and hiding elements that causes underlying dilemma.

Are these data are accurate or reliable? First we went from participation gross earnings in business income and we concluded that ranged from 6.55% in 2010. was that in the year 2012 was about 5.87% (*Overview 10*). At the level of the economy recorded a decline in the percentage of participation as well as in our selected sample, which means that the representativeness of the data important for our analysis.

Overview No.10 The average gross wage per employee in the sample tested	2010 The average RSD	2010 % deviation s	2011 The average RSD	2011 % deviation s	2012 The average RSD	2012 % deviation s
	31.272	31,27	44.520	19,25	52.256	5
– Limited Liability Company	45.252	0,54	49.250	10,68	53.126	4
– Joint stock companies	123.125	(170,61)	112.129	(103,37)	98.256	(78)
– Public Companies	14.100	69,01	45.125	18,16	33.924	38
– OTHER	**171.319**		**241.262**		**225.220**	
% Share of gross earnings in the business income:		**6,55**		**6,99**		**5,87**

Overview 11: Operating income,	2010	2011	2012
	In millions of dinars		
Operating income test sample	2.613.731	3.452.392	3.849.477
– Limited Liability Company	424.358	667.209	332.225
– Joint stock companies	1.652.125	2.418.911	2.921.000
– Public Companies	253.612	278.151	289.521
– OTHER	283.636	88.121	306.731
– *Total accrued gross earnings*			
– Limited Liability Company	74.825	112.990	135.799
– Joint stock companies	33.659	47.412	37.653
– Public Companies	52.718	70.989	46.426
– OTHER	10.118	9.873	5.558
Number of employees in total	171.319	241.263	225.435
– *% share of profits in business revenue*			
– Limited Liability Company	**4,53**	**4,67**	**4,65**
– Joint stock companies	13,27	17,05	13,01
– Public Companies	12,42	10,64	13,97
– OTHER	3,57	11,20	1,81

In the ledgers reported total accrued earnings at companies with limited liability (Survey 11) ranged from 4.53% share in operating revenue, in 2010. year to 2012. amounted to 4.65%. The percentage share of the gross receipts of public enterprises on average are identical and at the level of the economy. In our sample tested those amounts 12,42% in 2010. year to 2012. amounted to 13.97%. The situation is similar in joint stock companies. Here it can be noted that the term small percentage of the share of gross income in operating income in other entities (state-owned enterprises, cooperatives, etc..) And it ranged from 3.57% to in 2011. year was (growth) in the amount of 17.05%, while in 2012. year was reduced to 1.81%. The main reason for this phenomenon is that many state enterprises, which are subsequently liquidated and extraordinary income accounted for unpaid wages that are recognized by the state. Also, the analysis pointed to the fact that the financial statements percentage share of earnings of employees in companies with limited liability is below 13%, as well as for joint stock companies. Companies with limited liability account for earnings in operating income of 4.53% in 2010. year to 2012. amounted to 4.65%. These results point to the fact that such a ratio, the share of earnings in business income "hidden" confirms that the payment of wages to the normal average is done at the expense of other costs.

Overview 12 , % participation in the costs of production services business income	2010	2011	2012
– Limited Liability Company	**3,92**	**5,48**	**6,73**
– Joint stock companies	1,98	1,20	1,10
– Public Companies	**2,23**	**1,31**	**0,91**
– OTHER	2,30	1,20	4,30

The third approach. This approach is based on the height positioning of non-production services to the financial statements. Specifically, it is about proving the hypothesis that there are other material expenses, which represent elements suitable for manipulating. For test sample 1 000 companies we have found that the percentage share of non-production services business income varies according to the status of the company form of organization (*Review No. 13*). For companies with limited liability, the proportion is particularly pronounced and he went from 3.92% in 2010. and in 2012. amounted to 6.73%. In public enterprises % of share of non-production costs in the business income is 2.23% in 2010. to be reduced to 0.91% in 2012. In stock companies the percentage of participation in business revenue was approximately the same as for public companies. These relationships indicate a significant relationship between correlation percentage share of gross earnings in business income and percentage of non-production services business revenue, with companies (undertakings) that are organized as a limited liability company. Non-production services cover a wide range of services and vary from company to company (consulting services, bookkeeping services, elaboration, hiring professional companies, insurance, and other non-production services, per diem, business trips, etc.). This is not just a problem of non-production services that Figures data on production services, but we consciously avoid them because they are closely related to the unfinished production, cooperation, etc.. Public enterprises and public companies have a moderate percentage share of the costs of production services from 1-1.2% while that of limited companies the percentage of participation in business revenue ranges from 5-7%, which creates a dilemma whether to these costs shall be borne substitute money supply which compensates for the real wage payments to a reasonable height (average of the economy). Specifically, we're talking about manipulating the data in the financial statements up to the amount of missing the real earnings of participation in business revenue, which is about 8.5% for a company with limited liability. More specifically, the share of wages earned in the business income of a limited liability company from 3.92% in 2010. was going to 4,53 -4,65% in 2012., which is far below the average share of earnings in business income for joint stock companies and public companies, for which the fee goes up to 13%. When we made the average percent share of earnings in business income we find that the percentage of the money supply, which should belong to earnings is of the order of 6.73 to 8.5%. Earnings hidden and compensated at the expense of other handling records (documents), which are labeled as material costs for other purposes. In a review of 12, are presented other costs of production services in public and joint stock companies, and they do not exceed more than 2%, while in limited liability companies they exceed 6%. Determined difference of 4-5% are in fact costs of non-service, which manipulates or a substitute for real wage compensation of employees when it comes to companies with limited liability. It should be noted here that the missing expenditures for not accrued taxes and funds for the amount that was replaced by a full and realistic payment to employees via the *bypass* material costs. Accordingly, the gross earnings of employees in limited liability companies are unrealistic in relation to the other averages earnings. Costs on behalf of non-production services and their correlation indicates that they are hidden asset that should be further explored.

3. The Application of Quantitative Methods - Data Mining [8]

Data Mining (DM) method is an interactive process of discovering relations and forms of manual or automated means. The essence of DM scenario is that the research process *is not based on pre-defined hypothesis that constitute "required" results* (Kantardzic, 2002). We felt that this methodological construction application domain DM of importance for the determination of hidden losses that. the classification of financial undertakings which are loss-of those who did not. The application of DM methods we focus on the prediction of losses or gains, but to establish certain ratios that indicate significant hierarchical classification of the gainers and losers based on the given ratios using the method of decision trees and production rules.

3.1. Methods of Data Mining

3.1.1. Method of Learning Decision Trees (Decision Trees - DT)

Learning decision trees is the process of creating discrimination functions in the form of a decision tree (Cherkassky V. , Mulier F. M. 2007, Witten and. H. Frank E. , 2005). The tree is created recursively, from the top (root) to the leaves, so that each node of the tree represents the logical test the value of an attribute from a description of the problem, and the leaves represent the class in which the case is classified.

[8] Stanojević, S. „Doctoral dissertation, entitled "Multivariate Analysis of Financial Statements", 2014. year, defended the Banking Academy, Belgrade..

In our analysis, we used the well-known learning algorithms and decision trees to C4. 5 (J Quinlan. R. , 1996), which are available within the system WEKA (University of Waikato), (Witten and. H. Frank E. , 2005), for the purpose of selecting the associated attributes. The main advantage is that Decision trees provide a meaningful way of representing knowledge by extracting IF-THEN classification rules (classification rules).

3.1.2. Method of Learning of the Production Rules (Rule Learning- RL)

Production rules are logical expressions forms implications, which are based on the known values of attributes to classification of a case in one of the most anticipated class (Cherkassky V. , Mulier F. M. 2007, Witten and. H. Frank E. , 2005). A set of rules is usually created using successive revisions (version spaces) or breaking training set on the floor assemblies (separate and conquer) and their description using logical expressions, which can be propositional (quantifier-free) or logic (first order or, exceptionally, higher orders). We practiced well-known learning algorithms propositional rules as RIPPER (R Forsyth. (Ed), Machine Learning: Principles and technics, London: Chapman and Hall, 1989.), Which are available within the system WEKA).

3.2. Data - Financial Ratios

Pattern refers to the identical, which were taken for qualitative analysis: 2010. , 2011. And 2012. year. We calculated the 29 atributa- ratios and target attribute class with two values Gainers and losers (Table. 1.). The purpose of the functional analysis of financial ratios were evaluated with aspects of binary classification (eg. favorable and unfavorable to 1 with 0 (eg. : Unfavorable current ratio 1 < 0 a favorable> 0 to 1). So binary attributes are arranged clearly explained the impact ratios loss or gain observed entities - commercial enterprises and budget users. In this paper are applied to the three mentioned earlier Data Mining methods and decision tree (Decision Tree, DT), the method of inductive learning rules (Rule Learning, RL) and the method of selection of attributes (Feature Selection).

Table 1: Ratios

Attributes: 30

1. The overall liquidity ratio	16. The degree of coverage of the stock and accrued net working capital
2. The reduced liquidity ratio	17. The share of equity in long-term sources
3. Cash Ratio	18. Contributory margin
4. Velocity business assets	19. The rate of business results
5. Velocity of fixed assets	20. The net result before tax
6. Turnover ratio of current assets	21. The net result
7. Inventory turnover	22. The yield on commercial property
8. Number of days binding	23. Return on equity
9. Number of trades claims	24. The duration of the business cycle
10. Number of days to collect receivables	25. The duration of the cash cycle
11. Velocity own capital	26. EBITDA
12. Turnover ratio of liabilities to suppliers	27. EBIT
13. Number of days payables	28. Financial result
14. The degree of use of fixed assets Ratio	29. Other results
15. The degree of utilization of the working assets of long-term sources	***30. Class (Gainers vs losers)***

3.3. Results of the Analysis

3.3.1. The Results of the Decision Tree

As we mentioned above, we applied the three alternative models. First, the decision tree using the WEKE (University of Waikato-learning trees C45). The model is constructed with the confidence interval (confidence interval) 0.05. We used the entire sample as a training set. The model has been tested and is properly classified gainers with 96% accuracy and losers, also with 96% accuracy.

Results DT are identified with an accuracy of 96% to the classification of gainers and losers based on financial ratios EBIT = 0 (ie, unfavorable) whose structure is defined elements, logical connectors, and if the return on equity (net margin * turnover ratio of own capital) = 0, and if the rate of net result = 0 if the financial result (financial revenues -Financial expenses) = 0, and if the other results (Other income -Other expenses) = 0, then the detected around 96% losers.

While in the case of EBIT = 1 a signed profit-makers, is of the order of 99.20%.

Namely because of handling properties in financial reporting, subsequent write-off of accounts payable reduces total liabilities, as in the assessment of the participation of equity in the long term and short term source provides a hidden picture being the sum reduces the source, instead of the results of the gain is adjusted as a significant part of results shifted to a negative result. So business profits is never final profit because it collapses the negatives effects of financing and the consequences of manipulating the financial report.

3.3.2. The Results of the Method of Induced Rules

Another method used is the method of learning the rules of the system RIPPER WEKA, who found the logical principles, ie. taught four rules, with a significant number of examples cons of training set. Estimated accuracy sets of rules was 96.6%, a priori classification accuracy.

JRIP rules:

1. (EBIT = 0) and (Number of days payables = 1) and (The degree of use of fixed assets Ratio = 0) = Class = loss (759.0/21.0)
2. (EBIT = 0) and (Other results = 0) and (Financial result = 0) and (Return on equity = 0) = Class = loss (290.0/40.0)
3. (Number of days payables = 1) and (EBIT = 0) and (Return on equity = 0) and (The net result before tax = 0) and (Number of trades claims = 0) = Class = loss (10.0/3.0)
4. (EBIT =1) = Class = loss (1470.0/31.0)

The number of induced rules (Number of Rules) : 4 (four)

Rule 1: Inductive rule tells us that if a negative EBIT = 0 if the number of days of payment to vendors positive indicator = 1 if the level of utilization of fixed assets, own capital is negative indicator, then generates a 759 loss. *Rule 2* tells us that if EBIT = 0 and if the other score = 0 if the financial results = 0 if the Return on equity = 0 then generates a 290 loss.

Rule 3: If the date of payment to suppliers = 1 if EBIT = 0 if the Return on equity = 0 and if the rate of net result before tax = 0 if the number of trade receivables = 0 then generates only 10 loss.

Rule 4: for EBIT = 1 is generated 1. 470 Gainers.

3.4. Validation of the Accuracy of the Learning Method of Cross-Validation (Crossvalidation)

Appendix 14.

Value	Recall	1-Precision
Gainer	0.9333	0.0245
Loser	0.9658	0.0915

Implementation of the training set in order to estimation performance model has certain deviations. In many cases, models remembered pattern instead of "the training of" data (data over fitting). For the purpose of elimination we applied 10- fold (ten times) cross-validation (cross validation).

The method of cross-validation or rotational estimation (Cherkassky V. , Mulier F. M. 2007, Witten and. H. Frank E. 2005) in the case of application of Decision Tree was given overall cross-validation error rate (overall error) in the range of 0.0535 to 3.006%.

4. Conclusion

Detection of hidden losses in the publicly disclosed financial statements has not been the subject of detailed research in this area. The fact that the operating loss of the overall economy of a calendar year, as measured by 12 billion euros to the following year reduced by 2/3 value, along with the fact that the economy had in the observed years, significant investments, nor the newly created value, as well as the constant growth net of effects of business overall economy, which is constantly growing, indicating the potential hidden losses in the Serbian economy. In a sample of 1. 000 companies by the respective years, we have examined the effect of the impairment loss in 2010. year in the years to disappear, while at the same level of debt, and other financial ratios indicate quite the opposite effect overall operations of the Serbian economy.

Research results we obtained are based on an analysis of the financial statements for the year 2010-2012 ie respectively for each year after the loss of 500 and 500 Gainers.

Detection of hidden losses in the financial statements, precise handling of the financial statements, it is essential job forensic accountants and auditors. We tried to point out the significance of Qualitative and quantitative analyzes highlight the key points where the manipulation is done, which is to be recognized publicly disclosed data. The use of DM method, as quantitatively oriented method has a predominant role to perform qualification and prediction in the process of discovering hidden losses. In this sense, the DM method dominant and with a high percentage of accuracy up to 100% in the process of detection ratio indices are dominant in the classification of companies on the gainers versus losers. The methods we used are shown us that the dominant EBIT ratio indicator, which determines complemented with indicators referred to above, the commitment of the company as a loss or a profit-makers. But on the other hand we detected that insufficiency of other indicators, which are for example, related to expenditures and revenues, which are not represented in the financial statements are a major deficiency in the application of these methods in the field of detection of hidden losses. In contrast qualitative analysis based on decades of experience gives us fruitful results. To illustrate publicly published data do not provide the ability for flexible treatment of certain expenses such as the cost of currency depreciation, which were dominant in 2008. and 2009. year, when the state approved that operators can decide when and how the negative effects from exchange rate depreciation to express in financial expenses and income, which is especially true for 2010. and 2012. year. In this way many companies deliberately carried out the demarcation of the costs, and as a result we have had fewer total reported losses in 2012. year. In our analyzes cases this has no effect on the total score, so this place artificial correction loss that we had in 2010. the economic level of 12 billion euros was reduced to 4.7 billion euros in 2012. year. This fact alone made us the only approaches to qualitative analysis to derive results on the structure of the position, where it is manipulation of financial statements. Qualitative analysis has provided important answers as to what constitutes a manipulative elements and where on this or any way to expose. DM method, despite a significantly selection can not explain a quality answer to how and in what domain they manipulated financial results. Our research has identified the existence of conscious manipulation of rectifying the financial statements, which are most common in companies with limited liability, especially for minor amount of deposit, which is in principle always under the traffic that it generates. Frequent manipulation of extraordinary income, the write-off of financial expenses, wage costs over deflection, and others that have not been explored, are only part of the arsenal which affects the financial reporting. Generally, the dominant tendency to postpone losses, which means that they Gainers potential losers, and that a substantial part of the assets of the bankruptcy debtor's income and become the modus industry, through debt write-off, as the common practice in Serbia at the expense of a healthy core business. In the field of manipulation wages and salaries, it is also commonplace workaround method of calculation of wages and salaries, as well as cash payments which constantly threatens the country's fiscal system. Our findings clearly indicate the advantages of qualitative over quantitative analyzes, except in the field of predicting financial indicators.

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