

# Importance of objective and formal adequacy for the indicators of enterprise financial health

## *Význam věcné a formální adekvace pro ukazatele finančního zdraví podniku*

F. STŘELEČEK, R. ZDENĚK

*University of South Bohemia, České Budějovice, Czech Republic*

**Abstract:** The evaluation of financial health of an enterprise becomes very important in Czech businesses. Among other factors, it is so because it is viewed as a precondition for being eligible for some of the EU structural funds. Models of enterprise financial health were created mainly on the basis of objective evaluation of indicators and discrimination analysis for prosperous and bankrupting enterprises. Little attention was paid to the influence of particular indicators on the total value of enterprise financial health. Using the principles of objective and formal adequacy of the indicators, as well as their standardisation, and the methods of multicriterial evaluation together with the determination of particular indicators independence can improve the creation of financial health indicators and facilitate a higher rate of its objectiveness.

**Key words:** financial health of an enterprise, methods of multicriterial evaluation, cluster analysis

**Abstrakt:** Hodnocení finančního zdraví podniku nabývá u českých podniků stále více na svém významu. Aktuální v poslední době je dobré finanční zdraví podniku především jako podmínka pro čerpání některých strukturálních fondů EU. Modely finančního zdraví podniků byly tvořeny především podle věcného posouzení ukazatelů a diskriminační analýzy pro dobré a bankrotující podniky. Malá pozornost byla věnována vlivu jednotlivých ukazatelů na celkovou hodnotu finančního zdraví podniku. Využitím zásad věcné a formální adekvace ukazatelů, standardizace ukazatelů a metod vícekritériálního hodnocení spolu s posuzováním nezávislosti jednotlivých ukazatelů lze zlepšit tvorbu ukazatelů finančního zdraví a zajistit jeho vyšší objektivnost.

**Klíčová slova:** finanční zdraví podniku, metody vícekritériálního hodnocení, shluková analýza

## INTRODUCTION

The main aim of the financial management of an enterprise is to provide an overview of the financial situation and financial context in a particular firm. It is necessary to identify the factors (weaknesses), which could weaken the enterprise in the future as well as determine the strengths that could make the firm prosper and grow. The financial situation of the firm is observed by short-term creditors, long-term creditors, banks, shareholders and the firm management. Currently, the financial health of the firm has become important for acquiring support from the EU funds, e.g. the subsidies from the Operational Program of Agriculture etc. Due to the current interest in enterprise financial health evaluation, it is desirable to discuss this methodology in public. "It is necessary to change the presentation of financial health evaluation and explain the farmers that it is not a criterion which would deprive most agricultural enterprises of the chance to acquire support from structural funds", says the protocol of the Economic Commission of the Agrarian Chamber, CR.

In connection with the financial health evaluation, it is necessary to improve the methodology so that financial health could express the real situation in a more objective way. This study should contribute to the solution of some relevant methodological problems.

## EVALUATION OF ENTERPRISE FINANCIAL HEALTH

Standard financial analysis tests the financial health status by ratio indicators expressing the relationship between the relevant items from profit and loss statement and balance sheet. Financial health rate enables us to state how large risks from the operational activity the finances are able to resist. The evaluation usually involves the following classification:

1. Strong health, which can secure the enterprise even in the case of more serious failures in operational activity, or if there are external threats. Strong health means a low level of risk and enables the investors as well as creditors to trust the corporation.

---

The study was elaborated within the project MSM 1222 00001.

2. Good health is able to keep the firm in a stable state even at temporary difficulties in operational activity. Medium rate of risk enables the investors to hope that the debts are payable.
3. Weak health means that even minor faults in enterprise can cause temporary financial difficulties. The rate of risk is more significant but probably the short-term debts are still payable.
4. Ailment means that the enterprise can suffer from financial distress. The level of the trust of creditors in the enterprise is low and the situation in the company is monitored in a detailed way. The company is about to change.

## **ONE-PEAK AND MULTI-PEAK SYSTEMS OF ENTERPRISE EVALUATION**

The crucial factor for making decisions on the basis of a given set of indicators is the method of their synthesis. From this point of view the systems of indicators can be divided into three basic groups:

1. one-peak systems;
2. systems of indicators in parallel order;
3. combined systems.

One-peak systems consist in the principle that management effectiveness is expressed by means of one synthetic characteristic (only one peak indicator). The meaning of other indicators is only analytical and they provide information about the factors influencing the peak indicator. Here we can name e.g. the pyramid systems. Different "order" of indicators reflects a different degree of their synthesizing capacity, and is directly projected in the order of particular levels of the pyramid. Considering one-peak systems, it is typical that the order of indicators is in series from the peak (criterion) indicator downwards to lower order (explanation) indicators. Monitoring and evaluation of the indicators of lower order can facilitate the explanation of the causes in the peak indicator dynamics. This can be illustrated by the example of Du Pont analysis, named after the supranational chemical company Du Pont de Nemours, which disintegrates the profitability of invested capital into the product of profit margin and total assets turnover.

The systems of indicators in parallel order are systems according to the importance of indicators which are at the same level. These indicators express the financial health without being attributed to a certain level of synthesizing capacity. It is characteristic of these indicators that they usually occupy the same, mostly peak aggregation level. There is no subordination among these indicators; they express the evaluation at the same level and from different points of view. This system also includes the evaluation of enterprise financial health.

The combined systems involve the projection of varied degrees of synthesising capacity at the description of particular economic results. The method of synthesis in multi-peak systems ensues from the combination of

one-peak and multi-peak systems. Numerous economists consider this method to be optimal.

## **OBJECTIVE ADEQUACY OF INDICATORS FOR ENTERPRISE FINANCIAL HEALTH EVALUATION**

Currently, it appears undisputable that this group of indicators should include the basic factors of financial analysis as stated, e.g., by Brigham (Brigham 1996), such as the indicators of activity, profitability, liquidity, indebtedness and market effectiveness. Many authors use these components of financial analysis but choose different definitions for expressing the particular indicators. E.g., Grünwald (2001), when explaining the choice of basic indicators for enterprise financial health evaluation, expressed the following statement: "The basic ratio indicators test three aspects of enterprise financial health: profitability, liquidity and financial stability".

The importance of these indicators consists in the evaluation of the enterprise both according to its performance and its relations with the outside environment. Thus, logically, these indicators are at the same level of synthesizing capacity and provide a basis for multi-peak evaluation of the enterprise supported by a system of parallel peak indicators.

However, the construction of the system of financial evaluation displays some weaknesses leading to a result which may not be fully objective. These faults are brought about due to the effort to apply, among peak indicators, even the indicators of lower order providing facts proving their importance. Then it is necessary to realise that the influence of the particular indicator will be both direct (as a peak indicator) and indirect, mediated by the link with another peak indicator. In this context it is important to estimate the degree of the direct and mediated influence of the given indicator on the system of peak indicators.

## **FORMAL ADEQUACY OF THE INDICATORS OF ENTERPRISE FINANCIAL HEALTH**

Formal adequacy deals with the grammar of the given indicator during the evaluation of enterprise financial health. In this sense, an important role is played by the level and variability of the given indicator. The level of the indicator is influential in the case of the additive model; it impacts the importance of the indicator within the entire evaluation of financial health. On the other hand, the variability of the given indicator influences the shift rate in the hierarchy of enterprises according to financial health. It is obvious that the indicators of low level and small variability will not impact the entire financial health evaluation. On the other hand, the indicators of high level and great variability can become decisive for the determination of the entire financial health evaluation of an enterprise.

Considering the point of view of formal adequacy, the models of enterprise financial health use the following types of indicators:

1. The indicators based on ratio numbers of the structure. To these indicators belong, e.g. in Altman's "Z score" model, EBIT / total assets or working capital / total assets (Blaha, Jindrichovska 1995). Similar indicators can be found in other systems of enterprise financial health evaluation.

It is characteristic of these indicators that the values range within the interval 0; 1 and they are fully standardised as to their range and limiting values.

2. The indicators standardised to the neighbourhood of a certain value. In the above-mentioned Altman's "Z score" model, e.g., the indicator  $x_5$  – revenues (total proceeds) / total assets or the indicator  $x_3$  – EBIT (operational profit) / total assets.

It is characteristic of these indicators that they fluctuate around a certain typical value. E.g. the indicator EBIT / total assets can fluctuate around the average profit rate 4–10%. Growing deviations from this value are usually less probable. In addition, these indicators do not have limiting values.

3. Non-standardised indicators. Among these indicators there are, e.g., within the index of financial health Zeta 83, the indicator owners' equity / external capital, or,

within the index of financial health IN 95, assets / external capital and EBIT / interest. These non-standardised indicators sometimes acquire extreme values due to their inappropriate definition and thus significantly influence the result of enterprise financial health evaluation. They impact the total value of enterprise financial health via their level and variability.

Let us evaluate e.g. the characteristics of indicators for the index of financial health IN 95 from the sample of 149 enterprises (Table 1).

The presented characteristics illustrate that the standardised indicators EBIT / assets and proceed / assets have adequate values whereas the indicators EBIT / interest and assets / external sources differ significantly as to the average and, above all, variability. The range of these indicators is more than ten times higher than the range of standardised indicators and therefore their influence, e.g. in the total index IN 95, considerably prevails over the other influences.

To estimate the presented influences, we will use financial health index IN 95 (the Neumaier 1995):

$$\text{IN 95} = 0.22 * \text{assets} / \text{external capital} + 0.11 * \text{EBIT} / \text{cost interest} + 8.88 * \text{EBIT} / \text{assets} + 0.1 * \text{current assets} / (\text{KZ} + \text{KBÚ}) + 0.52 * \text{proceeds} / \text{assets} - 16.8 * \text{ZPL} / \text{proceeds}$$

Table 1. Statistical characteristics for the indicators of financial health index IN 95

Indicator	Average	Standard deviation	Maximum	Minimum	Range
A/CZ	2.53	3.09	31.32	0.69	30.63
EBIT/U	−0.63	211.9	40.4	−2 447	2 487.4
EBIT/A	−0.0057	0.06	0.18	−0.29	0.47
V/A	0.68	0.35	3.99	0.13	3.86
OA/KZ	3.06	3.78	25.66	0.32	25.34

Source: Monitoring of 149 enterprises

A – assets; V – proceeds; U – interests; CZ – external capital; OA – floating assets; KZ – current liabilities; EBIT – earnings before interests and taxes

Table 2. Influence of indicators range on index IN 95 values

Indicator	A/CZ	EBIT/U	EBIT/A	V/A	OA/KZ	IN 95 min	IN 95 max
A/CZ	<b>0.15</b> <b>6.89</b>	−0.069	−0.047	0.35	0.31	0.69	7.43
EBIT/U	0.56	<b>−269.2</b> <b>4.4</b>	−0.047	0.35	0.31	−268	5.61
EBIT/A	0.56	−0.069	<b>−2.4</b> <b>1.5</b>	0.35	0.31	−1.25	2.64
V/A	0.56	−0.069	−0.047	<b>0.07</b> <b>2.07</b>	0.31	0.81	2.82
OA/KZ	0.56	−0.069	−0.047	0.35	<b>0.03</b> <b>2.57</b>	0.82	3.36

Source: Monitoring of 149 enterprises

Table 3. Influence of the indicator average value and the standard deviation on IN 95 index

Ukazatel	A/CZ	EBIT/U	EBIT/A	V/A	OA/KZ	IN 95 ( $x - 2s$ )	IN 95 ( $x + 2s$ )
A/CZ	<b>-0.80</b> <b>1.92</b>	-0.069	-0.047	0.35	0.31	-0.26	2.46
EBIT/U	0.56	<b>-46.69</b> <b>46.55</b>	-0.047	0.35	0.31	-45.6	47.72
EBIT/A	0.56	-0.069	<b>-1.05</b> <b>0.96</b>	0.35	0.31	-41.30	2.10
V/A	0.56	-0.069	-0.047	<b>-0.02</b> <b>0.72</b>	0.31	-0.81	1.47
OA/KZ	0.56	-0.069	-0.047	0.35	<b>-0.45</b> <b>1.06</b>	0.3	1.85

Source: Monitoring of 149 enterprises

Explanations see Table 1

Table 4. Influence of the indicator maximum value and standard deviation on IN 95 index of financial health expressed in relative contribution of the indicator regarding the total value of IN 95 index

Indicator	Max. value influence (%)	Influence of the change of average of twice standard deviation (%)
A/CZ	92.7	78.0
EBIT/U	79.2	97.6
EBIT/A	56.7	97.4
V/A	73.5	75.2
OA/KZ	76.4	58.2

Source: Monitoring of 149 enterprises

Explanations see Table 1

The presented index is an additive model and thus the contribution of each indicator is determined by its own value. The Table 2 and 3 shows the influence of the range of particular indicators on index IN 95 value. Bold figures

represent the minimum and maximum value of the indicator, other figures have an average value.

The presented data (Table 4) demonstrate that the indicators A/CZ and EBIT/U conclusively influence IN 95 index, and not even low weights (0.22 for A/CZ and 0.11 for EBIT/U) can significantly influence the impact of these non-standardised indicators. The influence of the other factors is negligible.

Non-standardised indicators influence the indicators of financial health in a very unfavourable way and their values usually significantly influence the total value of the index. As a result, the model of financial health becomes unbalanced and thus also non-objective.

#### STANDARDISATION OF INDICATORS IN THE SYSTEMS OF ENTERPRISE FINANCIAL HEALTH

The elimination of undesirable influences of non-standardised indicators can be achieved through their

Table 5. System of indicators expressed by a score of points

Indicator	Formula				
Owners' capital quota	Owners' capital/total capital $\times 100$				
Cash-flow in firm performance	Cash-flow/Firm performance $\times 100$				
Total capital profitability	(EBIT + interest)/Total assets $\times 100$				
Period of repaying the debt in years	(External capital – liquid assets)/Yearly cash flow				
Indicator	Perfect state (1)	Very good state (2)	Good state (3)	Bad state (4)	Threat of insolvency (5)
Owners' capital quota	> 30%	> 20%	> 10%	> 0%	$\leq 0\%$
Cash-flow in firm performance, in %	> 10%	> 8%	> 5%	> 0%	$\leq 0\%$
Total capital profitability	> 15%	> 12%	> 8%	> 0%	$\leq 0\%$
Period of repaying the debt	< 3 years	< 5 years	< 12 years	> 12 years	>30 years

Source: Kralicek 1993

standardisation. The standardisation methods are as follows:

1. Methods based on subjective evaluation of the given indicator level expressed by scoring the points.
2. Methods based on the transformation of variables.

The following set of indicators (Table 5) illustrates the use of the evaluation method based on scoring points.

It is obvious that the evaluation by the method of scoring points is subjective and that its objectiveness depends on the author's knowledge of the levels of particular indicators in the sample of businesses in question.

The evaluation by allocating points can be made more objective if the range of indicators is divided into intervals whose limits are characterised by the average and a certain multiple of standard deviation.

Considering the methods of multidimensional comparison, it is useful to choose those which standardise the given indicator from the viewpoint of both the level and the variability. Here we should mention mainly the point method and the method of standard variable.

The standardisation of variables by means of the point method is based on the following relationships:

$$U_i = \frac{x_i - x_{\min}}{x_{\max} - x_{\min}}$$

for the indicators having positive value in the maximum,

$$U_i = \frac{x_{\max} - x_i}{x_{\max} - x_{\min}}$$

for the indicators having their positive value in the minimum.

After this arrangement the indicators become standardised within the interval 0, 1.

It would be possible to discuss the relation of this method of standardisation to the average and to the standard deviation of the given indicator, as well as the level of the indicator and the variability measured by the standard deviation. The advantage of this method consists in the defined range of each indicator in the interval 0, 1.

The standardisation of the indicator by the method of standard variable is based on the well-known relationship (Matějka 1976)

$$U_i = \frac{x_i - \bar{x}}{s_x}$$

This method standardises this indicator from the viewpoint of both the level and the variability. The disadvantage is that the range of standardised values is not defined. So the objectivity of this method cannot balance the lack of exactly defined range.

## THE COMPARISON OF ENTERPRISE FINANCIAL HEALTH EVALUATION BY ALLOCATING POINTS WITH THE METHODS OF STANDARD VARIABLE

To compare the method of the evaluation by allocating points with the point method and the method of standard variable, the matrix of Spearman correlation coefficients for setting the sequence of the enterprises was calculated.

As seen in the table (Table 6), the closest rank dependence is between the method of standard variable and the point method ( $r_s = 0.9795$ ). Lower dependence can be noticed between the point method and the method of evaluation by allocating points ( $r_s = 0.9040$ ) and the lowest dependence is between the method of standard variable and the method of allocating points. From the standpoint of formal adequacy, the point method is the most appropriate as it standardises the indicators within the interval  $<0, 1>$  and so it is highly correlated with the method of standard variable. The method of evaluation by allocating points seems to be acceptable.

Similar results are obtained if we compare the rank of prosperity of agricultural enterprises in dependence particular methods.

As shown in the Table 7, minimum differences in the rank of prosperity of agricultural enterprises are between the method of standard variable and the point method. With 82.15% of them, the rank difference is not higher than 5 and with 98.75% of enterprises the difference is not higher than 10. More than one half of enterprises (58.97%) present the difference lower than 3. Using the method of allocating points, the concordance in the rank of prosperity is rapidly lower. 21.8% of enterprises using the method of standard variable present the rank difference higher than 10 and using the point method the difference shows only 20.4% of enterprises. So more than one fifth of the enterprises are classified in a rapidly different way. Considering the subjective character of setting the points, the method of evaluation by allocating points cannot be observed as suitable.

Table 6. Matrix of Spearman correlation coefficients

Method	Evaluation by allocating points	Method of standard variable	Point method
Evaluation by allocating points	1	0.9027	0.9040
Method of standard variable	0.9027	1	0.9795
Point method	0.9040	0.9795	1

Source: Monitoring of 78 enterprises

Table 7. Comparison of differences in rank of prosperity of agricultural enterprises in dependence on particular methods

Differences in the rank of enterprises	Comparison of the method of standard variable with the point method		Comparison of the method of standard variable with the method of allocating points		Comparison of the point method with the method of allocating points	
	number of enterprises	%	number of enterprises	%	number of enterprises	%
0–5	64	82.15	44	56.41	40	51.28
5–10	13	16.6	17	21.79	22	28.2
10–15	1	1.25	7	8.9	6	7.69
15–20	0		7	8.9	6	7.69
20–30	0		1	1.2	3	3.84
30–40	0		2	2.8	1	1.3
Total	78	100	78	100	78	100

Source: Monitoring of 78 enterprises

### THE METHOD OF SYNTHETIC CLASSIFICATION AND ENTERPRISE FINANCIAL HEALTH

To construct the system of enterprise financial health, the method of synthetic classification should be ap-

plied. It means to decide how much the indicators of enterprise financial health should be homogeneous from the viewpoint of time, organisation and formal structure.

The structure of financial health indicators should be the same. This principle is considerably broken as obvi-

Table 8. Indicators of financial health

Indicator	$\frac{A}{CZ}$	$\frac{EBIT}{U}$	$\frac{EBIT}{A}$	$\frac{V(T)}{A}$	$\frac{OA}{KZ}$	$\frac{ZPL}{V}$	$\frac{CZ}{A}$	$\frac{OA}{KZ + KBU}$
Index								
IN 95	0.22	0.11	8.33	0.52	0.1	-16.9		
IN 99			4.573	0.481			-0.017	0.015
IN 01	0.13	0.04	3.92	0.21				0.09
Z 68			3.3	1				
ZETA 83			3.107	0.998				
TAFLER				0.16				
Indicator	$\frac{CPK}{A}$	$\frac{NER.ZISK}{A}$	$\frac{TRH.VJ}{A}$	$\frac{VK}{CZ}$	$\frac{Z}{KZ}$	$\frac{OA}{CZ}$	$\frac{KZ}{A}$	Source
Index								
IN 95								Neumaier (2002)
IN 99								
IN 01								
Z 68	1.2	1.4	0.6					Blaha, Jindřichovská (1996)
ZETA 83	0.717	0.847		0.42				Sůvová (1999)
TAFLER					0.53	0.13	0.18	
Z 68			ZETA 83				TAFLER	
Bankrupt interval	$Z < 1.81$		Bankrupt interval		$Z < 1.2$	Bankrupt interval	$T < 0.2$	
Grey zone interval	$1.81 < Z < 2.99$		Grey zone interval		$1.2 < Z < 2.9$			
Prosperity interval	$Z > 2.99$		Prosperity interval		$Z > 2.9$	Non-bankrupt interval	$T > 0.3$	
IN 95			IN 99			IN 01		
Bad financial health	$IN < 1$		Negative economic earnings	$IN < 0.684$	Bankrupt interval	$IN < 0.75$		
Good financial health	$IN > 2$		Positive economic earnings	$IN > 2.07$	Value creation	$IN > 1.77$		

A – assets; ZPL – liabilities after maturity; CZ – external capital; KBU – short-term bank credit; U – interests; CPK – net operating assets; V (T) – revenues (sales); NER.ZISK – retained earnings; OA – floating assets; TRH.VJ – market value of shareholder's equity; KZ – current liabilities

Table 9. Limits for particular indicators including point evaluation – double-entry accounting

	Original evaluation			Corrected evaluation		
ROA (%) MAX	< 1.99	2 to 6	> 6.01	< 1.49	1.5 to 3	> 3.01
Points	1	2	3	1	2	3
Long-term profitability (%) MAX	< 1.99	2 to 8	> 8.01	< 1.99	2 to 8	> 8.01
Points	1	2	3	1	2	3
Value added/inputs (%) MAX	< 11.99	12 to 30	> 30.01	< 14.99	15 to 30	> 30.01
Points	1	2	3	1	2	3
Value added efficiency (%) MAX	< 5.99	6 to 16	> 16.01	< 5.99	6 to 15	> 15.01
Points	1	2	3	1	2	3
Total insolvency (%) MIN	< 46.99	47 to 67	> 67.01	< 54.99	55 to 70	> 70.01
Points	3	2	1	5	3	1
Interest cover (times covered) MAX	< 1.09	1.10 to 2.50	> 2.51	< 1.09	1.10 to 2.10	> 2.11
Points	1	2	3	1	2	3
Short-term liability turnover (days) MIN	< 59.99	60 to 110	> 110.01			
Liability maturity (years) MIN				< 4.99	5 to 7	> 7.01
Points	3	2	1	5	3	1
Total assets turnover ratio (times) MAX	< 0.79	0.80 to 1.60	> 1.61			
Stock cover with net assets MAX				< 0.49	0.50 to 0.70	> 0.71
Points	1	2	3	1	2	3
Total liquidity (times) MAX	< 1.49	1.50 to 2.50	> 2.51	< 1.49	1.50 to 2.00	> 2.01
Points	1	2	3	1	2	3
Trade liabilities (times) OPTIM	< 0.99	1.00 to 1.50	> 1.51			
Points	1	3	2			

Source: Ministry of agriculture

ous from incomplete specification of financial health indicators (see Table 8).

More problem indicators can be found in this table from the viewpoint of objective and formal adequacy. We should notice at least one of outstanding problems which is the indicator of assets/external capital (A/CZ) and the indicator of external capital/assets (CZ/A).

The impact of non-standard indicator assets/external capital was mentioned. There is no doubt more suitable indicator will be that of external capital/assets.  $A/CZ = (CZ/A)^{-1}$  goes for these indicators and it should be considered if the indicator of  $1 - CZ/A$  were not applicable to the additive model of enterprise financial health.

The method of time synthetic classification, i.e. the acquirement of concordance between compared period and the period of the point evaluation processing, is really significant. The preparation of enterprise financial health evaluation which consists in the assessment of parameters of particular indicators is usually done on the basis of previous years. However, economic situation in the compared period can be often different from the model situation and therefore the indicators of enterprise financial health can be under- or overestimated.

The evaluation of enterprise financial health by allocating points for appraisal of candidates for the Operational Program of Agriculture subsidies can be used as a model (Table 9). The use of synthetic classification meth-

od acquires to divide the enterprises into those farming in production and mountain areas. The system of indicators for the evaluation by allocating points is shown in the Table 9.

This method proved subjective especially if the limit indicators were derived from the results of agricultural enterprises in economically positive years (2000–2001) and were applied to the indicators of enterprise financial health in less positive years. The differences were so significant that the indicators of point evaluation had to be modified. This model proved shortcoming in synthetic classification of agricultural enterprises in evaluation of enterprise financial health.

#### REDUCTION OF INDICATORS IN THE MODEL OF ENTERPRISE FINANCIAL HEALTH

The independence of singular indicators for enterprise financial health evaluation seems to be a significant condition in multi-criterion evaluation. The dependence between indicators usually means that the explaining indicator influences both one indicator and the value of some others if coexistence of particular phenomena is not considered.

We can hardly expect the independence between  $EBIT/A$  and  $V/A$  in the index of financial health IN 95 as in Du Pont balance equation

Table 10. Matrix of Spearman correlation coefficients

Correl. coeff.	UK1	UK2	UK3	UK4	UK5	UK6	UK7	UK8	UK9	UK10
UK1	1.00	0.09	0.21	0.52	0.07	0.80	-0.19	0.30	0.03	0.11
UK2		1.00	0.23	0.23	-0.17	0.14	-0.16	-0.14	0.18	0.35
UK3			1.00	0.42	-0.08	0.27	-0.27	-0.17	0.21	0.38
UK4				1.00	-0.06	0.47	-0.25	0.35	0.05	0.24
UK5					1.00	-0.04	0.34	0.12	-0.28	-0.40
UK6						1.00	-0.22	0.18	0.10	0.24
UK7							1.00	-0.10	-0.63	-0.57
UK8								1.00	-0.19	-0.10
UK9									1.00	0.46
UK10										1.00

Source: Monitoring of 78 enterprises

$$\text{EBIT/A} = \text{EBIT/V} \times \text{V/A}$$

EBIT/A depends on V/A indicator and, after all, the effect of production results from this dependence.

Other indicators do not show a marked dependence so it necessary to use the correlation matrix of enterprise financial health indicators. A model of this matrix used for obtaining subsidies from the Operational Program of Agriculture is presented in Table 10.

On the basis of the correlation matrix of Spearman correlation coefficient, a high statistic dependence between ROA and interest cover ( $r_s = 0.8$ ) is proved. The analysis of cluster analysis dendrogram leads to the same result. So both indicators can be united into one (Figure 1).

## CONCLUSION

The evaluation of enterprise financial health acquire the topicality nowadays. On the basis of experience with different models of enterprise financial health it was proved that some models due to unsuitable choice of indicators cannot assess enterprise financial health objectively and lead to trustworthiness injury of some enterprises. The methods reducing the rate of non-objectivity of enterprise financial health were derived from the principles based on formal and objective adequacy and multi-criterion evaluation. Some of the methods are as follows: correct construction of indica-

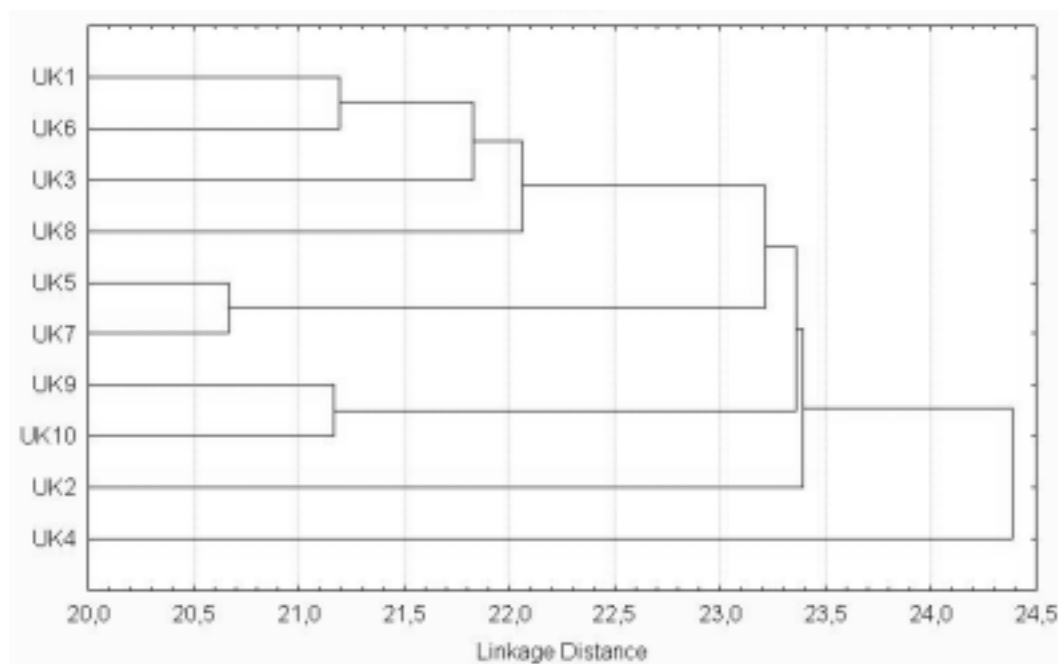


Figure 1. Cluster analysis – Tree diagram for variables single linkage Euclidean distance 2000–2002

Source: Monitoring of 149 enterprises



tors from the viewpoint of objective and formal adequacy, indicator standardisation, consistent use of synthetic classification methods, consideration of independence of peak indicators and on the basis of statistic methods of peak indicator reduction.

## REFERENCES

- Blaha Z., Jindřichovská I. (1995): How to consider enterprise financial health. Praha, Management Press.
- Blaha Z., Jindřichovská I. (1996): How to consider enterprise financial health: Financial analysis for investors, bankers, brokers, managers, entrepreneurs and shareholders. Management Press.
- Matějka M. and other authors, (1976): Evaluation of effectiveness in manufactory. SNTL Praha.
- Grünwald R., Holečková J. (1997): Financial analysis and enterprise planning. VŠE Praha.
- Grünwald R. (2001): Analysis of enterprise financial trustworthiness. Ekopress Praha.
- Pivnec J., 1995. Financial management. Grada Publishing Praha
- Neumaier I., Neumaier I. (1995): Terno. Volume 1 (5), February.
- Králíček P. (1993): Bases of financial management. Linde, Praha.
- Sůvová H. (1999): Financial analysis in management, bank and PC. Bankovní institut Praha.

Arrived on 10<sup>th</sup> November 2004

---

### *Contact address:*

Prof. Ing. František Střeleček, CSc., Ing. Radek Zdeněk, Zemědělská fakulta, Jihočeská univerzita v Českých Budějovicích, Studentská 13, 370 05 České Budějovice, Česká republika  
e-mail: strelec@zf.jcu.cz, zdenek@zf.jcu.cz

---