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DETERMINATION OF ECONOMIC INDICATORS IN THE CONTEXT OF CORPORATE SUSTAINABILITY PERFORMANCE

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Abstract. This article is focused on determination of the most significant economic indicators influencing corporate sustainability performance. Corporate sustainability performance is a multidimensional concept based on the original idea of sustainable development, replacing the traditional understanding of corporate performance only as capital appreciation for owners (shareholders). Compared to the original concept of sustainable development which consists of environmental, social and economic performance, the so-called triple-bottom-line, it is broaden to the responsibilities and the impact of Corporate Governance on the corporate performance. The basic set of economic indicators has been constructed from a synthesis of resources developed by international organizations (Global Reporting Initiative, International Federation of Accountants) and research among manufacturing companies in the Czech Republic. The basic set of twenty-five key indicators is divided into seven groups: Costs, Investments, Economic Results, Asset & financial resources utilization, Suppliers reliability, Penalties and R&D expenses. Basic set of indicators was presented to 23 top-managers who quantified the potential effect of each indicator to the success and sustainability of their companies. Through the methods of descriptive statistics knowledge of the particularities of each indicator was obtained. Correlation analysis and factor analysis were applied in order to eliminate information duplicity and dimensionality reduction. The result is a reduction in the number of economic indicators, so that the loss of information on the influence of the original indicators on the corporate sustainability is minimized. Corporate sustainability indicators are a tool for measuring and managing progress towards sustainability goals and environmental, social and economic impacts.

Keywords: economic indicators, corporate sustainability performance, factor analysis, Czech Republic.

JEL Classification: M21, Q56.

Introduction

Corporate economic performance indicators are going to remain one of the main interests of owners and investors. However, together with the information about corporate governance, the environmental and social factors, it creates a complex picture of any company and it has its significance for other key shareholders, it brings transparency and sustainability into business (Kocmanova *et al.* 2011). The goal of this article is to define the most significant economic indicators of corporate performance influencing the corporate sustainability. Corporations are attempting to reach long-term benefits by implementing sustainability related activities into the very core of corporate strategy (Chabowski *et al.* 2011; Cruz *et al.* 2006). In general it can be concluded that corporations implement these sustainability techniques because they either feel obliged to do so, they want to do so or they are forced to do so (Van Marrewijk 2003).

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1. Theoretical approach to corporate sustainability performance

The need for alternative performance measurement systems which would take the corporate influence on interest groups into account has increased in the time of crisis. According to Kruse and Lundbergh (2010) one of the reasons why corporations should consider their environmental and social performance as well is the fact that investors generally invest less money into corporations that do not follow this trend because they consider the level of risk higher. Based on the definition of sustainability performance published in the Report of the World Commission on Environment and Development (1987) established by the UN, corporate sustainability performance (CSP) is defined as corporate strategy which uses the best business techniques to fulfill and balance the needs of both the current and the future stakeholders. This presents a complex task of providing competitive product in a short-term period and at the same protecting, maintaining and developing human and natural resources necessary for the future. CSP therefore measures the extent to which a corporation implements economic, environmental, social and corporate governance factors into its activities and to what extent it considers the impact of its activities on its surroundings. (Artiach *et al.* 2010; Labuschagne *et al.* 2005). CSP involves the triple-bottom-line concept which suggests balance of three aspects – environmental, social and economic – to reach sustainability in organizations (Elkington 1998).

The connection of economic and sustainability performance is a subject of many theoretical and empirical studies. Kirchhoff (2000), Feddersen and Gilligan (2001), Fisman *et al.* (2008) state that economic benefits are reached by companies with high level of CSP by using brands and advertisements informing about the sustainability of their products. This way they support product differentiation. Turban and Greening (1997) show that high level of CSP allows companies to hire more innovative and motivated employees which is again reflected in the economic results. On the other hand there is the neoclassical approach stating that companies have only one social responsibility and that is increasing their profit (Milton Friedman). According to this approach CSP decreases economic performance because activities increasing CSP are costly (Friedman 1962; Alexander, Buchholz 1978; Becchetti *et al.* 2005). Investing into CSP means higher costs of improving conditions for the employees, donations, costs of supporting the community, introducing ecological processes and also opportunity costs of giving up socially irresponsible investments. From this point of view, investing into CSP goes against the interests of investors because re-allocation of investors' resources of the particular company onto other stakeholders takes place (Aupperle *et al.* 1985; McGuire *et al.* 1988; Barnett 2007). Ullmann (1985) states there is no direct connection between CSP and economic performance. According to Ullmann the reason is the existence of many variables which influence both types of performance and that is why this connection should not exist.

It is important for companies to set measurable and relevant goals of sustainable development and suitable metrics. Moreover, integrated reporting of financial and non-financial information is needed (Hrebicek *et al.* 2011a, 2011b, 2011c; Docekalova 2012). CSP indicators should reflect the reality of the company and its critical success factors as well as company values and culture. This is why their development should not be limited only to borrowing already existing methods and norms. However, internationally acclaimed norms can be a certain lead when creating company's own suitable indicators. One of the examples of these international norms and standards is: Global Reporting Initiative, ISO 14031 Environmental management – Environmental Performance Evaluation – Guidelines, United Nations Global Compact, World Business Council for Sustainable Development Eco-efficiency Metrics, United Nations Conference on Trade and Development Guidance on Corporate Responsibility Indicators in Annual Reports, Society of Investment Professionals in Germany Key Performance Indicators (KPIs) for Extra-/Non-Financial Reporting etc. (overview of methodologies can be found in Singh *et al.* (2009, 2012)).

2. Materials and methods

As the above mentioned suggests, CSP is a multidimensional concept and the research methods have to take this into account. Defining the economic indicators was realized in the following subsequent steps: first step meant creating a set of economic indicators by analyzing the approach of international organizations Global Reporting Initiative and International Federation of Accountants. Then, the relevancy of these indicators was verified by a questionnaire survey. The aim of the third step was reducing the number of indicators which was realized by removing duplicity information by correlation analysis and also by factor analysis so that the loss of original indicators information was minimal. The fourth step meant assigning weights to the key indicators because different indicators have different levels of importance in different companies. The impact on the total performance of each company also varies and assigning the weights approximates reality. The weights were set by point method as statistical testing of expert methods has shown that it does not cause any statistically relevant differences in the weights value results. As the last step aggregation methods were applied to combine key indicators into one aggregate indicator measuring economic performance and the benchmark was set.

2.1. Indicators reduction methods

To reduce dimensionality the correlation and factor analyses were applied. The purpose of the correlation analysis is disclosing multicollinearity of the key indicators and removing the redundant key indicators from the model. High values of pair correlation coefficients, i.e. $|r| > 0.8$ suggest multicollinearity. To detect multicollinearity the variance inflation factor was also used (Variance Inflation Factor, *VIF*), which is easily detected from an inversion matrix of the correlation matrix. *VIF* are diagonal elements of such an inversion matrix (Clark 2004). The indicator with higher *VIF* value was removed from the model. Factor analysis is based on a simple idea to describe the behavior of a set of variables by using a smaller number of new variables – factors – and via theses come to conclusions about the mutual dependence of the original variables.

The factor model analysis is as follows:

$$x_1 = \alpha_{11}F_1 + \alpha_{12}F_2 + \ldots + \alpha_{1m}F_m + e_1;$$
$$x_2 = \alpha_{21}F_1 + \alpha_{22}F_2 + \ldots + \alpha_{2m}F_m + e_2; \qquad (1)$$
$$x_Q = \alpha_{Q1}F_1 + \alpha_{Q2}F_2 + \ldots + \alpha_{Qm}F_m + e_q,$$

where:

x_i ($i = 1,\ldots, Q$) is the original set of variables (variables are standardized, i.e. zero mean value and unit distribution),

$\alpha_{i1}, \alpha_{i2, \ldots,} \alpha_{im}$ are factor loadings[1],

$F_{1,} F_{2, \ldots,} F_m$ is *m* non-correlated standardized factors,

e_i is specific (unique, error, residual) part of the variable x_i. (OECD 2008; Skaloudova 2010).

There are various methods of carrying out the factor analysis, e.g. principal component analysis, principal-axis method, alpha method, image factoring etc. Before the computation it is useful to decide whether the factor analysis is worth carrying out, i.e. the correlations of the variables are possible to explain by factors. Kaiser – Meyer – Olkin statistics (*KMO* statistics) is used for this as well as Barlett's test of sphericity. *KMO* is based on comparing the values of pair and partial correlation coefficients and reaches the values between 0 and 1. *KMO* statistics values are possible to interpret as follows: 0.90–1.00 using factor analysis is excellent, 0.80–0.89 very good, 0.70–0.79 medium level of usefulness, 0.60–0.69 average, 0.50–0.59 poor and 0.00–0.49 not acceptable. Bartlett's test of sphericity tests zero hypothesis that the correlation matrix of the variables is unit-based, i.e. correlation coefficients of the variables equal zero and therefore the condition of mutual dependence of variables is not met which prevents applying the factor analysis (Skaloudova 2010).

An important decision has to be made when applying factor analysis and that is the number of factors. This step significantly influences the solution and interpretation of factor analysis results. To set the number of factors the so called Kaiser criterion is used. According to this rule only the factors that have eigenvalues greater than one are retained. The number of factors can also be defined from graphic presentation of eigenvalues of individual factors by using a scree plot. The borderline marking the suitable number of factors lies where the numerical drop between two factors is the most significant. The number of factors can also be set heuristically.

Hendl (2009) states that factor analysis has three aims:

1. to analyze correlations of a number of variables by combining the variables so that the variables in one cluster strongly correlate and at the same time the variables in different clusters do not correlate; this means the set is characteristic for the particular factor variable,
2. to interpret the factors according to what variables are included in the particular cluster,
3. to summarize the variability of the variables by only a few factors.

Inner reliability of suggested indicators was then checked by applying Cronbach's alpha. Inner reliability means that indicators measuring the same phenomenon should have positive mutual correlations. For this purpose the Cronbach's alpha or reliability coefficient or consistency coefficient is applied. Cronbach's alpha reaches the values of 0 to 1. Cronbach's alpha is computed by the following formula:

$$\alpha = \frac{K \cdot C / V}{1 - (K-1)(C/V)}, \qquad (2)$$

where:

C is the average inter-item covariance among the variables,

V is the average variance of all the variables.

For standardized Cronbach's alpha the formula is:

$$\alpha = \frac{K \cdot R}{1 - (K-1)(R)}, \qquad (3)$$

where:

R is the average of all the correlation coefficients of the variables.

2.2. Sample definition

The research is focused on companies of the group 27.1 Manufacture of electric motors, generators, transformers and electricity distribution and control apparatus according to CZ-NACE and also on companies with more than 250 employees. This group of economic activities is divided into two subgroups 27.11 Manufacture of electric motors, generators and transformers a 27.12 Manufacture of electricity distribution and control apparatus. The basic set consists of 32 companies. 65.2% of the addressed companies are majority-owned by international subjects. Before the questionnaire survey itself it was known from the basic set

[1] Factor loadings are between –1 and +1 and can be interpreted as correlation coefficients between the variables and factors.

that majority of the companies had the form of Ltd. 82.6% of questionnaires were filled in by Ltd companies and 17.4% by stock companies, see Table 1. There was one cooperative in the basic set as well, but this company did not take part in the survey. One of the definition criterion of the basic set was number of employees. The survey is only focused on companies with more than 250 employees. The variable of number of employees has been re-coded into five intervals and Table 1 shows the value frequency of each interval. Majority of companies fall between 250–750 employees. Two companies of the interval above 2251 employees stated these numbers of employees: 3200 and 7500.

Table 1. Basic information on companies taking part in questionnaire survey (source: own calculation)

Criteria	*N*	%
Majority Owner		
Domestic subject	8	34.8
International subject	15	65.2
Legal form		
Stock company	4	17.4
Ltd	19	82.6
Number of employees in 2012		
250–750	13	56.5
751–1250	4	17.4
1251–1750	2	8.7
1751–2250	2	8.7
More than 2251	2	8.7

3.Results and discussion

3.1. Defining key indicators of corporate economic performance

The basic set of economic performance indicators was defined on the basis of synthesis of knowledge gained in the pre-research stage (results published in Kocmanova and Docekalova (2012)) and approaches of Global Reporting Initiative and International Federation of Accountants.

Resources consumption is described by indicator EN1 – Costs. Indicator EN2 – Investments is focused on the investment-effectiveness. Indicator EN3 – Economic results measures how successfully the resources were transformed and valorized. Effectiveness of using property and financial resources is described by EN4. Cooperation with suppliers is an important factor for all companies of manufacturing industry and that is why indicator EN5 – Supplier reliability has been included in the basic set of indicators. Indicator EN6 – Penalties describes the financial impact of irresponsible behavior of a company. Also indicator EN7 – R&D expenses has been included in the economic indicators. See Appendix Table A-1 for the list of indicators. These indicators were then presented through questionnaire survey to top-managers of corporations described in Table 1.

3.2. Number of indicators reduction

The questionnaire survey was based on evaluating the significance of the indicators, i.e. how much the factors of these indicators support the corporate sustainability performance. Rating method has been used. Experts expressed their opinions on the basis of a predetermined scale <0; 10>.

The first step of data processing was a quality check carried out in order to find out whether there were erroneous, missing or distant values in the data. The following statistic measures were computed in order to get the basic knowledge of key indicators:

- Measures of central tendency (arithmetic mean and median),
- Measures of variability (range *R*, standard deviation *s* and variation coefficient *Vx*),
- Measures of shape (skewness *skew* and kurtosis *kurt*).

These characteristics of key economic indicators are in Appendix Table A-2. Evaluating the significance of Economic result shows the lowest variability (*Vx* = 83.9% and *s* = 0.8) of all the indicators which were presented in the survey. The respondents agreed on the key significance of this indicator and its impact on success and performance of a corporation ($\bar{x}$ = 9.4 and $\tilde{x}$ = 10.0). The highest variation coefficient of the economic performance indicators is detected in ROCE and this indicator is evaluated as the least significant ($\bar{x}$ = 2.0 and $\tilde{x}$ = 1.0). ROI has symmetrical distribution. Investments are the most asymmetrical indicator (*skew* = –1.6), this indicator also has the highest coefficient of kurtosis (*kurt* = 3.4).

The basic set of key economic indicators included twenty five indicators. Key indicators that correlate the most ($r > 0.79$) are listed in Table 2. Besides that Economic result and Revenue correlate highly positively ($r = 0.789$) as well as Economic result with Total costs ($r = 0.774$). After evaluating the values of pair correlation coefficients and *VIF* values it was decided that Total costs, Revenue, ROE, Receivables turnover ratio and Stock turnover would not enter into further stages of constructing the aggregated indicator.

Table 2. Correlation analysis (source: own calculation)

KPI	*r*
Expenses	0.845
Revenue	
ROA	0.897
ROE	
Liability turnover	0.948
Claim turnover	
Claim turnover	0.796
Stock turnover	
Liability turnover	0.792
Stock turnover	

The next step of reducing the number of indicators was factor analysis. To extract factors the principal component analysis was selected. This method organizes the non-correlated factors (components) according to their variance so that the first factor has the highest variance and the last one the lowest one. The principal component analysis exists individually as well; factor analysis can be considered as its extension.

Number of factors is defined by Kaiser criterion. Kaiser–Meyer–Olkin statistics of anti-image matrix for individual key indicators has not sufficiently high value in these indicators: Operational costs ($KMO = 0.468$), Investments ($KMO = 0.337$), Economic result ($KMO = 0.394$), Economic value added ($KMO = 0.344$), Added value ($KMO = 0.450$), Asset turnover ($KMO = 0.384$), Liability turnover ($KMO = 0.461$), Debt ($KMO = 0.424$), Supplier reliability ($KMO = 0.471$) and Research and development expenses ($KMO = 0.400$). After removing these economic indicators *KMO* statistics increased from 0.502 to 0.699 and at this value it is meaningful to apply factor analysis. This is confirmed by Bartlett's test, because based on its result the zero hypothesis that variables do not depend on each other can be rejected, see Table 3.

Table 4 which shows the communalities makes it obvious that factors explain the variability of Personal costs the best (87.0%) and only by 49.6% in case of Turnover.

Table 3. KMO statistics and Bartlett's sphericity test (source: own calculation)

Kaiser–Meyer–Olkin statistics		0.699
Bartlett's sphericity test	Approx chi-sq.	106.734
	df	45
	Sig.	0.000

Table 4. Communalities of economic KPIs (source: own calculation)

KPI	Initial	After extraction
Personal costs	1.000	0.870
ROI	1.000	0.834
ROE	1.000	0.808
Turnover	1.000	0.496
Cash Flow	1.000	0.785
Market share	1.000	0.803
ROA	1.000	0.806
ROCE	1.000	0.504
Liquidity	1.000	0.502
Monetary penalty value	1.000	0.770

Ten extracted components explain the total variance of the original variables and the first three with eigenvalue higher than 1 explain 71.77% of total variance, see Table 5.

Scree plot shows all the extracted components with their eigenvalues. The graph clearly shows the turn between the first and the second component. It would therefore be sufficient to consider only one component. According to the Kaiser criterion three components should be selected – this approach is also more convenient considering the total explained variance, see Appendix Figure A-1.

In Table 6 showing the factor matrix the factor weights lower than 0.3 are neglected. The key indicators selection is based on their component correlation and only the ones with the factor weight higher than 0.7 which can be considered sufficiently high, are included in the aggregate indicator.

Two key indicators Cash Flow and ROA (Return on assets) are included in the aggregate indicator and are combined into one component. Reliability of this solution was verified by Cronbach's alpha (α), which approximates the recommended limit of 0.7, see Table 7.

Table 5. Numbers and percentage of explained distribution (source: own calculation)

Component	Number	% of explained variance	Cumulated %
1	4.472	44.720	44.720
2	1.541	15.408	60.128
3	1.165	11.646	71.773
4	0.989	9.889	81.663
5	0.578	5.779	87.442
6	0.458	4.585	92.027
7	0.308	3.078	95.104
8	0.217	2.166	97.270
9	0.163	1.625	98.896
10	0.110	1.104	100.000

Table 6. Factor solutions matrix (source: own calculation)

KPI	Component		
	1	2	3
Personal costs	0.689	0.601	
ROI	0.675	−0.599	
ROE	0.693	−0.568	
Turnover	0.656		
Cash Flow	**0.821**		−0.323
Market share	0.553		−0.701
ROA	**0.711**		0.504
ROCE	0.689		
Liquidity	0.676		
Monetary penalty value	0.462	0.627	0.405

Table 7. Reduced set of economic KPIs (source: own calculation)

Economic Performance
Cash Flow
ROA
A = 0.651

3.3. Key indicators aggregation

Weights (v_i) are computed by point method according to this formula:

$$v_i = \frac{b_i}{\sum_{i=1}^{k} b_i}, \tag{4}$$

where: b_i is an average number of points assigned by the respondents to i KPI. For each aggregate indicator it is necessary to compute normalized weights so that:

$$\sum_{i=1}^{k} v_i = 1, \text{ for } i = 1, 2, \ldots, k. \tag{5}$$

The computed weights suggest that Cash Flow (v = 70.8%) is much more significant than ROA (v = 29.2%).

There are three methods of aggregating indicators. Additive method of aggregation is a linear method based on the summary of weighted and normalized sub-indicators. An important condition when using the linear additive aggregation is preference independence of individual sub-indicators. (OECD 2008) The problem of indicators compensation can be solved by the multi-criteria aggregation method which does not allow sub-indicators compensation at all (Munda, Nardo 2005, 2009). A compromise between fully compensational and non-compensational approach to the aggregate indicator construction is offered by the geometry aggregation method which defines the aggregate indicator as a product of individual sub-indicators raised to a higher power by the particular weight value. To create the aggregate indicator measuring economic performance the geometrical aggregation method was selected. The key indicators have to be transformed to the same units – %. Cash flow is related to added value.

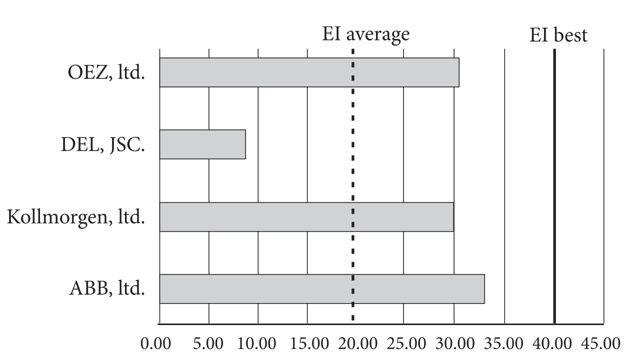

Fig. 1. Graphic depiction of economic aggregate indicator and benchmarks (source: own processing)

Aggregate indicator measuring economic performance is described as follows:

$$EI = x_1^{0,708} \cdot x_2^{0,292}\ , \tag{6}$$

where:

x_1 – Cash flow/added value;

x_2 – EBIT/assets.

Benchmark value is established by two ways:

1. From the best values in the group of companies 27.1 NACE;
2. From the average values in the group of companies 27.1 NACE.

In 2012 the values[2] are as follows:

– Cash flow/Added value$_{average}$ = 27.73%; Cash flow/ Added value$_{best}$ = 39.04%.

– $ROA_{average}$ = 11.46%; ROA_{best} = 43.84%.

– benchmark$_{2012}$: EI$_{average}$ = 21.42%; EI$_{best}$ = 40.39%.

Graphic depiction of the computed aggregate indicator is presented using the example of four companies, see Figure 1.

Conclusions

The aim of this article was to define economic indicators which influence corporate sustainability performance the most. To meet this aim an expert evaluation with a subsequent statistic evaluation was used. By applying statistic methods (correlation and factor analyses) it was found out that the original set of 25 key indicators can be substituted by only two – Cash flow a ROA. These indicators are therefore the top key ones for corporate sustainability from the point of view of the top-management. It is important to emphasize that it cannot be said about any of the indicator sets that it is optimal as the development and application of indicators should be a dynamic process which supports decision making and company management more than the goal itself. Searching for the balanced set of indicators is a complex process. Provided it is allowed for the indicator set development process to take long time, it can reduce its dynamics and reliability. Once a small, good and balanced set of simple indicators is created, the real effort should be made creating the evaluation process, providing the indicators are a base of a constructive dialogue among the organizational levels and mainly coming up with a way to improve the values of these indicators.

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[2] According to Database Amadeus, Bureau van Dijk

References

Alexander, G. J.; Buchholz, R. A. 1978. Corporate social responsibility and stock market performance, *Academy of Management Journal* 21(3): 479–485. http://dx.doi.org/10.2307/255728

Artiach, T.; Lee, D.; Nelson, D.; Walker, J. 2010. The determinants of corporate sustainability performance, *Accounting & Finance* 50(1): 31–51. http://dx.doi.org/10.1111/j.1467-629X.2009.00315.x

Aupperle, K. E.; Carroll A. B.; Hatfield, J. D. 1985. An empirical examination of the relationship between corporate social responsibility and profitability, *Academy of Management Journal* 28(2): 446–463. http://dx.doi.org/10.2307/256210

Barnett, M. L. 2007. Stakeholder influence capacity and the variability of financial returns to corporate social responsibility, *Academy of Management Review* 32(3): 794–816. http://dx.doi.org/10.5465/AMR.2007.25275520

Becchetti, L.; Di Giacomo, S.; Pinnacchio, D. 2005. *Corporate social responsibility and corporate performance: evidence from a panel of U.S. listed companies* [online], Working paper, (CEIS) [cited 29 January 2014]. Available from Internet: http://www.ssrn.com/abstract=871402

Chabowski, B. R.; Mena, J. A.; Gonzalez-Padron, T. L. 2011. The structure of sustainability research in marketing, 1958–2008: a basis for future research opportunities, *Journal of the Academy of Marketing Science* 39(1): 55–70. http://dx.doi.org/10.1007/s11747-010-0212-7

Clark, V. L. 2004. SAS/STAT 9.1: User's guide. SAS Institute.

Cruz, L. B.; Pedrozo, E. A.; de Fatima Barros Estivalete, V. 2006. Towards sustainable development strategies: a complex view following the contribution of Edgar Morin, *Management Decision* 44(7): 871–891. http://dx.doi.org/10.1108/00251740610680578

Docekalova, M. 2012. Corporate sustainability reporting in Czech companies – case studies, *Trendy ekonomiky a managementu* 6(11): 9–16.

Elkington, J. 1998. *Cannibals with forks: the triple bottom line of the 21st century*. Stoney Creek, CT: New Society Publishers.

Feddersen, T. J.; Gilligan, T. W. 2001. Saints and markets: activists and the dupply of credence goods, *Journal of Economics and Management Strategy* 10(1): 149–171. http://dx.doi.org/10.1162/105864001300122584

Fisman, R.; Heal, G.; Nair, V. B. 2008. *A model of corporate philanthropy*, Working paper. Columbia University, New York (NY).

Friedman, M. 1962. *Capitalism and freedom*. Chicago: University of Chicago Press.

Hendl, J. 2009. *Přehled statistických metod: analýza a metaanalýza dat*. Prague: Portál.

Hrebicek, J.; Soukopova, J.; Stencl, M.; Trenz, O. 2011a. Corporate key performance indicators for environmental management and reporting, *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis* 59(2): 99–108. http://dx.doi.org/10.11118/actaun201159020099

Hrebicek, J.; Soukopova, J.; Stencl, M.; Trenz, O. 2011b. Integration of economic, environmental, social and corporate governance performance and reporting in enterprises, *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis* 59(7): 157–166. http://dx.doi.org/10.11118/actaun201159070157

Hrebicek, J.; Stencl, M.; Trenz, O.; Soukopova, J. 2011c. Corporate performance evaluation and reporting, in *International Conference on Environment, Economics, Energy, Devices, Systems, Communications, Computers, Pure and Applied Mathematics,* 23–25 August 2011, Florence, Italy. USA: WSEAS Pres, 338–343.

Kirchhoff, S. 2000. Green business and blue angels: a model of voluntary overcompliance with asymmetric information, *Environmental and Resource Economics* 15(4): 403–420. http://dx.doi.org/10.1023/A:1008303614250

Kocmanova, A.; Docekalova, M. 2012. Construction of the economic indicators of performance in relation to environmental, social and corporate governance (ESG) factors, *Acta Universitatis Agriculturaeet Silviculturae Mendelianae Brunensis* 60(4): 141–149. http://dx.doi.org/10.11118/actaun201260040195

Kocmanova, A.; Dočekalova, M.; Němeček, P.; Šimberová, I. 2011. Sustainability: environmental, social and corporate governance performance in Czech SMEs, in *The 15th World Multi-Conference on Systemics, Cybernetics and Informatics*, 19–22 July 2011, Orlando, USA, 94–99.

Kruse, C.; Lundbergh, S. 2010. The governance of corporate sustainability, *Rotman International Journal of Pension Management* 3(2): 46–51. http://dx.doi.org/10.3138/rijpm.3.2.46

Labuschagne, C.; Brent, A. C.; VanErck, R. P. G. 2005. Assessing the sustainability performances of industries, *Journal of Cleaner Production* 13(4): 373–85. http://dx.doi.org/10.1016/j.jclepro.2003.10.007

McGuire, J. B.; Sundgren, A.; Schneeweis, T. 1988. Corporate social responsibility and firm financial performance, *Academy of Management Journal* 31(4): 854–872. http://dx.doi.org/10.2307/256342

Munda, G.; Nardo, M. 2005. *Non-compensatory composite indicators for ranking countries: a defensible setting*. EUR Report, EUR, 21833.

Munda, G.; Nardo, M. 2009. Noncompensatory/nonlinear composite indicators for ranking countries: a defensible setting, *Applied Economics* 41(12): 1513–1523. http://dx.doi.org/10.1080/00036840601019364

OECD. 2008. *Handbook on constructing composite indicators. Methodology and user guide* [online], [cited 1 March 2014]. Available from Internet: www.oecd.org/std/42495745.pdf

Report of the United Nations World Commission on Environment and Development (The Brundtland Report) Our Common Future [online] 1987 [cited 1 March 2014]. Available from Internet: http://www.un-documents.net/our-common-future.pdf

Singh, R. K.; Murty, H. R.; Gupta, S. K.; Dikshit, A. K. 2009. An overview of sustainability assessment methodologies, *Ecological indicators* 9(2): 189–212. http://dx.doi.org/10.1016/j.ecolind.2008.05.011

Singh, R. K.; Murty, H. R.; Gupta, S. K.; Dikshit, A. K. 2012. An overview of sustainability assessment methodologies, *Ecological Indicators* 15(1): 281–299. http://dx.doi.org/10.1016/j.ecolind.2011.01.007

Skaloudova, A. 2010. *Faktorová analýza. Charles university in Prague* [online], [cited 1 January, 2014]. Available from Internet: http://userweb.pedf.cuni.cz/kpsp/skalouda/fa/

Turban, D. B.; Greening, D. W. 1997. Corporate social performance and organizational attractiveness to prospective employees, *Academy of Management Journal* 40(3): 658–673. http://dx.doi.org/10.2307/257057

Ullmann, A. A. 1985. Data in search of a theory: a critical examination of the relationships among social performance, social disclosure, and economic performance of U.S. firms, *Academy of Management Review* 10(3): 540–557.

Van Marrewijk, M. 2003. Concepts and definitions of CSR and corporate sustainability: between agency and communion, *Journal of Business Ethics* 44(2–3): 95–105. http://dx.doi.org/10.1023/A:1023331212247

APPENDIX

Table A-1. Basic set of economic indicators (source: own calculation)

Indicator	Key indicator
EN1–Costs	Total costs
	Personal costs
	Operational costs
EN2–Investments	Investments
	ROI
EN3–Economic results	Economic result
	Revenue
	ROE
	Economic value added
	Added value
	Turnover
	Cash flow
	Market share
EN4–Asset & financial resources utilization	ROS
	ROA
	ROCE
	Liquidity
	Assets turnover ratio
	Stock turnover ratio
	Liability turnover ratio
	Receivables turnover ratio
	Debt
EN5–Suppliers reliability	Supplier reliability
EN6–Penalties	Monetary penalty value
EN7–Research and development expenses	Research and development expenses

Table A-2. Descriptive characteristics of indicators (source: own calculation)

Indicator	*R*	Min.	Max.	$\bar{x}$	$\tilde{x}$	*s*	*Vx* (%)	*skew*	*kurt*
Economic result	3.0	7.0	10.0	9.4	10.0	0.8	8.9	–1.5	1.9
Revenue	3.0	7.0	10.0	9.1	10.0	1.1	12.5	–0.9	–0.8
Expenses	6.0	4.0	10.0	8.8	10.0	1.7	19.5	–1.6	2.0
Turnover	5.0	5.0	10.0	8.3	9.0	1.5	18.3	–0.9	0.1
EVA	9.0	0.0	9.0	3.0	3.0	2.9	99.6	0.7	–0.3
ROE	9.0	0.0	9.0	3.4	3.0	3.0	87.9	0.6	–0.7
ROA	10.0	0.0	10.0	3.1	3.0	3.0	95.5	0.7	–0.3
ROCE	9.0	0.0	9.0	2.0	1.0	2.5	121.2	1.2	1.2
ROI	9.0	1.0	10.0	5.8	5.0	2.8	47.9	0.0	–1.0
ROS	10.0	0.0	10.0	3.7	3.0	3.3	89.1	0.7	–0.8
Liquidity	10.0	0.0	10.0	6.3	7.0	2.2	35.6	–0.9	1.4
Investments	6.0	4.0	10.0	8.6	9.0	1.5	17.1	–1.6	3.4
Assets turnover	10.0	0.0	10.0	3.8	4.0	2.8	72.1	0.4	–0.2
Stock turnover	10.0	0.0	10.0	6.1	6.0	3.0	50.0	–0.3	–0.5
Claim turnover	9.0	1.0	10.0	6.2	6.0	2.2	35.8	–0.3	–0.3
Liability turnover	8.0	1.0	9.0	5.9	6.0	2.1	36.1	–0.2	–0.4
Debt	10.0	0.0	10.0	5.3	6.0	3.7	69.0	–0.3	–1.4
Added value	10.0	0.0	10.0	7.2	8.0	2.4	32.9	–1.5	2.9
Personal expenses	6.0	4.0	10.0	8.4	9.0	1.5	17.8	–1.3	2.1
Operation expenses	6.0	4.0	10.0	8.5	9.0	1.7	20.1	–1.3	1.1
Cash Flow	6.0	4.0	10.0	7.5	8.0	1.9	25.5	–0.6	–0.6
Research and development expenses	10.0	0.0	10.0	7.2	8.0	2.7	38.2	–1.0	0.4
Monetary penalty value	8.0	0.0	8.0	3.1	2.0	3.0	95.7	0.3	–1.4
Market share	10.0	0.0	10.0	7.0	8.0	2.9	41.8	–1.0	0.1
Supplier reliability	7.0	3.0	10.0	6.3	6.0	2.2	35.3	–0.1	–1.4

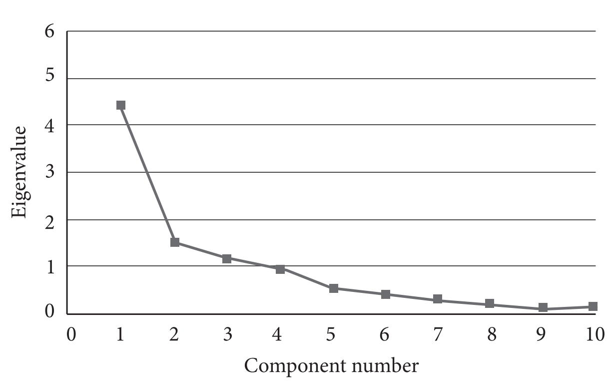

Fig A-1. Scree plot (source: own processing)

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