Udržitelná hodnota naftových společností v České Republice a na Slovensku

Sustainable Value Added of the Oil Companies in the Czech Republic and Slovakia

Juliana Straková

Abstract:
Purpose of the article: Sustainable Value Added was introduced as a whole new concept in 2004. Since then, it has gained popularity among some scholars, mostly of the West-European origin. In this article we implement this method further on the East as we see a huge gap in using modern ways of measuring the environmental impact of companies. In particular, we aim at the industry considered one of the "dirtiest" – oil industry.
Methodology: This paper presents results of an analysis of sustainable value added created by analysed companies in six different environmental resources: carbon dioxide emissions, nitrogen oxide emissions, sulphur oxide emissions, waste generated, water used and volatile organic compound emissions, respectively. Value created by these employed resources is compared with the benchmark value of the European Union.
Scientific aim: As crucial industry generating environmental pollution as a negative externality, we consider manufacture of plastics in primary forms (NACE code 1920). In this paper we determine whether Slovnaft, Unipetrol and Česká rafinérská, as the three biggest companies according to value added in the Czech Republic and Slovakia in this industry, contribute positively or negatively to value creation on the European Union level.
Findings: The results show that in 2010 Slovnaft performance failed to fulfil default target though it created the greatest (albeit negative) value added in financial terms. Other Czech companies are, surprisingly, worse off but not by much.
Conclusions: The concept of Sustainable Value Added takes another point of view to the problematic issues of companies' pollution. Although it determines how well (or bad for that matter) a particular company uses its resources compared to a benchmark, it does not judge whether using the total capital in a company can be considered as sustainable or not. Nevertheless, this method is suitable when used for analysis of contribution to the sustainability.

Keywords: economic, environmental and social aspects of sustainable development, oil companies, sustainability, Sustainable Value Added

JEL Classification: Q51, Q56

Introduction

Global environmental problems of modern society (soil devastation, degradation and contamination; air pollution; waste made; water pollution; excessive natural resource depletion and their consequences as desertification; greenhouse gas effects; chemical changes in troposphere; ozone hole; acid rains; smog; dust; noise; volcano eruptions; icebergs melting; climatic changes – to name just a few) affect the whole humankind. They last long and permanently. They are caused by nature (water and wind erosion) or by man (artificially) – consciously or unconsciously. Man interferes with environment directly (mining; agriculture chemicals – fertilisers, herbicides, pesticides, industrial composts; agrochemical waste; environmental accidents) or indirectly (industry, energetics, motoring). Actions of a man are called anthropogenic. Not solving above-mentioned problems could lead to devaluation of living conditions. This environmental impact affects also global market as Bikár and Polednáková (2012) pointed out: "The development on the financial markets was influenced by various occurrences, e.g. both earth-quake and tsunami in Japan in March, 2011, the safety of atomic power plants and struggle for their partial close-down,... Influenced by these occurrences, the uncertainty of investors regarding future development have been increasing in so far that several stock titles and indexes have dropped off."

Sustainable principles are aimed at prevention of environmental impact primarily (reduction, reuse or recycling of resource use). The other possible measures concern damage removal – mechanical cleaning (end-of-pipe technologies), chemical cleaning (like cures like), biological cleaning (microorganisms, biodegradable substances). According to the United Nations Environment Programme, sustainability is challenged by depletion of natural resources (UNEP, 2008). Implementation of sustainability principles into common business practice may encounter political, societal, regional, technological, economic and geological issues (Mog, 2008). The first and most quoted definition of sustainability was presented in so-called Brundtland Report, where sustainability is described as development that … *meets the needs of the present without compromising the ability of future generations to meet their own needs*... (UN, 1987). Such a definition is quite vague although it does shed the light into problematical areas that had not been taken seriously until then. Stavins *et al.* (2003) proposed a more accurate definition of sustainability as the efficient dynamics of a whole system with intergenerational welfare being consistent with production, consumption and disposal of goods and services.

The various elements of sustainability are usually divided into three areas: environmental, economic and social. Whereas environment is considered to be a basis for sustainability, economic activity is a tool for sustainability and the social aspect is an aim of sustainability. Global development could be marked as sustainable when the level of total capital (*i.e.* natural, man-made, social and human capital respectively) remains the same over time. This is known as the constant capital rule (Solow, 1986; Constanza and Daly, 1992). However, a question arises as to whether it is possible to substitute each form of capital (Norton and Toman, 1997) under a constant capital rule. The idea that all forms of capital are perfectly substitutable is common for every kind of weak sustainability. It is based on the idea that it is possible to have a level decrease in one form of capital by increasing it in another form (Pearce and Atkinson, 1998). Critics of this approach argue that some forms of capital do not have substitutes. They say that a certain minimum level should be retained in order to conserve the environment. This approach is present in all forms of strong sustainability. Strong and weak sustainability are not conflicting because strong sustainability applies as additional requirement for the basic constant capital rule on the condition that the stocks of natural capital should not decline (Constanza and Daly, 1992).

Sustainability concepts distinguish various successive kinds of sustainability (Robinson and Boulle, 2012; Kirchner and Leker, 2011; Pearce and Atkinson, 1998): non-sustainability (short-term self-serving interests) → very weak sustainability (GDP-growth) → weak sustainability (genuine savings, total wealth) → intermediate sustainability (conservation of diminishing species) → strong sustainability (conservation and investments into natural capital) → very strong sustainability (conservation and investments into natural, man-made, social and human capital). Sustainable principles (preferably based on very strong sustainability) implemented in an economic entity are a sign of both the internal need of an enterprise to conserve scarce resources and the external need of an enterprise to provide information about environmental issues to its stakeholders. Sustainability dares enterprises to invent, to discover and to explore new practices so that they bring their individuality into play.

The tough matter is how to measure performance on sustainability? The answer is twofold (Figge and Hahn, 2004a). One point of view, perceived as tra-

ditional, considers environmental impact as harmful thus uses so-called burden-based methods. The other, more progressive, point of view emphasizes the fact environmental impact would be formed always as a by-side effect of production processes. Should arise no environmental impact, production has to diminish to zero level. This occurrence is not probable to happen, if we want economies to develop further. Thus we should accept that certain level of environmental impact is present and always will be. The actual question is how to decide how much environmental impact is tolerable and what is enough. Sustainable value added is exactly the method examining this issue. It assesses how effective and efficient is an economic entity (an enterprise or an economy) using its resources (Figge and Hahn, 2004b). The assessment proceeds with the help of benchmark values. Performance of an economic entity is evaluated and compared to hypothetical performance of a benchmark. Unequivocal result expressed in reference currency unit (most often in euro) shows how much value reached an economic entity (polluting certain amount of emissions) compared to a benchmark . The data on pollutants and on economic performance must be of the same period (year). The comparison could be made on the international basis (various countries or various transnational corporations) or on the national basis (across the sectors or just in one particular sector). Additionally, as various enterprises are compared, SVA proponents suggest to use so-called Return to Cost Ratio comparing economic performance of an enterprise to hypothetical average environmental performance of a benchmark evaluated in the same monetary unit.

We took a closer look at three significant players at the Czech and Slovak market of plastics in primary forms. The chosen companies are Slovnaft, Unipetrol and Česká rafinérská. All three companies have their activities enlisted under NACE code 19.2.0 – Manufacture of refined petroleum products, inter alia. For our analysis, we took European targets on environmental impact of various elements and compare performance of the enterprises in 2010.

1. Methods

Failures at global economic markets request introspection of economic entities and their execution of sustainability practices (Fraser *et al.*, 2005). Resources used as inputs in an economic entity are combined and transformed thanks to unique potential to meet consumers‘ needs (Robinson and Boulle, 2012). One of these needs is thirst after information, even after those regarding sustainability issues. As stated by various authors (Schaltegger and Figge, 2000; Hart and Milstein, 2003; Kirchner and Leker, 2011), economic entities have identified this need and have taken it to the top concerns of their efforts. Although, some authors (Figge *et al.*, 2002) observe that environmental or social issues are not directly related to economic tasks in economic entities. The unclear relationship is supposed to be one of the greatest barriers for sustainability evaluation. Voluntary measures on environmental and social issues linked to the economic success have been in the focus of attention (Schaltegger and Wagner, 2006). Hahn and Scheermesser (2006) conclude there are three levels of sustainability implementation in economic entities: sustainability leaders, environmentalists and traditionalists.

Sustainability leaders are bothered with environmental problems and are strongly committed to sustainable development while for environmentalists the role of sustainability is not taken so seriously and has low priority or ranking in corporate goals. For traditionalists, economic performance is far more important than sustainability-related tasks.

Integration the sustainability into business strategies is a long run process. The explicit sustainability strategy leads to ambitious objective settlement while it is determined by openness and willingness to learn new procedures (Bieker *et al.*, 2002). According to three sustainability pillars, sustainability concept comprise environmental, social and economic aspects.

Analogously, sustainability management requires to achieve environmental, social and economic objectives simultaneously. Striving this, social and environmental aspects should be on the one hand managed by economic principles systematically and on the other hand they should be part of the corporate strategy (Hahn *et al.*, 2002). It takes commitment of top management, then sustainability vision transformed into sustainability goals and strategies to appear in sustainability actions (Kirchner and Leker, 2011). The theoretical literature demonstrates many development measures (Salamaga, 2011) but we took the only measure incorporating the value-added principle.

SVA logic is based on the idea that the central role of organisational management is to deal with resource scarcity effectively and efficiently. This approach engages value based optics as it focuses on the question how succeeds a company in creating economic value when besides products it produces also environmental contaminants. This process runs on four

successive actions: company sample selection, data collection, SVA assessment and interpretation of results (Kirchner and Leker, 2011). Selected companies were chosen as three biggest plastic companies in the Czech Republic and Slovakia, namely Slovnaft, Unipetrol and Česká rafinérská. Data on these companies were retrieved from publicly accessible sources, mostly environmental reports and annual reports and their websites.

The actual SVA calculation follows as (Figge and Hahn, 2004a):

1. How much of the environmental resource is used by a company? The quantity of a resource Rq is a crucial part of SVA calculation because it is precisely the input that creates sustainable value added. An amount of an environmental pollutant (in physical units, *i.e.* t, m^3) is multiplied by the benchmark value (in monetary unit per physical unit, *i.e.* €/t, €/m^3) for each of six environmental pollutants separately.
2. This partial result is for each environmental category compared with the economic result of an economic entity (for us it is gross value added summing up earnings before interest and taxes, depreciation and amortization and personnel costs). When economic entity created more value than benchmark figures, it operated more sustainably. If not, economic entity destroyed value and its resources should have been invested in another economic entity creating SVA. This result is shown as sustainable value added of a resource and thus could be positive (preferably) or negative.
3. All partial SVA results are aggregated in total SVA – it is the final result presented in absolute numbers. It shows the total contribution to sustainable value added creation when judged according to a benchmark.
4. For relative measure, it is proposed to use so-called Return to Cost Ratio represented as a relation: economic result to (total) environmental result, both in monetary units. This ratio should eliminate differences in the size of enterprises (Hahn *et al.*, 2007).

Brief and concise information about each company follows.

Slovnaft is a refinery and petrochemical company headquartered in Bratislava, Capital of Slovakia, Central Europe. Annually, it treats around 6 mil tonnes of mineral oil from manufacturing through storing, distribution to wholesale of oil and petroleum products or jet fuel. As many as 80% of this sales is exported, mostly within European Union trade area. Since 2004, Slovnaft is a part of MOL, Hungarian integrated petrochemical group.

Unipetrol processes above 5.5 mil tonnes of mineral oil and petrochemical products, jet fuels and asphalt product derivates – emulsions, lacquers, suspensions, binders, etc. Also, it has a wide portfolio of greases – motor greases, geared greases, industry greases, technological and process greases, etc. The company provides their wholesale and more than 330 retail sale points of unleaded motor fuels. It is headquartered in the Czech Republic. Since 2005, it became a part of PKN-Orlen, Polish refinery group.

Česká rafinérská is a company established by Unipetrol (51.22 %) and foreign companies both Eni (32.445 %) and Shell (16.335 %). It was founded in 1995 in the Czech Republic. It provides processing refineries for readjustment of mineral oil and other raw materials. The mineral oil originates partly in Russia and is transported by "Družba" pipeline.

The other source is in Trieste, Italy, transported by TAK-pipeline to Vohburg and from there by IKL-pipeline to the central oil tankers of the company. The oil is processed based on customers' requirements.

2. Results

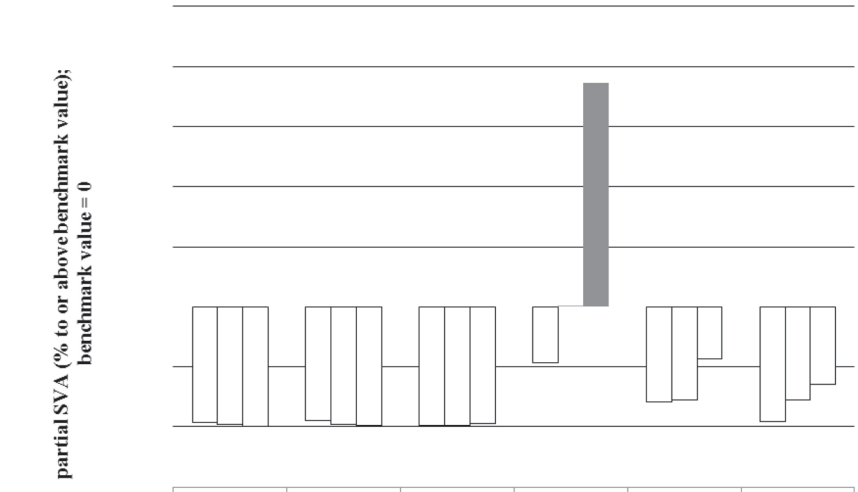
Companies for the analyses were chosen as three biggest companies in the Czech Republic and Slovakia operating in manufacture of refine petroleum products. The characteristics of analysed companies are presented in Table 1.

Sustainable value added was calculated as described above where for economic performance we took

Table 1. Characteristics of analysed companies.

Company	Country	Gross value added in 2010	Employees in 2010	Major product groups
Slovnaft	Slovakia	€ 3,752 mil	2,302	Refining of crude oil into petroleum products and petrochemicals, retail network of filling stations
Unipetrol	Czech Republic	€ 309 mil	3,976	Refinery and petrochemical products, agrochemicals, power engineering products
Česká rafinérská	Czech Republic	€ 86 mil	647	Refinery, asphalt and asphalt products,

Source: companies' publicly enclosed data.



	CO2	NOx	SO2	waste	water	VOC
Slovnaft	-96.5	-94.5	-99	-46.6	-78.9	-95.2
Unipetrol	-97.6	-97.6	-99.1	0.3	-77.4	-77.3
Česká Rafinérská	-99.4	-99	-97.4	186.7	-43.4	-64.2

Figure 1. Partial resource SVA for Slovnaft, Unipetrol and Česká rafinérská compared to benchmark value as in 2010 (in %; x-axis base: benchmark value). Source: Slovnaft (2011), Unipetrol (2011), Česká rafinérská (2011) and publicly enclosed data.

gross value added figures. For environmental performance, we considered six environmental pollutants: CO_2-, NO_x-, SO_2-emissions, waste, water and VOC-emissions. Benchmark values were assumed as described in The ADVANCE Project (2006). It means that at least € 3.733 of economic value (*i.e.* in our case gross value added) should be created when polluting one tonne of carbon monoxide. Similarly, an analysed company should create not less than 1.933.747 €/t of nitrogen oxides pollution.

For sulphur dioxide emission, the value 3.151.784 €/t should have been achieved. For waste generated, a target of 9.802 €/t was intended. Water used had to create minimum of 53 €/m^3. One polluted tonne of VOC-emissions should bring 2.052.245 €. Actual emissions of each category for all companies are multiplied by this value and result in the benchmark value (*i.e.* gross value added that should have been created in a company). The difference between true gross value added and the benchmark value is called partial resource SVA. This partial SVA compared to benchmark value is shown in Exhibit 1.

As can be clearly seen from Figure 1, the best partial resource SVA results are created when generating waste while Unipetrol and Česká rafinérská created positive waste partial SVA. Indeed, Slovnaft created negative waste partial SVA but on the other hand this negative contribution was its best performance of whole resources analysed. The worst result-creating environmental pollutant was different for each company. Whilst for both Slovnaft and Unipetrol were the most problematic SO_2-emissions, Česká rafinérská has to wrestle with CO_2-emissions.

The greatest volume of SO_2-emissions were in Slovnaft caused by both general revisions of refinery and combustion of fuel containing of more sulphur. Then again, layoffs during these revisions meant decrease in emissions of other pollutants (Slovnaft, 2011). The best results in waste partial SVA were achieved thanks to decline in total waste generation, especially hazardous waste generation. The other source of waste decrease comes from the downturn of biodegraded soils.

Relatively good results achieved in water used are due to cutback in drawing-off of Danube surface water.

The only positive partial SVA, the result of waste, is a matter of the decrease both in hazardous and in total waste generation in comparison to previous years in Unipetrol. Slight discrepancies were caused by extensive real investments and rail repairs (Unipetrol, 2011). The worst results for SVA creation in SO_2-emissions area signalize long-term problems in this area. They are brought about in both petroleum

Table 2. Total SVA and RCR for Slovnaft, Unipetrol and Česká rafinérská in 2010.

Company	Total sustainable value added	Return to cost ratio
Slovnaft	€ –5.3 bn	1 : 29.61
Unipetrol	€ –10.4 bn	1 : 34.58
Česká rafinérská	€ –4.3 bn	1 : 50.47

Source: own calculation.

refining and processing in industrial facilities as petroleum regularly contains sulphur compounds.

The best result in waste partial SVA of Česká Rafinérská is founded on waste management coming out of basic requirements on waste generation avoidance or its recycling or its material and energetic reuse (Česká rafinérská, 2011).

Except main company activities, investments containing ground works produced waste, as well (Česká Rafinérská, 2011). This is no surprise that for the company CO_2 partial SVA was the most problematic.

Indeed, oil companies play a central role in emitting carbon dioxide. Therefore, they are under constant regulatory pressure.

Regarding total SVA creation as well as Return to Cost Ratio, see Table 2.

Final results provide us with interesting facts. At first, if we look at total SVA we can conclude that none of the analysed companies could be called sustainable when taking EU targets as benchmark values. It is not surprising given that companies are operating in refinery sector which is considered one of the worst trespassers affecting environment. The main scientific aim points toward total SVA figures. Česká rafinérská reached the least negative result in absolute terms followed by Slovnaft and far exceeds Unipetrol.

In addition to total SVA, acknowledging Return to Cost Ratio (*i.e.* relative expression of SVA contribution) the best performer is Slovnaft then Unipetrol and at the end Česká rafinérská. For example, RCR 1 : 29.61 for Slovnaft demonstrates that while Slovnaft created just € 1 of sustainable value added by polluting of environmental substances the benchmark would have created even € 29.61 by exactly the same polluting amount as Slovnaft did.

3. Discussion

Both SVA and RCR are influenced by two factors: economic value company created and benchmark value based on real amount of environmental pollutants an economic entity defiled. From our results, two facts are obvious. Firstly, companies performed poorly creation of gross value added and secondly, they released too much of the environment deteriorating substances. While for recommendation in financial area we would need data enclosed in more detail, for environmental issues we see certain measures.

Generally, all examined companies have an issue with emissions at the same time as they have waste production and water consumption under control, relatively. It applies that all analysed companies should implement cleaner technologies or install end-of-pipe mechanisms to avoid emitting such amount of emissions. They contribute from a greater part to negative SVA creation. Or, companies could undertake measures in resource management and shift, for example to use rather lighter crude oil. On the other side, excess heat from refining could be used in the heat close-loop systems satisfying (if only partly) need for heating in winter or for cooling in summer time.

In its very nature, oil industry is generally seen as predestined to use fossil fuels. We do not entirely agree with this popular viewpoint. Obviously, we admit oil companies are part of fossil fuel supply chain but that means they do not stand alone. Johansson *et al.* (2012) state that a typical refinery pollutes CO_2-emission mostly from furnaces and boilers. Two key trends are foreseen (Johansson *et al.*, 2012) for oil industry. Ad 1, demand on heavy fuel oil decreases but demand on transport fuel (diesel and aviation fuel) increases (demand on gasoline decreases, as well). Ad 2, strict legislation dictates specifications for sulphur emissions (for other kinds of emissions rules are something loose).

As oil companies depend from a certain part on consumption in the transport industry they are challenged by car-producers offering greener engine systems.

Alternative measures to this development are epitomized in carbon capture and sequestration options. These measures depend on many factors, e.g. owner strategy, market situation, location, age and fitness of facilities, available financial funds, etc. But, on the other hand, never mind how minor a change is, it brings along by-side effects and could set off other, maybe more significant, changes in emission decrease.

Conclusion

Global economy is an interactive sub-system whose development is driven by neo-classical economic principles. Technological changes support economic principles as the sophisticated systems shifts economies further and make virtually nothing impossible. Economic activity bears consequences on environment and society, either. As a part of a greater social and environmental system, organisations should regard environment and social issues, as well. The reason is that both natural and human resources are limited and thus in economic viewpoint could be considered as scarce. Economic theory teaches us a valuable lesson – to use scarce resources effectively and efficiently. There overlaps economy and environmental science in a trend called sustainability using sustainability principles. These are such metrics that minimize environmental impact on environment, society and economy caused by production, supply, use and disposal of goods.

Albeit difficult, integrating sustainability principles into organisational structures is the first pre-requisite of environmental, social and economic goals achievement. To fulfil this, economic entities have to determine the impacts that their activities have on sustainability performance. This performance could be measured various ways. On the one hand, it can be calculated as deterioration of value or on the other hand, as value creation. A method considering value created is called Sustainable value added.

SVA uses publicly available data for its assessment. As economic entities report – besides economic figures – non-economic, *i.e.* social and environmental facts about their activities, this method could be widely applied. In its calculation, all environmental data could be taken into account.

As environmental and social issues do not explicitly carry monetary issues, they are transformed by a benchmark value containing this quality. Thus it enables economic entities to identify roam for improvements, particularly there where they fall short of achieving values the benchmark would have been providing. However, the applicability of this model is limited by accessible data, their reporting according various standards and appropriate choice of a benchmark. While in the Czech Republic and Slovakia national accounting system prescribes calculation on economic data, more and more companies incorporate IFRS standards. Then again, at the same time as Scandinavian countries and the Netherlands requires environmental reporting from organisations, for Czech and Slovak companies such a report is exclusively facultative. In order to refine SVA, rules for choosing a benchmark should be accomplished as each industry hurts environment in other areas. Nonetheless, this first value-oriented method is a first step to view emissions as by-products in value creation process. Thus, SVA proposes decrease of environmental impact in such an amount that it is within company ability and matches real conditions.

The advantages of the sustainable value added are obvious. First of all, the analysis of corporate environmental performance using this approach provides well understandable hard facts (*i.e.* soft factors expressed in hard numbers) even for managerial way of considering business issues. The other forte of SVA is the unique way it binds environmental resources (inputs) to value created (the output).

On the other hand, this is also one of its disadvantages as SVA considers just a few resources as value-creating determinants. We argue it could be of high importance to weight resources in the total SVA calculation according to their relevance for building, or rather deteriorating the natural environment. The other Achilles heel of this method is its disability to clearly define whether using the total capital in a company can be considered as sustainable or not. This method shows just how much a particular company contributed to sustainability in comparison to a chosen benchmark (in any of its forms).

The sound choice of a benchmark is another issue related to SVA, as it depends exclusively on authors' judgement.

The other animadversion is pointed toward value created by a company as every company calculates its accounts differently. Thus, figures from account statements could be slightly deceiving when comparing various companies by one benchmark.

Despite its minuses, implementation of the SVA can help managers (not just) of the analysed companies to become more environmentally conscious and caring about both their shareholders and stakeholders. Thanks to SVA they can clearly see their environmental improvement over time. Through SVA they can detect resources impeding sustainable value created and take appropriate actions to correct this inaccuracies.

Equilibrium is an ideal stance but humankind on its economic development path pushes environment further more off balance. Production is a crucial part of this development and we should count on certain anthropological level of environmental impact. However, it is not sound to put forward just economic principles but take into account environmental constraints, as well. Raising social and environmental awareness wants economic entities to obey natural rules.

The change should come from within, so it means that if I want someone to do for me, I should do the same for them. My environmental pattern of consumption will then influence environmental pattern of production and supply chain. Do I prefer continuous sustainability principles in my professional as well as private life? Do I reflect on my actions in the light of sustainability?

According to ancient saying the enemy wins when he is not recognized or acknowledged by the other party. Let us not do the mistake of silencing voices ringing on alarm. Let us answer these signals by creative and constructive actions. Now.

Acknowledgement

This paper was supported by the grant FP-S-12-1 'Efficient Management of Enterprises with Regard to Development in Global Markets' from the Internal Grant Agency at Brno University of Technology.

References

Bieker, T., Dyllick, T., Figge, F., Gminder, C. U., Hahn, T., Dchaltegger, S., Wagner, M. (2002). Erfahrungen und Schlussfolgerungen. In Schaltegger, Dyllick (Eds.): *Nachhaltig managen mit der Balanced Scorecard: Konzept und Fallstudien* (345–371). Wiesbaden: Gabler.

Bikár, M., Polednáková, A. (2012). Globálny vývoj ekonomiky a trendy na finančných trhoch, *Trendy ekonomiky a managementu*, VI(10), 9–20.

Constanza, R., Daly, H. (1992). Natural capital and sustainable development. *Conservation Biology* 6(1): 37. http://dx.doi.org/10.1046/j.1523-1739.1992.610037.x

Česká rafinérská (2011). *Zpráva o bezpečnosti a ochraně zdraví, ochraně majetku, vlivu na životní prostředí a kvalitě*. Litvínov: Česká rafinérská.

Figge, F., Hahn, T., Schaltegger, S., Wagner, M. (2002). The Sustainability Balanced Scorecard – Linking Sustainability Management to Business Strategy. *Business Strategy and the Environment*, 11(5), 269–284.

Figge, F., Hahn, T. (2004a). Sustainable Value Added – Ein neues Maß des Nachhaltigkeitsbeitrags von Unternehmen am Beispiel der Henkel KGaA. *Viertelsjahrhefte zur Wirtschaftsforschung*, 73(1), 126–141.

Figge, F., Hahn, T. (2004b). Value-oriented impact assessment: the economics of a new approach to impact assessment. *Journal of Environmental Planning and Management*, 47(6), 921–941.

Fraser, E. D. G., Mabee, W., Figge, F. (2005). A framework for assessing the vulnerability of food systems to future shocks. *Futures*, 37(6), 465–479.

Hahn, T., Wagner, M., Figge, F., Schaltegger, S. (2002). Wertorientiertes Nachhaltigkeitsmanagement mit einer Sustainability Balanced Scorecard. In Schaltegger & Dyllick (Eds.): *Nachhaltig managen mit der Balanced Scorecard: Konzept und Fallstudien*, 345–371. Wiesbaden: Gabler.

Hahn, T., Scheermesser, M. (2006). Approaches to Corporate Sustainability among German Companies. *Corporate Social Responsibility and Environmental Management*, 13(3), 150–165.

Hahn, T., Figge, F., Barkemeyer, R. (2007). Sustainable Value creation among companies in the manufacturing sector. *International Journal of Environmental Technology and Management*, 7(5/6), 496–512.

Hart, S. L., Milstein, M. B. (2003). Creating sustainable value. *Academy of Management Executive, 17*(2), 56–67.

Johansson, D., Rootzén, J., Berntsson, T., Johnsson, F. (2012). Assessment of strategies for CO_2 abatement in the European petroleum refining industry. *Energy*, 42(1), 375–386.

Kirchner, M., Leker, J. (2011). *Mirror Mirror in the Wall, What is the Most Sustainable Company of All? Assessing Corporate Sustainability Performance by Using the Corporate Sustainability Map* presented at Trends and Future of Sustainable Development [PowerPoint slides]. Retrieved from http://conference2011.files.wordpress.com/2011/06/kirchner_finland_presentation_short_110601.pdf

Mog, J. M. (2008). Struggling with sustainability – a comparative framework for evaluating sustainable development programs. *World Development*, 32(12), 277–291.

Norton, B. G., Toman, M. A. (1997). Sustainability: ecological and economic perspectives. *Land Economics*, 73(4), 553–568. Retrieved from http://dx.doi.org/10.2307/3147245

Pearce, D., Atkinson, G. (1998). *The Concept of Sustainable Development: An Evaluation of Its Usefulness Ten Years after Brundtland*. CSERGE Working Paper PA 98-02 (1–24) Norwich: CSERGE.

Robinson, D., Boulle, M. (2012). Overcoming organizational impediments to strong sustainability management. *The Business Review, Cambridge*, 20(1), 42–48. Retrieved from http://search.proquest.com/docview/1021196884?accountid=17115

Salamaga, M. (2011). Regional development of districts in the Lesser Poland Voivodship, *Trendy ekonomiky a managementu*, V(9), 44–52.

Schaltegger, S., Figge, F. (2000). Environmental

Shareholder Value: Economic Success with Corporate Environmental Management. *Eco-Management and Auditing*, 7(1), 29–42.

Schaltegger, S., Wagner, M. (2006). Introduction. Managing and Measuring the Business Case for Sustainability. Capturing the Relationship between Sustainability Performance, Business Competitiveness and Economic Performance. In Schaltegger, Wagner (Eds.), *Managing the Business Case for Sustainability* (1–27). Sheffield: Greenleaf Publishing.

Slovnaft (2011). *Výročná správa za rok 2010*. Bratislava: Slovnaft.

Solov, R. (1986). On the intertemporal allocation of natural resources. *Scandinavian Journal of Economics*, 88(1), 141–149. Retrieved from http://dx.doi.org/10.2307/3440280

Stavins, R. N., Wagner, A. F., Wagner, G. (2003). Interpreting sustainability in economic terms: dynamic efficiency plus intergenerational equity. *Economic Letters*, 79(3), 339–343. Retrieved from http://dx.doi.org/10.1016/S0165-1765(03)00036-3

The ADVANCE Project (2006). *Sustainable Value of European Industry: A Value-Based Analysis of the Environmental Performance of European Manufacturing Companies*. Berlin: Forres.

UN (United Nations) (1987). *Our Common Future*. Oxford: Oxford University Press.

UNEP (United Nations Environment Programme) (2008). *CCCC Kick the Habit: a UN Guide to Climate Neutrality*. Malta: Progress Press.

Unipetrol (2011). *Společná zpráva o ochraně zdraví, bezpečnosti práce a životního prostředí skupiny Unipetrol za rok 2010*. Praha: Unipetrol.

Doručeno redakci: 30. 10. 2012
Recenzováno: 29. 11. 2012
Schváleno k publikování: 17. 12. 2012

Ing. Juliana Straková
Vysoké učení technické v Brně
Fakulta podnikatelská
Ústav ekonomiky
Kolejní 2906/4
612 00 Brno
Česká republika
E-mail: strakova.juliana@gmail.com