SUSTAINABLE VALUE ADDED AS WE DO NOT KNOW IT

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Abstract. Entrepreneurial activities play an important role in a mixed economy. Incorporating the nowadays call for sustainable practices, enterprises cope with the evaluation of their efforts in the economic area as well as in the environmental area on their own. The method called Sustainable Value Added might very well solve this problem. It is based on the idea that enterprises actually create value when using environmental resources. However, opposite to the original idea, we do not think that environmental resources create the same value, never mind what resource we take. In this article, we propose the improvement of the original Sustainable Value Added arguing that the best for distinguishing various value creations is to weight the environmental resources according to their impact on environment. Based on an integrated analysis of the financial as well as environmental reports of selected German enterprises, we can conclude that when weighting environmental resources, enterprises performed worse than when simple averaged. However, the weighing reduces the risk of considering all resources to have the same impact on environment and on Sustainable Value Added results, as well.

Keywords: economic reports, environmental performance assessment, sustainability reports, sustainable development, sustainable value added, value-oriented approach.

JEL Classification: Q01, Q51.

Introduction

Nowadays, enterprises are challenged by sustainability as a general exigency. This paper examines the Sustainable Value Added method (abbreviated as SVA) that enables to measure the contribution of enterprises to sustainability. In practice, SVA from its nature is limited to subset of such environmental resources that are commonly recorded. All resources are considered to be equally relevant to SVA. We argue that the formula as originally proposed by Figge and Hahn (2004) needs some refining. In this paper we focus on different weights for different environmental resources.

This paper is organized as follows. The next section briefly sketches out the concept of sustainable development. Value-based perspective on the use of resources is outlined in the third section. Subsequently, we apply the Sustainable Value Added method to evaluate the performance of the sample enterprises based on their respective environmental data reported. Fourth, the formal sustainable value added

formula is presented and explained in more detail. In the fifth section we provide enhancement of the original formula. The final section points out some concluding remarks.

1. Sustainable development

Traditionally, an enterprise focuses on value maximization. Over the last decades, theorists emphasize wider scope of entrepreneurial objectives besides obtaining the greatest value possible (Jensen, Meckling 1992). The common curiosity about environmental issues was piqued after publishing the Brundtland report (Brundtland 1987) where the idea of sustainable development was firstly introduced to the general public, including enterprises. Sustainable development is a normative concept laid out as the combination of economic prosperity, environmental integrity and social equity. In order to walk on the sustainable development path – or even to reach it – society necessarily needs help

from enterprises as they are drivers in any modern economy (Bansal 2002). Furthermore, Soppe (2004) states that sustainable development without help of enterprises would fall like a house of cards. Thanks many movements, sustainable development has gradually become the mainstream initiative and is improving in its quality, quantity and overall acceptance not only on the theoretical level but in the entrepreneurial practice, as well (Bansal, Gao 2006; Jensen 2001).

The noble idea of sustainability should however be steeled by a solid concept. The most common concept of sustainability defines so-called weak and strong sustainability. The whole systems necessitate several different forms of capital. There is a debate about how many kinds of capital should be reckoned (Ekins 1992). Capital theory distinguishes between various forms of capital into man-made capital, human capital, natural capital and social capital (Pearce, Atkinson 1998; Costanza, Daly 1992).

Substitution of these forms of capital is solved in weak and strong sustainability differently. Weak sustainability demands the overall welfare to be at least constant over time. It implicitly assumes that natural capital can be substituted by manufactured capital (Pearce, Atkinson 1998). Strong sustainability does not mean the opposite of weak sustainability though some scientists may appear to think so. What strong sustainability requires in addition to weak sustainability is at least the constant level of natural capital over time (Daly 1990). It requires the application of a management rule known as constant natural capital rule. It should ensure for both the actual and the next generations at least the very same life quality. In order to avoid irreversible losses strong sustainability levies a critical minimum level for at least natural capital to be well-preserved (Figge, Hahn 2004).

The constant natural capital rule complies with three basic principles, namely efficiency, consistency and sufficiency. The efficiency means to produce either more material goods and services by the same level of input (maximum principle) or the same quantity of material goods and services by the lower input (minimum principle) (Huber 2000). The consistency asks for innovations in economy and society which makes them to be extremely hard to implement (Enquette-Kommission 1998). The sufficiency requires a reduction of consumption per capita and therefore also the shift in values of society (Huber 2000).

As enterprises build the fundament of nowadays society according to this approach they should consider not just economic but also environmental and social scarcities as well as their impact (Hahn, Figge 2011). This approach takes into consideration the restrictions enterprises should incorporate into their activities. Beside politic and law restrictions, enterprises operate within some technology level that is of a strategic key not only for the enterprise economic

results but for its environmental impact as well. With these inputs they produce the final desired output but also some undesirable by-products in form of various dangerous or hazardous substances.

It is not an easy task to evaluate these antagonistic effects caused by production but some methods have been explored by various researchers (see Fig. 1). The most of the earlier methods take into consideration just negative effects therefore they are described as burden-based approach. The relatively new method developed by Figge and Hahn (Figge, Hahn 2002) called sustainable value added relies on the logic that overall company output comprises not only of negative effects (by-products) but also of positive effects (actual products) so it belongs to the value-oriented approach. Therefore, the basic difference between burden-based and value-oriented approach lies in their understanding of environmental resources. Burden-based approach takes into consideration just their derogative nature. Value-oriented approach asks a question how much value is reached through the input of environmental, social and economic resources (Figge, Hahn 2002). The resources in this sense are (undesired) outputs rather than inputs. Enterprises emit pollutants to be able to produce. For this reason social and environmental by-products can be considered to be inputs from an economic point of view and in this article they will be seen as such.
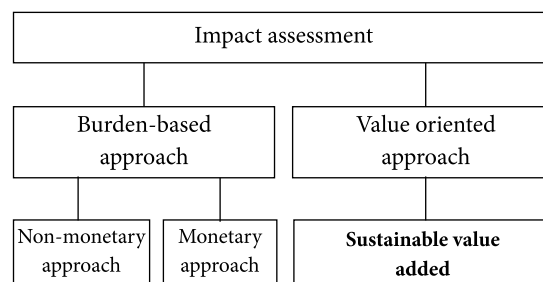

Fig. 1. Methods of environmental impact assessment (source: own modification based on Schaltegger and Burritt 2000)

2. Value creation in enterprises

Orientation on values in shareholder theory has been settled in management practices decades ago. Friedman´s and other theories emphasize the sole purpose of enterprise to create economic value (Rappaport 1986; Stewart 1991). Enterprises create economic value when the return on capital is greater than the costs of capital. Financial management considers costs of capital as assessed by opportunity costs. Opportunity costs express the return an alternative capital investment would have generated. This method has been confirmed as the most appropriate to measure the efficient allocation of scarce economic resources for creating economic value (Modigliani, F., Modigliani, L. 1997).

Value-based management can be applied to other types of resources as well. Economic, environmental and social resources are classified by corporate sustainability as interconnected and interdependent and such as they should be treated simultaneously (Hahn *et al.* 2015). A sustainable enterprise contributes to sustainable development by delivering economic, environmental and social value because environmental resources are needed together with economic capital to create value (Hart, Milstein 2003). Figge and Hahn (2002) relay opportunity costs to environmental and social resources, not just financial resources as it is originally understood. For simplicity, they consider primarily environmental capital by economic value creation though it is possible to extend this vision into other forms of capital as well (Figge, Hahn 2012). Opportunity costs express so the input efficiency of these various resources in comparison to the reference rate (benchmark). The benchmark thus sets the performance target for the evaluated enterprise (Kuosmanen, T., Kuosmanen, N. 2009).

2.1. Sustainable value added

Prior to proceeding to the methodology of sustainable value added (SVA in short) calculation, it is important to explain in a greater detail why is this method categorized as of value oriented approach.

Conceptually, SVA stresses the complementary disposition (substitutable just to some limited extension according to the constant natural capital rule) of economic, environmental and social resources. This is the basic logic of sustainable development concept. The criterion of value orientation is fulfilled in SVA since the environmental impact is considered as inevitable by generating profit. There will be no environmental impact of any subject just when no activity is undertaken. Therefore it is seen in the light of where this impact will bring more values.

Primarily focus of SVA lies in environmental and partly in social resources. One of the conditions applied to these resources is their measurability, e.g. they have to be expressed by quantitative units. Qualitative resources must therefore be excluded. The other negative side of SVA is its inability to judge whether an enterprise is sustainable in absolute terms, SVA shows only if the enterprise is more sustainable than a chosen benchmark (Figge, Hahn 2013). It enables to evaluate how much better (or worse, for that matter) an enterprise uses its resources in comparison to the benchmark.

3. Methodology

Methods of sustainable development on the entrepreneurial level are still juvenile and not standardized. However, they could be systematized by the fact whether they are negatively or positively set. Negative methodologies (also

called burden-based) are in many cases preferred as it is often easier to agree on problematic issues than on excellence drivers. However, negative methodologies do not identify best-in-class companies that perform well in both areas, economic as well as environmental (Delmas, Blass 2010).

The complex, yet simple formula for calculating Sustainable Value Added follows:

$$SVA_i = \frac{1}{R} \sum_{r=1}^{R} \left(\frac{y_i}{x_{ir}} - \frac{y^*}{x_r^*} \right) x_{ir} , \qquad (1)$$

where: *SVA* – sustainable value added; *i* – an enterprise; *R* – sum of environmental resources; *r* – environmental resource; *y* – value added; *x* – quantity; y^* – benchmark value added; x^* – benchmark quantity. Ratio y^*/x_r^* can be interpreted as an eco-efficiency of the benchmark.

SVA reveals if the accomplished value overshoots the opportunity costs of the input resources. The positive *SVA* result betokens the enterprise employs its resource bundle more efficiently than the benchmark of choice. The negative *SVA* result signalizes the enterprise is less efficient by using its resources than the benchmark.

3.1. Sample

The practicability of SVA depends on data availability on the enterprise level as well as on the benchmark. The enterprises were selected from German companies as they are generally considered as most environmentally conscious and an example for enterprises from other countries. The sample enterprises were chosen according to following criteria: first, they are exclusively private enterprises, second, they belong to industry coded in NACE as C25.1.1 – Manufacture of metal structures and parts of structures. Third, they possess a valid registration in The European Eco-Management and Audit Scheme (EMAS). Fourth, they reveal their environmental performance indicators. These high criteria are met by just four German enterprises whereas the benchmark is the best value of them in each category respectively. Data were collected from open information databases and publicly available reports of the analyzed enterprises.

3.2. Economic and environmental impact

The evaluation of the overall impact of an enterprise on environment should be enriched by economic data. They are in our study represented by value added. Environmental resources considered in this study comprise of emissions of carbon dioxide (CO_2), non-hazardous waste (non-HW), hazardous waste (HW), water used (WU) and power grid energy use (E). Other forms of natural capital are missing in the environmental statements of sample enterprises up to this point.

For SVA to be complete, the benchmark must be set. The benchmark is the reference that sets the performance optimum for the evaluated enterprises (Kuosmanen, T., Kuosmanen, N. 2009).

Although this method delivers useful results, we see some misconceptions, especially that the environmental resources are equally regarded. Therefore, we propose to set the wages applying ceteris paribus condition. We modify the original equation by weights of different resources as advocated by pairwise comparison method. Each resource is matched with each of the other resources according to their harmful effects on the environment perceived by us.

4. Results

We use formula (1) for SVA calculation where environmental data for 2011 as well as for 2012 were used while keeping economic data and benchmark values constant.

For economic data constant we have chosen value added of the Enterprise No. 4 as of 2011 simply because it was the sole enterprise revealing its economic value added. It is exactly € mil 37.

Environmental benchmark figures were calculated as the medians of each resource volumes of 2011 respectively (see Table 1).

For all calculations we rounded the numbers to three thousandth place as customary.

With pairwise comparison method we established: 4 times for CO_2, 1 for non-hazardous waste, 3 for hazardous waste, 1 for water used and finally 1 for power grid energy which makes it 10 weights altogether (see Table 2). Accordingly, we have divided the partial SVA results for each particular resource not by the number of resources (i.e. 5) but by the number of weights (i.e. 10).

It is interesting to see that the worst performer is the Enterprise No. 4 as its actual input figures are the only one that mirror reality (see Table 3).

The results show that enterprises are far worse when weighted resources than when simply averaged. It is caused

Table 1. Environmental performance of the sample enterprises for 2011 (source: publicly enclosed data of respective enterprises and own calculation of the benchmark values)

Resource	Year	Enterprise No. 1	Enterprise No. 2	Enterprise No. 3	Enterprise No. 4	Benchmark value (€ mil / t)
CO_2 (t)	2011	1,979	1,256.757	301.36	15,459	= 37/1,617.879 = 0.023
	2012	1,979	1,172.239	272.66	13,476	
Non-HW (t)	2011	666	211.35	1,977.77	1,341	= 37/1,003.5 = 0.037
	2012	676.9	231.76	1,473.15	1,448	
HW (t)	2011	17.7	84.37	31.73	0	= 37/24.715 = 1.497
	2012	13.9	78.43	39.26	0	
WU (m3)	2011	3,121	1,261	5,504	25,713	= 37/4,312.5 = 0.009
	2012	2,827	1,146	4,665	20,348	
E (MWh)	2011	1,402.4	2,753.112	5,821	19,766.459	= 37/4,287.056 = 0.009
	2012	1,318.3	2,633.808	5,555	22,897.739	

Table 2. Weights of environmental resources using preferences (source: own evaluation based on pairwise comparison method)

Resource	CO_2	Non-HW	HW	WU	E	Score
CO_2	–	CO_2	CO_2	CO_2	CO_2	4
Non-HW	–	–	HW	Non-HW	E	1
HW	–	–	–	HW	HW	3
WU	–	–	–	–	WU	1
E	–	–	–	–	–	1

Table 3. Sustainable value added of the sample enterprises for 2011 and 2012 when simple and weighted resources (source: own calculation)

in € mil	Enterprise No. 1	Enterprise No. 2	Enterprise No. 3	Enterprise No. 4
SVA 2011 simple	9.543	−2.831	−8.907	−108.098
SVA 2011 weighted	−14.191	−35.347	−16.033	−169.616
SVA 2012 simple	11.264	−0.393	−5.306	−113.547
SVA 2012 weighted	−12.184	−31.767	−16.289	−149.758

by relatively high CO_2-emissions and hazardous waste as they have the greatest impact on the total results.

Enterprise No. 1 turns its positive SVA in simple resources formula to negative SVA results when weighted resources. It is due to the fact that its greatest weakness lies in CO_2-emissions. These emissions are the stumbling-block for all sample enterprises except Enterprise No. 3. And though the hazardous waste produced by Enterprise No. 1 is lower then set benchmark, in the weighted resources SVA calculation it is not sufficiently low to result in positive SVA particular for this resource exclusively.

Regarding results for Enterprise No. 2 its unsatisfactory SVA roots in low performance of CO_2 and hazardous waste, i.e. the emissions are much higher than benchmark values. That affected also the SVA results when weighting environmental resources.

Comparing simple and weighted resources results, the most notable enterprise is Enterprise No. 3. We can see the improvement in results for 2011 and 2012 when simple averaged resources. When we look at results for 2011 and 2012 of weighted resources, the difference is worse by time. It is caused by higher hazardous waste volumes in 2012 than in previous year.

The opposite applies to Enterprise No. 4. It performed worse by time when comparing results for simple averaged resources. For weighted resources it enhanced its SVA results. It is thanks to the decrease in CO_2-emissions.

At the end we can conclude that weighting resources in SVA calculation can help to sort out more important environmental resources and treat them accordingly. We should add that our method of settling the weights is not the only one right. It is just the first step in improving originally proposed SVA calculation that is unique in its logic to create value rather than evaluating destroyed value. We strongly encourage developing this idea further and examining the objective relevance of weights.

Conclusions

The concept of sustainable development assumes relations between economic, environmental and social aspects on the societal as well as on the entrepreneurial level. This complementary relation asks for such sustainability when environmental, social and economic aims are achieved at the same time.

The conventional management takes into account just one dimension – economic – when creating value in an enterprise. All resources including environmental and social resources are neglected. This point of view is not acceptable when speaking about sustainable development. The opportunity costs method applied in financial management could very well be analogously brought to remaining kinds of resources.

Sustainable Value Added allows assessing the sustainable performance of enterprises similar to financial performance in monetary terms. The explanatory power of the result (positive or negative SVA) is not unequivocal as it hinges on the selected benchmark.

One of the premises of SVA is the equal weight of each and every environmental resource. We argue that equipollency is a very strong assumption because various resources cannot have the same damaging effects on environment. Therefore we propose to use weights when assessing SVA. The weights can be estimated by various methods. We have chosen the so-called pairwise comparison method. Naturally, the results we got were worse than when using original SVA formula.

SVA supports better knowledge and understanding of other competition – sustainable practices are considered to be one of the competitive advantages. On the other hand, thanks to SVA an enterprise could determine its strengths and weaknesses. And this, in turn, enhances creative leadership and better formulation of an efficient business strategy.

Not many companies evaluate their environmental impact in monetary units. We admit that one of the reasons for not implementing this (or any, for that matter) methodology is the lack of data, especially when striving for environmental performance information about rivals. At least publicly available data can be used, mostly annual reports, environmental reports, reports to professional associations or reports to national statistical offices though it is risky to choose variables based on their availability. One can so get a defect picture of the overall sustainability performance. To complicate the situation even more, environmental are mostly not standardized in environmental reports, even when we have chosen enterprises reporting in the EMAS scheme. We encourage using survey questionnaires as a complement to publicly enclosed data although we admit that enterprises might be reluctant to reveal information about environmental resources for whatever reasons.

Disclosure statement

Hereby we declare that we do not have any competing financial, professional, or personal interests from other parties.

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