Udržitelná přidaná hodnota Top evropských farmaceutických výrobců

Sustainable Value Added of Top European Pharmaceutical Manufacturers

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Abstract:
Purpose of the article: This article presents results of an analysis of sustainable value added created by top 5 European pharmaceutical companies in six different environmental resources. We compare value created in the respective companies to the target EU values. Our results show that in the year 2010 companies' performance overcame set target.
Methodology/methods: Sustainable Value Added is a relatively new method. It was first introduced as a whole concept in 2004 and assesses how companies perform in sustainability. We analyse sustainability performance in six selected environmental areas. As a benchmark we rely on target values for 2010 set by various European institutions. Data for our analysis were retrieved from publicly available resources, *e.g.* annual, environmental and other reports as well as the companies' websites.
Scientific aim: Originally, the sustainability concept was initiated in macroeconomics. However, increasing number of companies has incorporated it into their strategies. In this paper we aim to determine whether they succeeded. We present the contribution to sustainability by top five great players on the field of pharmaceutical market in Europe.
Findings This paper found several key issues: there is a little research of environmental impact generated by pharmaceutical companies in terms of sustainable value added. Sustainable value added was positive for all analysed companies. It means that successful pharmaceutical companies using six analysed environmental resources create more value than required by the target set.
Conclusions: Although sustainable value added 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, for comparing environmental results of various companies this method is suitable and highly adaptable when using it for analysis of other industries or services, as well.

Keywords: benchmarking, environmental performance, green economy, pharmaceutical manufacturers, sustainability, sustainable value added

JEL Classification: Q51, Q56

Introduction

Great societal challenge is built by both the increasing consumption of non-renewable resources and continuous growth of anthropogenic emissions. Methods valuing these negative externalities are so called burden-based methods. They belong to traditional economical approaches striving effective environmental protection (Mezřický, 2005). The only value-orientated method – sustainable value added (SVA) – takes into account the value created by all used resources. SVA expresses how much value contributed an economic entity to sustainable value creation. The sustainable value added is created when it overcomes the threshold of benchmark (The ADVANCE Project, 2006). Thus scarce resources used by companies should create at least as much value as the benchmark. Otherwise, these resources could have been employed where they create more value, ceteris paribus (Pearce and Atkinson, 1998).

In this article we aim to assess whether analysed companies perform better in environmental areas than set benchmark. There are presented the results of an analysis of sustainable value added created by top 5 European companies in the pharmaceutical sector in six different environmental resources (CO_2, NO_x, SO_2, VOC, waste generated and water used). We compare value created in these respective companies to the target EU values. Our results show that companies in 2010 performed better than the set target and therefore all analysed companies can be described as sustainable when considering EU targets as benchmark.

Human ingeniousness to use scarce resources by various ways enables us to increase requirements for comfort in our lives and thus influences or even defines both production and consumption behaviour. Such behaviour dictates trends in „modern" society (Pernica and Baštinec, 2012). In holistic point of view, this behaviour influences the whole system (universe, life, mind, spirit). Both production factors and use-and-throw-away life style lead to the increasing resources depletion. It can be easily deducted that a number of economic collateral damages are caused by the environmental problems (Stern, 2006). Companies have undertaken some measures supposed to lead to sustainability even if originating in the legislation (Freiberg, 2007).

Providing healthcare is one of society's greatest concern, it should be scrutinized from environmental point of view, as well. Berry and Rondinelli (2000) state though the pharmaceutical industry is not brought into sharper environmental focus, it plays a certain role in environmental pollution. These authors consider impact of pharmaceutical manufacturers mostly in areas of carbon dioxide (CO_2), nitrogen oxides (NO_x), sulphur dioxide (SO_2) and volatile organic compounds (VOC) from systems without filters. Besides to these components of pollution, we added both waste generated and water used into our analysis as other most common sources of environmental impact as it is not possible to produce without the by-side effects.

From an economic perspective, we consider a pharmaceutical company as defined by Berry and Rondinelli (2000), *e.g.* as an entity of "manufacturing, formulating and processing medicinal chemicals and pharmaceutical products" while finished production can be created in many forms, *e.g.* tablets, capsules, suspensions, solutions, etc. The authors further explain that factors as aging population, high life quality and research progress, respectively, drive innovations in pharmaceutical industry. The focus of

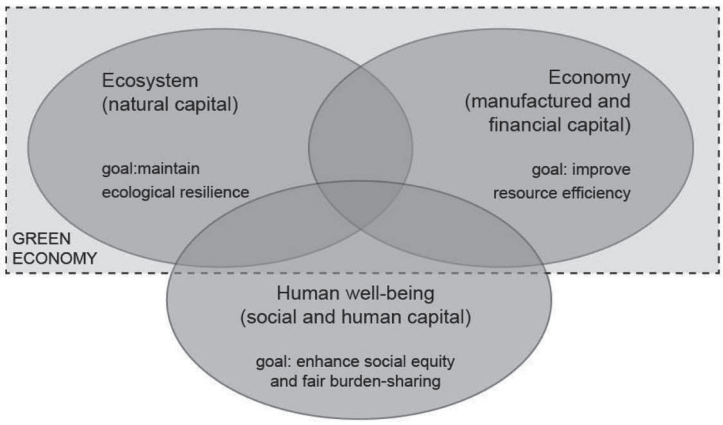

Figure 1 Green economy. Source: European Environment Agency, 2011(retrieved February 2nd 2012).

pharmaceutical companies will be aimed at diseases as hypertension, arthritis, Alzheimer's disease and other diseases occurring in elder age of live.

Beside medicaments, pharmaceutical companies create also negative by-products deteriorating air (air emissions, acid gases), water (waste water pollution of rivers, streams and groundwater) and soil (residual materials and waste) as solid or volatile pollutants (Berry and Rondinelli, 2000). The solution to these pollution problems can be presented in a trend called sustainability. In the last decades, the term sustainability has become very popular. Sustainability means behaviour using environmentally-friendly methods. Sustainability is not the aim; it is the way on which humankind is supposed to walk if it does not wish to perish by its own doing. The sustainability concept on macroeconomic level net of its social aspect can be translated into term green economy (see Figure 1). Green economy intends to implement sustainability rules by environmental technologies as it links economic success to environment issues. It means that finally we are gradually acknowledging that environment cannot absorb all emitted pollutants naturally (European Environment Agency, 2011).

Green economy applies to pharmaceutical sector as green chemistry. It embodies firstly the problem of efficient use of raw materials and elimination of waste and secondly the problem of health, safety and environmental risk exposure related to the chemicals (Ravichandran, 2011).

Berry (2004) emphasizes the other side of sustainability, especially the need to manage natural resources more economically. How effective and efficient a company is by fulfilling this managerial implication can be shown via Sustainable Value Added. SVA as a whole new method was first introduced in the article Sustainable Value Added (Figge and Hahn, 2004a) though first traces of it are apparent before (Figge and Hahn, 2002). These researchers are working today for both Euromed Management School in Marseille and the IZT (Institut für Zukunftsstudien und Technologiebewertung, *i.e.* Institute for Futures Studies and Technology Assessment) in Berlin. SVA differs from existing approaches because this value-based method assesses resources by their relative contribution to the value added. All other existing approaches to sustainability assessment are burden-based, *i.e.* resource use is assessed based on the burden that is created. Schaltegger and Figge (2000) explain that environmental protection *per se* does not generate any value.

Since introduction of SVA a few studies were accomplished mostly by original authors on both the macroeconomic and microeconomic level (Figge, Hahn, 2004b; Figge, Hahn, 2005; Hahn *et al*., 2007; Van Passel *et al.*, 2009, Rhouma, 2010).

Economic entities are exposed to environmental issues among others for emissions (to air, water and soil), waste and material intensity (Figge *et al.*, 2002). In this article we answer the question of how well do pharmaceutical companies cope with environmental issues outlined above by measuring SVA in six selected environmental outputs. Data for our analysis we gained from annual reports, financial statements, environmental reports, other enclosed reports and the companies' websites.

1. Weak *vs.* Strong Sustainability

Various elements of sustainability are usually divided into three areas: environmental, economic and social area – components of the triple bottom line (Hart and Milstein, 2003).The environment is considered to be a base for sustainability, economic activity is a tool for sustainability and social aspect is an aim of sustainability. Sustainable development occurs when the level of total capital used (*i.e.* natural, man-made, social and human capital respectively) keeps the same level constant over time. This is also known as the constant capital rule (Solow, 1986).

If all forms of capital are considered to be perfectly substitutable, it can be labelled as weak sustainability. The idea is that the decrease in one form of capital is compensated by the increase in other (Pearce and Atkinson, 1998).

Some forms of capital do not have substitutes or at the very least, a certain minimum level of it should be kept to conserve the environment. This approach is called strong sustainability. Dietz and Neumayer (2007) refer to strong sustainability as a concept focused more on environmental issue rather than a cost driver. However, in sustainability, green economy or green chemistry concept environment does not contradict the social and economic benefits, it adds to synergy effect, as well. Constanza and Daly (1992) support the opinion that strong and weak sustainability are not necessarily conflicting. They explain that strong sustainability imposes additional conditions to the basic constant capital rule.

According to Beckerman (1995), the difference between weak and strong sustainability exists (see Table 1). Here K stands for capital (all of its forms), accordingly K_N is natural capital, K_S is social capital and t is time.

On the other way, Robinson and Boulle (2012) argue if both natural and social issues are scrutinized

Table 1 Weak and Strong sustainability rules.

Form of sustainability		Requirement
weak		$dK / dt \geq 0$
strong	environmental	$dK / dt \geq 0$ and $dK_N / dt \geq 0$
	social	$dK / dt \geq 0$ and $dK_S / dt \geq 0$

Source: Beckerman, 19952 Methodology.

by economic principle, economic entity is of weak sustainability. Strong sustainability requires putting environment as the first priority, then society as the second and finally the economic logic. The reason is the scarcity of resources where environment is the utmost finite followed by social resources while economy remains well kept alive.

2. Methology

SVA gives the answer to the question how much value a company creates thanks to its environmental production factors compared to a benchmark. As the benchmark another company, a particular sector, an economy or even an internationally set target could be used (Figge and Hahn; 2004b).

We build upon the last kind of benchmark (EU targets). In this paper we use SVA approach to measure environmental performance for these respective companies: GlaxoSmithKline, Novartis Pharma, Fresenius, Sanofi, Vion, Novo Nordisk and AstraZeneca.These top manufacturers of pharmaceutical preparations were chosen according to operating revenues (category expressing economic value) in 2010 as recorded in the Amadeus database.

From seven selected companies, two were excluded. Fresenius, though it should be the third in our ranking, lacks on environmental data publicly accessible. We were not able to gain these data other ways.

The other excluded company Vion, supposed to be in the fifth position in ranking, was in our opinion mistakenly categorized as pharmaceutical company in Amadeus database. Yet Vion‘s business core activity is food and ingredients producing, what does not fit into our analysed company profile category.

Data for analysed companies were obtained through publicly accessible sources, *i.e.* annual reports, environmental reports, etc. It was essential to our analysis to integrate also sources other than environmental performance reports as they provided us with limited information.

As a benchmark we used target values elaborated in the ADVANCE Project (see Table 2) launched in Germany (Hahn *et al*., 2007).

We intentionally have left out value created by methane (CH_4-emissions) because just one company has reported data on it. Then the whole sample could have not been properly examined.

The SVA of analysed companies was assessed in five successive steps (Hahn *et al*., 2007) ranged alphabetically from the first (A) to the last (E).

A. How much of an environmental resource r is used by a company? There are considered six environmental resources.
B. What value of operating revenue (return R) is created in a company by these resources?
C. What value of operating revenue (*e.g.* benchmark value, BV) is considered to be a minimum to achieve a positive SVA? This is the target T:
$$T = r \cdot BV .$$
D. Which resources contribute to SVA, *i.e.* positive or negative SVA of a resource SVA_r
$$SVA_r = R - T ?$$
E. How much of total sustainable value added SVA_T does a company create through all six analysed environmental resources? This final result shows what economic value was created besides the six pollutants, if the EU15 environmental performance targets take part in value contribution as a benchmark:
$$SVA_T = \frac{\sum_{1}^{6} SVA_r}{r} .$$

Performance targets considered as the benchmark are shown in Table 2. They assess how well resources had to be used in 2010. When comparing companies with various sizes, large corporations usually make greater operating revenues than the small. To avoid this size effect, Hahn *et al*. (2007) propose to

Table 2 Target efficiencies of the EU 15 for 2010 in selected environmental areas.

Resource r	Benchmark value BV
CO2-emissions	3,733 €/t
NOx-emissions	1,933,747 €/t
SOx-emissions	3,151,784 €/t
Waste generated	9,802 €/t
Water used	53 €/m^3
VOC-emissions	2,052,245 €/t

Source: The ADVANCE Project (2006).

use Return to Cost Ratio (RCR). It is constructed as ratio between return and average benchmark value of resources used (in the case where return is greater than average BV. In other case, these variables are compared in reverse order.):

$$RCR = R{:}BV_{average}.$$

If the ratio is *e.g.* 3.78:1 (the case of GSK) the company created € 3.78 whereas benchmark would have created € 1 by the same resources.

3. Results

The analysed companies were chosen as top companies with the highest operating revenues in 2010 according to Amadeus database. The pharmaceutical companies selected can be seen in Table 3.

The figures in all calculations are rounded according to the custom, auxiliary data are presented in € mil, the final data (SVA_T) in € bn.

Data were collected either from 2010 reports or where more accurate, from 2011 reports. The absent data were experienced just by NovoNordisk in their VOC-emissions. We contacted the corporation via e-mail but to this date no answer was obtained. The other data inconsistency is apparent in SO_x-emissions as some corporations do enclose this information; others enclose information just for SO_2-emissions. We decided to consider SO_2-emissions as SO_x-emissions because the major part of SO_x-emissions consists primarily of SO_2-emissions. For three corporations (GSK, Novartis Pharma and AstraZeneca) no explicit information about CO_2-emissions was present. We took into account just their greenhouse gas emissions (GHG). Generally, they comprise of about 99 per cent of CO_2-emissions. This equal consideration is clearly marked in the analyses of the respective companies by marking *estimated* in brackets. NO_x and SO_2-emissions for GSK were not enclosed in any of its reports.

The final ranking of analysed companies according to sustainable value added will be presented in the Final results section.

The next sub-chapters are draft in the fashion: firstly we present concise information about each respective company, then we calculate the actual SVA (assessment of the SVA is easy to follow in the respective tables according to steps described in the Methodology part) followed by the explanation of the results. Finally, for each company we sketch possible areas of improvements and current activities undertaken in a company in environmental issues.

3.1 GlaxoSmithKline

GlaxoSmithKline Plc (henceforth GSK) is one of the biggest pharmaceutical companies in the world based in London. In 2000, GSK was formed through the merger of Glaxo Wellcome and SmithKline Beecham. Its main business is research and development, manufacturing and merchandising of various types of medicals. The corporation claims to develop effective and safe drugs of the highest quality (GlaxoSmithKline, 2011).

In the environmental area, the corporation would like to benefit both the environment and itself by reducing its annual costs through reduced energy, materials and distribution costs (GlaxoSmithKline, 2011). The greatest weakness for the corporation is its pollution of carbon dioxide emissions (see Table 4) because in this area it creates the lowest sustainable value added.

In its Corporate Responsibility Report, GSK (2011) publicly worries about exactly these emissions seeing that carbon dioxide and other emissions contribute to climate change.

The corporation has implemented life cycle assessment (LCA) of its key products. This behaviour is motivated by GSK's business strategy, its risk management, stakeholder interests (including inves-

Table 3 Pharmaceutical Company Characteristics.

Rank	Company	Headquarter	Operating Revenues in 2010	Employees	Major Product Groups
1	GlaxoSmithKline	London	€ 33,841 mil	99,913	Pharmaceuticals, drugs, dermatological products
2	Novartis Pharma	Basel	€ 26,663 mil	99,834	Pharmaceuticals, generics products, health product
3	Sanofi	Paris	€ 11,105 mil	101,575	Pharmaceuticals, human vaccines, animal care
4	Novo Nordisk	Bagsværd	€ 8,154 mil	32,500	Pharmaceuticals, diabetes care, hormone therapy
5	AstraZeneca	Södertälje	€ 7,074 mil	62,700	Pharmaceuticals, inhibitors, anaesthesia drugs

Source: Own elaboration.

Table 4 The SVA of GlaxoSmithKline in 2010.

	Resource r (t)	Return R (€)	Target T (€)	SVAr (€)
CO2-emissions	6,900,000 (estimated)	33,841 mil	25,758 mil	8,083 mil
NOx-emissions	n.a.	n.a.	n.a.	n.a. mil
SOx-emissions	n.a.	n.a.	n.a.	n.a. mil
Waste generated	361,000	33,841 mil	3,539 mil	30,302 mil
Water used (m3)	18,700,000	33,841 mil	991 mil	32,850 mil
VOC-emissions	2,700	33,841 mil	5,541 mil	28,300 mil
SVAT		**24.9 bn**		
Return to Cost Ratio		**3.78 : 1**		

Source: own analysis based on GSK (2011) and publicly enclosed data.

tor feedback), changes in operations (for products and markets, see also Ansoff matrix), existing and proposed legislation and public opinion supported by media communication (GlaxoSmithKline, 2011). We recommend providing stakeholders with LCA outcome. We express our support to apply this assessment further on to whole product lines.

The corporation also tries to reduce the full environmental footprint of the products. According to the environmental sustainability goals the value chain should be carbon neutral by 2050. This has to be achieved through disaggregated goals presented as reduced both carbon footprint (by 25 %) and water usage (by 20%) by 2020 in comparison to 2006 (GlaxoSmithKline, 2011).

Other environmental practice in the corporation is its requirement on potential new critical suppliers to fulfil standards on environment, health and safety issues (GlaxoSmithKline, 2011). LCA confirmed the necessity to recognize the responsibility of suppliers through grants into green chemistry as 40% of GSK's carbon footprint results from its supply chain (GlaxoSmithKline, 2011). GSK (2011) plans to reduce overall carbon footprint across the value chain by 10% by 2015 compared to data from 2010 report. We wish GSK to meet this number.

3.2 Novartis Pharma

Novartis Pharma (henceforth Novartis) was established in 1996 through the merger of Ciba-Geigy and Sandos. It operates globally with its headquarter in Basel. Novartis is active in research and development of medicaments and is a part of 2010 UN Global Compact Communication on Progress principles on environment. From all analysed inputs, Novartis is the worst off in water used (Table 5).

Furthermore, of our entire sample it uses the greatest amount of water as a resource, mostly for cooling purposes (Novartis, 2012). Cooling is required for the control of fermentation processes and for air conditioning mechanisms in offices.

In the corporation, water is acquired twofold. Around 28 per cent of water is purchased and other 72 per cent is abstracted from groundwater wells (Novartis, 2012).

Self-induced target for water efficiency for 2011 (4% improvement of 2010 figures) was not met, moreover, the efficiency even declined. For 2012, the target remains unchanged as water efficiency should increase by mentioned 4% in comparison to 2010 (Novartis, 2012).

From actual emissions, carbon dioxide shows the worst results. The corporation committed itself to re-

Table 5 The SVA of Novartis in 2010.

	Resource r (t)	Return R (€)	Target T (€)	SVA_r (€)
CO_2-emissions	1,509,910 (*estimated*)	26,663 mil	5,636 mil	21,027 mil
NO_x-emissions	313	26,663 mil	605 mil	26,058 mil
SO_2-emissions	82	26,663 mil	258 mil	26,405 mil
Waste generated	279,830	26,663 mil	2,743 mil	23,920 mil
Water used (m^3)	90,900,000	26,663 mil	4,817 mil	21,846 mil
VOC-emissions	1,521	26,663 mil	3,121 mil	23,542 mil
SVA_r		**23.8 bn**		
Return to Cost Ratio		**9.31 : 1**		

Source: own analysis based on Novartis (2012) and publicly enclosed data.

duction of CO_2 emissions from vehicle by using 1,315 hybrid gasoline-electric cars and 99 fuel efficient cars (thanks to filtered diesel engines) and switching to liquid natural gas or bio-fuels as propellants (Novartis, 2012). Yet, we do not agree with incorporation of biofuels since it does not bode well with green economy principles. Firstly, they need huge amount of water for their growth and secondly, instead of their outplanting other crops supposed for eating (such as wheat) could have been sowed. Thirdly, biomass results in SO_x and NO_x air pollution.

3.3 Sanofi

In August 2004, Sanofi-Synthelabo acquired Aventis, while the takeover was accomplished in December 31st of that year, giving birth to sanofi-aventis. On May 6th 2011, sanofi-aventis simplified its name to Sanofi.

As can be seen in Table 6, Sanofi's most problematic emission is carbon dioxide. These emissions are generated during manufacturing of medicines. Other factors causing this status quo are steam and hot water as auxiliary production factors, as well as business related tasks, *e.g.* transport of goods, business travel, employee commuting, organization of seminars, etc. The corporation set the goal of carbon dioxide decrease as 15% reduction by the end of 2013.

In VOC area, other sore subject of Sanofi's sustainable value added, in 2010, Sanofi placed bio filter into production instead of thermal oxidation processes. For several years, the corporation has developed new formulas for aqueous solution replacing those creating VOC. Therefore, it was possible to decrease annual VOC-emissions (Sanofi, 2011).

Water use accounts for average results in SVA generation. Sanofi (2011) states it consumes water during various stages of industrial processes (fermentation, vaccine manufacturing), for cleaning and cooling. The measurements for water decrease are in the corporation seen in closed-loop cooling facilities and recycling technology (especially in plants with high risk of water scarcity such as in Turkey or in Africa).

3.4 Novo Nordisk

Novo Nordisk manufactures pharmaceutical products and services. Since 1989, when it was established by a merger of two Danish companies, it has become one of the world's leading companies in diabetes care pursuing research into pulmonary delivery systems and insulin pump systems, hormone replacement therapy, autoimmune and chronic inflammatory diseases using state-of-the-art technologies such as translational immunology and monoclonal antibodies.

Table 6 The SVA of Sanofi in 2010.

	Resource r (t)	Return R (€)	Target T (€)	SVAr (€)
CO2-emissions	1,211,411	11,105 mil	4,522 mil	6,583 mil
NOx-emissions	370	11,105 mil	715 mil	10,390 mil
SOx-emissions	39	11,105 mil	123 mil	10,982 mil
Waste generated	230,843	11,105 mil	2,263 mil	8,842 mil
Water used (m3)	55,818,172	11,105 mil	2,958 mil	8,147 mil
VOC-emissions	2,058	11,105 mil	4,224 mil	6,881 mil
SVAT		**8.6 bn**		
Return to Cost Ratio		**4.44 : 1**		

Source: own analysis based on Sanofi (2011) and publicly enclosed data.

Table 7 The SVA of Novo Nordisk in 2010.

	Resource r (t)	Return R (€)	Target T (€)	SVAr (€)
CO2-emissions	158,000	8,154 mil	590 mil	7,564 mil
NOx-emissions	121	8,154 mil	234 mil	7,920 mil
SO2-emissions	119	8,154 mil	375 mil	7,779 mil
Waste generated	20,565	8,154 mil	202 mil	7,952 mil
Water used (m3)	2,047,000	8,154 mil	108 mil	8,046 mil
VOC-emissions	n.a.	8,154 mil	n.a.	n.a.
SVAT		**7.8 bn**		
Return to Cost Ratio		**27.00 : 1**		

Source: own analysis based on Novo Nordisk(2011) and publicly enclosed data.

The calculation of both the SVA and Return to Cost Ratio for 2010 can be seen in Table 7.

Novo Nordisk has been focusing on its use of resources, emissions and waste since 1975. Since 2002, the corporation has been reporting its environmental performance in accordance with the GRI Sustainability Reporting Guidelines.

The corporation states (Novo Nordisk, 2011) that more emphasis will be placed on pollution prevention through sustainable design of processes and products. The principles of sustainable development resonate well with the philosophy upon which Novo Nordisk was founded – and it showed in our results, too.

The Return to Cost Ratio can be interpreted along these lines (Figge and Hahn, 2004a): In 2010, Novo Nordisk should create € 1 of value added from analysed environmental components. Instead, it created € 27 and therefore generated positive SVA. In comparison to other analysed corporations, Novo Nordisk generated low operational revenues. On the other hand, its use of environmental resources has shown low figures, too. Therefore, Novo Nordisk is shining example for other corporations as how to use resources effectively and efficiently.

3.5 AstraZeneca

AstraZeneca was formed in April 6th1999 through the merger of Astra AB (Sweden) and Zeneca Group PLC (United Kingdom). Key products focus on pharmaceuticals, agrochemicals and treatment of oncology, cardiovascular and respiratory diseases, central nervous system disorders, anaesthesia and other diseases. The products are manufactured in 19 facilities located in 15 countries all over the world.

From all analysed companies, AstraZeneca shows the least value created by VOC. They are important because they create photochemical ozone in troposphere but VOC-emissions lead to smog and other negative effects on both human health and environment, as well. The corporation has set no particular target in this area. We recommend to look after VOC-emissions and maybe to categorise them to halogenated and non-halogenated to manage them appropriately.

However, AstraZeneca aims to reduce its footprint by 20% till 2015 when compared to 2010 baseline (AstraZeneca, 2011).

AstraZeneca is successful in water management, evident also in sustainable value created. Its actual target is to reduce absolute water use by 25% by the end of 2015 compared to 2010 (AstraZeneca, 2011). This objective is very ambitious in contrast with competitive corporations of our analysis who seems to have problems with or at least show mediocre results in water use.

AstraZeneca manages waste very well, too. Targets to meet till 2015 are set like this: the half of waste generated should be recycled, recovered and reused and non-hazardous waste landfilled should decrease from current 23 per cent to 10 per cent. Both target values refer to 2010 data (AstraZeneca, 2011).

Its green chemistry initiatives include training of the staff in environmental issues.

3.6 Final results

The best corporation in creating positive SVA from the analysed companies turns out to be Novo Nordisk. With its return to cost ratio (result 27:1 explained in the section 3.4) the corporation far exceeds the competitors though the actual absolute amount of sustainable value created is the second lowest (€ 7.8 bn). In the second place is Novartis with RCR 9.31:1 and absolute amount of SVA € 23.8 bn. The third place is held by AstraZeneca (7.11:1) with the lowest absolute amount of SVA (€ 6.1 bn). In the fourth place of our ranking is Sanofi with RCR 4.4:1 and absolute level of SVA € 8.6 bn. The least successful corporation was GlaxoSmithKline, the corporation with the highest absolute level of SVA

Table 8 The SVA of AstraZeneca in 2010.

	Resource r (t)	Return R (€)	Target T (€)	SVA_r (€)
CO_2-emissions	1,080,000 (*estimated*)	7,074 mil	4,032 mil	3,042 mil
NO_x-emissions	266	7,074 mil	514 mil	6,560 mil
SO_x-emissions	24	7,074 mil	76 mil	6,998 mil
Waste generated	44,000	7,074 mil	431 mil	6,643 mil
Water used (m^3)	4,000,000	7,074 mil	212 mil	6,862 mil
VOC-emissions	343	7,074 mil	704 mil	6,370 mil
SVA_T		**6.1 bn**		
Return to Cost Ratio		**7.11 : 1**		

Source: own analysis based on AstraZeneca (2011) and publicly enclosed data.

(€ 4.9 bn) but not so good in RCR (3.78 to one). We would like to emphasize the fact that all analysed companies generated positive SVA.

Nonetheless, we conclude that exceptionally good results in SVA achieved are from a greater part influenced not by effective and efficient use of resources but rather by good economic results. It is widely known that pharmaceuticals are neutral goods and the demand on them would be present regardless of economic situation of population. This fact alone causes that pharmaceuticals are sold with extremely high margin.

4. Discussion

As can be seen from brief description of each and every analysed company, the pharmaceutical industry (like any industry) is in Europe led by immense mergers and acquisitions. Besides ethical concerns resulting from pharmaceutical research practices, environmental concern should not be neglected. Moreover, environmental reports should be the DNA of pharmaceutical corporations. The environmental performance reports of leading European pharmaceutical corporations recognize their environmental duties in data enclosing on pollution prevention. Emissions and environmental impact of pharmaceutical corporations are influenced by solvent-based production. Pharmaceutical corporations affect environment in many ways, especially in water usage, waste and emissions resulting from production of active ingredients and the formulation of medicines, drugs or vaccines.

Corporations are aware of demands arisen from stakeholders‘ groups to implement technologies reducing waste, water and pollutants and therefore minimize negative environmental impacts. In return, corporations expect to gain competitive advantage in cost savings, increased efficiency and lesser environmental risks.

Beyond that, some issues are related to enclosing environmental data in not very great detail. Firstly, the non-transparency does not bode well with company‘s image built by eco-marketing strategies and secondly, undertaken actions declared by companies cannot be taken seriously while not backed up with hard data.

Conclusion

In the context of sustainable development it is imperative to widen financial perspective of business by other forms of capital, *i.e.* natural, man-made, social and human. Sustainable value added includes these various forms of capital. The analysis of corporate environmental performance with this approach provides soft factors expressed in hard numbers well understandable for managerial way of decision making.

The Achilles heel of this method is its disability to clearly define whether a company uses all forms of its capital in a sustainable way or not. This method just shows how much a particular company contributed to sustainability in comparison to a chosen benchmark.

Despite its obvious weakness, this method is applicable and has a great potential to be implemented in the real business world because it is novel from the way it is calculated. The novelty lays in value-based assessment of environmental impact. SVA is based on the rationale that emissions would be polluted in any case, the question is how much economic value (expressed by various economic categories) a producer delivers.

Further implementation of this method is needed both in macroeconomic and microeconomic analysis. The research has not been conducted in many companies, sectors or economies yet. This provides us with great opportunity to compare various economic entities from sector perspective, geographically and in a time span.

Green economy and sustainability principles could lead our world out of current economic and also ethical crisis to the brighter future. Tools for implementing these ideas are here, what we need is just heading the sea.

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