World Academy of Science, Engineering and Technology
International Journal of Economics and Management Engineering
Vol:5, No:11, 2011

Relation between Environmental Accounting and Pillars of rSustainability

P. Harazin, Gy. Horváth

***Abstract*—**There are four challenges of sustainable development and in corporate level sustainability management's role is to answer for ecological sustainability challenge, social sustainability challenge, economic sustainability challenges to environment and social management and integration challenge of corporate sustainable challenges by the help of different concepts, methods, instruments, which are in the toolbox of sustainability management. These instruments, concepts have different relevance in these challenges, and according to different literatures environmental management is outside of social and integration challenge. Main aim of this paper is to represent the answer for the question that: is it true that social and integration point of view is outside of the concept environmental accounting? Using literature review and primer research at the end of the paper the answer will be confirmed.

***Keywords*—**Corporate social responsibility, Environmental accounting, Integration, Sustainability management

I. Introduction

CONSEPT of sustainable development –which meets the needs of the present without compromising the ability of future generations to meet their own needs – with the pillars – environmental, social and economic – are destined to be a solution in a world which is famous for news about economic crisis, poverty and melting icebergs. But it is true that the concept is not enough, there should be actions behind the concept. Furthermore these actions have to concern the complex system of ecology-economy-society, so the concept has to be integrated into the entire sphere of life, so it is a component of politics, society and economics.

Sustainable development became officially important in the life of international companies in 1991 when the International Chamber of Commerce prepared the Business Charter for Sustainable Development which was accepted by the 2nd Worldeconomic Conference in Paris. This Charter contained 16 basic principles which's achievement helps the companies improving their environmental performance, improving the used management tools, achieving the continuous measurement, review and evaluation processes and reporting in a correct way [1].

II. Sustainability Management

It is important that the environmental protection crossed the threshold from being a technological problem to becoming an economic challenge and opportunity in a business life, which requires planning, organizing, leading and controlling from corporations. Sustainability (environmental) management which is – on the one hand – an institutional issue, can integrate the social and economic aspects in the conventional business management processes which is – on the other hand – the functional issue of sustainability management. Institutional issue means that sustainability management is an organizational structure within the business enterprise to achieve several functional issues [2].

As it was mentioned in case of the concept of sustainable development, actions have to concentrate to the three pillars of sustainability. In case of sustainability management also have to take into account all of the three pillars, so have to account with ecological, social and economic issues.

Proving the attendance of the three pillars there are challenges defined for organizations to reach the sustainability. Sustainability management's role is to answer for these challenges by the help of different concepts, methods, instruments, which are in the toolbox of sustainability management. First challenge is the ecological challenge, which's aim is to reducing the environmental impacts caused by corporate actions, so improving the ecological effectiveness of these actions. Second challenge is the social challenge, which takes into account and reduces the social impacts of corporate actions, and also an aim is the improvement of social effectiveness. The third challenge is called 'economic challenge to environmental and social management', which challenge increases the eco-efficiency and improves the social efficiency. Furthermore this challenge is in connection with profit oriented business operations, so in this challenge economic purposes (increase the value of the business, make profit, minimize operating costs) are combined with environmental and social point of views [2].

There is one more challenge, which is the fourth challenge, the challenge of integration. This challenge means the simultaneous treat of the above mentioned three challenges and also means the methodological integration of concepts and tools of environmental and social management in conventional, economically oriented management. Summarizing the importance of three pillars of sustainable development in case of management, business actions, "the aim of sustainability management is an integrated approach to ecological, social and economic aspects" [2].

Fig. 1 shows the system which is confronted the business enterprises with the objective of sustainable development: four challenges and the results/aims.

P. Harazin is with the Department of Environmental Economics, Budapest University of Technology and Economics, Budapest, Hungary (phone: +36-1-463-3155; e-mail: harazin@eik.bme.hu).

Gy. Horváth is with the Department of Environmental Economics, Budapest University of Technology and Economics, Budapest, Hungary (phone: +36-1-463-3155; e-mail: george@eik.bme.hu).

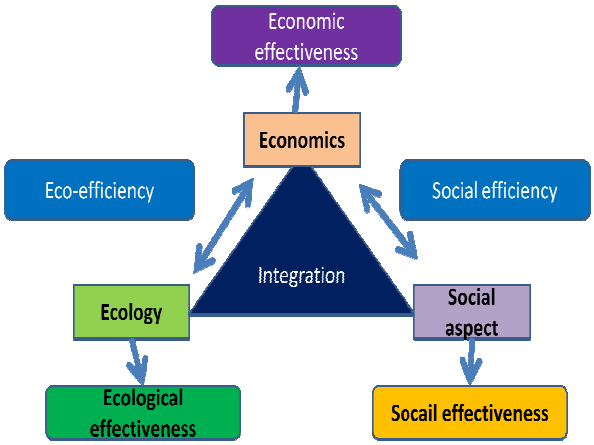

Fig. 1 System of four sustainability challenges [2]

III. Instruments And Concepts According To Sustainability Challenges

Sustainability management's role is to answer for ecological sustainability challenge, social sustainability challenge, economic sustainability challenges to environment and social management and integration challenge of corporate sustainable challenge by the help of different concepts, methods, instruments, which are in the toolbox of sustainability management. These concepts and instruments have different roles depending on that which chosen pillar of sustainability, which chosen challenge they answer to.

Concepts and instruments in case of ecological challenge help to improve corporate ecological effectiveness (degree of absolute environmental soundness) with reducing the environmental impacts created by corporate actions. Concepts and instruments improve the social effectiveness (degree of absolute social soundness) in case of social sustainable challenge by reducing socially undesirable impacts and promoting socially desirable impacts. "Concepts and instruments that improve the ratio of value added to environmental impact added or social impact added help to increase the eco-efficiency or social efficiency of a business enterprise" [2]. (Eco-efficiency and social efficiency means the ratio of added value to added impact.)

After the national and international literature review (secondary research) it has to be clear that there are several concepts and instruments which can help for sustainability management, and it also has to be clear that these have different weighted relevance in the challenges, in the pillars of sustainability. Also can be a fact that primer researches show the same property of these concepts and instruments, therefore these results will be presented in the next chapter.

Just to understand the different weighted relevance there are some examples in Table 1 for pairing concepts and instruments with sustainability challenges.

In this paper there is a chosen concept, instrument which is examined according to the challenges, pillars of sustainability. This is the environmental accounting.

First of all (before defining environmental accounting) it is important in this chapter to analyzing according to international literature review that how environmental accounting – connecting (mentioned) concept and instruments – can be paired with the challenges, pillars. This pairing is summarized in Table 2.

TABLE I
Concepts and Instruments with Sustainability Challenges [2]

	CHALLENGES			
CONCEPT/ INSTRUMENT	Ecological	Social	Economic	Integration
Accounting	partly oriented		largely oriented	
Environmental Management System	largely oriented		partly oriented	partly oriented
Sustainability Balanced Scorecard	partly oriented	partly oriented	largely oriented	largely oriented
Audit	largely oriented	largely oriented	partly oriented	
Indicator	largely oriented	partly oriented	largely oriented	partly oriented

TABLE II
Concepts and Instruments Connected to Environmental Accounting, with Sustainability Challenges [2]

	CHALLENGES			
CONCEPT/ INSTRUMENT	Ecological	Social	Economic	Integration
Accounting	partly oriented		largely oriented	
Control	largely oriented		largely oriented	
Cost Accounting	partly oriented		largely oriented	
Material Flow Accounting	largely oriented			
Material Flow Cost Accounting	largely oriented		largely oriented	
Social Accounting		largely oriented	partly oriented	

It is important to mention that these are the arbitrarily chosen methods which have a function in connection with environmental accounting. Examining the Table 2 there is an important consequence: there is less importance of social challenge and no relevance of integration challenge in connection with the chosen, mentioned concepts, instruments. And therefore an answerable question is definable: is it true that social and integration point of view is outside of the concept environmental accounting? Main aim of this paper is to represent the answer of this question, but before should see some results from primer researches to strengthen the relevance of challenges, pillars of sustainability, especially the integration challenge.

IV. Performance Evaluation According to Sustainability Challenges

There are some results from primer researches which can strengthen the importance of fourth sustainability challenge of sustainability management, which is the integration. In this aspect it is a proved that there is an opportunity for corporations to use integrated solutions for evaluation of their performance. In other words it is a proved fact the evaluation of different capitals, which are really important capitals of competitiveness in these days, can be integrated. In the background of integration there is a fact that these capitals, which are the intellectual, environmental and social capitals, have common characteristics and there are common problems in connection with evaluation, performance evaluation. These common things allow integrating the methods, and especially allow integrating the new point of views into economically oriented management methods. Just a good example for integration, for common evaluation is a Sustainability Balanced Scorecard, which was also mentioned in Table 1 [3].

It can be an integrated model for the evaluation, because the normal Balanced Scorecard (BSC) measures the performance of the organization in a correct way, because it evaluates from different point of views. BSC is a complex performance evaluating system, so it is able to join the different fields of corporate performance, in this way the BSC is good to measure the environmental activities, the intellectual, immaterial capital and social actions too. Harangozó [4] suggests the implementation of environmental, social aspect to the scorecard system, and call it Sustainability Balanced Scorecard (SBSC). Using different secondary researches a model for implementing SBSC can be created [5]-[6]. This model represents the usability of integrated evaluation, and how it is able to define indicators to measure the environmental and other performance of the organization. So with the steps, SBSC can break down the strategy and can measure it with indicators, so the organization can evaluate the performance in point of environmental and social aspects and impacts, so can evaluate the environmental and the social performance too.

Just to improve and explain the importance of common, integrated evaluation, the method of indicators also has to be mentioned in this chapter. Method of indicators is a most known instrument in performance evaluation, because with the help of indicators the performance, the effectiveness can be traced continuously. There are also indicators in case of intellectual, environmental and social performance evaluation, so the method of indicators also strengthens the opportunity of common, integrated evaluation.

Primer research also confirms the opportunity of integration which was made in connection with new, up-to-date tools of performance evaluation. As was it mentioned intellectual capital is one of the most important capitals of competitiveness. However there is a failure of traditional performance evaluation methods, because these can't show the real value of intellectual, immaterial capital.

According to professors of Cranfield School of Management, the intellectual capital is the topmost recourse, which is the leader aspect of the organizational value system. But the traditional financial system cannot show to the managers and investors that how the capital can produce value in the future. So, this is why should be special interest of intellectual capital's evaluation, and the result from this is the information about the future opportunities [7].

Sveibys' work also confirms the failure of traditional financial accounting in case of intellectual capital, because it completes the balance sheet with different elements, which can show the value of the intellectual capital. This completed balance sheet is called invisible balance sheet, because it shows the value under the surface, under the visible part of value. The invisible intangible assets part of the balance sheet can be classified as three families: Internal structure, External structure and Individual competence. In the liabilities side there are two classes, the Invisible Equity and the Market Value [8].

There are many of the new, up-to-date methods, which are able to evaluate the intellectual capital in a correct way. There is two groups of it. In the first one there are methods of the evaluation where the capital is expressed monetary. The second one is the group of scorecard methods, which measures the performance from different aspect. Indicators are defined in scorecards, but it is hard to find the best indicators, because these should be measureable, enough, easy to define, cost-effective and be able to measure the performance time to time. All of these methods can help to eliminate the failures and faults of the traditional methods, and the evaluation can be concentrated into the intellectual capital.

Why is it important in this case? Because primer research has showed that these methods, especially scorecard methods are able to admit new aspects, new pillars, so the integration challenge is realizable in the case of these methods.

V. Environmental Accounting

Examining the sustainability challenges in case of environmental accounting can be an interesting field. As was it mentioned not all of the sustainability challenges have relevance in case of environmental accounting and other connecting tools, methods. That's why there is a need to examine this situation and make consequences. First of all it is important to define the concept of environmental accounting.

There are many alternative definitions for environmental accounting, but broadly defined is the identification, collection, analysis, and use of two types of information for internal decision-making. These two types are physical and monetary information.

Just a bit explained it is the totality of Environmentally Differentiated Traditional Accounting and Ecological Accounting. In case of Environmentally Differentiated Traditional Accounting the main aim is the internalization of externalities, is to measure in monetary dimension the environmentally inducted monetary impacts. Ecological Accounting measures the ecological impact, and generates physical data for decision makers. There are main differences between these. The differences are in the focus point, source of information, purposes of generated information and measures (quantity, quality and monetary units) [9].

"Steel and Powell (2002) define environmental accounting as the identification, allocation and analysis of material streams and their related money flows by using environmental accounting systems to provide insight in environmental impacts and associated financial effects" [10].

It is important to mention the sub-system of environmental accounting, which is the monetary environmental management accounting, and it deals only with the financial impacts of environmental performance and allows to better evaluation the monetary aspects of products and projects during the decision making process [11].

According to Jasch environmental management accounting "represents a combined approach which provides for the transition of data from financial accounting, cost accounting and material flow balances to increase material efficiency, reduce environmental impact and risk and reduce costs of environmental protection...has a financial as well as physical component" [12].

After the definitions which can lighten the meaning of environmental accounting it can be an interesting question, that why companies should use it. The answer is that the system of environmental accounting can help to justify the cleaner production projects and identify new ways of saving money and improving

environmental performance at the same time. It is also important that it multiplies the benefits gained from other environmental, sustainability management tools [11].

Which also an important characteristic in connection with environmental accounting is that helps in decision-making, it is metrics for international decision-making include physical metrics (for material and energy consumption, flows, and final disposal) and monetary metrics (for costs, savings, and revenues related to activities with a potential environmental impact) [12].

VI. Environmental Accounting According to Sustainability Challenges

As was it examined in the Table 2, there is less importance of social challenge and no relevance of integration challenge (between the sustainability challenges) in connection with the chosen, mentioned concepts, instruments of environmental accounting. Therefore an answerable question was defined that is it true that social and integration point of view is outside of the concept environmental accounting.

To answer the question, there were more steps during the research. Firstly there was a primer examination between the social challenge and corporate social/stakeholder responsibility (CSR) and there was an examination of national and international literatures to mapping the relation between CSR and environmental accounting. To improve this concept there was a primer examination that how environmental accounting helps the CSR performance evaluation according to the logic of ISO 26000. At final, to answer the question of integration challenge, there was a primer examination in connection with method of indicators. At the end of the research consequences was made and also was examined that how the environmental accounting can reach the "five actions to better measure progress in a changing world".

VII. Examination of the Relation Between Sustainability Challenges and Environmental Accounting

Social challenge takes into account and reduces the social impacts of corporate actions, and also an aim is the improvement of social effectiveness (degree of absolute social soundness). According to experts there is a strong relation between the corporate social responsibility (CSR) and the financial performance of the corporation, in addition CSR also can help to achieve the competitiveness for a long run. There is a symbiotic where the corporation and social organizations help each other reciprocally to achieve their aims, goals [13]-[14]-[15]. Therefore it can be a fact that during the examination CSR can be the substitute concept of social challenge.

Usage of the traditional financial and accounting methods is possible in case of CSR, because the review of costs and benefits of CSR activities allows measuring the financial efficiency of these activities. According to Sprinkle and Maines "the heart of accounting is measurement", however it is difficult to measure the costs and benefits of CSR activities. There are some problems: costs are hidden in the category of general costs and benefits are not emphasized. There are more problems in connection with reviewing in the work of Sprinkle and Maines, like that "other costs should be considered, but may be rather difficult to estimate" [17].

There was a claim for an international standard in connection with corporate social responsibility in 2001. Reaching this claim the process started with commission works, multi-stakeholder conferences and stakeholder involvement. In 2005 was formed the work-group, to work out the international standard, which introduces the main guidelines of social responsibility and which is usable for non-experts too. 2010 was the publishing date of the standard, which is the ISO 26000:2010(E) Guidance on social responsibility. This standard is useful to all types of organizations in private, public and non-profit sectors, whether large or small, and whether operating in developed or developing countries. It is providing guidance does not contain requirements but may contain recommendations and it is not a management system standard, so it can't be certified. It defines the principles of social responsibility, the two fundamental practices of social responsibility, the core subjects, the way of integration throughout on organization and examples of voluntary initiatives and tools [18].

It is important to mention the ISO 26000 standard because there was made an integrated model in connection with performance evaluation of CSR. This model shows the relationship between the ISO 26000 and existing CSR evaluating direct and indirect methods. There is a relationship between the accounting, environmental accounting in this model. This relationship is the result of the primer examination which can be one of the answers for the main question of this paper: environmental accounting can produce information for CSR performance evaluation which relationship only depends on what kind of data should be collected and what kind of data of costs and benefit are available in a trustable way.

To answer the question in connection with integration challenge, again have to go back to the relevance of indicators. Method of indicators can make an integration approach for environmental accounting. Indicators from general accounting system are usable in case of ecological, social and economic challenge for measuring efficiency and effectiveness. And it is also true that generated indicators by environmental and social performance evaluation also can be integrated into the economic evaluation, into conventional, economically oriented management.

Just to prove all of the before mentioned, especially the integration challenge in case of environmental accounting, accounting there was a final examination. There was prepared a Communication in 2009 from the Commission of the European Communities to the Council and the European Parliament in the topic of GDP and beyond GDP measuring progress in a changing world. In this document there is a discourse that the GDP is not able to measure the environmental sustainability and the social integration. Before the born of this document, in November 2007, the European Commission (together with the European Parliament, the Club of Rome, the WWF and the OECD) organised the Beyond GDP conference, which revealed strong support from policy-makers, economic, social and environmental experts and civil society for developing indicators that complement GDP and aim to provide more comprehensive information to support policy decisions. According to this conference the document of the commission identifies a number of actions that can be taken in the short to medium term. The overall aim of it is to develop more inclusive indicators that provide a more reliable knowledge base for better public debate and policy-making. The Commission intends to cooperate with stakeholders and partners to develop indicators that are internationally recognised and implemented [19].

Among others this document contains five actions to better measure progress in a changing world. The Table 3 contains the five actins and the summary of these actions.

TABLE III
FIVE ACTIONS TO BETTER MEASURE PROGRESS IN A CHANGED WORLD AND NOTES [19]

FIVE ACTIONS TO BETTER MEASURE PROGRESS IN A CHANGING WORLD	NOTES
Complementing GDP with environmental and social indicators	Complementing GDP with environmental and social indicators; the Commission services intend to develop a comprehensive environmental index and improve quality-of-life indicators
Near real-time information for decision-making	The Commission will aim to increase the timeliness of environmental and social data to better inform policy-makers all across the EU; more timely environmental indicators; more timely social indicators
More accurate reporting on distribution and inequalities	To foster exchange of experience between Member States, the Commission reports on a set of indicators agreed with Member States, to inform policy-makers about income disparities and particularly about the situation at the lower end of the income scale.
Developing a European Sustainable Development Scoreboard	It sets as a key objective to respect the limits of the planet's natural resources.
Extending National Accounts to environmental and social issues	The national accounts will be complemented with integrated environmental-economic accounting that provides data that are fully consistent; integrated environmental-economic accounting; increasing use of existing social indicators from national accounting

TABLE IV
RELATION BETWEEN FIVE ACTIONS AND ENVIRONMENTAL ACCOUNTING

FIVE ACTIONS TO BETTER MEASURE PROGRESS IN A CHANGING WORLD	Characteristics	Relationship with Environmental Accounting
Complementing GDP with environmental and social indicators	New indicators: environmental indicators and social indicators	With physical and monetary data it is able to produce indicators which can measure the environmental and social point of views
Near real-time information for decision-making	Current	General accounting produces data time to time. Physical and monetary data can be current.
More accurate reporting on distribution and inequalities	Accurate reporting - especially in field of social responsibility	Reporting is one of the roles of accounting and envronmental accounting too. There are methods and indicators for reporting.
Developing a European Sustainable Development Scoreboard	Measuring, evaluating, reviewing	Data availability time to time helps in countinous measurement and evaluating.
Extending National Accounts to environmental and social issues	Environmental and socail aspects in the economic tools	With the help of indicators integration is possible.

In spite of these actions apply to macroeconomic level; there can be a relation between these actions like characteristics, requirements and environmental accounting in microeconomic level. The next table, Table 4 shows the interpretation of actions like characteristics and also the relationship of these with environmental management.

VIII. CONCLUSION

Examining the content of the Table 4 conclusions can be defined: environmental accounting can reach the five actions of Commission, so it can be a real instrument in the better measurement. These five actions are in connection with concept of sustainability, because all of the pillars of sustainability appear on it. Environmental accounting can be related to these actions, so can be related to the pillars of sustainability, to the sustainability challenges.

It also can be a conclusion and also an answer for the main question of this paper that environmental accounting cannot be outside of the social and integration challenge of sustainability. This answer is confirmed by literature review and primer research, and also was strengthened by the help of five actions to better measure progress in a changing world. Like a summary there is a fact the environmental accounting is an instrument of sustainability management which helps for the management in case of ecological, social, economic and integration challenge too in a world which is famous for news about economic crisis, poverty and melting icebergs.

ACKNOWLEDGEMENT

This work is connected to the scientific program of the " Development of quality-oriented and harmonized R+D+I strategy and functional model at BME" project. This project is supported by the New Széchenyi Plan (Project ID: TÁMOP-4.2.1/B-09/1/KMR-2010-0002).

REFERENCES

[1] K. Kósi, L. Valkó, Environmental management, Printed in Hungarian language, Typotex Kiadó, Budapest, 2006.
[2] S. Schaltegger, C. Herzig, O. Kleiber, J. Müller, Sustainability management in business enterprises, BMU/BDI (Eds.) Lueneburg, 2002.
[3] K. Kósi, P. Harazin, Evaluating intellectual and environmental capital – the whats and hows – performance evaluation in the information era. INTERNATIONAL JOURNAL OF MANAGEMENT CASES 13:(4) pp. 233-241. 2011.
[4] G. Harangozó, Methods of environmental performance evaluation, Vezetéstudomány, 2008. 39. évf. 2. sz., 2008. p. 46
[5] K. Hársvölgyi, Z. Bokor, L. Csillag, Practical adaptation of Balanced Scorecard (BSC), Vezetéstudomány, 2002 2. sz.
[6] E. Szegedi, Experiences in connection with implementation of Balanced Scorecard, Minőség és Megbízhatóság, 4. 2003.
[7] J. Mouritsen, P.N. Bukh, B. Marr, Reporting on intellectual capital: why, what and how? 2004. www.som.cranfield.ac.uk, Downloaded: November, 2009
[8] K.E. Sveiby, The "Invisible" Balance Sheet. 1997, 1998, 2001. http://www.sveiby.com/articles/InvisibleBalance.html, Letöltve: 2011. január
[9] S. Shaltegger, Accounting for eco-efficiency In: P. Bartelmus, E. Seifert, Green Accounting, Aldershot: Ashgate, Reprinted. 2003.
[10] P. Beer, F. Friend, Environmental accounting: A management tool for enhancing corporate environmental and economic performance, Ecological Economics 58 (2006) 548-560
[11] UNIDO, United Nations Industrial Development Organization: Introducing Environmental Management Accounting at Enterprise Level, Methodology and Case Studies from central and Eastern Europe. http://unipub.lib.uni-corvinus.hu/223/1/Robertacsutora.pdf

[12] Ch. Jasch. The use of environmental management accounting (EMA) for identifying environmental costs, Journal of Cleaner Production 11 (2003) 667-676
[13] A.P. Steele, J.R. Powell, Environmental accounting: application for local authorities to quantify internal and external cost of alternative waste management strategies. Environmental Management Accounting Network Europe, Fifth Annual Conference, Gloucestershire Business School, 11/12 February 2002.
[14] J. Szlávik, H. Csáfor, M. Csete, N. Csigéné Nagypál, M. Füle, T. Pálvölgyi, Corporate Social Responsibility, in Hungarian language: A vállalatok társadalmi felelősségvállalása. CompLex Kiadó Jogi és Üzleti Tartalomszolgáltató Kft., Budapest, 2009.
[15] E.M. Porter, M.R. Kramer, The competitive advantage of corporate philantrophy. Harward Business Review, December (2002) 56-58.
[16] A. Chikán, Corporate competitiveness and social responsibility, in Hungarian language: Vállalati versenyképesség és társadalmi felelősség, Harvard Business Review Hungarian edition, November (2008) 6-13.
[17] G.B. Sprinkle, L.A. Maines, The benefits and costs of corporate social responsibility. Business Horizons, Kelley School of Business, Indiana University, 53, pp. 445-453
[18] ISO 26000:2010(E) Guidance on social responsibility, The Standard is Available on the Budapest University of Technology and Economics, Department of Environmental Economics
[19] COM (2009) 433: COMMUNICATION FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT; DP and beyond Measuring progress in a changing world; http://eur-lex.europa.eu; Downloaded: sept. 2011.