A NEW SYNERGIC INSTRUMENT FOR SUSTAINABLE INVESTMENTS VALUATION[1]

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Abstract

This article deals with an original proposed benchmark instrument useful in selecting investment projects, called The Circular Synergic Benchmark (CSB) graph. It is proposed to be used in Project Management and in other Management activities. Compared with the other graphs or benchmark instruments, this instrument allows for one single view to have a complete image of good and bad aspects of economic, technical, social, and environmental issues of two or more projects in order to chose the best one.

Keywords: life-cycle assessment, environmental management syste, life cycle thinking, circular synergic benchmarks

[1] This article is based on Cristian Silviu Bănacu's MA dissertation *A New Synergic Instrument for Sustainable Investments Valuation* presented within the framework of the Interdisciplinary Master Programme "English Language Education and Research Communication for Business and Economics", ASE Bucharest, 2008, having .Dr. Cristina Neesham as academic supervisor.

Introduction

The growing awareness and the need to reduce the environmental impact of products, processes and activities in industry identifies Life-Cycle Assessment (LCA) as a significant managerial tool in assisting strategic planning and decision making. LCA is a support tool for implementing Environmental Management System (EMS) and Life Cycle Thinking (LCT) in companies.

The success of LCA implementation in (product) companies depends on how the information regarding four important factors (economic, technical, environmental and human-social) are received and understood by top management. If the data presentation is concise and time-efficient and interrelates the four factors, the efficiency of the company management is improved and the time spent between decision making and implementation is reduced.

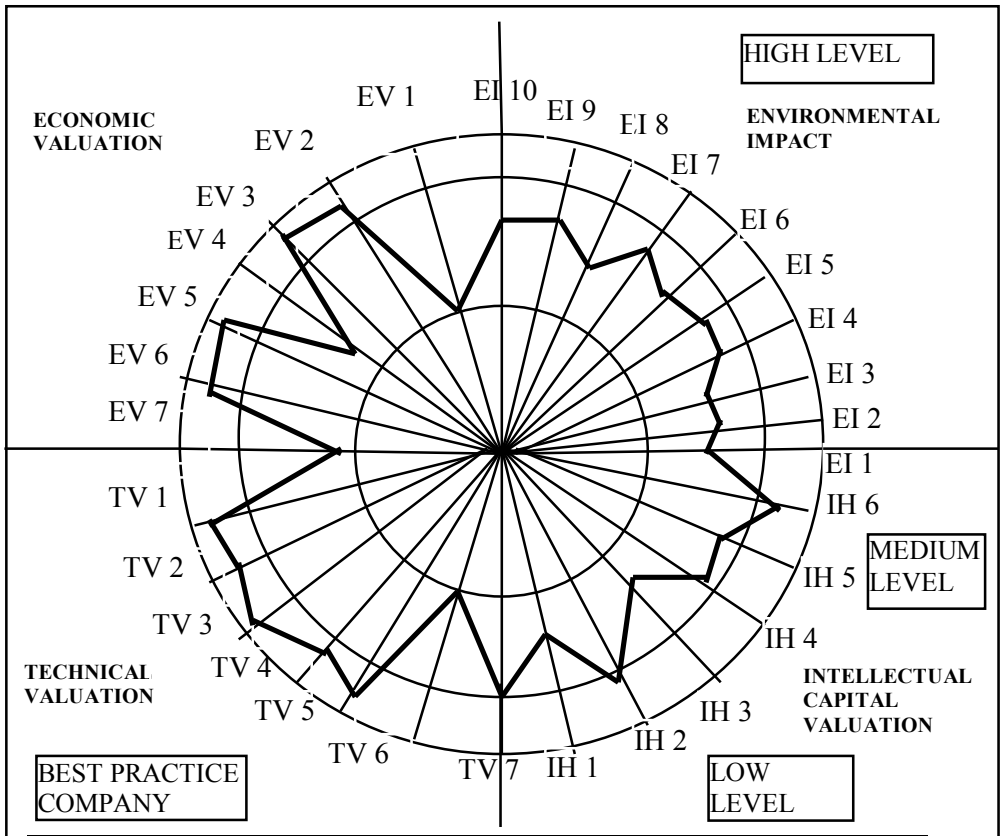
This paper presents the application of Circular Synergic Benchmarks (CSB) to the integrated management of business processes according to criteria of environmental impact (resource depletion and pollution), economic valuation, technical valuation and intellectual capital. This integrated valuation offers a systematic and consistent instrument for the multidimensional assessment of products across industries.

The instrument

The new information technologies e.g. computers and specialised programs used by the product companies allow the fast synthesis and the aggregation of different various data covering the four factors (economic, technical, environmental, human-social) which, the top management are usually using in decision making processes.

Therefore, there is a need for an instrument capable to aggregate data from the four factors and to relate these data to product life cycle at the level of the stage for which the company is specialised. A CSB graph is presented in Figure 1.

This instrument brings together in a single image information obtained from different departments within the product companies: management, human resources, marketing, technology, environment, production, legal, accounting, purchasing, business development, distribution, communication.



	ENVIRONMENTAL IMPACT		
	RESOURCE DEPLETION		
EI 1	Depletion of non-renewable resources	EV 6	Value added
EI 2	Depletion of renewable resources	EV 7	Material Stocks level
EI 3	Land use		**TECHNICAL VALUATION**
	POLLUTION	TV 1	Productivity
EI 4	Global warming	TV 2	Efficiency
EI 5	Ozone depletion	TV 3	Effectiveness
EI 6	Photochemical oxidant formation	TV 4	Quality
EI 7	Acidification	TV 5	Flexibility (Rate of change)
EI 8	Eutrophication	TV 6	Energy consumption
EI 9	Waste	TV 7	Complexity degree
EI10	Ecotoxicity		**INTELLECTUAL CAPITAL**
	ECONOMIC VALUATION	IH 1	Creativity
EV 1	Product value	IH 2	Market recognition
EV 2	Product / Project cost	IH 3	Nr of franchises
EV 3	Product / Project benefit	IH 4	Nr. of contracts/ Nr of sold products
EV 4	Depreciation	IH 5	Customer satisfaction
EV 5	Profit	IH 6	Empowerment and innovation

Figure1 The CSB (Circular Synergic Benchmark)[2] graph adapted after Balm (1992)

[2] CSB graph was developed by Cristian Silviu Banacu in 1996 at Chalmers University of Technology under the supervision of professor dr. Sten Bengtsson

It is considered that an eco-product must be: (1) economically profitable; (2) environmentally friendly; (3) technologically feasible; and (4) socially acceptable.

Therefore, the CSB graph has four quadrants correspondent to the four aspects that concern a company in relation to product life cycle: These are:

1. *Economic*: a company's reason for being is to obtain profit, to minimise the production costs, to have a better public image, to strengthen its position on the market. Costs, profits, depreciation of machinery are factors that influence the decision making of the product companies. Putting into a single chart these factors together with the environmental impact of the product at different stages of its life cycle and considering the technical and social aspects of production, the building company management will have a complete image of the feasibility of the product.

2. *Environmental*: reflects a company's need to adapt its production to the new environmental requirements. The environmental data for PLCC are obtained from LCA of the product. However, a formal modification will be made in the sense that the LCA data will concern the *stage* of the product life cycle, according to the company's profile. For example, if the field of activity of the company are the product works, if it repairs products. LCA that will be made, will be *specific* to this segment of the product life-cycle. That means that the stage "product in use" will be analysed separately from the whole life cycle, but following the LCA procedures (goal definitions and scoping, inventory, impact assessment, improvement assessment).
The analyses concern more indoor climate, energy consumption over the product usage, waste separation at source, CO emissions during construction works, etc.)

3. *Technical*: reflects the need of the company to improve its work efficiency and productivity in order to minimise the energy consumption together with the emissions of wastes and toxic gases; to improve the quality of products through quality of activities and processes; to leave room for innovation.

4. *Social* human needs: reflect the interest of the company into motivating its employees for an environmental behaviour; the learning organisation is transforming into an environmental educational organisation; Employees learn to have an environmental behaviour either by qualification courses about the environment performed by the company or by the nature of the job e.g. selective demolition, materials and product component parts recovery-recycle-reuse. The social aspect of environmental qualification resides on the fact that the employees will continue to have an environmental attitude also in their private life, which is good for society as a whole. Other aspects are related to the policy of the product companies to create jobs especially in new segments such as recycling, re-manufacturing of materials and products resulted from demolition.
The CSB has *axes* in each quadrant. The number of axes depends on the number of issues that the company management wants to have information about.

The chart has three levels: minimum (low); medium; and, high.

The chart presents the trend (resulted from analysis) for a specific aspect of the product during its life cycle, and not to give numerical data.

Therefore, it is understood that the results obtained are from different numeric analysis (economical, technical, environmental, social). However there has to be the possibility that the data be easy verifiable. Therefore the company could provide a system of indicators as is presented in Table 1.

Table 1 System of indicators for CSB graph
(Circular Synergic Benchmark created by Bănacu, 2009)

	ENVIRONMENTAL IMPACT		
	RESOURCE DEPLETION	MATERIALS; EMMISIONS	MEASURES
EI 1	Depletion of non-renewable resources		kg. Metter or MJ energy from fossil fuels
EI 2	Depletion of renewable resources		MJ energy from hydropower
EI 3	Land use		km^2 crop land or km^2 forest
	POLLUTION		
EI 4	Global warming	CO_2, CO	Global Warming Potential (GWP), CO_2 equivalent
EI 5	Ozone depletion		ozone depletion potential, (CFC 11) equivalent
EI 6	Photochemical oxidant formation		ethene equivalent
EI 7	Acidification	SO_2, Nox, HCl	H+ equivalent
EI 8	Eutrophication	Nox, NH_3, P	PO_4^{2-} equivalent
EI 9	Waste		Mass Units (M) e.g. kg waste and kg hazardous waste
EI10	Ecotoxicity		No Effect Levels (NOELS)
	ECONOMIC VALUATION		
EV 1	Product value		Monetary Units (MU)
EV 2	Product / Project cost		Monetary Units (MU)
EV 3	Product / Project Company benefit		Monetary Units, (MU)
EV 4	Depreciation		Monetary Units (MU), Time Units (TU), Physical Units (PU)
EV 5	Profit		Monetary Units
EV 6	Value added		Monetary Units
EV 7	Material Stocks level		Quantity, Volume, Mass measures (tonnes, m^3.nr.)
	TECHNICAL VALUATION		
TV 1	Productivity		Functional Units (FU) / Time Units (TU)
TV 2	Efficiency		Input / Output
TV 3	Effectiveness		Available Time / Effective Time
TV 4	Quality		Max(Usage Time) / Min (Time for Maintanance)
TV 5	Flexibility (Rate of change)		Life-time product 1 / Life time product 2
TV 6	Energy consumption		MJ / product, process
TV 7	Complexity degree		percentage
	INTELLECTUAL CAPITAL		
IH 1	Creativity		Nr. pattents / eco-products
IH 2	Market recognition		Nr. of recognized trade marks or brands
IH 3	Nr of franchises		
IH 4	Nr. of contracts/ Nr of sold products		Demand level
IH 5	Customer satisfaction		Nr. Of product sold / year
IH 6	Empowerment and innovation		Rate of innovation

The CSB graph is characteristic of management through objectives. Therefore, a best practice company is taken as a system of reference.

A best practice company is the company which is the most experienced in the field, obtaining maximum profit and having a good technological development, but at the same time having good results concerning environmental issues (energy consumption, pollution, depletion minimization).

If there is no other competitor with better results, the company could consider its own goals as a level of reference.

For different products with the same characteristics, it is possible to find the best alternative using a proper weighing.

An example of weighing is given in the Table 2. The weighing model presented here is purely illustrative. A proper weighing system has to be established by specialists, according to each category of importance for the company, and for society.

Table 2 A model of a weighing system for a CSB graph

	ENVIRONMENTAL IMPACT	**Weight**	**Scale (percentage)** **Low. Level Medium Level High. Level**
	RESOURCE DEPLETION	0.15	0 50 100
EI 1	Depletion of non-renewable resources	0.5	1= small 50 = medium 100 = large
EI 2	Depletion of renewable resources	0.5	1= small 50 = medium 100 = large
EI 3	Land use	0.5	1= small 50 = medium 100 = large
	POLLUTION	0.25	
EI 4	Global warming	0.10	1= small 50 = medium 100 = large
EI 5	Ozone depletion	0.5	1= small 50 = medium 100 = large
EI 6	Photochemical oxidant formation	0.05	1= small 50 = medium 100 = large
EI 7	Acidification	0.020	1= small 50 = medium 100 = large
EI 8	Eutrophication	0.020	1= small 50 = medium 100 = large
EI 9	Waste	0.05	1= small 50 = medium 100 = large
EI10	Ecotoxicity	0.05	1= small 50 = medium 100 = large
	ECONOMIC VALUATION		**Scale** **Low. Level Medium Level High. Level**
EV 1	Product value	0.10	1 = poor 50 = good 100=excellent
EV 2	Product / Project cost	0.10	1= small 50 = medium 100 = large
EV 3	Product / Project Company benefit	0.10	1= small 50 = medium 100 = large
EV 4	Depreciation of machinery	0.10	1= slow 50 = medium 100 = fast
EV 5	Profit	0.25	1 = poor 50 = good !00=excellent
EV 6	Value added	0.15	1 = poor 50 = good !00=excellent
EV 7	Material Stocks level	0.20	1= small 50 = medium 100 = large
	TECHNICAL ASSESSMENT		**Scale** **Low. Level Medium Level High. Level**
TV 1	Productivity	0.10	1 = poor 50 = good 100=excellent
TV 2	Efficiency	0.45	1 = poor 50 = good 100=excellent
TV 3	Effectiveness	0.10	1 = poor 50 = good 100=excellent
TV 4	Quality	0.25	1 = poor 50 = good 100=excellent
TV 5	Flexibility (Rate of change)	0.05	1 = poor 50 = good 100=excellent
TV 6	Energy consumption	0.10	1= small 50 = medium 100 = large
TV 7	Complexity degree	0.05	1= small 50 = medium 100 = large

	ENVIRONMENTAL IMPACT	Weight	Scale (percentage) Low. Level Medium Level High. Level
	INTELLECTUAL CAPITAL		
IH 1	Creativity	0.45	1= small 50 = medium 100 = large
IH 2	Market recognition	0.10	1= small 50 = medium 100 = large
IH 3	Nr of franchises	0.5	1= small 50 = medium 100 = large
IH 4	Nr. of contracts/ Nr of sold products	0.25	1= small 50 = medium 100 = large
IH 5	Customer satisfaction	0.10	1 = poor 50 = good 100 = excellent
IH 6	Empowerment and innovation	0.10	1= small 50 = medium 100 = large

Method of calculation

The method of calculation is similar when comparing the results of two companies that produce a product with the same characteristics, or when comparing two or more products, projects or process alternatives that the company has to decide about.

Positional value = weight x scale (%) (1)

It is considered that the scale of the similar (corresponding) axis from the CSB is from 1 to 10.

For example: Depletion of non-renewable resource for a certain material:

Company A: 0.5 x 50 = 2.5

Company B: 0.5 x 49 = 2.45

This applies for all the items presented in the CSB weighing table.

The comparative results are presented in the CSB.

Computer expert system development for CSB

CSB can increase in utility by developing a computer program (Figure 2).

In this way, the information from different databases of the company concerning product, processes / activities and projects can be easily aggregated in a single chart.

The information could be easily updated according to the modifications that can occur at one period of time in relation to the product, project, process / activity, from different aspects: economical, technical, environmental, social.

In this way, the top management of a company can analyse just in time the best alternative of products, project investments, or choose the suitable technologies for its production purposes.

Data from the producers of various product components, materials and machinery will be available for the product companies. By simply updating the databases of

the company, the management of the company can quickly establish the best decisions to be taken regarding suppliers, qualifications of personnel, or investing in new technologies.

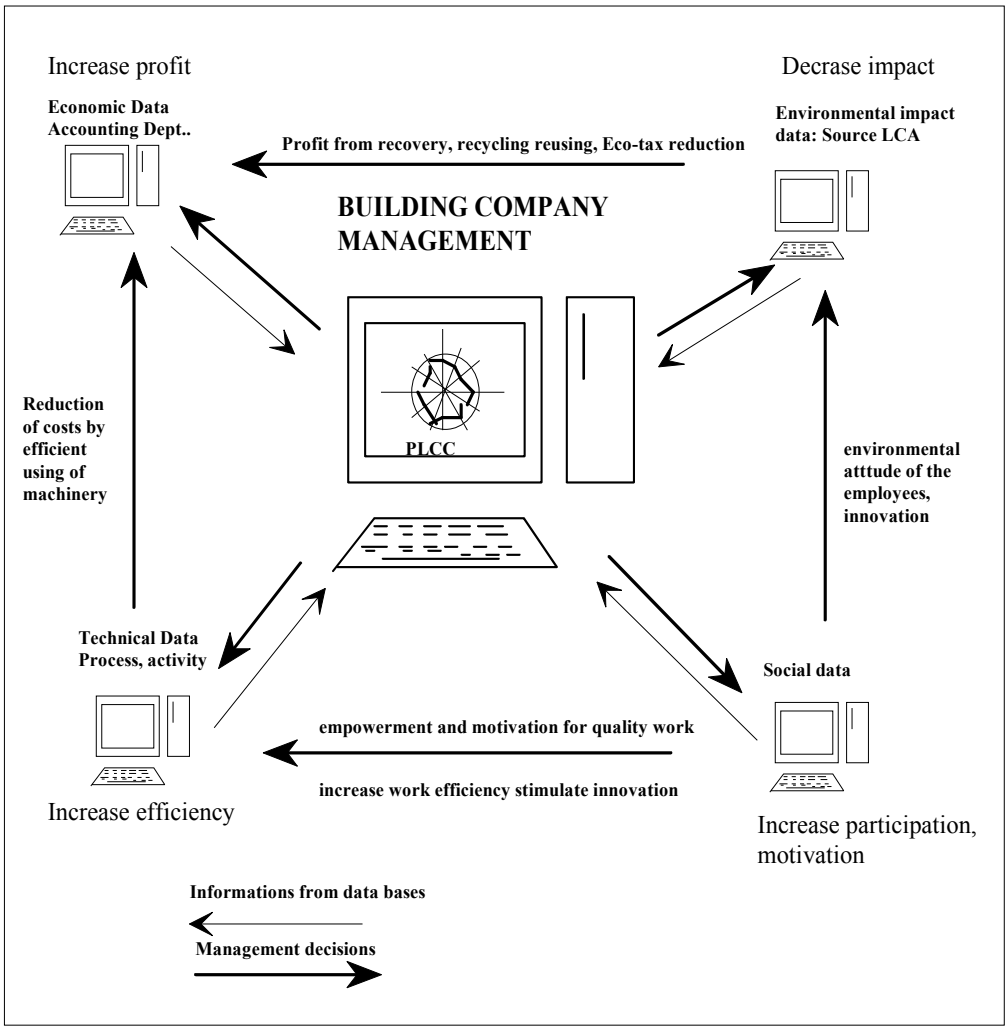


Figure 2 Computerized version of a CSB expert system for sustainable companies

Conclusions

The actual practice of implementing the Life Cycle Assessment (LCA) for products, processes and activities in companies has made it necessary to develop specific tools that could ease the responsibilities of top management.

One such tool is the Circular Synergic Benchmark (CSB), which puts together the four categories of requirements for products: economic profitability, environmental friendliness, technically effectiveness, and social acceptance.

CSB have the following advantages: (1) it is easy readable and understandable; (2) it offers in a comprehensive form data on four issues related to a company's product: economic, environmental, technical-technological, human-social; (3) it increases efficiency in the work of management; (4) if used on a computer program, it could transform into a 'barometer' of the company concerning its policy for a certain product; (5) it allows comparisons between companies within the same domain of activity; (6) it allows comparisons between products with the same functionality; and (7) it is also a useful instrument in the eco-labelling of products.

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