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LINKING ECONOMIC AND ENVIRONMENTAL PERFORMANCE IN THE AGRI-FOOD FIRMS: THE ROLE OF PRODUCT-ORIENTED ENVIRONMENTAL MANAGEMENT SYSTEMS (POEMS)*

The implementation of environmental management systems as a process of knowledge construction for both academic studies and organizational world

There is broad acceptance, among both researchers and practitioners, of the need to achieve greater mutual relevance between the two communities. Recent studies have highlighted how useful dissemination of research results in the community of practitioners need to be aligned between the epistemic and the ontological constructs: this alignment maintains the integrity of a construct and enables the so-called "ontological shift" when ontological emphasis changes; otherwise those changes, where such alignment is not maintained, can compromise the theoretical/epistemic construct, and are responsible for the so-called "ontological drift".

Much empirical evidence has demonstrated that evolution of business practice over time shows examples of both ontological *shift* and *drift*. As argued by Thompson, entitative "bias" can only inhibit the mutual benefit between academic constructs and business context. Thus, it is possible that implementing more entitative constructs, or using entitative terminology, may hold greater natural appeal for organizations*, that seem to be likely to adopt only those research constructs that are entitative in nature, or to harbor simplistic expectations about the ease with which these may be implemented*. The increasing adoption of best practices, common standards and professional codes can be considered as examples of such a possible "entitative bias" and explain the widespread implementation of management models in the community of practice[1].

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[1] M. Thompson: *Ontological shift or ontological drift? Reality claims, epistemological frameworks, and theory generation in organization studies*, "Academy of Management Review" 2011, Vol. 36, No. 4, p. 769. The meaning of "entitative" can be explained within the epistemic debate concerning the level of the

In this context, a challenge for researchers is to transfer the know-how and enable the adoption of the innovative management system, and in this way make practitioners aware of the efficiency and profitability of such management tools.

In this paper we attempted to identify some virtuous links between environmental management systems and financial performance, within the framework of a research project which the authors are presently carrying out. There are a few underlying assumptions of this study, i.e.:

1. according to the knowledge-based theory, a firm's success will depend on how well it can: (a) enhance its own knowledge base; (b) integrate knowledge; and (c) apply knowledge to either successfully develop new products/services or improve current products and processes[2];
2. environmental management systems, while developing eco-efficient behaviour, also support monitoring of environmental costs and enhancing economic performance. A common "bias" among companies about the low profitability of environmental management tools was: "*Help the environment and hurt your business*" (Clarke et al., 1994). Given that such view has been overcome by a lot of empirical evidence, there is room for opportunities to reduce the environmental impact while simultaneously improving the value of the firm[3].

The relationship between economic and environmental performance improvement

An increasing number of companies worldwide are adopting environmental management agendas to reduce the negative effects of their activity. Achievement of sustainable development often represents a strategic business decision, which plays a key role in creating the competitive advantage of firms.

The implementation of management tools like the EMAS scheme or ISO 14001 standards, together with the adoption of voluntary reporting on social and environmental issues are among the most pervasive means that firms use to cope with this question.

The reasons for which firms embrace sustainable development at a strategic level are both ethical and economic. The ethical reasons stem from the view that a firm is as *a pool of interests*: the greater is the interest of various stakeholders in environmental protection, the more widely the institutionalization of good practice in environmental protection is encouraged. The economic motivations include innovation and learning, the opportunity

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ontological dimension of theory: "Mid-range theory acknowledges the importance of abstraction, representation, and refinement of general principles that apply across multiple situations while also recognizing the limitations of such entitative abstractions in accurately representing emergent, contingent, and locally specific reality" (p. 754).

[2] M. Knockaert, D. Ucbasaran, M. Wright, B. Clarysse: *The Relationship Between Knowledge Transfer, Top Management Team Composition, and Performance: The Case of Science-Based Entrepreneurial Firms*, "Entrepreneurship Theory and Practice", 2011, July.

[3] R.D. Burnett, D.R. Hansen, O. Quintana, Eco-Efficiency: *Achieving Productivity Improvements trough Environmental Cost Management*, "Accounting and the Public Interest" 2007, Vol. 7.

to defend the market position, the aim to gain trust of the financial markets and reduce risk management, and the wish to increase shareholder value.

The reasons behind the adoption of environmental management tools may be either economic and/or ethical; their choice depends on firms. The firm's size probably explains the predominance of ethical or economic reasons underlying the decision to go green. There is evidence, in this regard, that economic benefits are not a relevant issue for SMEs; their interest in environmental management systems is more likely motivated by the will to improve their:

- organizational and managerial efficiency;
- continuous monitoring of compliance;
- corporate reputation[4].

Whether or not the choice to invest in environmental management system is associated with the aim of pursuing economic benefit, and independently with the awareness of the economic implications of such decisions, significant economic benefits are always associated with the optimized use of resources. The lack of the awareness of economic benefit is often the necessary consequence of the lack of information that characterizes the management accounting and reporting system of enterprises. Green or environmental accounting studies suggest incorporating environmental benefits and costs into economic decision-making in order to overcome this "information gap". Unfortunately, the implementation of Green Accounting guidelines presents a myriad of reporting problems that need to be resolved for effective long-term implementation. Apart from problems connected with the accuracy of accounting systems, time and money required to evaluate, account and report on environmental items, there are also some opportunistic behaviours that can slow down the implementation of environmental accounting. Some of the authors who debated President Obama's call for a heightened amount of transparency in financial reporting culminating from the recent debacle on Wall Street have pointed out that "management and investors will resist any accounting reporting guideline that will decrease profitability and reduce net worth even if transparency and accuracy are enhanced"[5].

So, nowadays, the application of financial and strategic control methods to environmental management is one of the most challenging tasks for researchers and practitioners. Furthermore, though there is general acceptance of the virtuous cycle embedding the three dimensions of sustainable development – economic, environmental and social results – into the ongoing debate over the relevance of environmental management systems, evidence points to different results in different context.

Some empirical evidence emphasizes the positive relations between economic/financial and environmental performance, while in other studies this relation seems to be more controversial.

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[4] V. Biondi, M. Frey, F. Iraldo: *Environmental Management Systems and SMEs. Motivations, Opportunities and Barriers Related to EMAS and ISO 14001 Implementatio*n, "Greener Management International ", Spring 2000, Issue 29.

[5] C. Crawford, *In the Midst of Economic Disaster, Can the United States Still Care About Green Accounting?*, "International Journal of Green Economics" 2010, Vol. 4, No. 4, pp. 327–332.

Many studies show the positive impact of a well-designed environmental management system on environmental performance and, as a consequence, on technical and organizational innovations[6]. The effects on other competitive variables such as market position, cost savings and intangible asset creation are not always strongly supported. For example, the results of a study conducted on a sample of Canadian manufacturing firms suggest that the application of financial and strategic control methods to environmental management has no direct effect on economic performance. A mediating effect of environmental performance on the link between environmental and economic performance is observed in different contexts. Eco-control indirectly influences economic performance in the context of (i) higher environmental exposure, (ii) higher public visibility, (iii) higher environmental concern, and (iv) larger size[7].

Sometimes criticism is related to models used in these surveys, sample size and its significance, the system of indicators used to evaluate environmental and firm performance, the cause and effect relationship between economic and environmental data.

Two different methodologies prevail in studies on the assessment of the financial effect of environmental management practices:

1. a group of studies focuses on the variation in market value of the firm by using Tobin's *q* as a measure that effectively reflects the inherent value of the firm and the expected future gains;
2. a second set of surveys assesses the operating and financial performance using accounting measures of profitability such as ROA, ROE and ROS.

In recent years other scholars have tried to measure performance using both accounting and market value criteria (ROA and Tobin's *q*)[8].

The arguments discussed above emphasize the importance of developing a framework to identify and measure the associated environmental variables in order to enhance managerial planning, control and decision making as well as to assess the financial impact on a corporation's bottom line. The following paragraphs present a specific model designed to implement environmental management in the agri-food sector, and some implications of its framework in the perspective of multidimensional performance of enterprises.

New approaches for the definition of competitive strategies

Nowadays businesses are held responsible for the economic and environmental impacts of their activities (the so-called extended producer responsibility) in every phase of the life cycle of the

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[6] For a literature review of these issues, see: A.A. Russo, S. Pogutz, *Eco-efficiency vs eco-effectiveness. Exploring the link between GHG emissions and firm's performance*, Academy of Management Annual Meeting Proceedings, 2009.

[7] J-F.Henry, Journeault M., *Eco-control: The influence of management control systems on environmental and economic performance*, "Accounting, Organizations & Society" 2010, Vol. 35, Issue 1, pp. 63–80.

[8] A.A. Russo, S. Pogutz: *Eco-efficiency vs eco-effectiveness. exploring the link between GHG emissions and firm's performance*, Academy of Management Annual Meeting Proceedings, 2009.

products they make. This means that companies have to manage processes that extend beyond their factory gates.

Therefore, the boundaries between an organization pursuing its competitive strategies and other actors in the economic system, as well as those between process management and product/service management, have proved to be permeable whenever businesses decide to make a concrete commitment to improving their environmental performance.

Thus, more environmentally aware organizations are experiencing more and more the need for integration between system standards and product standards (e.g. the ISO 14040 series of standards), gradually moving the emphasis from the system/process to the product/service. As a result of this, alongside management "tools" that are already widely used (ISO 14001 and EMAS), companies have started to appreciate other "tools" that are more oriented towards the environmental performance management of products, bringing about an increase in the number of organizations beginning to "work on products" and on the whole chain of production[9].

This push towards moving the emphasis from environmental impacts of individual production sites to those associated with products can be seen, for example, in the EU Green Paper on Integrated Product Policy (IPP), in the EMAS III Regulation, in the revision of the ISO 14001 standard and in the indications emerging from businesses with experience of a possible integration of the previously separate system (EMS) and product (LCA, Eco-design, ecological labelling) fields, with the development of positive synergies.

These aspects can be considered as clear signs of the introduction of product management into EMS, which have thus permitted the emergence of a new specifically product oriented environmental management tool: POEMS (Product-Oriented Environmental Management System).

Product-Oriented Environmental Management System (POEMS): definition and methodology

One of the most widely used definitions of POEMS to be found in the limited literature available is the one provided by Rocha and Brezet: "an environmental management system with a special focus on the continuous improvement of a product's eco-efficiency (ecological and economic) along the life cycle, through the systematic integration of eco-design in the company's strategies and practices"[10]. Another definition of POEMS, which is more appropriate for the agri-food sector as it is not unequivocally tied to eco-design and is, thus, also applicable to companies that do not deal with product design, is the one coined by de Bakker: "a systematic approach to organizing a firm in such a way that improving the environmental performance of its products across their product life cycles becomes an integrated part of operations and strategy"[11].

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[9] R. Luciani, L. Andriola, S. Sibilio: *I sistemi di gestione ambientale orientati al prodotto (POEMS),* Technical report RT/2003/10/PROT, ENEA, 2003.

[10] C. Rocha, H. Brezet: *Product-oriented environmental management systems*, "The Journal of Sustainable Product Design: a case study" 1999, No. 10, pp. 30–42.

[11] F.G.A. de Bakker, O.A.M. Fischer, A.J.P Brack: *Organizing product-oriented environmental management from a firm's perspective*, "Journal of Cleaner Production" 2002, Vol. X, No. 5, pp. 455–464.

Currently, there are no prescriptive standards for POEMS and the only elements that can offer methodological references as a starting point for their wider use are: corporate practice, a few pilot trials, the few studies available in literature, the Spanish UNE 150.301 and the ISO 14006:2011 standards (the latter two relating to the insertion of Eco-design in environmental management systems). None of these, however, concern the agri-food sector, where the only experiment reported is one relating to the wine-making industry[12].

Thus, within the context in which organizations are showing increasing interest in ways of integrating system standards and product standards there is certainly great interest in being able to create a POEMS model that reflects the real needs of companies and their stakeholders, also considering the lack of a uniform and widely accepted methodology.

This is particularly true of the agri-food sector, which has seen the setting-up of a research project – EMAF[13]. The project aims to test, implement and then promote a POEMS model specifically designed for this sector, which is of huge importance in Italy and Europe, both from an economic and from an environmental point of view (the latter deriving from the substantial use of natural and energy resources and by the emission of numerous pollutants). The basic specifications identified for the development of a POEMS model can be summarised as follows:

- fundamental structure composed of a management system conforming to ISO 14001 or to Reg. EMAS, integrated with ISO 9001 and other possible management systems typical of the agri-food sector;
- methodology based on the Deming Cycle, fully exploiting the iterative character of the cycle in order to pursue continuous improvement of both the methodological structure and environmental and product performance;
- product orientation ensured by the integration of a simplified Life Cycle Assessment methodology suitable for organizations in the agri-food production chain, which can be used to evaluate different cultivation methods, production technologies and alternative materials;
- ability to transform the environmental measures taken into commercial advantages in the best possible way for the organization, thanks to the use of guidelines that can support organizations in their choice of the most suitable form of environmental message, closely linked to the product.

The POEMS model proposed is simple and straightforward thanks to the simplification of certain operational aspects and the reduction of "bureaucracy"; it is general in character, making it applicable to any type of activity in the agri-food sector, irrespective of the organization's size, its nature and position in the agri-food production chain; it has a modular structure, as it is composed of a collection of management tools that can be applied, individually or as an integration of two or

[12] F. Ardente et al., *POEMS: a case study of a winemaking firm in the South of Italy*, "Environmental Management" 2006,, Vol. XXXVIII, No. 3, pp. 350–364.

[13] http://ww2.unime.it/emaf (5.04.2011).

more elements, on the basis of organizations' specific requirements and of the objectives they aim to reach. The modular structure of the proposed model is illustrated in Figure 1.

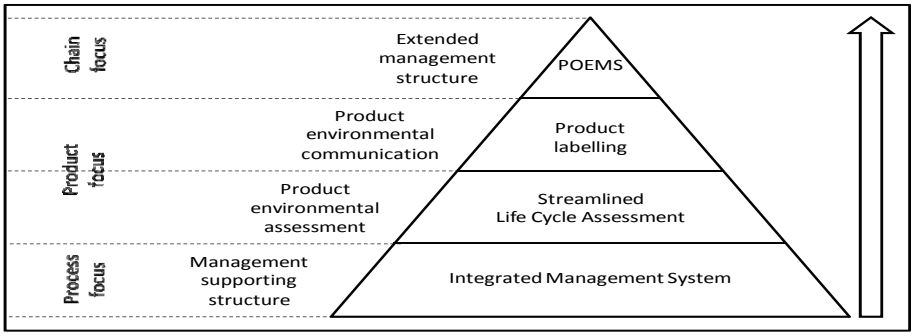

Figure 1. The modular structure of the POEMS framework

Source: R. Salomone, M.T. Clasadonte, M. Proto, A. Raggi, I. Arzoumanidis, G. Ioppolo, A. Lo Giudice, O. Malandrino, A. Matarazzo, L. Petti, G. Saija, S. Supino, A. Zamagni: *Product-oriented environmental management system (POEMS): A sustainable management framework for the food industry.* Proceedings of the Life Cycle Management Conference 2011, 28–31 August 2011, Berlin, Germany.

The role of POEMS in the improvement of financial and competitive performance

The structure of POEMS can assist uniform and widely accepted methodology in the improvement of both financial and competitive performance, thanks to its main characteristics:

- the modularity of the model which is proposed, which can be associated with the flexibility of the accounting information system and/or with the gradual implementation of financial measures related to environmental performance;
- the source of data supplied when implementing the product management system, which enable the evaluation of the firm's strategy, on the assumption that improvement of the environmental performance of products across their product life cycles becomes an integrated part of operations and strategy. The data collected are suitable to be processed for financial purposes, e.g. the financial strategy, and also for external purposes;
- it can be used as a framework to test the coherence of financial, social/environmental and competitive relapses of strategic planning and of voluntary and compulsory reporting.

Conclusions

This study contributes to the environmental management and accounting literature by providing insight into the role of an integrated framework for sustainable development. This paper should serve as a "primer" on the subject matter of a link between economic and environmental performance. Once the POEMS is implemented in the agri-food sector, it is expected that variables to be included in the measurement of environmental performance will be developed, and then integrated with accounting information system so as to support a more comprehensive evaluation of a firm's performance.

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Summary

In management studies an important challenge for researchers is to transfer know-how and enable the adoption of innovative management systems, and in this way make practitioners aware of the efficiency and profitability of such management tools. The authors attempted to identify some virtuous links between environmental management systems and financial performance, within the framework of a research project carried out on a model of Product-Oriented Environmental Management System (POEMS).

ŁĄCZENIE DZIAŁALNOŚCI EKONOMICZNEJ I ŚRODOWISKOWEJ W PRZEDSIĘBIORSTWACH ROLNO-SPOŻYWCZYCH: ROLA ZORIENTOWANYCH NA PRODUKT SYSTEMÓW ZARZĄDZANIA ŚRODOWISKOWEGO

Streszczenie

W badaniach z zakresu zarządzania ważnym wyzwaniem dla naukowców jest przekazanie know-how oraz umożliwienie przedsiębiorstwom wprowadzania innowacyjnych systemów zarządzania, przekazując praktykom wiedzę na temat efektywności i rentowności narzędzi zarządzania. Autorzy próbowali zidentyfikować pewne pozytywne powiązania między systemami zarządzania środowiskiem oraz wynikami finansowymi, w ramach projektu badawczego przeprowadzono na modelu zorientowanego na produkt systemu zarządzania środowiskowego (POEMS).