Innovations fields from corporate studies to socio-ecological indicators : a point of review

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Summary: In this paper, we attempt a crossing state of the art of innovation concept, through exploring the both corporate and territorial significations of this notion. Next, we list the corresponding specified innovation indicators, in order to be able to propose a systemic description of socio-ecological innovation, through introducing its informational characterization.

Résumé : Dans ce papier, nous proposons d'aborder un état de l'art croisé entre significations productiques et territoriales de la notion d'innovation. Après avoir listés et décrits les indicateurs correspondants, nous proposons une description systémique de la transition socio-écologique en introduisant la caractérisation informationnelle de ses paramètres d'interaction.

Keywords: innovation, sustainability, territory indicators, systemic approach, socio-ecological resilience

Mots clés : innovation, durabilité, indicateurs territoriaux, approche systémique, résilience socio-écologique

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I. Introduction

Core knowledge of innovation studies refeers to diverse topics such as qualitative improvements of products (i.e. ISO 9,000, EFQM), knowledge management (i.e. intellectual capital), environmental management (i.e. ISO 14,000, EMAS), organisation of economic activities and corporate social responsibility (i.e. SA 8000, AA 1000).
Corporate studies generally presents innovation concepts within two complementary fields :
- Internal fields, or evolutionary economics perspective on technical and social changes develops path dependency of innovation, implying the specificities of the routines generating innovation (« operational routes » to specific artefacts, « organisational signature » of the concerned firms knowledge deployment).
- External fields, understood as knowledge-centered model of the enterprise situated at interface of innovation- and management-research. Knowledge considered here as a production factor, a driving force of economics and enterprise innovation (changes) (Nonaka 1994) makes a distinction between implicit and explicit knowledge : this signs the « knowledge conversion » phenomenon, also corresponding to information symetrization in economy topics.

II. The sustainability challenge for innovation

As the challenge for sustainability is to manage consumption without increasing its resource use and environmental impact (Daly 2004, Goudie 2005), through integrating social, cultural, health-related and monetary/financial aspects into human development process (Hak and al. 2007, Soederbaum 2008), sustainability pursues the composite goal of more liveable, viable and equitable human development (Emden, Peakall 1996, Pearce, Barbier, Markandya 2000) through proposing an inclusive and ethical economic model for society (Wilson 2002).
As a mirrored response to corporate innovation field classification, sustainability pillars combinations can also be internal, involving articulation between economic (Dasgupta & al., 2000), social (Kollmuss & al., 2002) and environmental dimensions (Ahmed & al. 2004), or external, involving articulation between liveable, viable and equitable life qualities (Holling, 2001; Giddings & al. 2002).
Moreover, technological, economic and social transformations understood in terms of neo-evolutionary mechanisms, implies university–industry–government relationships to generate knowledge-intensive network transitions (Etzkowitz, Leydesdorff 2000), defining the post-modern paradigm of innovation (Vieira 2008).

III. From Corporate to Territorial innovation indicators

Therefore, standards of production, organization and administration of territory spatial redefinitions as a result of new global strategies (Castells 1995) should re-define classical corporate indicators along the DPSIR chain (Driving forces, Pressures, State, Impact and Response), towards new eco-innovation indicators (Freeman 1979) regarding the production process in an eco-social prism, understood as associative parameters between market, technology, culture and social assesments.

Those socio-ecological innovation scales production process from corporate to territorial dimensions, through the following eco-innovation indicators: Corporate Social Performance (CSP) (Ruf and alii., 2001), Environmental Sustainability Index (Esty et. al, 2005), Eco-Indicator 99 (Goedko op and Spriensma, 2001), Environmental Performance Index for Rich Nations (Roodman, 2004), Environmental Policy Performance Index (Adriaanse A., 1993), Eco-innovation indicators, Index of Environmental Friendliness (Puolamaa et al., 1996), or Innovation Capacity Index (Porter and Stern, 2003).

As corporate indicators were recently launched within European Environmental Technologies Action Plan (ETAP) (OECD 1999, 2000, 2002, European Commission 2002-2003), innovation and eco-development processes should be clearly systematised and analysed, in order to develop eco-innovation indicators integrating the 3 pillars of sustainability development (Ziolkowska and alii, 2008), with proposing ways to measure societal progress within a territorial production structure (Gameson 1998, Kuhndt and alii, 1999).
Interesting analysis has been provided under FP6, which was launched as the Sectoral Innovation Watch. For example, Eurostat, IPTS and INNOVA projects takes it to analyse innovation performance

in several industrial sectors across EU-25 Member States. The interesting thing about this analysis is that it goes beyond more statistical market analysis to incorporate a comprehensive qualitative analysis of innovation dynamics and related policies. (Lázaro and alii, 2007 and Ziolkowska and alii, 2008).

IV. Innovation and sustainability : the structural point of view

In this framework, the self-organizing and internal structure of ecological and socioeconomic can help to identify the benefits of cooperative structures and behavior, which a more partial analysis may neglect.

1. A systemic approach

Systemic approach of this "Triple bottom line" structure of sustainability, understood here as three inter-related systems, should imply informational dimensioning of :

- Economical assymetric information, applicated to industrial organization, macro and microeconomic dynamics (Akerlof 2002, Stiglitz 1992), efficiency wage theories of unemployment (Akerlof 1969, 1980, 1982, 1990, Stiglitz 1975, 1976) , credit market rationing theory (Spence 1974, 1976, 2002, Stiglitz 1999, 2000), capital structure decisions (Bharath 2009), and issues of economic development and global stability (Hayes and alii. 1983, Lewis 2007),
- population-wealth distribution (Wolff 2007, Davies and alii., 2007), including earnings or income (L-distribution, (Costa 2010)), standards of living and economic well-being measure (Human Development Index, (McGillivray 1991, Rao VVB 1991, Sakiko 2003)) of the ability of households to consume (Flemming 1979),
- and ecological human footprints (Ayres 2000, Costanza 2000, Moffatt 2000) vs. Human Welfare space-time scaling, to evaluate effects on vulnerable communities and ecosystems (ICSU 2005). It includes ecological, demographic and economic evaluation skills (Wackernagel and alii., 1999, Van den Bergh and al. 1999, Opschoor 2000, Holling 2001), generally categorized for Carbon, Food, Housing, Goods and Services.

2. Resilience and informational dimensioning

The environmental concern allows the sustainability trade-off system to retain resilience, with implying a reduction in the self-organization of the sustainability system, with little risk of instability, as resilience theory claims that perturbated systems soon returns to their dominant stable equilibrium (Costanza and alii. 1997). This assumption is valid for both economic and social systems: as economic system resilience is defined by the ability to allocate resources efficiently in the face of major shocks, social systems resilience traduces the capacity of human societies to face conjunctural stress (Norgaard, 1994, Munasinghe, 1994). Thus, linkages between socio-cultural and ecological sustainability can emerge through interaction studies, evaluated through their entropy dimensioning (Woloszyn and al., 2008), therefore defining their resilience capacity. This informational evaluation should reveal similarities between economical system, human societies and ecological systems, through lifestyle preferences, consumption behaviour and policy rules, underlined by biodiversity and cultural diversity mirroring.

A conclusion

Therefore, co-evolution of social, economic and ecological systems within a complex adaptive system modelling should be able to provide useful insights regarding the harmonious integration of the three pillars, or "triple bottom line" of sustainable development, as new innovative indicators to be applied to the socio-ecological challenge.

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