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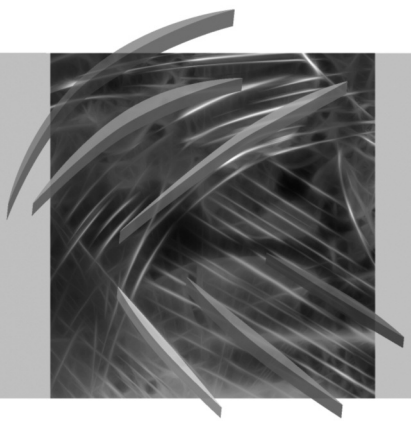
# Knowledge Acquisition and Management



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# FUTURE TRENDS IN KNOWLEDGE MANAGEMENT. KNOWLEDGE ECOINNOVATION

**Summary:** Among the future trends in knowledge management one of the most significant could be Knowledge EcoInnovation, connecting knowledge management, innovation, and environmental aspects into a system approach. After introducing some trends in the knowledge economy and ICT,[1] this paper presents our work on the knowledge-based innovation process and the contribution of holistic knowledge management approach to the role of information and knowledge processing in the innovation ecosystems.

**Keywords:** knowledge management, EcoInnovation, knowledge economy.

## 1. Introduction

Economy evolves from the industrial to the knowledge-based one. This change influences the way of managing enterprises and organizations – they have to deal with intangibles such as knowledge, competency, ideas, opportunity, or links and learn how to transform them into economic values. Innovation is considered as the only possibility to succeed in the context of globalization and hypercompetition and as an engine of regional development as well. The duty of firms is to manage the environmental impact of their activity. In the above context the ICT including knowledge technology can play an essential role in a wise transforming of the intangibles into economic values. The last trend of digital ecosystems introduces a biology inspired system view of technology, users, and economy.

Our knowledge-based EcoInnovation approach goes further, including also environmental, cultural, and social aspects to a global innovation process. The relative activities are knowledge intensive and require the collaboration of multi-domain specialists and computers through an organised knowledge flow.

## 2. Relative Work

Two points of view have to be considered – the scientific work in the relative domains, but also the field experience of companies dealing with the knowledge economy challenges, such as delocalization, unemployment, and regional development. Many

[1] Information and Communication Technology.

of them are facing the push of web 2.0 services and tools and IT trends such as externalization and cloud computing. From the scientific point of view the various domains are involved at the individual level or in multidisciplinary projects.

While the innovation is not new, Schumpeter's definition [Schumpeter 1912] is still relevant. Knowledge innovation® was introduced by Amidon [Amidon 1997] to join knowledge management and innovation in the same holistic approach having as a goal the organizational and regional development and prosperity (see Table 1).

According to the updated Lisbon strategy [*Treaty of Lisbon* 2009], in the European and national research programmes, the innovation means technology; the new findings have to generate values through technology transfer. Two main topics of 2020 vision is the Internet new generation and EcoInnovation. The last is mainly about technology for energy and transportation [*Europe 2020*… 2010].

The ICT and knowledge technology have a strong influence on the new economy, bringing a considerable help in the activities, such as business intelligence (BI) [International Journal… 2010], [Machalewicz 2007]; semantic data and information management [Virgilio, Giunchiglia, Tanca (eds.) 2010], communication and collaboration with clients and partners [Mercier-Laurent 2007ab], diagnostic, customer support, intelligent e-commerce, e-training [EUROCONTROL 2009], decision support systems, and many others. A symbiosis of a user and intelligent knowledge processors is the base of the Fifth Generation of Management [*Fifth Generation Management*... 1996; Amidon 1997] and of holistic knowledge management [Mercier-Laurent 2007ab].

The European Commission strategists[2] claim that "ICT adoption plays a central role for improving productivity and for enabling business networking in a competitive knowledge-based economy". In their vision, shown in Figure 1, ICT is a system component of the economic growth. The term of digital ecosystems (DES) expresses a new dynamics including technology, commercialization, and policy. As shown in Figure 1, ICT takes an inspiration from natural biologic ecosystems [Ber 33] and produces commons by creating open source, able to generate new values through traditional or new business models. These new value systems encourage collaborative creation. Such an organisation improves the market efficiency and influences the growth and the innovation policy.

An ambition for Europe is to become world innovation leader through technological innovation. This vision encapsulates three dimensions of DES: economic, technological, and social. From the economic point of view, innovation has to create value and encourage a sustainable development of regions and firms, including SMEs. From the social point of view, innovation has to create jobs, deal with diversity, and produce or influence well-being. In this context DES connect firms, technology, and knowledge (people, documents, all kinds of computers).

[2] See: http://www.digital-ecosystems.org/.

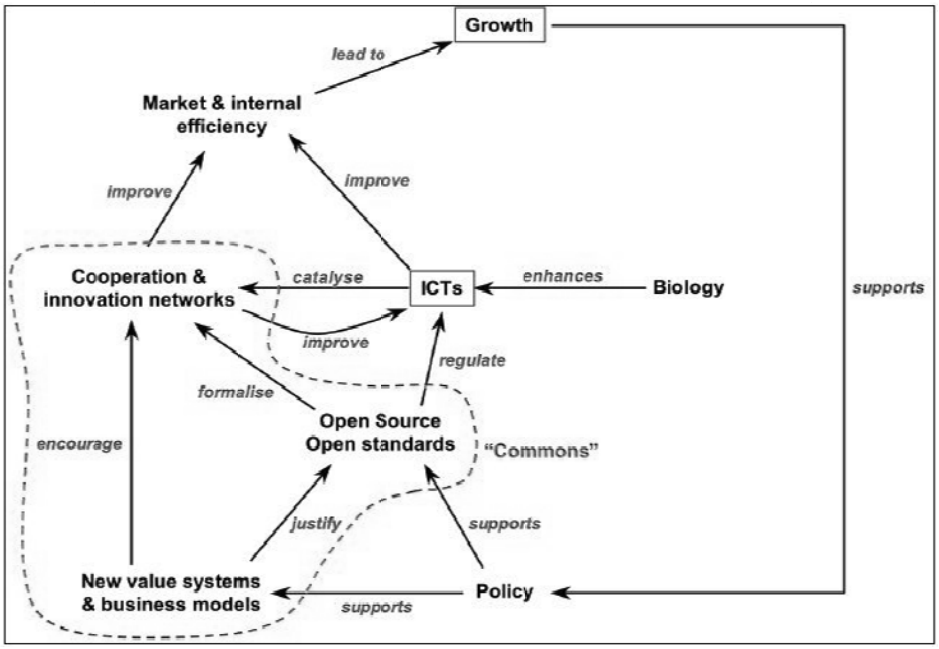


**Figure 1.** Digital Ecosystems Research Vision 2010 and beyond

Source: author's own study.

One of the sustainability conditions of the above system is user's centered technology; the extreme programming [Beck 1999] is an example of such a method. The value chain is here from research to an end user, but in reality, the values come from the collaboration of both [Mercier-Laurent 2007ab], [Mercier-Laurent 2009a]. Knowledge sharing is not the only aspect – this system needs knowledge to be sustainable; they did not mention Knowledge Management as an approach for optimizing the whole process. To follow the world research and applications of DES, in 2009 the ACM[3] introduced a new conference on Digital ecosystems – MEDES.[4]

In the context of Tokoro work on Open system Science [Tok 09] and our previous work [Mercier-Laurent 2007ab; Mercier-Laurent 2009a], the DES needs to be open for exchange with outside and to capture the opportunities. To remain sustainable, this system need talents from all mentioned domains in a global multidisciplinary approach.

Some researchers working on ecodesign begin to link design, environmental aspects, and knowledge management, and consider the design as a part of the innovation process [Mercier-Laurent, Reyes 2008].

[3] Association for Computing Machinery.

[4] See: http://sigappfr.acm.org/MEDES/09/.

The innovation-based economy needs *soft technologies* such as management, marketing, and social to succeed [Jin 2006]. The research in organizational innovation includes various theories on a knowledge-based company such as learning organization [Senge 1990], intellectual capital [Edvinsson 2002], networks [Amidon 2003], and social networks and web 2.0 services. Enterprise 2.0 is in fashion, but the majority of firms do not know yet how to turn these web services into the economic values [Newman, Thomas, Steinberg 2009]. While e-commerce is popular, it is still at the basic level without any possibility to capture ideas from clients and visitors. No one offers some intelligence as for example a direct association of offer and demand. The social networks facilitate connections between people and companies, but they are used for information push and not enough for discovering the needs. Many firms are still working with Word, Excel, and email only. The "faster, better, cheaper" logic keeps them in a short-term strategy, the delocalization and devitalization of regions is a consequence.

From economists' point of view, innovation has to bring a considerable contribution to the national and regional development [Hockuba 1995; Atkinson 2009]. However, the impact of innovation on job creation and economic development is still measured with at least two years of delay, using the old statistical methods [Lisbon Strategy... 2010] instead of those conceived for the knowledge economy [Amidon 1997; Skyrme 1998; Mercier-Laurent 2000]. Knowledge economy combines all the domains mentioned above into a global, knowledge-, and innovation-based approach [Amidon 2005; von Stamm 2009].

## 3. From innovation to EcoInnovation

The innovation process is composed of two stages: creativity and transformation of an idea into tangibles and intangible values.

### 3.1. Creativity

As shown in Table 1, the creativity is a process of finding ideas. While we can have a lot of ideas individually and collectively, only few of them can be valuable from the economic and the environmental points of view. The majority of firms are still practising the close innovation limited to R&D department only. For that reason, they are the main users of creativity methods such as Blue Ocean [Kim, Mauborgne 2005], 6 hats [de Bono 1999], TRIZ [Altschuler, Shulyak, Rodman 1997], or others. Those practising the participative innovation have to manage the ideas coming from all professionals from the inside of a company. Some of them organise internal competition to capture the best ideas of employees (Groupe Accor, AMD, Cisco). Knowledge management could be a considerable help, but only few firms practise it at a strategic level.

**Table 1.** Some definitions of innovation

| Creativity | Ideas finding |
|---|---|
| Innovation | From an idea to technology/product/service/revenue |
| Knowledge Innovation®* | Knowledge Innovation is the creation, evolution, exchange, and application of new ideas into marketable goods and services for the success of an enterprise, the vitality of nation's economy, the advancement of society |
| Knowledge EcoInnovation** | Process beginning from an idea and leading to sustainable success of all participants, including environmental aspects |

* Knowledge Innovation is a registered trademark of ENTOVATION International Ltd.
** Definition by Eunika Mercier-Laurent [Mercier-Laurent 2007ab].

Source: author's own study.

### 3.2. From idea to sustainable success

The innovation process is considered as a transformation of an idea into a product, service, or revenue [Schumpeter 1912]. The traditional innovation is the result of research or work of R&D department in companies [Dubuis 2007]. According to Business Dictionary, innovation is a process by which an idea or invention is translated into a good or service for which people will pay.

Debra Amidon [Amidon 2005] defines three levels of benefits: company, nation, and society. They could be tangible and intangible as well. We define innovation as a five-dimensional process (see Figure 2) beginning from an idea and leading to a sustainable success of all participants [Mercier-Laurent 2009a], involving clients, partners, and sometimes competitors and environmental and social impacts. Knowledge management and ICT play an essential role in such a process.

#### 3.2.1. Collaborative EcoInnovation

As a consequence, the effective innovation system is larger then the previous because it has to take into account the environmental impact through the elements such as the choice of materials, components, energy needed to produce and to use, recycling, and other. This process, presented in Figure 2, is nourished by knowledge.

From the innovation point of view, DES provide a support for this knowledge intensive process. An idea can come from a customer and address the needs, or it can create new needs and new markets. Each idea is evaluated from technology, market and resource points of view; it can evolve through discussions, or collaborative innovation on line.

The next step is to verify all constraints BEFORE doing: the market impact, competitors offer (BI), technological feasibility, environmental impact, competency, and other resources. At this stage, the use of simulators avoids the productivity paradox [Mercier-Laurent 1997] and other lost. After the verifications of all

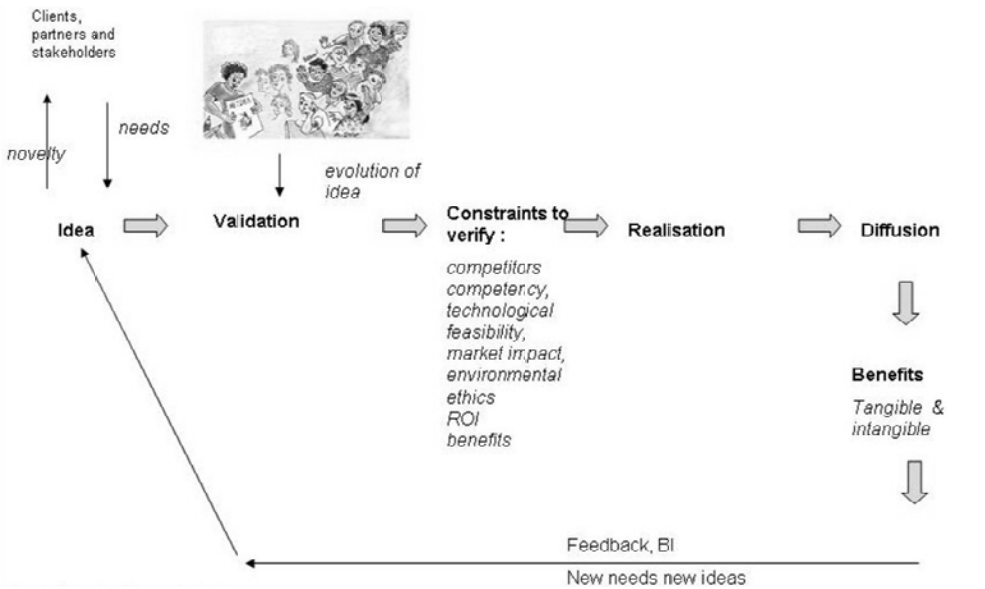


**Figure 2.** The EcoInnovation process

Source: Mercier-Laurent [2009]; illustration by Ron & Arte Dvir from "In Search of Innovation. A Book for Children and Leadership Executives" by Debra Amidon.

constraints, the transformation of the final result into products or services can begin. The continuous feedback (KM culture) [Mercier-Laurent 2003] allows improving this process but can also facilitates the generation of new ideas.

### 3.2.2. Innovation ecosystem

The innovation ecosystem can be expressed as an extension of DES, as presented in Figure 3. The ecosystem here is composed of technology, users, and firms. Firms' problems remain interesting challenges for research, and firms are a playground for experiments. For effective research, the knowledge models and techniques (new generation of AI) could be useful to improve existing technologies and invent new ones.

Through technology transfer, research results become commercialised products or services for firms able to improve their efficiency. Such a system acts as an amplifier of the innovation dynamics.

The conditions of sustainability are the way of thinking and solving problems, the library of knowledge models to reuse and technologic standards. The "common language" is required for life long collaboration between companies and researchers to allow both fundamental and applied research.

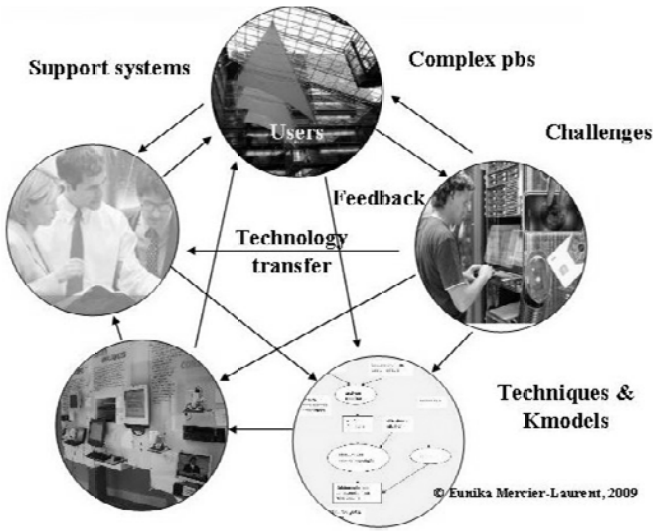


**Figure 3.** Innovation ecosystem

Source: author's own study.

## 4. Perspectives

The above innovation ecosystem could be experimented on by researchers and firms from several countries to build together a virtual knowledge and innovation space for ERA.[5] Such space could provide relevant information and knowledge about research projects and their results, about the European talents, research centres in function of interest, technology transfer opportunity, companies, and knowledge regions. It could also facilitate links for new needs-driven projects and an association of offer and demand.

## Reference

Amidon D. (1997), *The Innovation Strategy for the Knowledge Economy*, Butterwrth Heineman.

Amidon D. (2003), *The Innovation Super Highway*, ButterWorth Heineman.

Amidon D., Formica P., Mercier-Laurent E. (2005), *Knowledge Economics: Emerging Principles, Practices and Policies*, Tartu University Press.

Altschuler G., Shulyak L., Rodman S. (1997), *40 Principles TRIZ Keys to Technical Innovation*, http://www.triz40.com/aff_Principles.htm.

Atkinson R.D. (2009), An innovation economics agenda for the Obama administration, *The Journal of Technology Transfer*, Vol. 34.

Beck K. (1999), *Extreme Programming Explained: Embrace Change*, Addison-Wesley.

[5] European Research Area.

[Ber 33] *Kritische Theorie der Formbildung*, Borntraeger 1928. In English: *Modern Theories of Development: An Introduction to Theoretical Biology*, Oxford University Press, New York: Harper, 1933.
de Bono E. (1967), *The Use of Lateral Thinking*, Penguin Books.
de Bono E. (1999), *Six Thinking Hats*, Little, Brown & co.
Dubuis B. (2007), *J'innove. Comment gérer son innovation: de l'idée au marché*, Les Clefs du Savoir.
Edvinsson L. (2002), *Corporate Longitude*, Book House Publishing.
EUROCONTROL (2009), Institute of Air Navigation Services, Training Activities.
*EUROPE 2020. A strategy for smart, sustainable and inclusive growth* (2010), European Commission, 03.03.2010.
International Journal of Business Intelligence and Data Mining, Inderscience (2010).
Hockuba Z. (1995), *Droga do spontanicznego porządku*, PWN.
Jin Z. (2006), *Global Technological Change*, Intellect.
Kim C., Mauborgne R.B. (2005), *Blue Ocean Strategy: How to Create Uncontested Market Space and Make Competition Irrelevant*, Harvard Business School Publishing Corporation.
*Treaty of Lisbon* (2009), http://europa.eu/lisbon_treaty/glance/index_en.htm.
Lisbon Strategy evaluation document, Comission Staff Working Document, 02.02.2010
Mercier-Laurent E. (2000), Le cerveau, outil ideal pour mesurer le benefice du knowledge management, *Informatiques magazine*, No. 103.
Mercier-Laurent E. (2003), *Organization and Processing of "Best Practice". Knowledge Approach to Database Creating and Exploring*, Knowledge Discovery, Turawa.
Mercier-Laurent E. (2007a), *Rôle de l'ordinateur dans le processus global de l'innovation à partir des connaissances*, HDR, Université Jean Moulin, Lyon.
Mercier-Laurent E. (2007b), Innovation, knowledge management et développement durable, *Dossier Qualitique*, Decembre.
Mercier-Laurent E. (2008), Innovation organisationnelle vue comme une composante de l'innovation globale, *Journée de Recherche Crest-Magellan Innovation organisationnelle*, 28 janvier 2008, Saint Etienne.
Mercier-Laurent E. (2009a), *Digital Ecosystems for the Knowledge Economy*, Invited talk MEDES'09.
Mercier-Laurent E. (2009b), Toward to Innovation 4D, [in:] B. von Stamm, A. Trifilova (eds.), *The Future of Innovation*, Gover Publishing.
Michalewicz Z. (2007), *Adaptive Business Intelligence*, Springer.
Newman A., Thomas J., Steinberg A. (2009), *Enterprise 2.0 Implementation*, The McGraw Hill.
Mercier-Laurent E., Reyes T. (2008), *Ecodesign as a Prospective Innovation Driver for Companies*, IDMME-Virtual Concept, Beijing.
Fifth Generation Management: Dynamic Teaming, Virtual Enterprising And Knowledge Networking, 1996.
Senge P. (1990), *The Fifth Discipline*, MIT Press.
Schumpeter J. (1912), *Theorie der wirtschaftlichen Entwicklung* [Theory of economic evolution].
Skyrme D. (1998), Measuring the value of knowledge. Metrics for the knowledge-based business, *Business Intelligence*.
von Stamm B., Trifilova A. (eds.) (2009), *The Future of Innovation*, Gover Publishing, 2009
Tokoro M. (2009), Open Systems Science: From Understanding Principles to Solving Problems, IOS Press, 2009
Ulwick W.A. (2007), *What Customers Want: Using Outcome-Driven Innovation to Create Breakthrough Products and Services*, Kindle Edition.
Virgilio R., Giunchiglia F., Tanca L. (eds.) (2010), *Semantic Information Management. A Model-Based Perspective*, Springer.

## PRZYSZŁE TRENDY W ZARZĄDZANIU WIEDZĄ. EKOINNOWACJE WIEDZY

**Streszczenie:** Wśród przyszłych trendów w zarządzaniu wiedzą jednym z najbardziej znaczących może być ekoinnovacja wiedzy, łącząca zarządzanie wiedzą, innowacje i aspekty środowiskowe w podejściu systemowym. Po omówieniu trendów w gospodarce opartej na wiedzy i technologiach ICT, artykuł ten przedstawia pracę nad procesem innowacji opartym na wiedzy oraz wkład holistycznego podejścia do zarządzania wiedzą w rolę informacji i przetwarzania wiedzy w ekosystemach innowacji.

**Słowa kluczowe:** zarządzanie wiedzą, ekoinnowacje, ekonomia wiedzy.