

MODELING CONCEPT DESIGN OF INNOVATION PLATFORM

Knowledge management approach

Albena Antonova

Sofia University Faculty of Mathematics and Informatics

Roumen Nikolov,

Sofia University Faculty of Mathematics and Informatics

Abstract. The transformation of the innovation processes is a fact and new forms of cooperation and partnership among companies and research community emerge. The paper presents a model of concept design of Innovation platform, based on the 4 networked innovation models. Knowledge management is a common approach, providing opportunity for better knowledge exploitation in innovation life-cycle and considering new types of cooperation among innovation seekers and innovation providers. The Innovation platform concept design proposes unique opportunity for generation, exploitation and dissemination of innovation ideas and products, enhancing various forms of interaction and networking between different end-users. Finally, a link of the Innovation platform and organizational knowledge portal is discussed as part of one integrated knowledge management process.

Keywords: Innovation platform, Innovation models, Knowledge management

1. Introduction

Today, as a result of the development and use of wide range of information technologies (IT), the innovation model is changing. The process of innovation goes beyond the borders of the companies and combines the collaborative efforts of professionals, customers, employees, researchers and leading experts. In order to construct new products and services, it is no longer necessary to employ the brightest and most talented experts. It is enough to build boundary-less networks, motivating and empowering persons with different fields of expertise, experience and background to share ideas, to generate new concepts, to exchange and create new knowledge, and thus - to cooperate in order to create or transform an invention, innovation or discovery into a unique product or service. The main question is how technologies could facilitate hungry for innovations companies and the brightest researchers to find each others to create new forms of cooperation and partnership.

Some existing IT platforms provide unique opportunities for networking and cooperation between the **innovation seekers** and **innovation providers** (Nambisan & Sawhney 2008). However, it is not an easy task to balance the interest of individuals and researchers' communities with the requirements and innovation requests of large corporations. The main aim of the present research is to identify and point out how to effectively match existing and emerging technologies into

new business models in order to improve the communication and networking opportunities leading to business oriented transformation of the innovations. All these relationships will be observed from the knowledge management (KM) point of view by discussing various roles and interrelations occurring during the processes of knowledge generation, storage, use and transfer within the innovation cycle.

The paper aims to describe a design of a successful model of innovation platform. For this purpose the main trends and changes occurred with the innovation seekers and innovation providers during the last years will be shortly presented and analyzed. The roles and characteristics of the companies and the communities of researchers involved in the innovation process will be presented as well.

2. Transformation of innovation models

The transformation of the traditional in-house innovation model (or firm-centric model) to the networked-centric innovation model is the topic of discussion in the book “Global Brain” authored by (Nambisan & Sawhney 2008). The emergence of new technologies and globalization created more demanding and more competent customers - forming different communities of interests, taking part in virtual social networks, discussing their satisfaction or disappointment in personal blogs. On the other hand, corporations are operating in new business environment where they have to increasingly innovate and compete on the global market emphasizing on the newest aspects of their products or services.

It is interesting to note that since 1900 the majority of the most significant innovations for all industries originated outside the large, established firms (Utterback 1971). While analyzing the model of sustainable innovation, presented by (Keyes 2006), the following conclusions emerged:

1. Increased collaboration between different stakeholders is observed;
2. The companies strengthen their external relationships;
3. The role of R&D is expanded – it includes not only knowledge generation, but also knowledge brokering;
4. Computational modeling and simulation are utilized as evolving solutions for fast learning related to the innovation cycle.

It could be drawn a conclusion that nowadays the active approach for catalyzing innovations requires extension of the company borders and involvement of external players. (Du Plessis 2007) claims that the knowledge management assists innovations in creating tools, platforms and processes for tacit knowledge creation

and sharing, and thus it plays a very important role in the innovation process. In addition, it promotes the improvement of the company capacity to absorb and to build on the new generated knowledge and ideas coming outside the company.

2.1 Features of the Industrial R&D activity

There are many changes observed into the industrial research during the last decades. After restructuring of the state industry in the 80th and 90th in most countries, and as a result of the exposure to new competitive global forces, the scope of industrial research has changed (Nowotny et al. 2002). The industry neither can afford large-scale research infrastructures, nor can maintain its previous commitment to in-house research anymore. Moreover, the big companies are no longer so strongly influenced by the state models of doing research. As a result, many industrial research departments have been transformed, re-engineered, or floated-off as independent entities. Nowadays the industrial research is much more distributed than before (Nowotny et al. 2002). Three main results of this change are pointed out, namely: the emergence of small specialized R&D companies, the spread of the industrial research back down the supply chain and the increased level of networking and partnerships. These new characteristics open place for new forms of innovation and collaboration within the research processes that promote emergence of new cooperation models and tools.

2.2. Characteristics of the Researchers community

The emergence of information technologies totally transformed the way the researchers cooperate and generate new knowledge. As described in (Delanty 2001), during the last 20 years the following changes occurred in the communities of researchers:

1. Internet has altered the nature of cooperation of the researchers by locating a lot of the knowledge in the cyberspace and by eliminating the roles of time and distance as a barrier for communication and knowledge dissemination;
2. The mobility of researchers has significantly increased. The international conferences are becoming more frequent and the academics have more opportunities to meet colleagues with similar interests even when their research is highly specific;
3. The academics are networking more - they form multiple research networks that are spread across the globe;
4. The number of co-authored or multi-authored publications has been increasing, in particular in fields where the research depends on large-scale funding. Group publications are more frequent and provide evidence that

the traditional model (described by Weber 1948) of the solitary professor in personal possession of his tools, would be no longer valid.

5. The emergence of transnational knowledge as a result of international research could be observed. In addition - new forms of cooperation between organizations and individuals appeared.

Nowadays the researchers increasingly act as self-directed experts, motivated by achievement of specified research goals. They are highly mobile and they enter in various virtual networks. They cooperate with a number of research and industrial institutions, take part in international research communities, manage a broad range of national and international contracts funded on competitive bases by various national and international sources. Academia-industry interactions and cooperation increasingly becomes subject of negotiations and opportunity for establishing new partnerships fostering the innovation process. (Machlup 1980) considers university, being the center of knowledge production and teaching, as a “*knowledge factory*”, equated to an industry. Kerr, former president of the University of California, Berkeley, cited Machlup's notion of the *knowledge industry* in his influential book *The Uses of the University*. (Kerr 1963) laid out his views that **a large modern university had to operate as a part of society, no longer as an ivory tower apart from it.**

3. Emergence of New Innovation models

New networked innovation models emerged (Nambisan & Sawhney 2008). The models can be described as follows: **Orchestra** model (where one leading organization is orchestrating innovation activities of the network members); **Creative Bazaar** model (where a company looks for new ideas and technologies from wide variety of sources); **Jam Central** model (where individual contributors come together to collaborate in envisioning and developing innovations); and **MOD Station** model (where a community is trying to modify an existing innovation). The main characteristics of these models are defined in Table 1.

Table 1. Four network-innovations models according to (Nambisan & Sawhney 2008).

<p>Creative Bazaar</p> <ul style="list-style-type: none"> - Broad innovation goals - Evident market opportunities - Stand-alone innovations - Moderate to high development risk, moderate commercialization risk - Innovation knowledge range from simple to complex and some integration is required 	<p>Jam central</p> <ul style="list-style-type: none"> - Broad innovation goals - Not clearly defined market opportunities - Specialized contribution, helping to define and implement innovations - High development and commercialization risk - Integration of widely distributed new, complex and diverse knowledge
---	--

<ul style="list-style-type: none"> - Inexpensive or moderately expensive facilities for idea development and testing Intellectual property rights –feasible and predictable, but requires more efforts 	<ul style="list-style-type: none"> - Sophisticated and moderately expensive infrastructure - Unpredictable context, mix of open and close systems
<p>Orchestra model</p> <ul style="list-style-type: none"> - Well defined innovation goals - Clearly specified and modular innovation architecture - Clearly defined market opportunity - Implementing, complementing or extending the innovation architecture - High development and implementation risk - Innovation knowledge is complex – requires integration across domains - Expensive and sophisticated facilities for idea development and testing - IP rights – predictable and manageable 	<p>MOD Station</p> <ul style="list-style-type: none"> - Well defined modular architecture, innovation opportunities are not predictable - Not evident and clearly identifiable market opportunities - Complement or enhance existing innovation - Low development risk, high commercialization risk - Innovation knowledge is complex, specialized but widely distributed - Not expensive and specialized facilities for idea development and testing - Predictable IP context

(Nambisan & Sawhney 2008) propose detailed analyses of each of the models by discovering the concrete company needs and opportunities. They suggest that the innovation-driven activities have to be lead, organized and supported by companies and commercial organizations. According to (Utterback 1971) a commercial organization apparently tends to innovate in areas where there is a fairly clear short-term potential for profit. This statement can provide an explanation for the fact that “...most innovations representing a breakthrough or potentially changing the character of a whole industry tend to come from sources other than firms within that particular industry...”(Utterback 1971), e.g. from universities, independent research units, etc. One can conclude that cooperation and collaboration of the companies with a large pool of researchers and inventors coming from universities and public research units can give birth to new concepts, ideas and grounds for further research and innovations. Due to the fragmented nature of the discussed innovation models in (Nambisan & Sawhney 2008) it can be assumed that a lot of useful sources for innovations can be missed. For instance a number of interesting ideas and suggestions, rejected by an organization, identified as Innovation seeker, could have some potential to become successful in different context or for different markets, if they are demonstrated to a knowledge broker. In the next sections a new business model for an Innovation platform is described. It combines the features and the different aspects of the 4 models mentioned above and, in the same time it plays the roles of an innovation marketplace, a knowledge broker, and a pool for communities of interests that network the innovation seekers and innovation providers. The platform could be beneficial for all participants by creating and adding value for them. The knowledge management approach provides a model and reference how to develop an extended Innovation IT

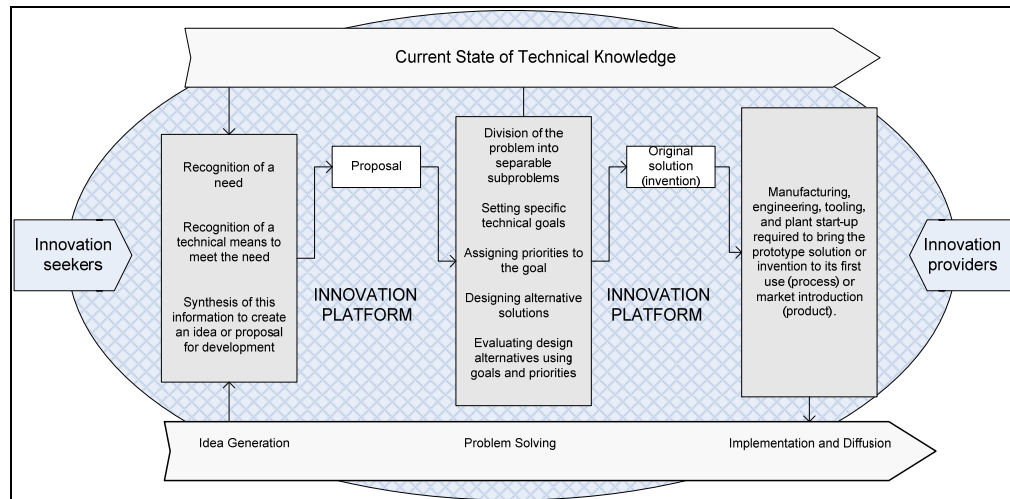
platform that promotes knowledge generation, knowledge transfer and further knowledge exploitation.

4. A model of an IT innovation platform

According to (Utterback 1971), the technical innovation process is divided in 3 main sub-processes, namely: *Idea generation*, *Problem-solving*, and *Implementation and diffusion*. The model design of the Innovation platform will support each stage of the innovation life-cycle. It aims will be to combine the roles of the virtual social community, the knowledge broker and the innovation marketplace. The platform will encourage attainment of the both crucial phases –**Innovation Proposal** and **Original solution or invention** and will allow the innovation seekers and the innovation providers to meet and to enter in relationships as they do in the 4 network innovations models (Nambisan & Sawhney 2008). In addition, the Innovation platform will address all of the activities in the Technical innovation sub-processes that support companies, communities and individuals to figure out how to contribute in an innovation process. According to the different innovation models discussed above, the innovation process can be lead by any of the innovation seekers and/or innovation providers.

The main objective of the platform is to add value not only by fostering communication processes and exposing current innovation needs of the companies and opportunities for researchers as done in other platforms (for example www.innocentive.com), but to adapt the innovation life-cycle into a knowledge management framework in order to achieve greater competitive advantage for innovation seekers and innovation providers.

Figure 1. The process of technical innovation and the role of the innovation platform (adapted from Utterback 1971)



There exist a number of innovation platforms, concentrated around one or more of the 4 models determined by (Nambisan & Sawhney 2008). There can be cited the cases of Innocentive.com, Boeing 787 and Salesforce.com illustrating the **orchestra model**, Dial Corporation, BIG and Yet2.com as examples for **creative bazaar model**, project TDI (tropical disease initiative), HapMap project and Second Life as examples of **jam central model**, and OpenSPARK initiative and Mashup movement, illustrating the **mod model**. In order to design a sustainable and market-oriented platform, the following issues should be analyzed:

- Innovation approach: How the innovation process should be organized?
- Motivation: How different prospective actors to be involved in the Innovation platform activities should be motivated and stimulated?
- Benefits: What the potential benefits for different users would be?
- Knowledge life-cycle: How to generate, store, transform and distribute valuable knowledge, in order to create value in the innovation process?
- Business model: How to define business roles and users interactions?
- Users roles and profiles: How should be determined the roles and the positions of the various actors?
- Activities: What type of activities should be possible to perform within the framework of the platform?

5. Features of the Innovation platform

The characteristics of the 4 models of networking innovations, supported by the Innovation platform, are presented at Table 2. The innovation seekers IS and the innovation providers IP can participate in multiple networks, and can form different cooperation and collaboration models both with other innovation seekers and

innovation providers. The main advantage of the innovation platform is that it provides opportunities to meet IS and IP by using standardized forms, e.g for requests, for offers and presentations of innovative proposals, etc. The users could also prepare a profile, invite co-workers to take part in a project, initiate innovation project, share virtual place to work together, use different groupware and project management technologies to keep track of the process, organize social networks, etc. All innovation requests and proposals should provide estimated budget, time framework and level of completeness. The platform will provide support and assistance with further explanations and presentations as well as with links to experts at all stages of the innovation process, including IPR issues.

Table 2 Features and functions of the Innovation platform according to 4 models network innovation approach.

<p>Creative Bazaar</p> <ul style="list-style-type: none"> - <u>Innovation Approach</u> – Broad range of innovations, ideas, innovation proposals and offers presented and exposed by IP - <u>Motivation</u> – IS can receive interesting ideas and can browse among various ideas and research proposals. IP can expose and explain much more in details their innovation proposals, may prepare and collect offers, may develop and expand their ideas in business plans, project proposals, business offers. - <u>Benefits</u> – IS will benefit from access to different sources of innovations, IP can benefit from opportunity to give publicity of their inventions and research ideas, potentially finding funds and forming partnerships. IP will benefit for expanding chances to “sell” its ideas even previously rejected. - <u>Knowledge life-cycle</u> – the innovation knowledge is widely distributed among members of the portal and new knowledge value is created through knowledge transfer. - <u>Business model</u> – IS are allowed to browse different sources of innovation ideas and can select ideas that can be adapted or transformed in order to become innovations. - <u>Users roles and profiles</u> – Innovation seekers – active or passive – search for useful innovations or browse for ideas, innovation providers – expose their inventions, innovations etc. - <u>Activities</u> – IP upload presentation, description or formulation of the idea and its potential impact, sending concrete proposal (offer) for a specific purpose or to potentially interested IS, or targeting specific industry, pool of companies etc. IS can browse innovation proposals, select ideas and get in touch with IP, expanding and negotiating further cooperation and go to phase 2. 	<p>Jam central</p> <ul style="list-style-type: none"> - <u>Innovation approach</u> – IP can publish “raw” ideas for cooperation, in order to invite and form partnerships with another community members– researchers, inventors, companies etc to generate new knowledge or innovation - <u>Motivation</u> – IP can find another interested partners among IP and IS in order to cooperate and to perform research or innovation activity. - <u>Benefits</u> – IP will benefit from access to community members and potential collaborators, sources of funding –companies, national and international funds and VCs, reserved virtual collaboration space; IS will benefit from access to new –generated knowledge, and its potential application in innovations; - <u>Knowledge life-cycle</u> – knowledge generation, transformation and distribution. In the process of cooperation within the community new knowledge emerges and can give birth to new innovation process. - <u>Business model</u> – IP and IS can form Communities of practice (CoPs), developing new innovations and finding new funds; IS can observe and can take part in some research and innovation process or can fund interesting opportunities. - <u>Users roles and profiles</u> – IP can initiate or take part in some CoP; IS, Companies can take part in the research, can provide financing and support of the innovation process; - <u>Activities</u> – IP initiate innovation ideas, form communities and invite other IP and IS. IP can use private virtual collaboration space, allowing transfer of explicit and tacit knowledge.
<p>Orchestra model</p> <ul style="list-style-type: none"> - <u>Innovation approach</u> – IS has determined specific characteristics of the innovation and organize and 	<p>MOD Station</p> <ul style="list-style-type: none"> - <u>Innovation approach</u> – IP create in cooperation new enhanced innovative products, features, concepts etc,

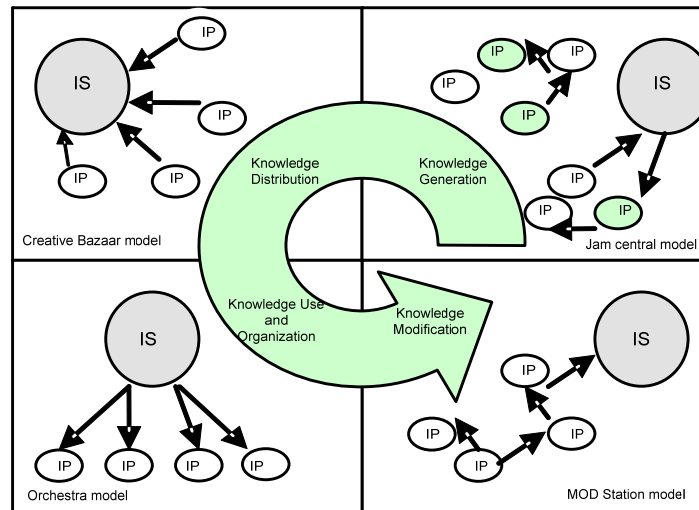
<p>govern the innovation process of IP.</p> <ul style="list-style-type: none"> - <u>Motivation</u> – IS has access to various specialized IP, innovation platform provides intermediary functions, supporting collaboration process, private virtual space, project management tools; IP can obtain detailed description of the tasks and can be involved in large-scale research and innovation activity. - <u>Benefits</u> – IS can easily organize knowledge production coordinating and managing networks of different IP; - <u>Knowledge life-cycle</u> – existing and new-appearing knowledge is integrated, used and transformed in order to create unique new valuable innovation. - <u>Business model</u> – IS govern the network activity and use Innovation platform to support IP, project management and collaboration. - <u>Users roles and profiles</u> – IS is leading actor, orchestrating the innovation process and all type of relationships with IPs. - <u>Activities</u> – IS will be allowed to formulate a problem, to form community, to reserve virtual work space, to invite members IP of the community, to support them finding appropriate solution, to manage complex projects. 	<p>based on product or model or delivered by IS.</p> <ul style="list-style-type: none"> - <u>Motivation</u> – IP can attain interesting results as the process is open. IS can take part in transformation and modification of their product. - <u>Benefits</u> – IS have access to community of IP. IP can finally provide improved versions and tradable solutions to IS; - <u>Knowledge life-cycle</u> – on the base of the existing knowledge, new knowledge is developed, modified and integrated. - <u>Business model</u> – IP have the control and position to propose innovations, to develop networks, to initiate cooperation and to invite other community members to take part in the innovation. - <u>Users roles and profiles</u> – IP can provide new proposals based on the directions and description of IS. - <u>Activities</u> – IP can initiate a process of enhancing or completing features, etc of existing product, model etc, can invite IP and new members, can share knowledge.
--	--

Legend: Innovation Seeker = IS, Innovation provider = IP

6. Knowledge management and Innovation Platform

Various perspectives of the knowledge life-cycle within an innovation platform are presented at figure 2. One could imagine that in the Jam Central model some new knowledge and innovations emerge from the community work. However, this knowledge can be transferred and presented to the innovation seekers by the Creative bazaar model. After that, the company can orchestrate its own innovation process based on the selected knowledge or innovation and finally, when a product, concept or model is ready, the community can assist the company to create new environment and context within the MOD model while modifying or completing an existing product. Thus we can claim that the role of the Innovation platform should be to facilitate and enable an effective knowledge management within the innovation process, following the phases of knowledge creation, knowledge distribution, knowledge exploitation and knowledge modification. This concept design of the Innovation platform integrates all 4 networked innovation models in one knowledge-management cycle.

Figure 2. Knowledge life-cycle within innovation process based on the 4 models of networked innovation in (Nambisan & Sawhney 2008)



Legend IS= Innovation seeker; IP = Innovation provider

7. Knowledge management and innovations

While innovation platform can provide access to innovative ideas, inventions, new knowledge and experts, innovation process is actually company-centered activity. According to (Brand 1998), in order an innovation to take place, a company needs people who are willing to share and creative people who have the ability to turn ideas into real products and services. The knowledge management approach provides guidelines how to empower the various processes of knowledge generation, use, transformation and sharing both inside and outside the company. (Du Plessis 2007) defines the following benefits which KM brings to the innovations process:

- KM facilitates collaboration in the innovation process;
- KM enables the flow of knowledge used in the innovation process;
- KM provides platforms, tools and processes to ensure integration of an organization's knowledge base;
- KM assists in identifying gaps in the knowledge base and provides processes to fill the gaps in order to aid innovation;
- KM assists in building competencies required in the innovation process;
- KM assists in steady growth of the knowledge base through gathering and capturing of explicit and tacit knowledge;
- KM provides a knowledge-driven culture within which innovations can be incubated.

In order to assure wider adoption and use of the Innovation platform business model, it has to be a natural extension of the organizational knowledge portal. An organizational knowledge portal provides information and knowledge about the

internal processes that describe the key success factors and indicators for management of inter-organizational knowledge. However some common understanding of the KM and innovation process as drivers of the company development and sustainability has to be established before linking the Innovation platform with the organizational knowledge portal. Organizational Knowledge portal should enable the internal tacit and explicit knowledge to flow, to facilitate understanding, to use taxonomies to facilitate access to knowledge and to decrease the time to reaction in case of external events. Furthermore, the benefits of linking the innovation platform to the knowledge portal or to the enterprise information portal can be twofold. The innovation platform would provide up-to-date information about the current innovation requests and innovation proposals that could be filtered and delivered to the interested employees through the Knowledge portal. On the other side, by linking the organizational knowledge management portal to the innovation platform a company would get access to a variety of social networks, and various Communities of Practice, access to external experts and sources of funding. In this way the Innovation platform will increase tacit and explicit knowledge flows from and to the organization, and thus - enhancing its active innovation position in the market and thus its knowledge base.

8. Conclusions

The information and communication technologies provide multiple opportunities to enhance and improve the existing business models and processes. KM allows business processes to become more efficient and effective by ensuring better redistribution of the organizational resources and better response to the signals coming from the business environment (Galabova& Antonova 2007). One independent Innovation platform will enhance the organizational innovation processes and will contribute to better exploitation and use of the organizational knowledge management portals by improving the innovation and knowledge management processes within an organization. The above described concept design of the innovation platform which is based on the 4 models of networked-centered innovation of (Nambisan & Sawhney 2008), present an opportunity to meet the innovation seekers and the innovation providers. One of the main advantages of this concept design is that it fully explores the innovation knowledge life-cycle: knowledge generation, knowledge use and exploitation, knowledge transfer and distribution and knowledge modification within a networked community. The further research would be concentrated on the criteria and the success factors for establishment of an innovation platform. The links between the innovation platform and the organizational knowledge portals (as part of one integrated knowledge management process) could be also an interesting area of further research.

References

Brand A., *Knowledge Management and Innovation at 3M*, Journal of Knowledge Management Vol. 2 Number 1, September 1998

Delanty G., 2001, *Challenging Knowledge. The University in the knowledge society*, Buckingham, Open University Press

du Plessis Marina, *The role of knowledge management in innovation*, Journal of Knowledge Management, Vol. 11 No. 4, 2007, Emerald Group Publishing

Galabova, L.& Antonova A. *Sustainable business processes through effective knowledge management*, Proceedings of International Conference of Automatics and Informatics, Vol III, October 3-6, 2007

Kerr C. 1963, *The uses of the university*, Cambridge, Harvard University Press

Keyes J., 2006, *Knowledge management, business intelligence and content management, The IT Practitioner's Guide*, New York, Auerbach Publications

Machlup F., 1980, *Knowledge: its creation, distribution, and economic significance: v. 1. knowledge and knowledge production*. Princeton, NJ: Princeton University Press.

Nambisan S & Sawhney M, 2008, *The Global Brain, Roadmap for Innovating faster and smarter in a networked world*, New Jersey, Pearson Education

Nowotny H.& Scott P.& Gibbons M., 2002, *Re-Thinking Science, Knowledge and the Public in an Age of Uncertainty*, Cambridge, Polity Press

Utterback J. *The Process of Technological Innovation within the Firm* The Academy of Management Journal, Vol. 14, No. 1. (Mar., 1971).

Weber, M., 1948, *Science as a vocation*, in H.H. Gerth and C.Wright Mills (eds.) From Max Weber. London: Routledge & Kegan Paul