

Innovation and Social Sciences : empirical study

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Abstract :

This contribution concerns the increase of social sciences research usefulness for the industry and services sectors. The objective of this paper is twofold. Our first aim is to contribute to the understanding of (1) the mechanisms underlying the use of human and social sciences knowledge in the innovation process and (2) the management of the research-industry relationship in this field. Our second aim is to empirically enlighten this growth by crossing the sectors of industry and services and the different fields of social and human sciences. This framework is based on the French innovation survey data base (2000) and the European community innovation survey (CIS 3).

Key Words : Social Sciences, Knowledge Base and Innovation

Introduction :

It is widely acknowledged in the knowledge literature field and in the literature on the resource-based view on the firm in particular that knowledge can be a source of sustainable advantage. In this context, understanding the process of knowledge production and the relationship between innovation and knowledge has become a key issue. However, despite the attention that has been dedicated to this field, there is little conceptual and empirical research on the topic.

This framework constitutes an attempt to understand one form of knowledge production- the multi science model- using the analytical concept of “interdisciplinarity” or “collectively creating new knowledge” and providing its theoretical background. The second aim is to illustrate the innovation processes by focusing on the attributes of its knowledge base.

Indeed, the fact is that firms rarely use and apply social sciences knowledge in their R&D projects. This under utilisation might be explained by two factors. First, is there any room for Social Sciences on firm’s innovation process ? The impression persists that the innovation needs much more “Hard Sciences” knowledge. Second, if the Social Sciences Knowledge is marginal in the innovation process, there is no doubt that scholars, firms and policy makers assume a partial responsibility for that.

The paper is organised as follows. First, it reviews the major theoretical models of knowledge utilization and introduces our two central concepts, i.e. “ Multisciences Model of R&D” and “ Knowledge base” concepts. Second, the paper presents the Data analysis methodology.

Literature review :

The impact of national culture on the innovation’ adoption (Kedia, Keller & Julian, 1992; Shane, 1993) in high uncertain markets is more often questioned.

Numerous studies have found a relationship between the National Culture Dimensions and various aspects of national and firm performance. This result can be extended to the relationship between Product innovation and societal culture of the demand. The integration of cultural values on R&D projects permit for example to increase the probability of innovation adoption by the market. A number of authors have suggested that successful innovation adoption depends on congruence between the innovation characteristics and the demand’ embedding milieu. The receptivity to innovation and the technological change in the case of radical innovation depends on the multivariate factors in which societal and cultural factors are present. In particular, cultural factors play a larger role in the diffusion and acceptability innovation.

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But, in which conditions, the level of influence of culture is lower/higher on the innovation acceptability ? What is the impact on the adoption process in the case of innovation with high level of scientific content ? Is there a need of the social Sciences knowledge in the innovation process ? If yes, is there difference between radical and incremental innovation in this matter ?

Following Landry et al (1998, 1999), There is 4 models who explain the process of knowledge utilization by decision makers (Weiss, 1979; Yin and Moore, 1988; Kline and Rosenberg, 1986 and Landry, 1990).

In the technological model, research funding is considered as the major determinant of knowledge utilization. It is based on the assumption that the needs of decision makers will compel them to use research, and high quality knowledge will be automatically and rapidly captured and used. This utilization is influenced by: 1. The nature of knowledge and its attributes (Dearing and Meyer, 1994; Edwards, 1991; Lomas, 1993) and 2. Types of research: basic/applied, general/abstract (Machlup, 1980); quantitative/qualitative (Huberman and Thurler, 1991); particular/concrete (Rich, 1997); research domains and disciplines (Oh, 1997, Rich, 1997). Landry et al (1998, 1998) addresses two critics to this model: 1. Knowledge transfer is not automatic 2. Raw research information is not usable knowledge and there is a process for transforming it into usable one (Lomas, 1990).

Knowledge utilization is explained in **the economic model** only by the needs and the context of the users (Frenk, 1992; Chelimsky, 1994; Silverside, 1997, Orlandi, 1996). In the case of contradiction or conflict between research and the organizational interests of users, the research may be pushed aside. Consequently, organizational structures, norms and rules are essential determinants of knowledge utilization (Rich and Oh, 1993), and the principal factor causing under utilization of research material lies on the interests of the users, which may be in conflict with the research findings. In this point of view, research results are more likely to be used when they support the interests and the goals of the organization (Oh, 1997). This model can be criticized for 1. Focusing on instrumental use of research, hence neglecting that different types of knowledge lead to different uses, 2. Laying too much stress into selfish interests of the users, 3. Omitting the interaction between producers and users of research findings, a factor that may increase utilization (Landry et al, 1998).

The institutional model was developed in response to the fact that knowledge transfer was not automatic. It explains knowledge utilization with recourse to two determinants: 1. The content attributes and types of research results; 2. And the dissemination effort. The main limitation of the institutional model is that the potential users are neither concerned in the selection of the transferable knowledge or information, nor involved in the production of the research results.

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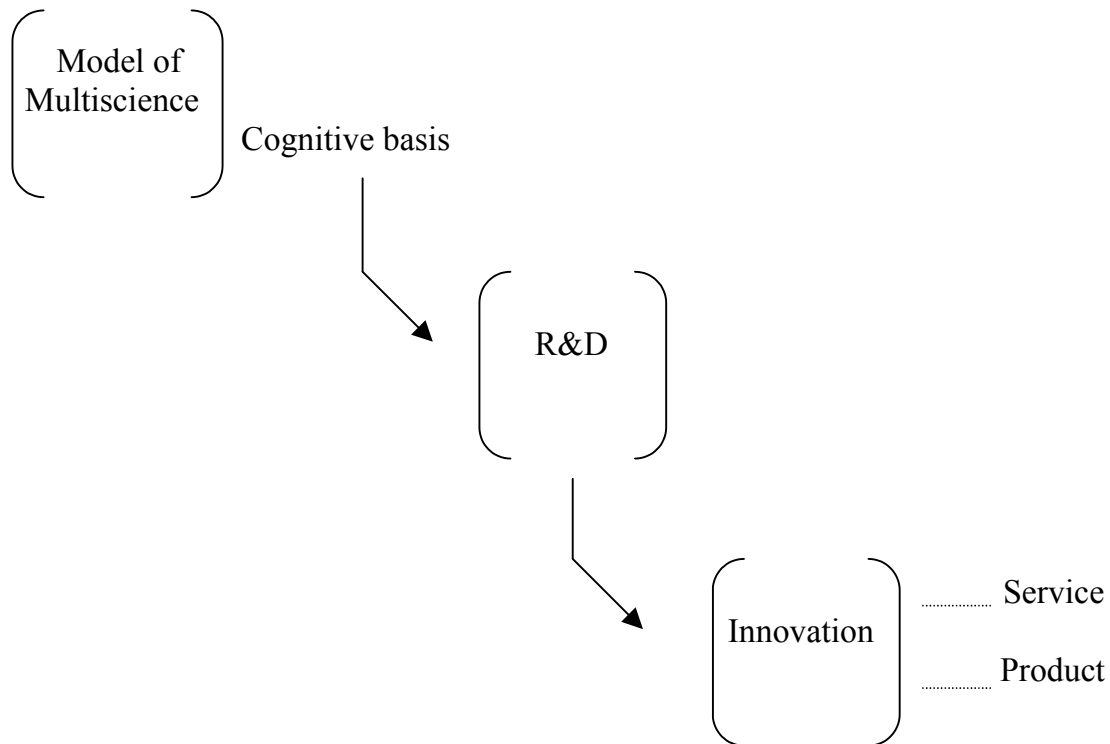
Knowledge utilization depends on various interactions occurring between researchers and users rather than on linear sequences beginning with the researchers or the users needs. According to the Landry et al (1998, 1999), **the (social) interaction model** is supported by two communities : 1. The supporters of the communication related theories emphasized on the so-called “two communities metaphor”. A difference between the culture of science and the culture of users leads to a lack of communication between them, and consequently, to low levels knowledge utilization (Caplan, 1979; Rich, 1979; Oh and Rich, 1996); 2. The second approach focuses on the intensity of interaction between the users and the producers of knowledge. More sustained and intense the interaction between researchers and users, more likely there will be utilization. According to this model, factors explaining utilization are: types of research outputs, organizational interests of users, dissemination efforts and linkage mechanisms.

The lack of interaction between researchers and their potential audiences has been identified as the main problem in under utilizing research findings (Oh and Rich, 1996; Leung, 1992; Huberman, 1987; Lomas, 1997). More to the point, the under utilization of Social Sciences Knowledge by firms can be explained by there inability to use this type of scientific knowledge. But this firm’s ability to use Science to innovate and produce value-added products is a critical core competence (Sahal, 1981; Brown & Eisenhardt, 1995). Consequently, firms must develop their abilities to use and capture Social Science knowledge.

Conceptual framework :

“Innovation is now seen as a more systemic activity involving many and diverse actors throughout the economy” (Cowan et Jonard, 2002). It is modelled as knowledge created under interdisciplinary research. Two main concepts are mobilised. At first, we consider that the knowledge base influence without any doubt the processes of knowledge creation and innovation. The nature of this basis is determinant in the innovation adoption process. The second concept is “Multiscience Model of R&D”. We consider that the complexity of research and development process within a risky environment impose the combination of heterogeneous but complementary scientific knowledge.

Figure 1 : The “Multiscience” Model of R & D

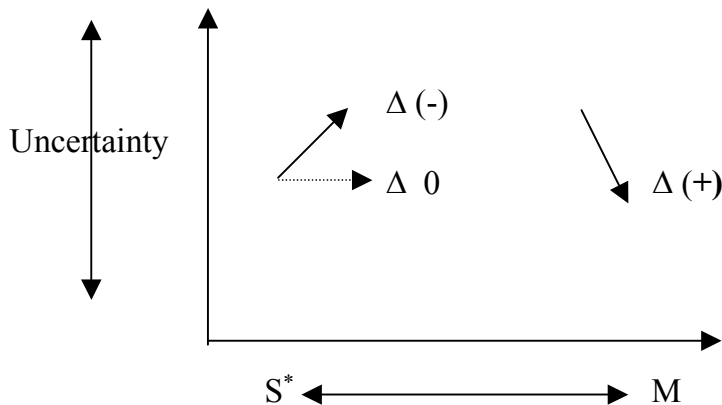


We first define interdisciplinary research and the multi science research model. How multi-science model of research and development modify the process of knowledge creation, and how does it influence the formation of new knowledge ? Secondly, we consider customers to be the most relevant source of information for guiding the strategy and innovation process. For this reason, the firm has to develop an analytical tool that helps the research and development unit to explore the ‘world of customer’. The firm focus will be on extracting information from market about the ‘dominant logics’ of customers. So, we suggest that interdisciplinary research is a complex but powerful process that can help firms to elicit the information that are central to their success. We argue that interdisciplinary research is a digging process that can facilitate that elicitation of less explicit information.

In this fact, the MSM is defined as a mode of production and dissemination of knowledge inside the firm. More precisely, it concerns the knowledge production mode based on the resolution of problems. It is different from the others models (Gibbons et al., 1994) by its main characteristic is the interdisciplinary. The application fields of this model covers the situations of decision making in uncertainty context and in high-risk level environment. The knowledge production in this model is different from the linear logic characterised by the preponderant role of "Hard Sciences". The MSM, which is an

interdisciplinary model by definition, is characterised by the interaction between different types of scientific knowledge fields. Indeed, and here we find our second concept, the principal characteristic of MSM is the nature of its knowledge base.

Figure 2 : Uncertainty and ‘Science or Multiscience’ Research and Development



Thus, innovating in the case of extensive knowledge basis (with eclectic sources of knowledge : engineer sciences and social sciences) allows the firms to reduce risks on the market. A market sanction in this case is much more important than for the companies which operate in a schumpeterian¹ context. Indeed, we maintain that firms should abandon the uni-dimensional base of their research and development projects in the case of uncertain projects. Our main argument will be that the Social Sciences Knowledge is necessary for the projects dealing with a high market uncertainty.

Methodology :

This work addresses two questions: What is the extent of the utilization and use of Social sciences research in the innovation projects ? What are the determinants of the utilization of Social Sciences research knowledge ? This work aims at developing a framework to analyse the relationship between Social Sciences Knowledge and Innovation. The main purpose is to explain what is the nature of the determinants of Social Sciences Knowledge use in the firms. How can we improve the ability to use Social Sciences knowledge and under which conditions is this process possible ?

Our methodological approach is empirical and combines two strategies.

* S: science; M: multiscience

¹ We refer to the destructive creation process where, each dominant position is threatened by another innovation.

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The first one aims at (1) identifying what are the main variables determining firms decision to invest in Social sciences research. It also aims at (2) building sectorial typologies according to the Social sciences weight in firms research and development expenditures (DIRD). To reach these objectives, we have recourse to the two following databases:

- « the French innovation survey data base (2000) » DPD/French Education and Research Ministry ;
- « Community Innovation Survey » (CIS 2 et CIS 3) INSEE

The level of Social Sciences knowledge use is examined by using eight categories of explanatory variables : Innovation type, Firm size, Funding, Patent, Research expenditures, Existence of research centre and type of research, Research sector. The dependent variable refers to the proportion of Social Science research expenditures in the total amount of Research expenditures.

The second one is based on an econometrical model. Our aim is to show the impact the utilization of Social sciences research on the reduction of market uncertainty. Our model is based on the “Cournot duopoly” with only one firm investing on Social Sciences Research. Our hypothesis is that there is a negative correlation between the investment on Social Sciences Research and Market Uncertainty reduction. In our model, we show that firms investing in Social Science Research succeed in rapidly penetrating their innovation market.

Discussion :

The importance attributed to innovation is reflected in an abundant literature based on empirical studies. Nevertheless, there are few studies interested in the nature of the innovation knowledge base. Indeed, the literature on innovation makes a distinction between tacit and codified knowledge (Cowan et al. 1999; Johnson and Lundvall, 2001; Nonaka et al., 2000; Polanyi, 1966). Another approach on knowledge distinguishes four kinds of knowledge : (1) Know-what, (2) Know-why, (3) Know-how and (4) Know-who (Lundvall, 1996). The knowledge creation and production process was recently defined as the result of the tacit and codified interaction, i.e. Knowledge conversion (Nonaka et al, 2000). However, when the Social Science research is seen as critical to advancing knowledge and to supporting decision making at all levels, no distinction was made between the Scientific Social Knowledge and the other type of knowledge. Despite no agreement on what constitutes the type of science (of which the social sciences might be considered a species), the existence of such a discipline suggests that there might be some important difference between “science” and social sciences. To a very large extent, the subject matter of the Social Sciences is different from the one of natural science for example.

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Even though the Social Science may be defined as the rational and systematic study of human society in all its forms with the aim of reaching an enduring understanding, acknowledged as such by a broad consensus of researchers on social phenomena, they are regarded as being more biased and less objective than the ones working on natural sciences. For example, social science research often supports participatory approaches of decision making, calling for changes in traditional decision procedures. In this perspective, the question arises as to whether the social sciences should restrict themselves to the analysis of phenomena in organizations or should it be instrumental in actually changing organizations. Social Science research needs to be problem-oriented and multidisciplinary if it is to have an impact on decision-making. But it must use language, concepts and research methods that decision makers in firms can understand.

Without any doubt, there is a further need for reflection on the role of the social sciences knowledge in decision-making or innovation process for example. In this way, this research tries to provide information on the relationship between Social Sciences research and industrial firms. The database allows us to identify "Social Sciences intensive using" sectors. The objective is to determine industrial logics of Social Sciences use in innovation processes, to show the effects of using this type of knowledge on the processes of innovation adoption and to propose contents to the "multiscience model " concept. This model allows us to understand the dynamics induced by using Social Sciences Knowledge on the innovation processes.