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Questioning two myths in innovation literature

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ABSTRACT

Which knowledge is most important in the completion of innovative processes? In which contexts does such knowledge develop? The combination of an in-depth case study, theory and reasoning formed the platform from which conclusions could be drawn. One conclusion is that the strategic knowledge necessary for innovation not only concerns technology. It is rather about business intelligence, funding, marketing and other non-technical areas. Moreover, the production and development of frontline knowledge and research is not the sole province of universities. In many areas, companies are far ahead of universities. Both conclusions differ from the assumptions in mainstream innovation literature.

1. Introduction

The aim of this article is to discuss *which kind of knowledge* is most vital in the formation of innovative processes; and *in which contexts* such knowledge develops. These problems became of interest during a literature study concerning the process of innovation as part of a research study for the Swedish Government (Gidlund & Frankelius, 2003). Earlier literature surveys concerning innovation (e.g. Kelly & Krantsberg, 1978; Ravichandran, 2000) have given valuable insights regarding the different kinds of focus reflected by the literature, such as technology push vs. demand pull of technological innovations. However, we were unaware of any studies which included analyses of the relative quantity of publications focusing upon a technology vs. a non-technology perspective. Our study aimed to complement earlier studies.

With the help of two university library experts (one expert in technical literature and the other in business literature), we searched databases such as JSTOR, EBSCO, ISI, ABI/Inform, and LIBRIS. The search keywords were innovation, innovative processes, innovative work, innovation systems, and related subjects. We analyzed the headings, key words and abstracts of articles and books, and made a careful examination of a selection made from the publication lists. During this literature survey we could identify two underlying assumptions: Firstly, it was usually assumed that the strategic knowledge (or research) needed for innovation in a high-technology context is *about technology* (often related to the development of technical products). Secondly, it was assumed that the high-level knowledge needed for innovation is usually produced *inside universities*.

The first assumption was so widespread, that most researchers seemed to take it for granted. The meaning of "R" when talking about "R&D" was almost always *technological* (including medical and pharmaceutical research) and included nano-technology, optical technology and molecular technology. The meaning of "R" was never, for example, research in economics, marketing or sociology. When authors discussed topics such as "commercialization of research", the term "research" referred to technological research (not any research into business administration or customer psychology).

The pattern was also obvious in literature that mirrored the priorities given by policy-makers such as Montreal TechnoVision in Canada, National Research Agency in France or the Finnish Funding Agency for Technology and Innovation (Tekes). From the literature representing innovation policy we selected a few cases for more detailed study and analysis. When the Swedish Governmental Agency for Innovation Systems (Vinnova) in 2006 made their decision regarding the funding of "Excellence Centers" (70 million SEK each) they had to choose from 167 applications. The research areas covered by these applications were not exclusively technically oriented. Proposals for research into entrepreneurship and foresight were examples of non-technical

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projects. However, Vinnova selected knowledge-specific areas such as antenna systems, antidiabetic foods, biomaterials structure dynamics and properties, functional nanoscale materials, efficient product realization, protein technology, paper and packaging, wireless sensor networks, and giga hertz technology (Vinnova, 2006). As we can see, these selected knowledge areas represent a focus on technological knowledge and technology research, and excluded research into entrepreneurship or foresight methods.

The same technology-bias can be illustrated with another innovation support organization, the Swedish Foundation for Strategic Research. The mission and purpose of the Foundation is to strengthen Sweden's competitive power by the funding of "strategic research". It is interesting to note the kind of knowledge defined by this body as strategic. The selected "strategic research centers" during 2006–2010, were given five years' funding each, (a total of 800 million SEK). They focused on the following areas: antenna systems, bio electronics, bio membranes research, biomimetic fiber technology, functional genetics, burning technology, brain cognition research, nano-technology, mathematics, cancer research, wireless communication technology, vaccines, mathematic modeling, and visualization technology (Swedish Foundation for Strategic Research, 2008). With the exception of mathematics, all these areas are about technology *per se*.

However, the assumption that the main problems in innovation concern technology itself is not verified empirically, and thus can be questioned. I choose to call it a prevailing myth. My starting points are explorative: Firstly, innovation may be related to and occur in many other areas besides technology, such as art or social care services. I leave that discussion as being outside the scope of this article. More importantly, I would argue that strategic knowledge *in high-technology contexts* (such as pharmaceuticals or aero-space) is *not only* about the technology involved. Other kinds of knowledge may have equal or greater importance. One well-known example is the space shuttle "Challenger" disaster. The accident occurred 73 s after lift-off on January 28, 1986, resulting in the deaths of seven crewmembers. The tragedy led to the formation of a special commission appointed by United States President Ronald Reagan. The Rogers Commission reported and concluded that the cause of the accident was *not* a technological failure as such. Rather, the root-cause was deficiencies in NASA's organizational culture and decision-making processes (Feynman, 1988; Presidential Commission on the Space Shuttle Accident, 1986). Logically, the knowledge area of "organizational culture" should be given as much strategical importance as the areas of innovative technology. But knowledge regarding subjects and topics such as organizational culture are not considered when innovation agencies, such as Vinnova or the Swedish Foundation for Strategic Research, make their priorities. One can only assume that they regard technology *per se* as being the basis and most difficult factor in any process of innovation. Moreover, non-technological areas are hardly ever considered in the literature on "R&D" or even mainstream innovation literature in general (cf. Fagerberg, Mowery, & Nelson, 2004). More examples will be presented later in the article. There are, of course, interesting exceptions from mainstream literature (such as Gomez-Mejia, Balkin, Cardy, Cardy, & Balkin 2006; Johne & Snelson, 1988; Rothwell et al., 1974).

The second assumption (or myth) that I will examine is that the high-level knowledge needed for any innovation almost always originates from universities. This assumption is usual in, for example, literature on "commercializing of research" or "technology transfer". Rothwell (1982), Hindle and Yencken (2004), Speser (2006) and Gulbranson and Audretsch (2008) are just a few examples representing this view. Strangely enough, the assumption is seldom discussed in an explicit way. There are exceptions such as Etzkowitz, Webster, Gebhardt and Terra (2000), but most authors accept this assumption as a non-problematic truth. This myth contained in innovation literature will be questioned in this article by the help of theory, reasoning and a particular case study.

Different settings outside the university context have spurred many major turning points in knowledge history. In his Nobel memorial lecture Herbert Simon mentioned the most important theoretical inspiration for his whole research career: "Barnard proposed original theories, which have stood up well under empirical scrutiny, of the nature of the authority mechanism in organizations, and of the motivational bases for employee acceptance of organizational goals (the so-called 'inducements–contributions' theory); and he provided a realistic description of organizational decision-making, which he characterized as 'opportunistic.' The numerous references to Bernard's work in *Administrative Behavior* attest, though inadequately, to the impact he had on my own thinking about organizations" (Simon, 1978, p. 352). Chester L. Barnard was not a University researcher. He was President at New Jersey Bell Telephone Company in New Jersey and had worked in many other organizations. But, as Simon said, Barnard created original theories.

In 1664, Cambridge University was closed because of a plague. Professors and students were therefore active in other places during a period of two years. Among these was the young student Isaac Newton, who returned home to his parents' farm in Woolsthorpe. It was in this environment, when he was away from university, that his basic ideas regarding movement and light were formed (Gleick, 2003). Newton told his friends later that he became inspired by watching the falling apples on the farm (Herivel, 1965). His home-environment on the farm, and *not the university environment*, was the place and inspiration for his groundbreaking original concepts and thoughts.

One academic problem during the 18th century was the concept of longitude. Most academics—including those belonging to the Royal Society—took it for granted that this would eventually be resolved from the study of astronomy, and that this solution would originate from academic studies in the universities. However, John Harrison found the solution, which was of a different kind and not derived from astronomy (Sobel, 1995). He invented and produced a marine clock, first tested in 1736, by which the longitude problem could be solved. The solution was mechanical. Moreover, Harrison was not an academic, but in fact a carpenter. He was *not* part of the university world.

Einstein conducted much of his revolutionary thinking at the Swiss Patent Office in Bern around 1903. His job was to evaluate patent applications for electromagnetic devices. Einstein later wrote to his friend Michele Besso and commented on the patent office as being "That secular cloister… where I hatched my most beautiful ideas" (Einstein, 1972, p. 147). Einstein also told Besso that the environment at the patent office was "the best sounding board in Europe" for scientific ideas (*Ibid*). The Center for the History of Physics at the American Institute of Physics, (2008) concludes: "With other friends in Bern, all unknown to the academic