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Learning for learning economy and social learning

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ABSTRACT

Failure to meet the preferences and needs of users has been consistently stressed as a major cause of unsuccessful R&D for over 30 years. Yet little seems to change. An important element in this "producer–user paradox" is a lack of frameworks able to inform empirical research and the work that people do when they bridge designing, implementing, using and managing new technology. "Learning economy" and "social learning in technological innovation" appear promising as such integrative frameworks not least due to their emphasis on learning between producers and users. The present paper examines the value in the way learning is treated in these frameworks for empirical research and for the practitioners, and to this aim contrasts these frameworks to findings from a line of studies on learning between producers and users of new health technologies.

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1. Introduction

Failure to meet the preferences and needs of users has been consistently reported as being a major reason for unsuccessful R&D, particularly in high technology and software. In the 1970s a series of studies, including project SAPPHO, compared successful and unsuccessful innovation projects with regard to a range of different characteristics. Understanding of user needs was found to be one of the very few factors that was statistically significant and consistent (Coombs et al., 1987, 93–119; Rothwell et al., 1974). In the 1980s 70% of UK and US large information systems were classified as functional failures, bringing only harm or marginal utility for their customers (Gibbs, 1994). In the mid-1990s product developers' own estimates about the failure rate of software projects was an astonishing 84%, in which failure to meet user needs featured again as the most common reason at 12% (StandishGroup, 1995). The situation has not changed. More in-depth inquiries about the dynamics of particular R&D processes also portray a similar difficulty in dealing with use and user-related issues in design (e.g. Miettinen et al., 2003; Rohracher, 2005; Williams et al., 2005).

At the same time, there has been a steady increase in management literature stressing users and clients as a key competitive asset (e.g. Leonard, 1995; Prahalad and Ramaswamy, 2004; von Hippel, 2005). This state of affairs has been characterized as the producer–user paradox (Miettinen et al., 2003): while research is consistent about the importance of addressing user needs better in product design, changes in technology production seem small. The explanations for this phenomenon vary from the hard-headedness of engineers and misplaced management practices (Cooper, 2004; Leonard, 1995) to users' poor competence in purchasing and stating their requirements (Cooper, 2004; Lundvall, 1985, 1988).

Attention could also be turned back to research as well as to what it has provided for professional training. Implementation, consumption, post-launch improvements, product development, industrial and systems design, management and policy are predominantly treated by disparate disciplines (Tierney and Williams, 1990). Integrative frameworks such as economic models of innovation or product development models, in turn, tend to give only a stylized treatment of issues such as information exchange, technical and cultural content as well as learning that connect these areas (Pollock and Williams, 2008). Integrative models stressing learning and interaction in producer–user relations have been argued to remedy this shortcoming (Lundvall and Johnson, 1994; Lundvall et al., 2002, 221; Williams et al., 2005).

However, approximating the processes and interactions by which innovation takes place as a learning by doing, using and interacting (DUI) in "learning economy" (LE) (Lundvall and Johnson, 1994) or as "social learning in technological innovation" (SLTI) (Williams et al., 2005) may lead to another problem. The scope, scale and types of phenomena that are analyzed as "learning" differ somewhat from studies of learning in behavioral sciences and in organizational learning (Lehenkari, 2006). This harks back to Jean Lave's apt remark (1993, 8): "That learning occurs is not problematic. What is learned is always complexly problematic". Indeed a mere emphasis on learning in 'learning economy' and 'social learning' would remain almost trivial: People acting in changing

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socio-economic formations can be expected to be involved in all sorts of recursive learning processes. The added value from learning in these integrative frameworks for researchers and practitioners may hinge on what more specific orientation about the objects, nature and organization of this learning the framework can provide.

To clarify the issue further, this paper first examines Lundvall's work on producer–user interaction and the 'social learning in technological innovation' framework (Sorensen, 1996; Williams et al., 2005) and then contrasts them to findings from a line of study on interaction and learning between production and use of new health technology. Cast in terms of a research question, this means two interrelated concerns: How does the way DUI and SLTI treat learning affect the way these frameworks are able (a) to integrate a relevant scope of issues in producer–user relations? (b) to deal with learning as an empirical object of study?

2. Organized markets, learning economy and learning

Lundvall's research reveals that many producers and users do not leave themselves at the mercy of markets, but, instead, develop sustained relationships with one or several selected user and supplier organizations, which allow the exchange of qualitative information related to user needs and technological possibilities (Lundvall, 1985, 1988; Lundvall and Vinding, 2005). He asserts that such "organized markets" go against assumptions in standard microeconomics where "agents – firms and consumers – are assumed to behave as maximizers of profits and utility". And where "the only information exchanged relates to products already existing in the market and it contains only quantitative information about price and volume" (Lundvall, 1988, 349–350).

The result is a "focus upon a process of *learning*, permanently changing amount and kind of information at the disposal of actors... [a] focus upon the systemic interdependence between formally independent economic subjects" (Lundvall, 1988, 350 emphasis in original).[1] Lundvall here refers to "learning by doing", which was originally offered as an explanation of why the cost of manufactured goods tends to decline significantly due to the accumulation of skill in producing them (e.g. Arrow, 1962; Wright, 1936), and "learning by using", the users' increasing skill in and/or understanding of using the product, leading to, for instance, less maintenance, new uses and improved products after becoming "embodied" through redesigns (Rosenberg, 1982). Innovation is therefore seen as an interactive process that tends to be continued by both its users and developers over a significant period of time. To capture the overall thrust of these findings, Lundvall introduces the term "learning-by-interacting" and the ensuing learning by doing/using/interacting model (DUI), to stress the active engagement between designers and users as a source of new knowledge, technical improvements and economic growth (Andersen and Lundwall, 1988; Lundvall, 1988; Lundvall and Vinding, 2005).[2]

To thrive in the learning economy, actors are encouraged to complement their specialization with active linkages and in-depth trust-based relations with strategically chosen partners (Lundvall et al., 2002; Lundvall and Vinding, 2005). The specific measures include monitoring the innovations and modifications that users make to existing equipment as well as scrutinizing the bottlenecks and technological interdependencies that represent potential markets for the innovating producer. Along with seeking direct collaboration with some users, producers should estimate their skills and capabilities in adopting new solutions as a basis for their design decisions (Lundvall, 1985, 1988; Lundvall and Vinding, 2005). The scope of useful information to keep track of spans from codified "know-what" to explanatory "know-why", "know-who", "know-when" and "know-where" and, finally, to skills and actionable knowledge as "know-how". The perspective recognizes that power, trust and loyalty among actors are important as well as orients them towards balancing new learning, and forgetting and remembering issues in regard to the current relevance of knowledge (Lundvall and Johnson, 1994; Lundvall et al., 2002; Lundvall and Vinding, 2005). All in all, DUI model integrates a range of non-trivial issues that have practical relevance for policy makers (Lundvall et al., 2002, 221) as well as for practitioners grappling with the producer–user paradox at company floors.

In regards to our second concern—providing empirically grounded insight about learning—LE has more problems. Eric von Hippel and Marcia Tyre note: "Although the economic significance of learning by doing and using has been made clear, the *process* by which these gains are achieved is still quite unclear. That is, we do not know the micro-level mechanisms by which learning by doing is actually done" (von Hippel and Tyre, 1995, 1 emphasis in original). Indeed, the present author is not aware of Lundvall's or his co-researchers' work trying to do this.[3] Likewise, interaction, firm, organization, use, production remain for the most part assumed on the basis of earlier theory (e.g. Lundvall and Vinding, 2005). Taking these for granted may, however, neglect complexity involved as innovations tend to feature highly uncertain, shifting and only emerging relations and actors (Sorensen and Williams, 2002; Van de Ven et al., 1999), as becomes evident from the SLTI framework. This is where we turn next.

3. Social learning in technological innovation: the processes and contexts of developer–user interactions

Social learning in technological innovation (SLTI) "seeks to explore empirically and in detail the operation of learning economy... as a process of negotiation, subject to conflicts of interests amongst players with rather different capabilities, commitments, cultures and contexts" (Williams et al., 2005, 8). It draws from the social shaping of technology approach in placing particular design episodes within multiple, overlapping cycles of development and appropriation and focusing on the coupling between technological and social change (Rip et al., 1995; Sorensen and Williams, 2002; Williams and Edge, 1996). SLTI has further drawn on a range of research fields to understand the difficult and contested processes of learning that are integral to innovation (Rip et al., 1995; Stewart and Williams, 2005). These include cultural studies of artifacts and marketing, engaging with the consumption of goods and services; innovation studies stressing non-linear and heterogeneous innovation processes; and work on organizational learning and the reflexive activities of players in the innovation process (Williams et al., 2005).[4] The framework views the devel-

[1] Organized markets feature frequent innovations targeted at external users (product innovations), also implying that in-depth information sharing does not lead to integrating user or producer into an hierarchical relationship (Lundvall, 1985; Pavitt, 1984). The formidable investment in diversifying competences and unfavorable competitive position contribute to this on the developer side (Freeman, 1994; Lundvall and Johnson, 1994), while transaction costs and further agency costs (von Hippel, 2005, 48–50) do so from the purchaser side.

[2] Any pairing between designers and users is of course affected by the context in which it happens. Evolutionary economics regards that many such contextual issues are path dependent and form deterministic "natural trajectories" within and across industries. Associated "technological regimes" set preconditions and limits for what are sensible actions for both producers and users (Nelson and Winter, 1982).

[3] In some of his recent work Lundvall refers to Kolb's theory of experiential learning, but it has not been used in empirical analysis, its relationship to learning-by-doing, using and interacting has not been elaborated, and nor have its characteristics been compared to other equally potential theories of organizational, group or individual learning.

[4] Work on and referrals to social learning around social shaping of technology approach are by no means restricted to the particular model of SLTI, even as this

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