

Organizing Innovative Projects to Interact with Market Dynamics: A Coevolutionary Approach

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This paper is about the coevolutionary processes that take place between the way firms organize their innovative activities and the dynamics of the relevant markets, especially those having to do with bandwagon and network effects. We focus on the decision-making actors and propose a categorization of causes of increasing returns and definitions of bandwagon and network effects that are consistent with this aim. We investigate the extent of internal autonomy of the unit, the extent of the integration of R&D, production and other activities in the product development process, and the extent of external autonomy. Based on three cases of projects creating software products, two of them in the same firm, we develop hypotheses concerning the relation between the organization of innovation and bandwagon and network effects. Also, on the basis of the discussion of the cases and the coevolutionary framework, a number of research questions are formulated dealing with the relation between the organization of innovative activities by firms, bandwagon and network effects and long-term dynamics, especially of industry life-cycles.

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Keywords: Organization of innovation, Increasing returns, Project teams

Introduction

The framework of coevolution (Baum and Singh, 1994) allows researchers to integrate the approaches coming from the two poles of the adaptation – selection debate. This seems particularly useful in studying the interaction between the organization of a firm and the firm's environment. The main purpose of this paper is to study a particular coevolutionary process: the way in which particular organizational forms can serve to increase the ability of the firm to achieve increasing returns, not caused by productive efficiencies inside the firm but by market dynamics outside the firm, which in their turn are caused by the phenomena of bandwagons and networks. Effective management by the firm can strengthen these phenomena and the increasing returns that result from them and thus make it likelier that the environment will be one in which these phenomena are significant, while, at the same time, increasing returns will have a positive effect on the likelihood that successful firms, with organizational structures that are effective in dealing with this aspect of the environment, will survive, thrive and go on managing bandwagons and networks.

It is generally accepted that increasing returns are basic to the nature of competition in most sectors of

the modern economy, and especially in the markets for information-technology products and information services. 'Increasing returns' means, that the marginal benefits of a good or of an activity are growing with the total quantity of the good or the activity consumed or produced.

We will analyse these mechanisms, in order to distinguish between, on the one hand, the 'traditional' type of increasing returns generated by the characteristics of the production process and, on the other hand, increasing returns generated by (different types of) bandwagon and network effects operating in the market. We focus on the second class of mechanisms and ask how firms should organize their innovation process to succeed in environments where increasing returns, caused by bandwagon and network effects, are present.

Increasing returns in the economy play a central role in evolutionary theories of economic and technological development (e.g. Arthur, 1988, 1989, 1996), especially because they are seen to generate self-reinforcing processes leading to path dependency. Also, increasing returns are considered to have significant effects on the interaction between the process of variation and selection among innovators and the type of selection system dominating the competitive arena (Wijnberg and Gemser, 2000) or the more general environment in which science and technology develop (Nelson, 1994, 1995; Nelson and Winter, 1982; Rip and Kemp, 1998). In management studies the interaction between adaptation of firm strategy, capabilities and processes, and the development of the selection environment has been conceived as a coevolutionary process (Baum and Singh, 1994). Our question is how do firms adapt the organization of their innovation processes to these mechanisms in the market, interacting with the operation of these mechanisms and, at the same time, the evolution of the environment within which they position themselves.

There is an extensive literature on the organization of the innovation process in firms (e.g. Brown and Eisenhardt, 1997; Burns and Stalker, 1995; Christensen, 1997; Cooper, 1993; Leonard-Barton, 1995; Wheelwright and Clark, 1992) and we want to restrict ourselves to one aspect that is generally recognized as important: the degree of independence of the group or team responsible for the innovative project. As will be discussed later on, we distinguish, on the basis of earlier studies, three dimensions of independence, namely: internal autonomy, integration of tasks in the team, and external autonomy.

First, we discuss the literature on increasing returns to arrive at definitions of network and bandwagon effects. The definitions will be based on an actor-perspective, which seems most suitable to clarify processes in which the actors coevolve with the changes they, intentionally or not, effect in their environment. Secondly, we review the literature on organizing

innovation, in order to enable us to delineate more precisely the degree of independence of innovating teams. Three cases will be presented of software products, two of which are produced by the same firm. Based on these cases we will develop hypotheses concerning the coevolution between the organization of the innovation process in the firm and the management of bandwagons and networks. The software sector is chosen since in this sector bandwagon and network effects are relatively important (Arthur, 1996). The first case concerns Unit 4, a producer of administrative software. The second and third cases concern two different products in a consumer software products firm (Davilex): an Internet site providing information about pregnancy and baby-care, and a racing game.

Considering the cases in the light of the theoretical approaches presented before will serve to suggest a number of further research questions dealing with the relation between the organization of innovative activities by firms, bandwagon and network effects and long-term dynamics, especially of industry life-cycles.

An Actor-Perspective on Increasing Returns

Increasing returns are especially problematic to the study and practice of innovation management where they are caused by market dynamics on which the firm's behavior and, indirectly, its organizational structure and decision-making processes, can have a significant influence while, at the same time, the firm's competitive success can significantly depend on these market dynamics. (Arthur, 1988, 1989, 1996; Shapiro and Varian, 1999). Before attempting to link the possible ways of organizing the innovative activities in a firm we will first discuss increasing returns in more depth, so as to clarify further the distinction between the types of increasing returns, focusing on the types this paper is primarily concerned with – those having to do with bandwagons and networks – and also to redefine increasing returns in such a way that it becomes easier to discuss the impact of managerial actions and the organizational structures that increase or decrease the probability that such actions can be undertaken.

In the literature, several definitions are given for these economic and technological mechanisms. Arthur (1988) distinguished five causes of increasing returns:

1. *Learning by using*. This refers to the improvement of a specific product by the producer during the period of use.
2. *Network externalities*. The utility of specific products for a user depends on the number of other

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