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Part I: Management of Innovation – Are We Looking at the Right Things?

Introduction

New Tendencies in Society.

The Management of Innovation and Innovation Research

Jon Sundbo

Are we looking at the right things when we undertake innovation research?

As a point of departure for editing this book, we asked the following question: Why should we not look at the right things and why is it that we might not be looking at the right things? Our answer was that both society and the market have changed, and with them the art of innovation management has changed. In June 2004, we organized a workshop involving researchers from several countries to discuss this question. The book is a result of that workshop. Part I provides an introduction and outlines the societal changes and the resultant changes in the nature of innovation activities and their consequences for innovation management. All of these changes can be characterized in one phrase – increased complexity. This means that the factors (innovation research, basic research in natural sciences and classic entrepreneurship) that classically have been thought to ensure innovation, firm development and economic growth are too limited for the present situation. In the next two chapters of the introduction, Staffan Laestadius and Marius Meeus discuss in greater depth the development of innovation research and the challenges it faces today.

Society has changed – appearance of the problematization society

We are looking for societal changes that can explain the introduction of new factors of innovation. New aspects have appeared in society during the past decades. The economic surplus has increased, markets have been satisfied, the service or experience society (cf. Pine & Gilmore, 1999) has arisen. The firm has gained a new relationship to society. Its exposure in society has become important for sales and for the success of its innovations, and the public has become much more interested in firms' internal affairs. The existence of the knowledge society means that firms can procure much of the knowledge needed for innovation activities from outside, and they involve external actors in innovation processes to a greater extent. Employees have more education, independence and initiative. Customers want individual solutions to problems (not goods or simple services) or entertainment. Meanwhile, because prices are still an important competition parameter, firms need to cooperate with external actors and even competitors (the network society, cf. Castells, 2000). Communication channels have become a thousand times more efficient (e.g., via the Internet), which for example has promoted e-business (a new part of the innovation task). The protection of innovations has become a greater problem.

These changes have led to what could be called the complex or problematization society, in which innovations solve complex problems and become complex themselves, as do the processes of solving them. The more knowledge, engagement and conscious customer behaviour, the higher and more varied the expectations to goods and services. As a result, a more advanced society means that everything has become problematized (not simplified). Everything in this society becomes a complex problem (which follows from the advanced knowledge, engagement of employees, customers and citizens – that all lead to many expectations and many problems in relation to each innovation). The complexity arises when social factors are added to technical-practical and economic factors.

To sum up, complexity in innovation can be many things. If we talk about the conditions for innovation, we could sum up complexity into the six most important new developments in society:

Market

- Product packetation: the combination of goods, services and experiences.

- Individualization of the product.
- Extras to the product (environmental protection, ethics, experience, meeting the customer's customers and so on).

Organization

- External networking-cooperation with many actors.
- Employees engaged and involved.
- Renewed importance of the price mechanism and productivity (back to basics in a complex world).

Innovations become complex

Innovations themselves have become more complex. The development of firms has become broader than innovation that is understood as technology-based development of new technological products. Many innovations are non-technological or a mix of technological and social aspects. Innovation within services becomes important since services comprise 80 per cent of economic activity. There has been greater focus on market behaviour as part of goods, service or experience (and of the innovation). Generally, innovations have been more integrated in that they are a renewal of already existing products, processes, organization and market behaviour all at the same time. Often goods and services (and maybe even experiences) are renewed and marketed as a complex product packet. This is done because the problem that the innovation is to solve has become complex and involves more side activities (such as services and experiences). All must be marketed in a special way that emphasizes this particular combined product/image packet to differentiate this product and firm from others, to demonstrate that the product meets ethical and other requirements, and to protect the innovation (since patents are not longer as efficient as they once were in the industrial society). Each customer expects an individual innovation made just for him – but at the price of a mass product. Flexible specialization (cf. Volberda, 1998), mass customization (cf. Pine, 1993) and modulization (cf. Sundbo, 1994) have become part of the innovation task – each new product or service must have a high-productive basis, but be delivered individually.

Change of firms' innovation activities – the management of innovation becomes complicated

The innovation process in firms has become complex, while innovation activities have become broader. Innovations are less dependent on

in-house specialized research and development (R&D) activities. The environment is more involved. Customers play a central role. If they are business customers, there is more focus on innovations' importance to their production and their customers – the innovation process must be seen from the customers' side. Market reputation is part of innovation. Political considerations concerning both the public and governments must be taken into account. The employees are more involved and play entrepreneurship roles. Small, but many, improvements become increasingly important (e.g. quality improvement). Innovation activities increasingly are based within the firm's strategy. Innovation activities in networks – some regional, others structured otherwise – become important.

New common characteristics across industries can be observed. Certain types of firms have similar innovation behaviour (e.g. depending on size) and there is regional coherence. These characteristics are often more important than industrial traits. This makes the management of innovation more complicated. Managers become dependent on the efforts of other people and must continuously reflect on the innovation route in relation to the firm's strategy and unpredictable changes in the environment. Innovation management has become the art of balancing different factors of development and development against stability.

New factors in innovation research

The situation outlined above has led to new innovation factors being introduced in the firms. They should be studied in innovation research. These factors become a supplement to the old factors and thus there is a development of innovation research and theory. The new factors that should be included in innovation research are, for example, increased dependence on market structure, collaboration in networks, active placement in the market structure as a result of strategic behaviour, and better exploitation and exploration of internal and external resources – involvement of employees, involvement in customers' innovation and production. More efficient research and development (R&D); R&D of social factors (such as a new market behaviour, a service as an addition to goods, new organizational or management forms) should be included. There should be more efficient use of external knowledge channels and new decision mechanisms – prices as a direct development parameter of innovations, non-patent protection mechanisms, which must be decided.

The book

The book both investigates and discusses some of the new factors behind innovation, and provides an insight into the new empirical and theoretical research that is taking place in this area. The work is far from complete and thus this book is more a state-of-the-art report.

The book is structured as follows: Part I discusses the various perspectives there are within innovation research; Part II deals with the environment and complexity of the market. In Part III, the internal, organizational aspects of innovation will be analyzed and discussed. Part IV looks at information and knowledge and their importance to the appropriability of the innovations. Each part has an introduction that explains the ideas and contents in greater detail.

Bibliography

- Castells, E. (2000), *The Network Society* (Oxford: Blackwell).
- Pine, J. (1993), *Mass Customization* (Boston: Harvard Business School Press).
- Pine, J. & Gilmore, J.H. (1999), *The Experience Economy* (Boston: Harvard Business School Press).
- Sundbo, J. (1994), 'Modulization of Service Production', *Scandinavian Journal of Management*, 10 (3), pp. 245–66.
- Volberda, H. (1998), *Building the Flexible Firm* (Oxford: Oxford University Press).

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