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Review Article

Implications of the innovation management models on the organizational performance

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Abstract: Innovation management is a topic increasingly addressed in the literature. The reason for this is that innovation is a key element for the survival of an organization. The need for innovation is imperative, whether if companies have to fight for market share or profit, or public organizations need to improve their services. The body of innovation management literature grew considerably over the last 40 years. This led to an increasing amount of different models of innovation processes. This article analyzes a series of management models that lead to innovation. The analyzed models cover both the strategic and the operational level within an organization - indicating the performance of the innovation on each analyzed level.

Keywords: innovation, innovation management, the models of the innovation management

1. Introduction

Innovation management is an increasingly covered topic in scientific and management literature over the past 40 years (Figure 1). The reason for this interest is likely to be the realisation that innovation is of key importance for survival of an organisation. Whether it concerns firms that need to compete for market share or profit or public organisations that need

improve their services, does not matter. The need for innovation is imperative. But at the same time, innovation is not easy. Innovation efforts over time gave us a multitude of failed innovation projects (See e.g. box 1 on the next page). Even huge companies that once were the forerunners and creators of whole markets have failed to stay competitive when (mayor technological) changes occurred.

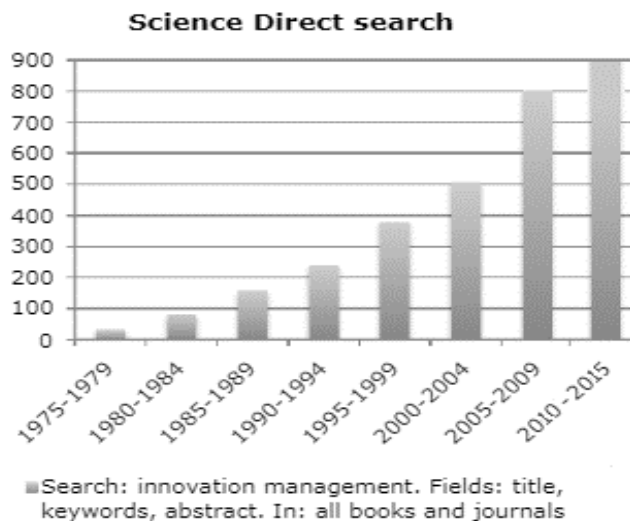


Figure-1: Number of papers and books about innovation management over the years as searched in Science Direct

An organization is so involved with - and simply used to - what they are good in (core competencies),

they become trapped in it. When the environment changes (e.g. changing consumer needs, changing

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regulation) organizations are not able to adapt (Eveleens, 2010; Maier A., 2012; Kiehne, 2016; Maier D., 2018 a-g).

1. Innovation

Innovation has been and is a topic addressed in the scientific literature (Mann, 2000; Chakravorti, 2003; Mohr, 2005; Milbergs, 2007; Leavengood, 2011, Maier A, 2013a- d; Nicoară, 2013a; Olaru, 2013 a-b) and defined by both practitioners and researchers, due to sales relevant to increasing success and unemployment. Innovation was considered the elixir of life for companies, regardless of their size and profile (Coelho, 2010; Maier A, 2012; Allio, 2015; Olaru, 2014; Vadastreanu, 2015a; Maier D., 2017a). Innovation is a dominant factor in maintaining global competitiveness (Lin, 2010; Maier A., 2014).

At the same time, innovation is not easy. Innovation efforts over time have provided a multitude of failed innovation projects. Even large companies, formerly precursors and creators of all markets, have failed to remain competitive when major, especially technological changes have taken place (Pralhad, 1994; Vlachaki, 2010). Organizations are accustomed to what they do (basic skills) that they remain stuck there, and when the environment changes (eg changing customer requirements, changing regulations) are unable to adapt quickly and easily (Tushman 2002; Vlachaki, 2010).

The notion of innovation was economically analyzed for the first time by the Austrian scholar J. Schumpeter in 1934 (Mohini, 2004, Leitner, 2010), where innovation was defined as the total of changes to implement and use the new types products, means of production and transport, markets and forms of organization of the production process (Hidalgo, 2008).

As part of the innovation, as defined by Schumpeter, it is admitted that five types of activities have come into being: the creation of a new product or the substantial improvement of an existing one, the introduction of a new production method, new market, the development of new sources of raw materials and materials, namely the creation / change of an industrial enterprise. In the last period, the sixth activity can be admitted: creating a new image of the organization (Butlin, 2004; Maier A., 2013b; Vadastreanu, 2015b).

Innovation is a process in which the organization creates and defines issues and then actively develops new knowledge to solve them (Caloghirou, 2004, Maier, D., 2013; Von Hippel, 2005; Yan, 2009; Maier D. 2015a-b; Nicoară, 2013b). Galanakis (2005) considers that the raw material or input for innovation is scientific or technological knowledge.

3. Innovative management models

Most companies do not recognize innovation management as a problem, or one that should be addressed in a systematic way. There are no standard practices accepted to manage today's technological innovation (Brady, 1995; Maier D., 2014; Vadastreanu, 2015c; Maier D., 2016a-c; Maier, 2018 a-c).

Over the years, many studies have been conducted on innovation management models. The studies that had the biggest impact were those who analyzed the work of those directly involved in the innovation process and not those that highlighted the activity of top managers in an organization. Thus, from a series of management models, seven were selected as representative for the innovation process:

- the Roberts Frahman model (Gaynor, 2002)
- the Quinn model (Gaynor, 2002)
- the Van de Ven model (Gaynor, 2002)
- the Cooper model (Gaynor, 2002)
- the Abemathy-Ulterback model (Mohini, 2004)
- the Roussel and Faster model (Mohini, 2004)
- the Kusiak model (Kusiak, 2007)
- the Maier model (Maier, 2014)

The Roberts Frahman Model (Figure 2): was the first relevant model to explain the innovation management process. This model is structured in six steps, namely: identifying the opportunity, formulating the idea, solving the problems, developing the prototype, developing the product, technology and the use of technology and / or its dissemination (Gaynor, 2002). The authors of this model admit that innovation is not a linear process, and this is highlighted in the commercial development stage, where, if necessary, it can go back to the problem-solving stage or even higher. This model is considered to be a generation of technological innovation and therefore stops at the "use of technology and / or its diffusion". Innovation implies making changes, and changes not only involve a high degree of discomfort, but also great internal disagreements with the organization.



Figure 2. The Roberts Frahman model (Gaynor, 2002)

The Quinn Model (Figure 3): James Bryan Quinn defines innovation as a controlled chaos. It does not focus on process details, but only on the attitude of independent innovators and on the restrictions imposed

by innovation organizations. Quinn addresses innovation from two perspectives: 1) that of independent innovators; 2) that of innovators working in organizational bureaucracy.



Figure 3. **The Quinn Model** (Gaynor, 2002)

Quinn has identified seven barriers to innovation: 1) top management isolation; 2) intolerance of "fanatics"; 3) lack of vision; 4) meeting all additional service requirements; 5) too much rationalism; 6) excessive bureaucracy; 7) inappropriate stimuli. One conclusion of this model is that no matter how the innovation appears, it starts from an idea and has to overcome a series of obstacles before it reaches the market.

The Van de Ven model. Van de Ven, has researched over the course of 17 years to find answers to the question: "How and why do innovations develop from idea to concept and then implement?" The organizational structure that supports these types of processes often accepts the existence of groups of professionals who develop their ideas around certain goals. Van de Ven proposes an innovative process model involving three stages (Figure 4): 1) initiation; 2) development; 3) Implementation / finalization (Gaynor, 2002).

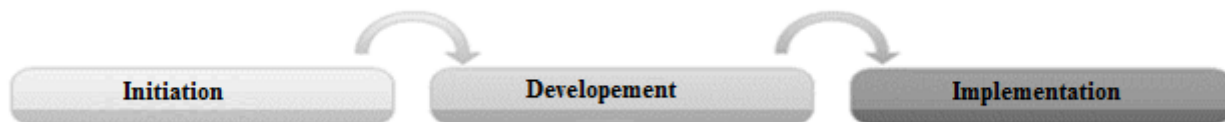


Figure 4. **Van de Ven model**

Van de Ven admitted that innovation does not appear as a result of a linear or mechanical process, but common elements of different innovations can be identified.

out of the market as quickly as possible. The model describes a series of stages that highlight clear points to be achieved. The stages in Cooper's innovative process are as follows (Figure 5): problem identification, idea, conceptualization, product development, testing and launching.

The Cooper model. Robert Cooper introduced in his model some very clear steps to get the product



Figure 5. **The Cooper Model** (Gaynor, 2002)

All six steps of the model can be divided into several sub-categories, depending on the purpose of the innovation. Each stage involves making more decisions. To ensure the quality of the process, each stage of this model must have performance indicators to quantify the outcome.

The Abernathy - Ulterback model (Figure 6): is a dynamic model as it is concerned with how the innovative process evolves according to the organization's development process. An organization that produces a single product has many different

features in terms of competitive strategy, organizational characteristics and production capacity, compared to an

organization with a complex production profile.

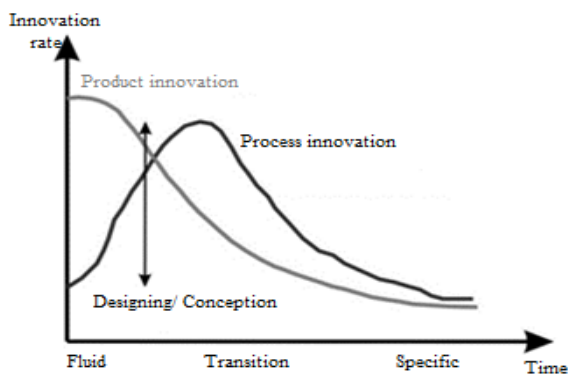


Figure 6. **Abemathy-Ulterback Model** (Mohini, 2004)

While the Roberts-Frohman model makes it possible to explain the stages of an innovation project of a certain type, the Abemathy-Ulterback model explains the innovative process in its dynamics. The following main steps are distinguished in this model:

1. "Fluid Stage": refers to the first phase of product development when it is intended to improve functional characteristics and performances and less costs.
2. "Specific stage" (or second phase): the product is already stabilized and the innovation objective is characterized by innovative quality improvement and cost reduction.

The Roussel and Faster model (Figure 7): because there is a portfolio of different technologies within an organization, it is necessary to develop a model to prioritize different technologies according to their impact on the organization's competitive position.

Technological progress is not a casual and discontinuous one. It follows a pattern based on certain technical parameters or economic performance - visible on the so-called "S-curve", which can be used to quantify the various technologies within the organization's portfolio. New emerging technologies have a potential impact, with little known limitations (problems may be huge) and uncertainty about the success of products on the market is very high.

The impact of this model, technological evolution, on the organization's innovative management practice lies in the fact that R & D's mission within the organization is to exploit its potential for technology upgrading. This translates into linking the technology portfolio to the organization's business opportunities portfolio.

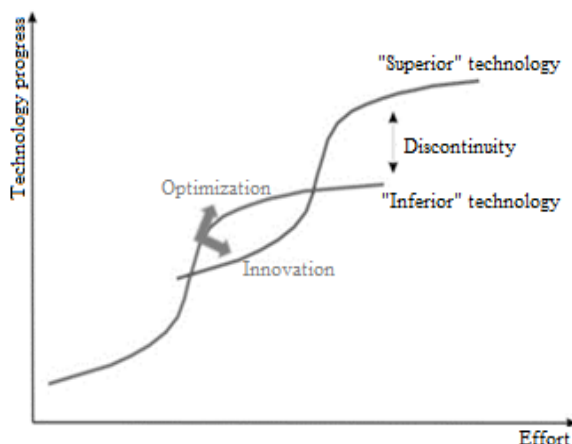


Figure 7. **Model Roussel and Faster model** (Mohini, 2004)

From the above, it follows that the classic model of linear organization of the innovation process: prototype research, prototype development, pre-series production, serial production, etc., is replaced by dynamic systemic models in which the

multidisciplinary project team approaches the process with all interconditions (R & D, manufacturing, quality organization, supply, marketing, service, costs, etc.).

An innovation management model, to be effective, should be useful for all types of organizations, whether large or small, public or private, and must address and organize a wide range of problems (Maier, D., 2017 b-d). This framework must manage a rigorous innovation process, requiring specific tools, and above

all must remain simple and accessible. The author proposes an integrated model (Maier, 2012), illustrated in the Figure 8, which fulfills these conditions and is a basis for the future development of an innovation management system.

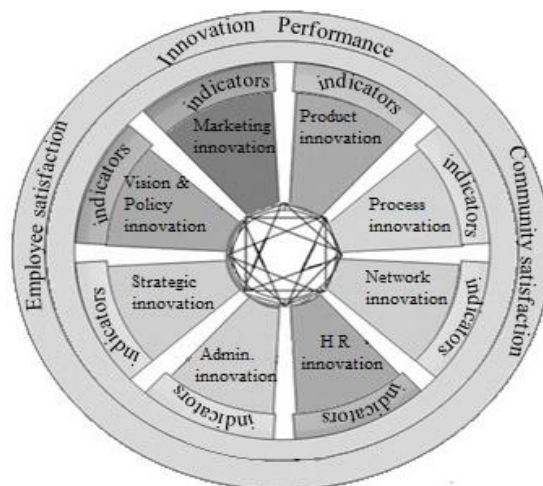


Figure 8. **Integrated Innovation Management Model** (Maier A, 2012; Maier A, 2013c-d)

In order to achieve high innovation performance, we have to share the complexity of the innovation field, existing in an organization, into smaller parts. In this model innovation is divided into eight parts that are interconnected in a specific way. These parts are: innovation in vision and policy, strategic innovation, innovation in network development, human resource development for innovation, process innovation, product innovation, innovation marketing and administrative innovation.

4. Conclusions

Successful innovation management involves a strategic approach to both innovation and management issues, involves the use of effective implementation mechanisms and structures, requires the development of an organizational culture that supports innovation and also involves the maintenance and development effective external links.

In other words, while the importance of innovation is predictable, the interesting question is how to achieve excellence in innovation management. As literature literature shows, there are no easy answers to this question because there are no shortcuts to excellent results. Successful companies do not have an innovative silver bullet - they do not get results doing one or several things better than others. They do everything better.

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