

Differences in the dimensional perception of subjective and objective innovation

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ABSTRACT

This article provides an introduction to the topic of innovation management as a systemic component of an enterprise. The focus is on describing the point of view according to which the innovation concept is defined. It is differentiated between the subjective standpoint of the company and the objective view of the market as an important component of the strategic management of research and development projects (R&D) in industry.

KEY WORDS

Innovation management, research and development.

RESUMEN

Este artículo da una introducción al tema de administración de innovaciones como una función sistémica de una empresa. El enfoque está puesto en describir el punto de vista según el cual se define el concepto de innovación. Se diferencia entre una perspectiva subjetiva de la compañía y la visión objetiva del mercado, como una parte importante de la administración estratégica de proyectos de investigación y desarrollo en la industria.

PALABRAS CLAVE

Innovación, administración, investigación y desarrollo.

THE IMPORTANCE OF INNOVATION

The social, politic-legal and economic environment is subject of constant change and industrial plants are impacted in the form of changeable, fluctuating requirements due to their sales-market orientation. The current market environment trends include the globalization of markets, an increased competitive situation, increasing capital intensity of research, development and production, increased complexity and intermeshing of technologies and processes, differentiated shareholder/stakeholder interests, the shortening of innovation cycles and the inhomogeneity of customer structures, resulting in an elaborate diversity of product variants.^{1,2,3} Recognizing and reacting to these changes are strategic tasks of corporate management necessary to ensure the long-term success of the company and therefore its economic existence. In this regard, the strategic interface functions between the environment and the enterprise include, for example, innovation management tasked with the identification and

development of potential for competitive distinction, in particular, for manufacturing companies in high wage countries. A lack of innovation activities, according to Christensen, leads to a loss of alignment with technological advances and to a loss of market share, as a result.⁴ Innovations therefore play an important role – they are considered the motor for economic success¹ and are seen as an instrument for strengthening market position, for future growth and for cost reduction.⁵

GLOBAL BUSINESS ENVIRONMENT

The enterprise, as a social system, is closely linked with its environment. Activities occurring outside the corporate-system boundaries affect the company internally. The total system surrounding environment is defined, for example, by the following parameters: politics, society, ecology, economy and technology.⁶ Stakeholder groups and interaction topics, displayed as arrows in figure 1, represent the relevant interface elements of the levels. Stakeholder groups are people, organizations and institutions affected by the enterprise’s added value activities. They communicate with the system levels on interaction topics such as concerns, interests, norms, values or resources.⁷

These interface elements represent system transmitter, from which influencing factors are

induced. Initiated by the environment’s global challenges, more specific influencing factors are extrapolated to innovation management at an increasing system depth. A methodological description and a detailed derivation of the influencing factors are given in literature i.e. on the Scenario Technique.^{8,9,11,12} As an example for the automobile industry, specific influences were mentioned at the BMW Group’s General Meeting by the Chairman of the Board of Managing Directors as current challenges for the vehicle manufacturer.¹³ They include:

- Intensified global competition and increasing concentration in the automobile industry
- A shifting of growth regions
- A scarcity of fossil fuels and the necessity of developing alternative drive types
- Demographic development
- Mobility in growing mega-metropolises

INNOVATION MANAGEMENT

There are two generic strategies that will permanently ensure a company’s economic objectives: Whereas the goal of the first strategy is to obtain a market advantage through price differentiation, the second targets a performance differentiation. According to Cagan and Vogel,¹⁴ there are three attributes that aim for the second strategy’s

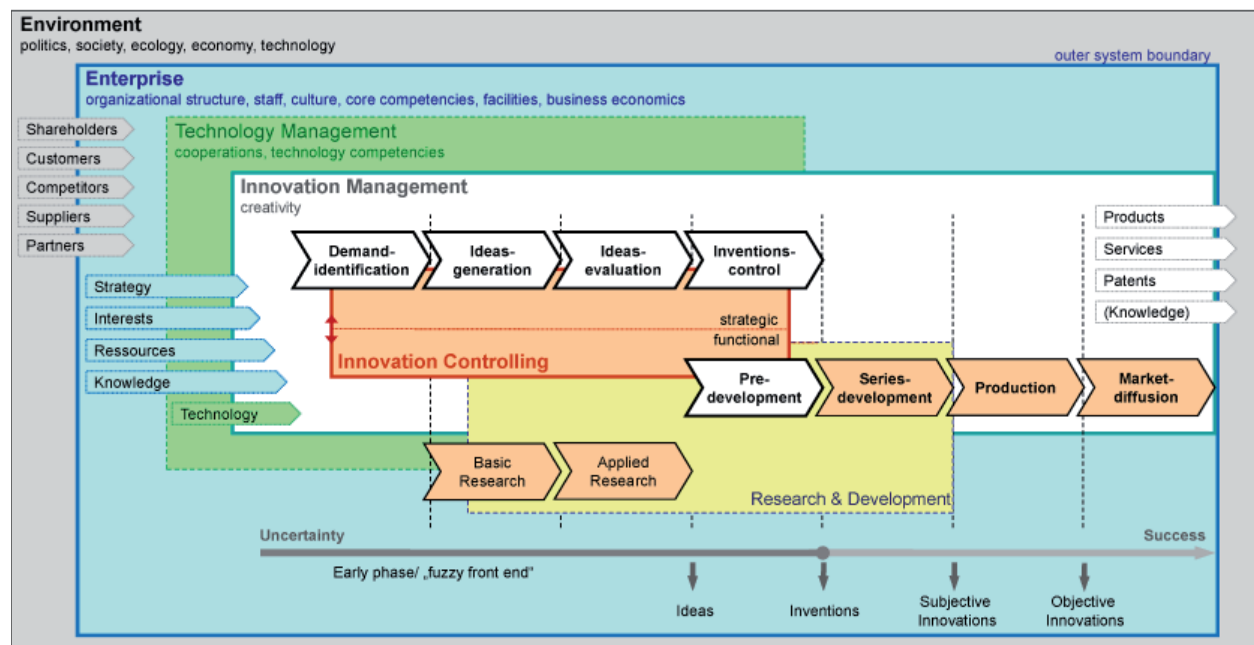


Fig. 1. The Enterprise from a Model Perspective.

performance differentiation, and thereby define the product value from the customer's perspective: The product should be useful, manageable/practical and desirable. These aspects result from the customer's expectations and are primarily based on lifestyle influences and individual perceptions. The value of a product is therefore not a cost-driven attribute,¹⁴ instead it is determined by ergonomic, technological and quality factors, the successful implementation of which ensures sustained customer satisfaction. Social influences, lifestyle aspects and aesthetics also contribute to the emotional valuation of a product.¹⁴

Ideally, when bringing new products to the market, they should fulfill these customer expectations to be well received and sell well as an innovation. In addition to the need for innovative products, manufacturing companies are increasingly utilizing the potential of production-related innovation undertakings, particularly in times of scarce resources, to contribute to the reduction of unit costs, to improve productivity and to improve the availability of plant and equipment. This type of innovation has a favorable effect on the first strategy mentioned above, in the form of internal increases in efficiency and effectivity.

The innovation is regarded as the result of an innovative process that is formed by the striving for a novel, marketable product or technique.¹⁵ Innovation management is the planning, organization, management and monitoring of this innovation process. The innovation process encompasses both the technical and organizational aspects of the various evolutionary stages of an innovation from the idea to the development of the invention to its successful implementation in the market.

Degree of novelty

The word innovation stems from the Latin word "novus" and means "novelty". The literature contains a variety of definitions and demarcation efforts for the term innovation,¹⁶ all of which come to recognize that an innovation is something new as opposed to what presently exists. With respect to the question "Innovation: How New?", there is a differentiation with regard to the level of novelty of an innovation that ranges over a

continuous spectrum from incremental to radical.¹⁷ An incremental or evolutionary¹⁸ innovation is a rather minor improvement in already known products and processes,¹⁹ e.g. using the lighter magnesium in the cast manufacturing engine-crankcases. In contrast, radical or revolutionary innovations¹⁸ set a fundamentally new course in comparison to the current products and processes,¹⁹ for example, BMW introducing "head up displays" in their cars or the first liquid hydrogen series car.

The assessment of an innovation's novelty is the result of the company's internal as well as external perspectives.¹⁸ This leads to the question "Innovation: New for whom?" The scientific literature does not universally define the reference system for which this condition applies. Thus, it is differentiated between an objective innovation¹⁵ from the macro-perspective of the market¹⁸ and the micro-perspective of the enterprise, which subjectively values the novelty of an innovation (figure 2). As a result, the level of novelty is a hypothetical construct, lacking direct measurability and which is strongly oriented towards the subjective impressions of the respective reference system.²¹

The source of innovation

Gerpott¹⁷ describes a direct relation between the direction of the momentum caused by an impetus and the level of novelty of the resulting innovation. An economically-oriented forecast of market requirements is considered a driving force for incremental innovations. The identification of new or changing customer requirements leads to product adaptations, which promise continued market success. Incremental innovations can therefore be characterized as demand-pull innovations. This demand can be expressed by the internal marketing department that is assuming the future customers' needs.

The counterpart is formed by innovation based on engineering insights or new technological knowledge. As this type of innovation is not oriented towards established markets, from the market perspective, it has a fundamentally novel character and therefore has the potential to open new application fields or new business areas. Therefore revolutionary innovations can be characterized as

technology-push innovations.²² The mixture of those two innovation sources contribute to the setting of the subjective degree of novelty (figure 2). The interface elements in the enterprise environment already presented in figure 1 are among the potential sources for innovation stimuli. Further information on the inclusion of these stakeholder groups can be found in Lead-User Method²³ or the outside-in aspects of the Open-Innovation Approach.^{24,25,26}

Type of innovation

Due to the various operative areas in an enterprise affected by innovation a differentiation by contentual dimension would be suitable.¹⁸ It is differentiated between the three types of process innovation, structure innovation and product innovation (figure 2). Process innovation targets new or improved processes for the rendering of services which leads to an indirect competitive advantage. They include: cost savings, flexibility gains, productivity increases, time savings¹⁹ and increased security as well as the prevention of environmental damage.²¹ Structure innovation addresses changes in the company organization or its management style. The goal of this type of innovation is, among others, improving workplace attractivity and employee motivation by changing the culture, organization, competence or

qualification of the employees. Product innovation refers to a company new or improved products or services through which a direct competitive advantage is attained with increased sales opportunities.

Invention and innovation

Coupled with the question of the reference system with respect to the evaluation of the level of novelty is also the term innovation itself. Whereas in business practice, innovation management in its forward-looking expectation of success will label an idea as an innovation, the term innovation in the literature is delimited by an economically successful market introduction. Its validation can however only take place after the innovation process is complete¹⁸ and complicates the temporal pinpointing of the exact term-formation and uniform wording to be used. Innovation is therefore defined as the final step in an evolutionary sequence with a concrete association to the innovation process.

IDEA → INVENTION → INNOVATION

The idea represents the vague understanding of a promising novelty.¹⁸ Inventions represent a more concrete, targeted form of the idea¹⁹ and describe the discovery of technical problem-solving potentials in the context of a possible economic application.²⁷

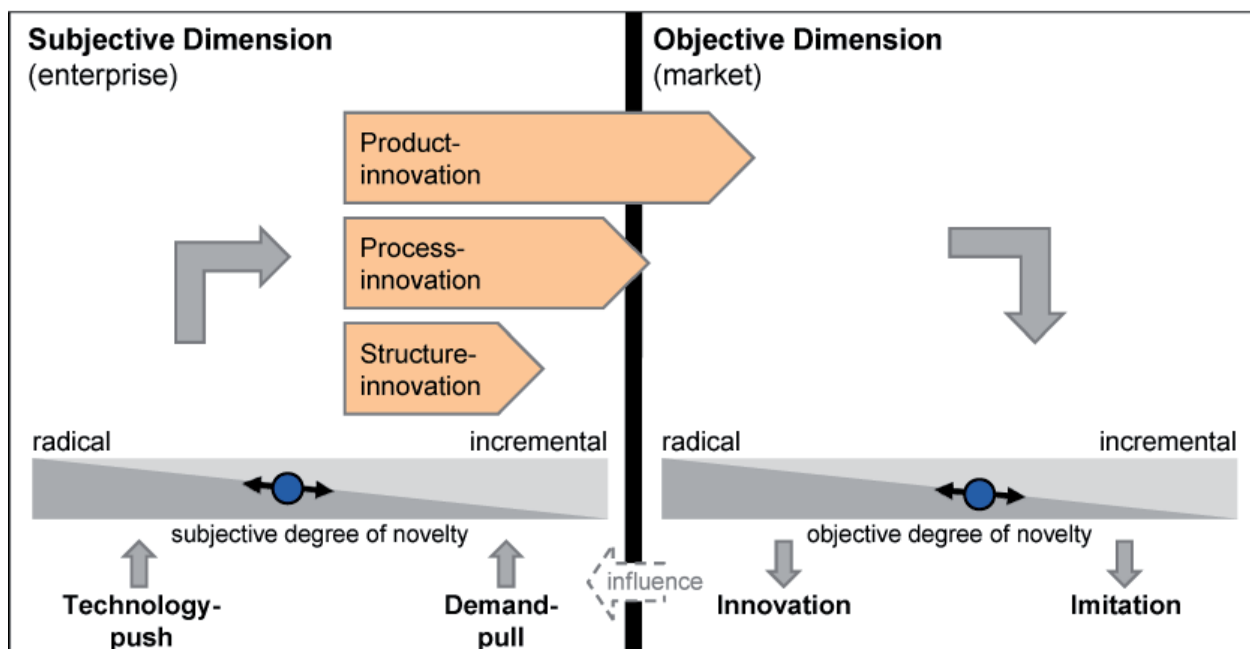


Fig. 2. Path of an Innovation from Source to Market

In the model shown in figure 1, the invention is the output of the pre-development. The next stage, the innovation, additionally presupposes an economic use for these technical potentials.²⁸ The innovation thus represents a success-oriented form of the invention in the context of market-related needs: “Inventions only then become innovations when they have achieved market penetration”.¹⁸

Subjective and objective innovation

In the scientific literature, the term innovation is used interchangeably for both the company-internal and the market-related perspective. To clearly delimit the term innovation, this paper differentiates between a subjective innovation and an objective innovation in line with the reference system of the level of novelty. Objective innovations or market innovations²⁹ find a direct application in the market.¹⁵ Product innovations typically belong to this type of innovation. The subjective innovation or enterprise innovation²⁹ takes place within a company and is utilized indirectly in the market through product support or rationalization effects.¹⁵ An innovation of this type represents e. g. the successful development of an alternative product component or technology, which brings an internal advantage to the company but which, at least at the beginning, can not be positioned as a direct differentiation characteristic. In the automobile industry, this includes the platform construction, product line communality and shared-component utilization. In addition to innovations that are product-related, innovations can also bring advantages to other areas of a company, e.g. production: In the successful introduction of a new manufacturing process, higher productivity represents a further form of subjective innovation. For example: Laser welding instead of conventional spot-welding.

A subjective innovation can also be considered a pre-stage of the objective innovation, provided it can be successfully placed in the market as an innovation or imitation.³⁰ It is an imitation when a similar product, or an attribute of a competitor already offered in the market, is offered and an enterprise deliberately chooses the role of the follower. The potential success of the imitation is substantiated in that the barriers to market entry and the weaknesses

of the market pioneers are known and the customers can be offered an improved alternative product. An example: The hybrid vehicles of other manufacturers in reaction to the success of the Toyota Prius. In contrast, when a provider unexpectedly finds itself crowded by the competition into the role of the follower due to a simultaneous market launch, the market success may not materialize due to a lack of differentiation characteristics to the already available product: “Price advantages or performance benefits must be clearly perceptible to achieve success in already occupied markets”.³¹ This circumstance, according to the definition, is not a case of an objective innovation, but rather it will remain an innovation solely within the company.¹⁶

CLOSING COMMENT

Innovation management has been discussed in literature for almost 20 years on a steady basis. Nevertheless, there still is no holistic concept available that addresses all factors reducing uncertainty in the fuzzy front end of the innovation process in order to accomplish success in the long run. As discussed earlier, new challenges continuously arise from a company’s surrounding global business environment that decision makers within the innovation process have to cope with. In this paper, the environment of innovation management and the influences acting thereupon are addressed.

Especially in times of scarce resources demands for efficiency and effectiveness appear but are considered rather counterproductive to the creative nature of innovation development. Established efficiency enhancing rationalization methods as known from R&D-processes do not apply successfully to the early phase of the innovation process. Hence, new multidisciplinary approaches are necessary in order to resolve this dilemma. This paper represents the starting point of its authors’ research dealing with the young subject area of “innovation controlling” that focuses on supporting the process instead of managing it in a “transactional” or “steering by numbers” way. Besides leadership, the multidisciplinary, holistic concept should include the jointly cross-linked elements of process, methods, knowledge and communication as supporting services (figure 3).

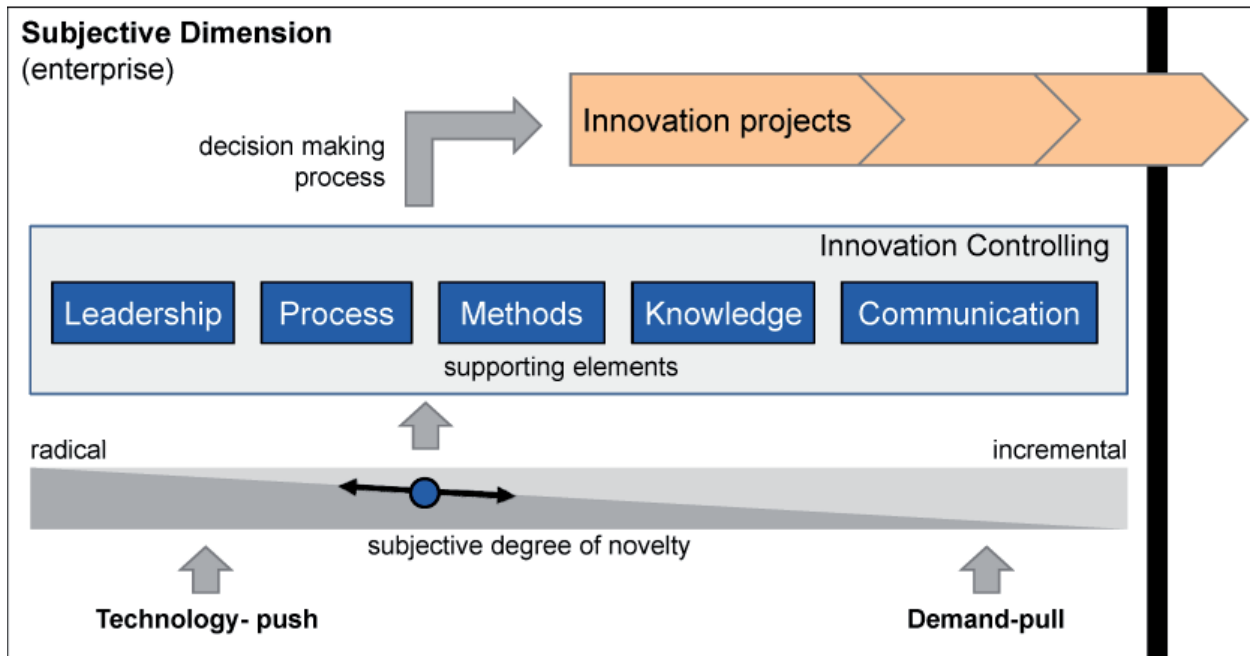


Fig. 3. Supporting elements of innovation controlling.

The differentiation between subjective and objective innovation dimensions represents one important decision-clinching factor in the innovation process. Due to this, the subjective level of novelty acts as an indicator demanding specific support that enables projects of any novelty to reach their targeted strategic goals (effectiveness) in a time- and cost-saving manner (efficiency). As an example for “leadership”, radical innovations have the highest degree of resistance within industrial companies and thus need higher management attention compared to incremental innovations. Another example for “communication” is the higher need for transparency, when it comes to radical innovations in order to reduce the inherent uncertainty.

The objective level of novelty, on the other hand, is difficult to determine, since external analysis data about competitors and markets are rare to acquire and mostly lack the necessary quality. Its continuous valuation nevertheless offers important indications regarding the differentiation potentials that an innovation can expect at its market launch.

As a conclusion, both pieces of information lend support to the decision-making process and lead to the derivation of recommendations for action in the innovation process. First model validations in

industrial practice have shown proof, that innovation controlling as supporting layer for innovation management, as shown in figure 1, increases the quality of decision making and thus leads to a process of increased success.

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