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Innovation quality—a conceptual framework

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Abstract

In this article a framework for a new concept—that of innovation quality—is presented and its relevance for considerations with respect to innovation and strategy is highlighted. The concept of innovation quality allows making a statement regarding the aggregated innovation performance in three different domains within an organization by comparing the result, being it a product, process or service innovation, with the potential and considering the process on how the result has been achieved. The three domains of innovation quality are product/service, process and enterprise.

After analyzing the foundation concepts of quality and innovation a short interpretation of the concept of "innovation quality" in contrast to "quality innovation" is given. In the second large section of this article the principle of innovation quality is presented, possibilities of determining and representing the concept are shown and a strong link among innovation quality and strategy is suggested.

Keywords: Innovation; Quality; Measurement; Strategy; Framework

1. Introduction

Innovation quality, a concept not found in literature yet, is—at first look—either a desirable and even "natural" condition or at the other extreme a forced combination of what one might conceive as incompatible and contradicting paradigms. While "innovation" has a strong link to newness, creativity and unconventionality, to "quality" concepts like standardization, low tolerance and systematic procedure adhere. Therefore combining the concepts of innovation and quality, which are powerful and extensive in themselves, requires at least a short analysis of both in order to purposefully integrate them and thereby generate a consistent framework for a new concept.

2. Managing quality and innovation

2.1. Managing quality

In the development of quality management four to five distinctive steps can be identified (e.g., Grabowski, 1997, p. 9ff). In the 1930s and 1940s managing quality meant ensuring a product's quality through an inspection at the production process. The function of "quality control" has been digital in nature, in the sense that either a product was conform to specifications or it was not. The goal was to deliver products with no failures. The second step around the 1950s and early 1960s is the one of static quality assurance.

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Here efforts were directed towards guaranteeing "stable", low-variance processes. Thereby product and process quality became intertwined. In the late 1960s then the phase of the integrated quality assurance started. This quality management approach acknowledged that quality emerges from all direct value adding phases and therefore also suppliers and customers were integrated into the quality management perspective. This has lead to the establishment of the ISO9000+norms. The total quality management approach as pursued since the mid-1980s included in its perspective additionally the fulfillment of stakeholder needs, thereby adding more dimensions to the customer oriented view. It included for example employees and the society in general and their needs as a basic driver of quality.

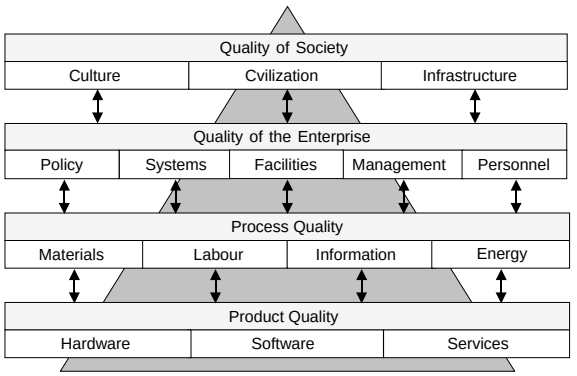


Fig. 1. Hierarchy of quality (Seghezzi, 1992).

So when describing the different phases in the quality management field it becomes obvious that over time always additional elements have been incorporated into it. These new elements together with their interactions to the previously considered ones have built new layers in a hierarchy of quality (see Fig. 1).

Approaches towards a management of quality have been limited in delivering contributions to solving problems which arise from the need for flexibility, handling shortening product and technology lifecycles and particularly in relation to the need for innovation in order to remain competitive on a global scale. In its latest model on how quality has to be managed the European Foundation for Quality Management (EFQM) has integrated the concept of innovation (see Fig. 2).

In the graphical representation of the EFQM-model the concept of innovation, similarly to the one of learning, has to be interpreted as contributing to a feedback loop towards the elements described as enablers. In EFQM (2001) under the section "Continuous learning, innovation and improvement" it is stated that "Organizational performance is maximized when it is based on the management and sharing of knowledge within a culture of continuous learning, innovation and improvement." No statement is found how this innovation supporting culture is assessed, of which elements it consists and how it contributes to an organizational performance of higher quality. But obviously, innovation is linked to and even part of the quality management body.

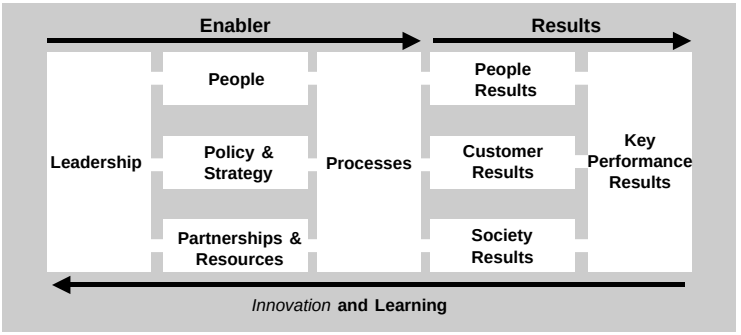


Fig. 2. Quality management according to EFQM (2001).

2.2. Managing innovation

Already in 1912 Schumpeter (1912) has recognized innovation as a central driver of economic development. But only lately with intensifying competition on global markets and the need of bringing efficiency and effectiveness to higher (quality) levels, the issue of innovation and its management have become a prominent field in research and practice. According to Bullinger (1994) an innovation is defined by the first economic utilization or application of an invention to achieve corporate goals. This definition has similarities to many others in some respects: first there is nothing said about the amount or the degree of innovation, second there is no statement about the nature of the innovation itself or its domain and third, it is clear that in order to implement an innovation a series of steps have to be undertaken, which stresses its process character no matter what type of innovation is considered.

Innovation management is therefore about transforming an initial impulse for improvement via idea generation, screening, evaluation and implementation into a market success considering all fostering and impeding factors. It is not specified of what type the market is, external or internal to the company. Innovations might have different time needs until implementation, depending on the type of innovation, evolutionary or radical, and their domain (see Fig. 3). While product and service innovations might be rather quickly introduced and implemented, changes of human behaviors and consequently of corporate cultures typically are more time consuming. It is the extent to which structural arrangements (Knight, 1967) are affected which is to be considered.

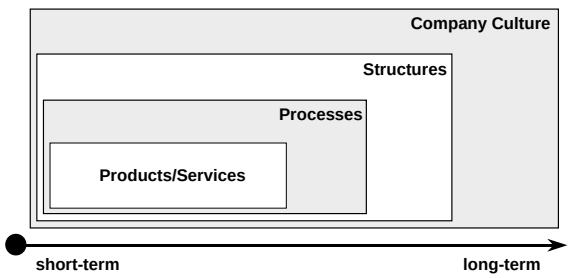


Fig. 3. Domains of innovation management (Bullinger, 1994).

These domains of managing innovation and the hierarchy of quality presented in the previous section have strong similarities. Excluding the societal level and taking a microeconomic perspective, both quality and innovation can be seen from product/service, a process or a company-wide perspective—the latter will subsequently be called enterprise perspective. Accepting this as a basis it is now possible to try to integrate the concepts of quality and innovation.

2.3. Managing quality and innovation

On the most superficial level, combining the concepts of quality and innovation might lead to two results: quality innovation and innovation quality. In both cases the first concept has a restraining impact on the second.

From this follows that quality innovation refers to a distinctive characteristic of an innovation. This view is incorporated by Swann (1986, p. 2) who defined the term as follows: ''By quality innovation we mean a particular form of product innovation: the introduction of a new (often improved) version of an existing product, rather than a completely new product. The quality innovation can be analyzed within an existing space of qualities or characteristics; the new product requires new dimensions''. Following this definition, quality innovation is about quality improvement and performance enhancement within existing boundaries. In case that these enhancements meet preset expectations they contribute also to innovation quality.

But what is innovation quality? A slightly modified quote from Pirsig (1974, p. 178) highlights the problem: ''[Innovation] Quality…you know what it is, yet you don't know what it is. (…) But some things are better than others, that is, they have more quality. But when you try to say what the quality is, apart from the things that have it, it all goes poof! (…) [W]hat's the ''betterness''?…So round and round you go, spinning mental wheels and nowhere finding anyplace to get traction. What the hell is [Innovation] Quality?

What is it?" An attempt to answer these questions is undertaken in the following section.

3. Innovation quality

3.1. Principle

Innovation quality has—like its founding concepts—three levels: a product/service level, a process level and an enterprise level (see Fig. 4). With respect to products and services, innovation quality is defined through variables like amount, performance, effectiveness, features, reliability, timing, costs, value to the customer, innovation degree, complexity, and many more. In this case innovation quality comprises all measures regarding new—innovative—products or services and thereby makes a statement on how good a company is at pursuing innovation in the product or service domain. Similar are things with respect to the process domain of innovation quality. Also here the company is assessed on how good it pursues process innovation considering all measures which determine the quality of new processes and how this quality has been achieved. Determining innovation quality on the enterprise level does not change in comparison to the two other domains in principle since it also looks on potential, process and result, but to some degree it might be more challenging due to the increased complexity, the difficulty to identify catalysts (see Bullinger and Haner, 2001) and the need to integrate measurements on so-called soft issues. This is something already inherent to the concept of enterprise quality, which according to Grabowski (1997, p. 30) is the ability to satisfy stakeholder needs.

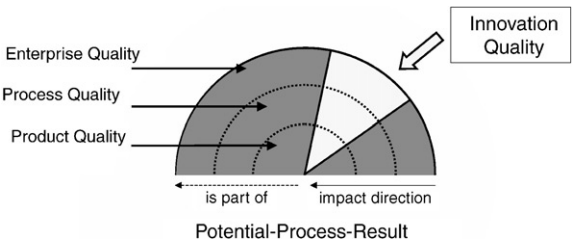


Fig. 4. The domain of innovation quality (Haner, 2000).

Assessing innovation quality within the three domains of product, process and enterprise allows for distinguishing activities within organizations with respect to their goal. While for example companies might focus their research on new products, others might aim at the redefinition of the value chain or focus on introducing modern ways of working in order to attract and retain key personnel, the latter being a social innovation to be considered on the enterprise level.

The concept of innovation quality therefore allows making a statement regarding the aggregated innovation performance in every domain within an organization by comparing the result, being it a product, process or service innovation, with the potential and considering the process on how the result has been achieved. Therefore innovation quality has a special dynamic characteristic.

3.2. Determining innovation quality and its representation

To determine the innovation quality of a whole organization, one must assess first the degree of innovation quality in the individual domains. These can be achieved by applying a set of measures and integrating them possibly through a functional relationship. Potential measures for the individual domains are (see also Ahmed and Zairi, 2000):

(a) product/service-related measures:

- value-added to the customer,
- costs against targets,
- stability of design,
- product return on investment,
- product performance level,
- …

(b) Process-related measures:

- time to market,
- efficiency and productivity improvement,
- staffing level effectiveness in product development,
- project management effectiveness,
- flexibility increase,
- …

(c) Enterprise-related measures:

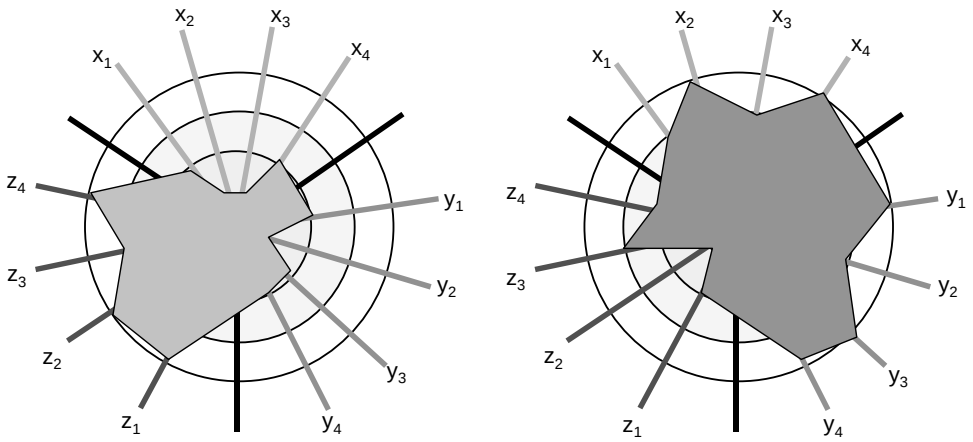
- acceptance rate throughout the workforce,
- understanding customer needs,
- turnover generated with innovative products,
- patent ratio,
- rate of successful innovation attempts,
- ….

As can be seen from the few potential measures contributing to innovation quality mentioned here, the spectrum of these measures is very large. But they do have in common, that they all can be linked to an organization's innovation management system and therefore are in themselves indicators for innovation quality.

Integrating these indicators is a matter of complexity allowance and value-added generation. How many measures should be applied and integrated into a statement? Does a quantitative integration generate significantly higher value than a qualitative integration? These are but two questions to be dealt with when applying the concept of innovation quality.

The representation of innovation quality can be performed by using radar diagrams, like those depicted in Fig. 5. There the axes $x_1, \ldots, x_4$ represent parameters of innovation quality in the enterprise domain, while $y_1, \ldots, y_4$ and $z_1, \ldots, z_4$ represent parameters of innovation quality in the process and the product domains, respectively. The higher the values of these parameters, the better the innovation quality is assumed to be and the further out from the diagram center the notation on the respective parameter line will occur. In Fig. 5 two possible outcomes are represented. In the left half a fictitious company is depicted with a very high innovation quality in the product domain but with a rather low valuation with respect to the process and enterprise domains. The right half shows the inverted case.

From a corporate user perspective, these diagrams allow getting a fast overview of the general situation as well as offer the possibility to specifically scrutinize the meaning of individual parameters. From a benchmark and a research perspective, the identification of patterns when comparing different companies is facilitated. Nevertheless a further possibility is to define and apply a functional relationship among the different parameter values within and across the domains and to generate absolute values for innovation quality. It just remains to be questioned, if such a procedure is not over-simplifying in the end and thereby producing a presumably not generally applicable assumption that only a company with high values in all domains of innovation quality can be successful.



(a). Strong product IQ

(b). Strong process & enterprise IQ

Fig. 5. Possible outcomes of innovation quality assessment.

3.3. Innovation quality and strategy

As implied at the end of the previous section, different patterns of innovation quality might reflect the states at different but similarly successful companies. While one might be strong in the product/service domain, another might be as strong in the process domain, but both are very successful. Therefore no final judgement can be made regarding the "betterness" of one possible outcome of innovation quality assessment displayed in Fig. 5 in comparison to the other based on this assessment alone. Evaluating one instance of an innovation quality pattern by itself does not make any statement regarding the success of the company displaying this pattern—and it does not aim to do so! Measuring and displaying innovation quality is in a first step a method of increasing awareness within an organization regarding its innovation pattern.

For judging its appropriateness for the organization, the innovation quality pattern needs to be evaluated in conjunction with the strategy this organization pursues. Here it is, where innovation quality can receive a subjective connotation that adheres to quality concepts. With respect to product quality a consumer might be completely disappointed with a particular product's quality, while for an other and for the company producing it, the quality level might just be optimal, possibly profit maximizing. The same holds true for innovation quality: For one company in a particular market with a particular strategy a particular innovation quality pattern might be just optimal, whereas in a different company even in the same market the same pattern would be considered completely unsatisfactory.

Two disguised examples of German companies will reflect the notion that to successful companies different innovation quality patterns might belong.

"A" is a medium sized enterprise in the wood and plastic processing business and has an owner, which has been the creative head of the company for many decades. He is the originator of most product ideas, a multiple patent owner and to a large extent the reason for a high innovation quality rating in the product/service domain of his company. From the owner's perspective, the company has been there to produce and market his ideas. How these particular products were produced and processed was for a long time not very important, and consequently, innovation quality in the process domain is rather low. From the enterprise perspective, innovation quality has a fairly high value since many improvements within and outside the organization, which is the largest employer in a rural area, would not have been possible without the company's involvement.

"B" is also a medium sized company in the automation industry. Resulting from two rounds of re-engineering the company has been able to increase both productivity and employee satisfaction significantly within the last five years. Not only due to reduced cost, lower failure rates but also due to a higher demand and higher prices in a stagnating market—made possible by increased flexibility and a delivery warranty—the company is very successful. Seen from a innovation quality perspective, this company while being high in the process and enterprise domain is rather low in the product domain. As one indicator for the latter might serve, that only very few new or improved products have been introduced to the market within the same period of time.

These examples show that some patterns of innovation performance might be more consistent with some business strategies than with others and thereby just establishing innovation quality in its most profound meaning. Furthermore, it can be expected that a company's individual pattern of innovation quality is changing over time, which—so a research hypothesis—reflects a change in the company's strategy.

4. Conclusion

In this article the framework of innovation quality and a way of representing it have been introduced. Innovation quality can be determined based on three different domains: a product/service domain, a process domain and an enterprise domain, each of which is comprising a set of measures. Displaying patterns of innovation quality aims at first on increasing awareness regarding the innovation activity within organizations.

For making a judgement regarding the appropriateness of a particular outcome of an innovation quality assessment for a particular organization this outcome needs to be seen in the context of the organization. The same outcome can be interpreted differently in the light of the organization's strategy in particular.

It is suggested that the innovation quality pattern and the strategy of a successful company are corresponding within certain frames of time. Ensuring consistence can therefore become a powerful way of supporting strategic decisions.

Further research currently undertaken is focussing among others on building a consistent measurement system for innovation quality, assessing strategy and strategic actions with respect to the innovation domains used, and aligning strategy and innovation quality for allowing recommendations with respect to increasing innovation quality.

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