Possibilities and threats to TQM implementation in the innovation processes

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Abstract. The objective of this paper is to clarify the relationship between TQM (Total Quality Management) and innovations, to understand whether the innovation affects the enterprise efficiency. After sources analyzing, it was revealed that process strategies (process strategies, not product ones) improve the enterprise efficiency both in operational and financial terms, and product innovations only improve financial indicators. It was also found that the TQM implementation encourages both product and process innovations. However, only those enterprises that implement the process innovation strategies aim at adopting TQM principles and methods, although there is a connection between product innovation and TQM implementation. The paper novelty is to consider the interdependence of different innovative strategies (strategies for orientation to financial indicators and strategies for orientation to operational performance) with TQM implementation.

1. Introduction

The development of engineering and technology is the most significant incentive for change in society. The problem of innovations considered as the main factor of industrial dynamics was started to develop abroad at the beginning of the last century, becoming particularly acute in the 60s, when difficulties arose with the industrial development of R&D results obtained in the framework of national strategic programs. In Russia, the interest in this problem arose in connection with the change in the system of production relations and priorities in government of a state. In this regard, the problem of innovation, which transforms the achievements of scientific idea into production is a problem that we formulate as an increase in innovation activity and production potential of industrial enterprises.

Management of a complex and multi-stage process for creating high-tech products becomes impossible if management does not understand the principles and mechanism for interconnection of various subsystems within one enterprise, as well as it has no clear vision of the company’s functional structure and the ability to predict its development for a certain period.

While considering the sphere of intellectual assets management, it can be concluded that the matters regarding formation and use of such assets, as well as determination of a level of their influence on the performance of the company function and economic growth in general, are one of the problem areas of a modern high-tech enterprise.

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as soon as possible. In addition, it is desirable to have a single process that supports the level of new products in accordance with the high demands of the market and rapidly changing consumer tastes. A single, thoroughly integrated, comprehensive support of the entire process of development and launching a new product to the market from the idea to successful sales is extremely important for the stable success of the company. It is required to find a comprehensive, integrated solution that assists to develop and launch new products to the market.

Currently, innovations play a huge role for any enterprises creating conditions for producing original products and services, and specifying barriers for competitive companies. Therefore, one of the problems is to decide whether the Total Quality Management (hereinafter referred to as TQM) is implemented in the basic requirements of innovative strategies.

The development of any management innovation goes through five stages:
- The first stage — the initial research and formation of the conceptual innovation basis.
- The second stage — the transition of academic concepts into a consulting-oriented product for its active promotion, consumption and sale in the market.
- The third stage — ideas get great popularity. Conceptual problems and negative experiences begin to arise.
- The fourth stage — enthusiasts’ eagerness begins to fade when an attempt to obtain significant benefits from the use of innovation on the permanent basis fails. There are new innovations – competitors.
- Fifth stage — innovation gets disrepute and is out of use.

In turn, the TQM implementation ensures the following results:
- Increase of customers’ products and services satisfaction level.
- However, under conditions of the TQM system, the company is simply obliged to satisfy all customers, as well as to make an additional effort to anticipate their expectations.
- Reinforcement of the company’s image and reputation.

There is a significant difference between these terms. The image is a look through the company by the customer’s eyes. The reputation is just what customers tell others about the company. If the company needs to set difficult priorities in this pair, it certainly invests in reputation first.
- Increase labor productivity.
- It comes automatically as soon as employees become partners in the TQM implementation.
- Growth of employee moral (see figure 1)

This is one of the system basis. One of the key TQM objectives is to involve an employee in the process of company improvement, while simultaneously motivating him/her in this process.
Figure 1. General principles of quality management based on TQM.

As a consequence of the above points, the company's profits increase [1].

2. Reasons and prerequisites of innovative strategic management
Managers of companies that have implemented the TQM already understand the need to develop a long-term innovation development strategy. This is facilitated by the identification of the enterprise as an integral, isolated system, as well as the formation of new targets for the enterprise itself and its employees [2].

The principles of a new managerial paradigm shall constitute the entire system of organization management improvement.

The sharp increase in the strategic management value resulted in a number of reasons. The main reasons are as follows:

- acceleration of environmental change;
- appearance of new requests and change in customer positions;
- increase of competition on resources;
- business internationalization;
- appearance of new unexpected business opportunities to be investigated by the achievements of science and technology;
- development of information networks that makes lightning-fast spread and information receipt possible;
- wide availability of modern technologies;
- change of the human resources role.
But, since there is no unified strategy for all companies, just as there is no unified multi-purpose strategic management (each company is unique in its own way), therefore, the strategy development process for each company is unique. Such factors are effect on them:

- company position in the market;
- company development dynamics;
- company potential;
- competitors behavior;
- characteristics of the goods produced or the services provided by the company;
- economy state;
- cultural environment [3].

Results and processes in the TQM. According to the ISO standard, the quality management system (QMS) model involves managing only the results, and the implementation of innovative processes at the enterprise includes feedback in the QMS model, which, in turn, drastically changes all management concepts.

The process is considered as a “black box” model with inputs, outputs, environmental influences and feedback, with pre-established rules (standards, regulations). According to this classification, it is possible to systematize innovations and subdivide them into three groups:

- innovation at the enterprise “input”;
- innovation at the enterprise “output”;
- enterprise structure innovation.

The product manufacture technology itself is considered as a closed box that is the parameters inside the process are unknown (see figure 2).

**Figure 2.** Presentation of the process as a “black box”.

Unlike the ISO and other concepts of quality management, the TQM proposes not only new methods and means of quality improvement, but also a new management philosophy [4]. Thus, any intervention of innovation is considered through the process management system (see figure 3). Therefore, when implementing the innovation into the QMS model, it is transformed into a process control system.
3. Sources analysis

There are opposite ideas in various sources regarding whether the innovations create conditions for implementation of TQM practice or, on the contrary, the TQM creates the environment and culture that supports the innovations. Some authors [7–9] say that the quality management methods are positively associated with innovations. These methods make it possible to train specialists in the field of research, while creating a huge opportunity for innovation and finding new markets and customers. The implementation of quality management methods in innovative activities helps companies to modernize themselves in relation to customer needs, minimize operating costs, and reduce a time and cost of new products development. The TQM has successfully proved itself as a management model that provides a competitive advantage in case of successful implementation. However, the market is constantly changing and the competition conditions can also change, and since the quality is one of the main competition criteria, as well as susceptibility to innovation, it is necessary to assess the TQM usefulness for innovation and identify threats that exist in relation to the TQM relationship — INNOVATION. The literature contains the studies, which summarize that not all quality management methods are associated with innovation. Some authors [10, 11] stumbled at the relation between the TQM and innovation, and some of them even considered the TQM as an obstacle to innovation. On the one hand, the customer orientation forces organizations to search new needs and, therefore, to develop new products or make changes to existing ones to meet them. Continuous improvement gives employees an impulse for creative thought. Also, improving innovations can lead to improved quality, as, for example, in the case of software mechanical and thermal processing. Personnel management within the TQM provides employees satisfaction and facilitates the exchange of ideas among them.

On the one hand, it should be noted that if the TQM provides continuous improvement, then in terms of innovation, they are more intermittent in time.

On the other hand, the consumer-oriented TQM philosophy can fix the organization on only improvements in its products or services, without creating conditions for fundamentally new solutions in the processes at all. In this case, there is no global contradiction between the TQM and innovations, but the TQM will have a limited impact on enterprise innovation activity.
Standardization which prevents creativity can be another obstacle to innovations implementation.

4. Efficiency assessment as a result of strategic management

In this century of highly competitive markets and world globalization, efficiency assessment is a necessity to develop the company strategies. The overall efficiency assessment is a quantitative efficiency assessment and the efficiency of the enterprise’s production systems themselves [12]. The literature mentions that the company effectiveness consists of four components: innovation activity, productivity, market and financial indicators [13–15].

An enterprise, in turn, must effectively manage innovation processes to achieve positive dynamics in the business efficiency. Such effective innovations management implies a rather serious organizational support at the strategic level [16]. Therefore, the interconnection chain is as follows: the innovation actively effects on productivity, which gives a competitive advantage and provides the best position in the market [17]. The innovative strategies are the required condition to ensure a competitive position, and not just a part of competitive advantage [18].

Several studies reflect the relationship between innovations and efficiency, including the progress in innovation potential, and this, in turn, leads to increased business efficiency [19, 20].

In view of the foregoing, it can be assumed that the use of innovative processes encourages the company to implement the TQM principles and methods. The innovation processes provide a number of advantages which, most often, justify the investments which are aimed at producing new products or services, or improving the production and management processes. Then it is necessary to consider the relationship between the innovations and efficiency, taking into account the fact that there are different types of innovations: product and process innovations.

The companies which are engaged in innovative process strategies achieve improvement of their work at the operational and financial levels, and those who pay attention to product innovations improve only the company’s financial indicators (see figure 4).

![Figure 4. Interaction between TQM and innovations.](image)

5. Conclusions

Thus, the TQM is a favorable condition for implementation of innovative strategies of products and processes into the enterprise activities. Then it is necessary to consider the issues of interaction between the TQM and mixed innovations, where a new overlay is formed related to the interaction of productive and process innovations. Collage innovations are point changes in the process forming a complex of changes, including a positive effect not only in the production process itself, but also a possible positive effect in materials (semi-finished products, etc.) and product (service). While considering this feature in the context of technological improvement innovations, where the technology itself acts as a complex value, then in addition to the three existing groups, the fourth one should be added.
Such a complex effect is important in cases where a manufacturer and consumer are one person that is very often found in mechanic engineering, or in case of a zero level sales channel when the manufacturer is more responsible for the quality of the supplied product, or in case of state order.

On the other hand, for now, only companies that implement process innovation strategies consider that the TQM must be adopted.

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