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A QUALITY IN RESEARCH INSTITUTES IN CONTEXT OF IMPLEMNTING THE QUALITY MANAGEMENT SYSTEMS

Summary

Research institutes which exist in the field of R&D, have a significant contribution, among others in a number of implementations of innovative solutions. The result of the activity is a service that is subject to the principles of free market competition. Effectively competitive struggle takes place when as an asset of an offered product can be presented its high quality confirmed by implemented, maintained and improved quality management system. In case of research institutes, a quality, understood as the professionalism, reliability and credibility is a fundamental value in their business, especially in the commercialization of its results.
***Key words**: research institute, quality, quality management system*

JAKOŚĆ W INSTYTUTACH BADAWCZYCH W ASPEKCIE WDRAŻANIA SYSTEMÓW ZARZĄDZANIA JAKOŚCIĄ

Streszczenie

Instytuty badawcze działając w obszarze B+R mają znaczący udział m. in. w liczbie wdrożeń innowacyjnych rozwiązań. Efektem tej działalności jest usługa, która podlega na wolnym rynku zasadom konkurencji. Walkę konkurencyjną skuteczniej toczy się, gdy jako atut oferowanego produktu można przedstawić jego wysoką jakość potwierdzoną wdrożonym, utrzymywanym i doskonalonym systemem zarządzania jakością. W przypadku instytutów badawczych jakość, rozumiana jako profesjonalizm, rzetelność i wiarygodność stanowi podstawowy walor w ich działalności, zwłaszcza w procesie komercjalizacji jej wyników.
***Słowa kluczowe**: instytut badawczy, jakość, system zarządzania jakością*

1. Introduction

A research institute within the meaning of the Act [16] is a state organizational unit, separated in terms of legal, organizational, economic and financial aspects, which conducts research and development works focused on their implementation and application in practice.

The basic activities of the Institute are:
1) conducting research and development works;
2) adapting the results of research and development to the practical needs;
3) implementation of the results of research and development work.

Research institutes can conduct the production of equipment and devices, and take other economic activities or services to the needs of the country and export covered with their actions. Detailed subject and scope of the research institute is defined by the statute adopted by the Scientific Council, approved by the minister supervising the particular institute. [16]

For the purposes of this article it is assumed that the research institute is treated as a company engaged in the execution of R&D. The results of this activity can be both an intellectual product (eg, a report on the research, simulation, analysis) and even indirectly the material product (implemented in the enterprise as a result of R&D, a technology).

2. A research institute - industry partner

A company undertaking a cooperation with a research institute assumes to treat the offered service as a valuable product of high quality, certified by specialistic qualifications of staff, modern apparatus facilities and relevant certificates giving the right to conduct certain activities. Investment in collaboration with a research center - the realities of the assumptions of the knowledge economy – is a guarantor of achieving measurable gain, increasing the prestige of the company and creating trust among customers.

A hard result of such a type of activity may be the implementation in practice. An example of such a situation is the realization of the goal-oriented project. These projects, implemented by the scientific and business units, are aimed at supporting innovation in businesses by funding research (industrial research and development), the results of which are used in production.

The tangible result the project for research institute is selling R&D services in the form of for example the development of virtual models, simulation tests, strength calculations, development of new security models, the development of design documentation, experimental research, safety testing for compliance with standards and directives. In addition, to commercialize the results of R&D activities can be conduct in two basic forms - through licensing or bringing them to the company.

In the reality of a market economy, research institutes, as any "classic" company, demonstrate competing ability, which is a potential opportunity to compete. Gaining a competitive advantage is to offer lower prices of products, their better properties and quality compared to equivalent offered by the competition. In terms of quality management system in research institutes competing with the price level becomes a secondary factor in the competitive struggle. The most important incentive for the customer is an aspect of professionalism, integrity and credibility. Undoubtedly, confirmation and guarantee of an adequate level of service quality is properly functioning quality management system in the research institute. Quality can and should be used in the competition. It shows the potential of competitiveness

and competence of the institute.

A key aspect of R&D activity in the institutes is innovation, understood as the ability to generate and implement new solutions (eg. technological). The crucial role of innovation in growing of competitiveness is the ability to gain priority in the creation of new products and services to meet new needs or to improve the effectiveness of meeting the existing needs of customers. Adoption of an innovation strategy and its effective implementation allows, among others to:

- achieve a customer satisfaction,
- increase the quality of services and products,
- ensure the high productivity,
- maintain the highly qualified personnel,

so it meets the objectives of quality management [14, 15].

3. A quality management in research institutes

Research institutes appreciate the significance of recognition of their competence by implementing quality management systems. Many of them maintain a system/systems useful because of their profile. Figure 1 illustrates the potential environment and adequate quality management systems.

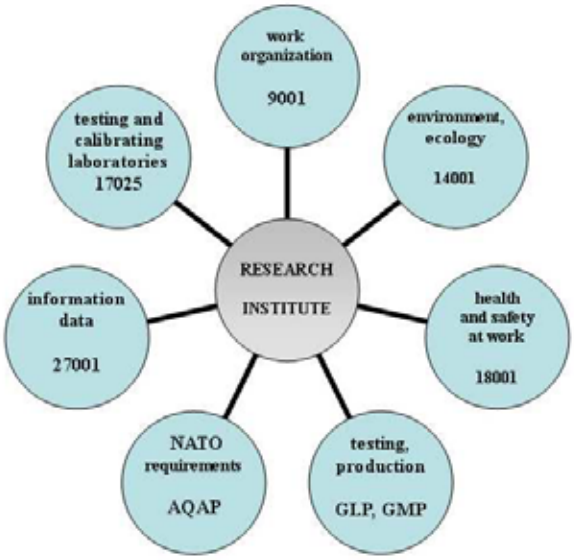

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Fig. 1. Environment of research institute and corresponding quality management systems
Rys. 1. Otoczenie instytutu badawczego i odpowiadające mu systemy zarządzania jakością

Although the research institute is created by the Council of Ministers at the request of the minister competent for the planned activity of the institute and supervised by him [16], but it has a degree of freedom in the conducting of its actions. The decision to implement the quality management system lies also with the director of the institute. In a situation where the institute implemented a quality management, the diagram of managing the entire institution can be simply modular presented, as shown in Figure 2.

Assuming that the institute operates a quality management system according to PN-EN ISO 9001 [11] and/or PN-EN ISO 17025 [12], the quality management module is connected directly with the management of knowledge/processes of research and intellectual property management module. (In the situation of the implementation a system according to ISO 14001, PN-N 18001 or ISO 27001, the individual management modules would be properly grouped differently). The module also affects indirectly the other categories of management (eg. from the perspective of the quality of services human resources can be properly dispose - secondment, employment, compensation of persons involved in the system, materials and finances - to ensure proper test equipment meeting requirements of the standards and regulations, its legalization and calibration, corresponding expenses, costs of implementing and maintaining of the system and even risk - with a properly functioning system it can be taken a lower probability of occurrence of certain risks).

In this paper, there is focused however on the assumption that the quality of the research institute refers to the product of its activity - as a result of R&D (achieved obviously while complying with all the requirements of the relevant standards). In the case of the PN-EN ISO 17025 it is more explicit because the requirements of this standard and granted accreditation in this area relate directly to the result of research. System according to PN-EN ISO 9001 recognizes the quality in the organizational aspect, but it also has an effect on the quality of the final product.

Implementation and maintaining of a quality management system in research institute affects the results of its operations. The most desirable effect in the current economic reality is a commercial dimension. Achieving financial gain, supported by other, non-commercial outcomes is an ideal outcome for the organization. For the purposes of this article there was developed a simplified algorithm for the theoretical impact of the operation of the quality management system in research institute on a potential customer. Due to the importance of the institutes and the popularity of considered systems according to PN-EN ISO 9001 and PN-EN ISO 17025. Customer of research institute is characterized as a professional entity, appreciating guarantee of product quality and competence of the contractor's staff (Figure 3).

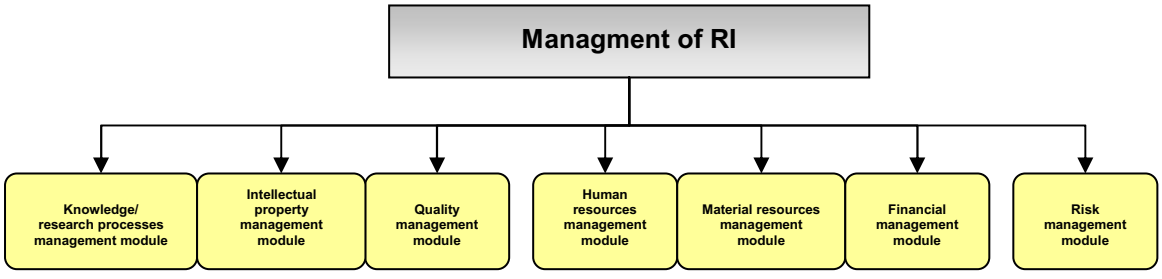

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Fig. 2. Modules of managing the research institute systems
Rys. 2. Moduły zarządzania instytutem badawczym

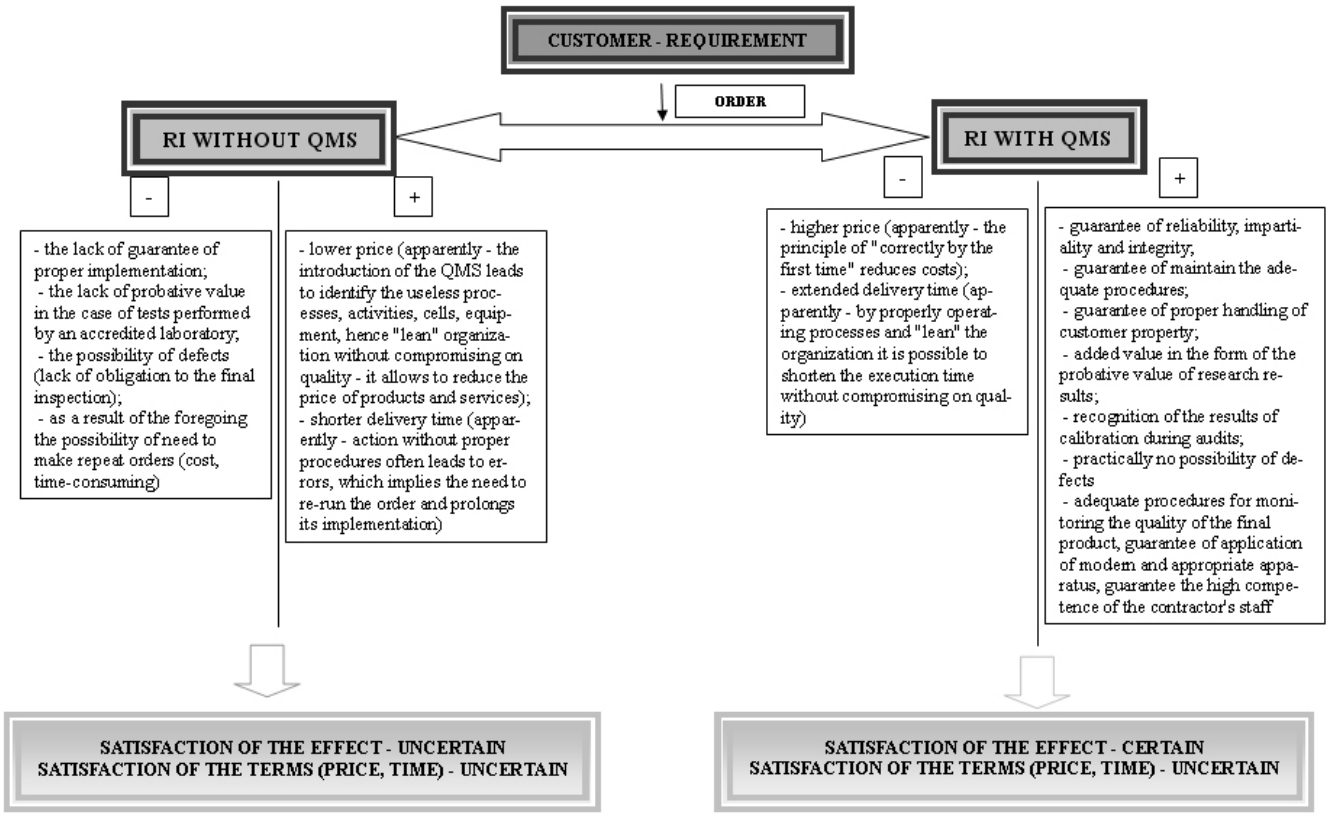

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Fig. 3. Diagram of an impact of quality management system on a decision of potential customer
Rys. 3. Schemat wpływu systemu zarządzania jakością na decyzję potencjalnego klienta

The quality has a close relationship with both the product material, as well as with service [9]. The service (product of operation of research institute) is the result of a process like material product (process approach). Its "production" is placed in a particular system (system approach). Schematic operation of the quality management system in a research institute will be therefore analogous to the systems implemented in manufacturing companies (Figure 4).

A specific feature in quality management system in research institute may be aspects of knowledge management and innovation.

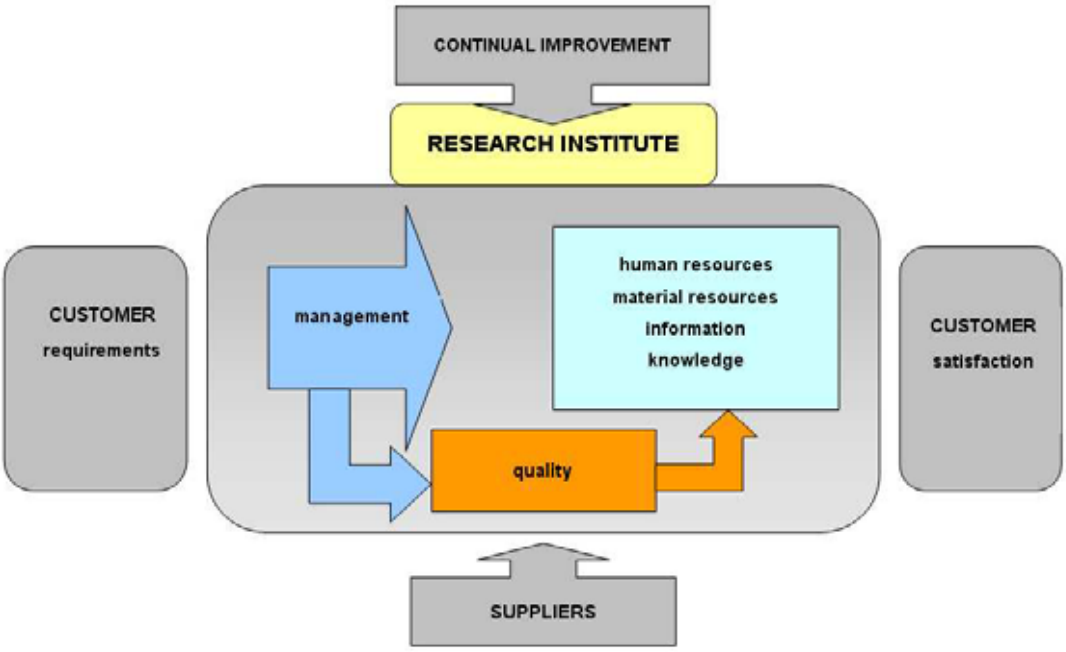

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Fig. 4. Total quality management in research institute
Rys. 4. Zarządzanie przez jakość w instytucie badawczym

Principles of quality management in the broad concept can be easily transposed to the terms of a research institute:
- customer satisfaction (eg. opportunity to present reliable test results or an accredited testing or calibrating laboratory, guarantee of the correctness of the offered services),
- continual improvement (eg. participation in staff training, conferences, obtaining academic degrees and titles),
- involvement of employees (creating an atmosphere of commitment of staff by building internal and external motivation which, besides the knowledge, skills and experience affects the result of the work, ensuring effective communication between employees, creating a culture of the organization which invokes feelings of staff satisfaction and pride),
- process approach (eg. identifying and processes managing - from the inquiry and preparing an order to provide the results of research to the customer and monitoring the satisfaction; every phase of the process can be improved, each process carried out in the institute refers to the PDCA cycle),
- system approach (grouping processes in the system, management of individual processes and the whole system, correlation between the processes within the system, process integration – they allow effective management and achievement of aims),
- mutually beneficial suppliers relationships (selection of the right provider basing on criteria such as possession of quality management system),
- involvement of management (chief executive takes an active part in establishing the quality policy, ensures the availability of resources, uses or creates a control tool for the whole process of quality assurance),
- factual approach to decision - making (the collection of reliable information within and outside the institute to develop methods for measuring indicators, their analysis and use in making decisions) [1-5, 7-10].

A comprehensive approach to quality management in research institutes should include three basic levels:
- the level of quality management concept. This level is the most general and important. Adopted concept of quality management is a result of an organizational culture functioning in the institute. The external manifestation of the concept of quality management can be for example the degree of occurrence of quality issues in key documents: statute, mission and vision;
- the level of quality management models. This level includes a framework addressing the issue of quality taking into account among others division of responsibilities and powers for qualitative matters, information and decision-making processes relating to quality issues, the scope of the implementation of quality function. A quality documentation is the external manifestation of the models of quality management.
- the level of quality management methods. It is the lowest, operating level of quality management. This level fills all tools (own or borrowed), supporting management processes, analytical and diagnostic execution and perfecting within the quality management function.

The condition for an effective quality management system is the compatibility between the above mentioned levels (the concept of quality management determines the possibility of effective use of models, used model can not be effectively implemented if it is not consistent with the basic assumptions characterizing the concept of quality management; quality management models create the need for different quality management methods) (Figure 5).

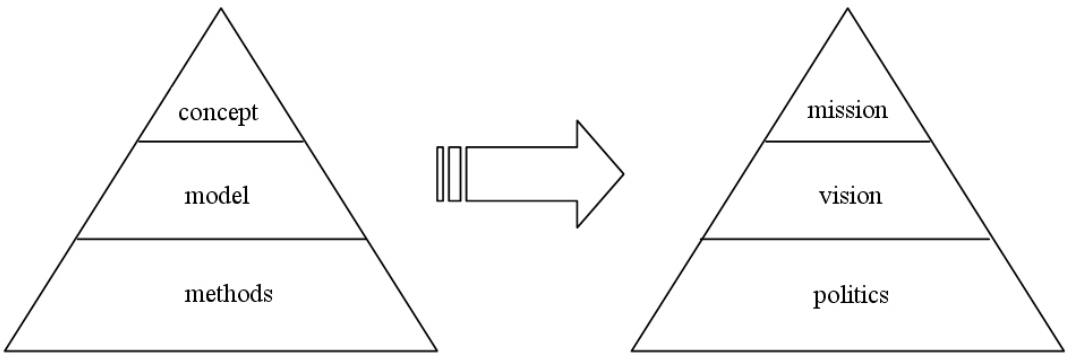
Research institutes originally created in a completely different economic conditions, must now adapt their way of activity to market oriented economy. To understand accurately the difference in the perception of the concept of quality, it should be noted characteristic phenomena of command- distribution economy:
- the excess of demand over supply,
- the limited competition,
- the imposing quality level by the manufacturer,
- the mass production.

These conditions favored the phenomenon of quality deterioration, which then led to an increase production costs and product prices.

In a market economy:
- the supply is greater than demand,
- there is a strong competition,
- the market determines quality level (customer and competition),
- the production is diversed, focused on innovation and individually meeting of the customer expectations.

The above conditions do not allow for the reduction in the level of quality, and if it occurs, then the costs are borne by the manufacturer, deducting his profit.

The perception and the role of quality in an organization such as a research institute under the previous regime and nowadays are fundamentally different. Selection of these differences is shown in Table 1.



Source: own description upon [6] / Źródło: opracowanie własne na podstawie [6]

Fig. 5. Relation of quality management levels and activity aims levels
Rys. 5. Przełożenie poziomów zarządzania jakością na poziomy ujmowania celów działalności

Table 1. Differences in perception of quality in centrally planned and distributed economy and market economy [17]
Tab. 1. Różnice w postrzeganiu jakości w gospodarce nakazowo-rozdzielczej i rynkowej [17]

	Command – distribution economy	Market economy
Economy aim	produce	meet the requirements
Quality system	inspection, a posteriori checking	prevention, a priori checking
Responsibility	hierarchic leadership, sanctions	common participation, self-auditing, division of responsibility
Pro-quality actions	treatment	prevention
Quality measurement	failure rate	analysis of quality costs and profitability
Pro-quality actions aim	lack of trust	trust

4. Summary

Research institutes are specialized and professional institutions. The object of the activity is scientific and research actions. Considering the above, it becomes logical, how a quality is appreciated in such circumstances. The concept of quality in this context refers to the result of activity - the offered R&D service. The data obtained from the individual 116 research institutes [13] indicates a conscious pro-quality orientation. It is confirmed by implemented, maintained and improved quality management systems according to standards and guidelines: PN-EN ISO 9001, PN-EN ISO 17025, PN-N 18001, ISO 14001, ISO 27001, AQAP, GLP, GMP.

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