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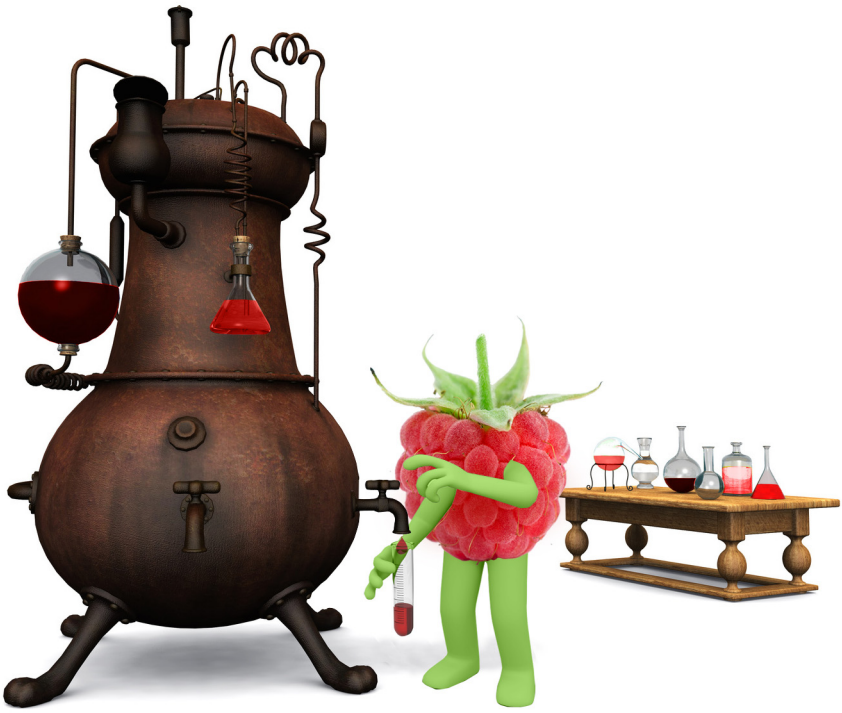

QUALITY MANAGEMENT PLATFORM IN RESEARCH INSTITUTES (PART 1)

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QUALITY MANAGEMENT PLATFORM IN RESEARCH INSTITUTES (PART 1)

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Summary

Research institutes face a chance to take the lead in the system of commercialization of the effects of R&D. For the purpose it is necessary to strengthen their position in the market i.a. by reorganizing structures and focusing on quality management. A multi-faceted approach to the problem of quality in the activities of research institutes based on an analysis of stakeholders and products, led to the idea of creating a platform for quality management - an entity bringing together 3 sections:
1) Section of Quality Management Systems,
2) Section of Scientific Information,
3) Section of Cooperation with the Customer.
The choice of these areas, according to the author, corresponds to the specific activities of research institutes and emphasizes the need to improve and ensure the quality of the (often depreciated) area.

Keywords: research institute, quality management, R&D activities, stakeholders, organizational structure, marketing

Situation of research institutes in Poland in the aspect of quality management

In the current economic situation in Poland the R&D sector is gaining key importance in the process of the transfer of knowledge from scientific units to companies. However, research institutes (IB) are not fully ready to play the role of leading institutes in the sector. On the one hand they have qualified personnel and specialist facilities — infrastructure and equipment. On the other hand, research institutes were mostly formed after WWII for the emerging Polish industry and functioned for decades as scientific support for numerous and flourishing factories in various branches of the economy and they were not forced to compete. As a result of economic and political transformation polish industry was substantially weakened. This situation is illustrated by statistical data shown in table 1, presenting the comparison of the scale of production in various branches of the industry in the years 1980, 1987 and 2013.

Table 1. The volume of production in chosen branches of the industry in the years 1980, 1987 and 2013

Industrial sector —product	Production in 1980	Production in 1987	Production in 2013
Textiles [km^2]	1330	958	125
Hard coal [million tons]	193	193	77
Machine tools [thousand units]	38.3	46.1	10
Cargo carriages [thousand units]	15.2	6.7	3
Tractors [thousand units]	57.5	59.2	3.5
Buses [thousand units]	13.1	10	4.1 (all vehicles for public transport)
Sea ships [units]	61	41	5

Source: own materials prepared on the basis of data from Central Statistical Office (1981, 1988, 2014).

In a situation where the number of big partners has been substantially reduced, temporary cooperation with small and medium companies doesn't guarantee financial liquidity. What gives a chance for financial stability is only continuous participation in research projects and expanding client portfolio among interested European and global entities. The

contemporary rules for carrying out research projects and opening to the global markets is undoubtedly a completely new environment for the R&D activity of research institutes. The will to stay afloat on the market implies also the necessity to expand and improve one's offer. The preferred directions of economic development under the "*EU Policy of Cohesion*" and the "*Framework Programme for Science and Innovation 2014–2020 HORIZON 2020*" define priorities in the area of modernization of the Polish economy. These activities carried out by state authorities with the support of the European Union require the participation of national research-scientific units. Research institutes participate in projects coordinated by particular ministries, Polish Agency for Enterprise Development, or Marshall Offices' projects aimed at creating "Polish product brands", selecting and filling with material content "national intelligent specializations", or supporting local innovations, which thanks to the cooperation of science and business will have a chance for commercialization, or finding particular applications on the market. Changes in the environment of research institutes obviously have an impact on their organization, strategy of activity and the perception of quality. These aspects have become a starting point for the preparation of a concept for the creation of a quality management platform in research institutes. According to the author of this article, identified and described quality of R&D activity in research institutes is, along with the possessed resources, the most important tool for creating competitive advantage in current, dynamically changing economic conditions. Taking into consideration the outdated organizational structures of research institutes, unsuitable for contemporary forms of activity (projects), it is necessary to consider the concept of reorganization — creating modern multidisciplinary teams aimed at carrying out particular research projects. This paper is limited to the presentation of the concept for creation of an organizational unit responsible for guaranteeing the quality of activity of research institutions from a broad perspective. This constitutes an indispensable element in the process of adapting the structures of research institutes to contemporary economic-administrative requirements.

On the basis of the analysis of the social-economic situation of the sector of science and R&D activity, a SWOT analysis was carried out. The results of the analysis are presented in the following table.

Table 2. SWOT analysis of R&D activity in Poland

STRONG POINTS	WEAK POINTS
• Strong position of some of the basic sciences (exact sciences), as well as achievements in some areas of applied sciences; • high and not decreasing share of researchers in the overall number of people dealing with R&D activity in scientific units; • growing number of doctoral diplomas and growing number of employees in R&D sector holding doctoral titles; • the participation of scientific units in international projects and experience in their implementation; • creation of Advanced Technology Centres, Centres of Perfection and scientific networks, as well as technological platforms; • functioning of the National Centre for Research and Development, National Science Sector, Information Processing Centre, National Information Processing Institute, Centrum Innowacji NOT — institutions acting as intermediaries in financing R&D activity; • growing number of scientific publications; • growing number of entrepreneurs running, or interested in R&D activity.	• Low level of budget spending on R&D and non-budget spending on applied research and development works; • traditional, ministerial structure of the R&D sector; • small share of Polish companies maintaining their own R&D centres; • insufficient number of young and middle-aged scientific employees and researchers; • obtaining the titles of habilitated doctor and professor at an old age; • high decapitalization of scientific equipment; • small number of patents granted to Polish residents abroad; • weak cooperation of scientific units with companies; • insufficient potential of the units mediating between the sphere of R&D and companies; • lack of a system of information about the existing system of the institutional environment of R&D sphere; • small degree of implementation of R&D results in economy; • limited availability of external capital for innovative activity in companies; • low level of companies' innovativeness; • lack of legal-tax incentives for Polish and foreign companies and concerns for investing in R&D activity, • low share of high-technology products in exports; • little experience in carrying out big international projects; • lack of conviction in the scientific circles that regularly communicating with the society and informing about scientific achievements is a necessary element of scientific institutions' activity; • common lack of skills in the area of social communication and marketing in the scientific environment.

cont. table 2

CHANCES	THREATS
• boosting the role of R&D in the improvement of attractiveness of Polish economy; • possibility of using the funds from European Union; • creating a system of the state policy of innovation based on scientific and technological research and development works; • changing the system of financing scientific research; • building a system of legislative and financial solutions supporting the transfer of technologies (innovations) to small and medium companies; • designed financial incentives for investing in R&D; • restructuring of scientific units and liquidation of the weakest units; • consolidation of the best scientific and research-development teams around priority long-term and strategic research programmes; • growing number of national inventions submitted to foreign patent registers; • growing expenses on innovative activity in companies.	• lack of consistent implementation of raising spending on R&D, which results in the continuation of low level of funds allocated in the state budget to science (lack of the effect of leverage) and insufficient share of non-budget financing in total spending on R&D; • the risk of insufficient absorption of EU funds for R&D; • lack of knowledge and social support for scientific research especially in controversial areas (e.g. nuclear energy, genetically modified food); • low social awareness, also among entrepreneurs, of the significant role of science and technology in economic and social development; • lack of pro-innovative attitudes among entrepreneurs; • low demand for the results of R&D works in companies.

Source: opracowanie własne na podstawie na podstawie (Ministerstwo Nauki i Szkolnictwa Wyższego, 2007).

Numerous conversations and conducted questionnaire surveys among the representatives of units responsible for the functioning of quality management systems in research institutes clearly lead to a conclusion that despite the fact of implementation of often expensive systems, there is no possibility of measuring their efficiency. In particular, there are no analyses of the impact of quality management systems on the final effects of R&D activity. In a situation where more and more advanced research projects — which are subject to meticulous accounting procedures based on reports, results and lists — are being carried out and where running activities requires fast reaction to changes, analysis of risk, which are assessed every year by the Ministry of Science and Higher Education — it seems advisable to apply tools supporting the assessment of quality. Statutory obligations associated with the functioning of the POL-on system impose on research institutes the duty to adapt the manner and scope of work of reporting teams to the new requirements.

In the context of functioning within research institutes an organizational unit called in this work quality management platform — quality will be defined in three areas:

- degree to which the requirements of quality management systems implemented in an organization are satisfied;
- internal databases in the scope of scientific information in terms of satisfying the requirements of scientific information systems;
- methods of cooperation with clients.

The purpose of establishment and functioning of a quality management platform in research institutes

The author of this work has prepared a quality management concept taking into consideration multiple aspects of this sphere in research institutes. The goal of creating a special organizational unit in the structure of research institutes (physical, or virtual) responsible for complex management of quality is above all strengthening the aspect of guaranteeing quality thanks to professional analyses (reflecting the characteristics of research institutes) of both the internal situation in an organization and the observation of the environment. The preparation of the concept has been stimulated by many factors, among others:

- the necessity to rise to the challenges of dynamic and competitive market, which imposes new requirements on entities in the area of provision of quality;
- the necessity to satisfy the requirements in the area of obligatory reporting in the POL-on system;
- in most of the functioning research institutes issues associated with generally understood quality management are limited to care about satisfying the requirements imposed by the implemented management systems (mainly PN-EN ISO/IEC 17025:2005 and PN-EN ISO 9001:2009);
- lack of complex concept for the consideration of aspects of quality in the activity of research institutes, including professional management in terms of satisfying the requirements of all the stakeholders;

- lack of solutions adapting the characteristics of research institutes (in terms of goals and strategy of activity, legal regulations in the scope of defined conditions of financing of activity, organizational structure and scopes of responsibility) as entities operating on the market so that they can efficiently compete on the national and international market;
- lack, or outdated forms of activity of the teams responsible for information management in an institute and contacts with clients;
- lack of modern internal solutions making sure that the recipients get the highest quality products of the activity of research institutes;
- the necessity to raising awareness of the significance of quality within an organization.

In organizational structures of research institutes there are no teams dealing in a complex way with quality management. Usually the functioning of the section of quality is limited to appointing a plenipotentiary for the issues of quality, which is associated with the duties imposed by norm regulations. However, the plenipotentiary's only task is making sure that the procedures of a particular system are followed. Such a suppression of pro-quality initiative usually results from the fact that the person serving as plenipotentiary for quality often has other duties, e.g. in case of PN-EN ISO/IEC 17025:2005 system the person is above all a research-technical, or even a scientific employee in a laboratory.

In the structures of research institutes the responsibility for the quality of works is dispersed among direct performers. Lack of integration of pro-quality goals of an institute within one specialized unit leads to the lack of the possibility of analysing the quality of the whole activity and thus lack of the ability to steer quality and low competitiveness on the market. Moreover, what further favours the creation of a quality management platform is the fact that focus on team work with utilization of professional knowledge leads to the effect of synergy over individual competition.

Guaranteeing quality constitutes a key element of competitive struggle. In research institutes, due to their characteristics (in terms of legal form — an intermediate institution between a commercial entity and a scientific unit), the notion of quality refers to many planes of activity. Multi-aspect approach to the perception of quality in research institutes results from the multitude of stakeholders. In many cases defining and analysing stakeholders may lead

to significant redefinition of the strategy of activity. The first step in discussing the issues of providing quality in research institutes is detailed definition of the groups of its stakeholders. Picture 1 illustrates mutual relations between research institutes and groups of stakeholders.

Picture1. **Stakeholders of a research institute**

Source: Own materials.

Every stakeholder has particular, diversified expectations with regard to the product. If we define quality as satisfying requirements (PN-EN ISO 9001:2009 "Quality management systems — Requirements"), relations with particular groups of stakeholders can be described with definitions from the perspective of expectations with regard to the product. Exemplary measurable traits defining quality can be ascribed to particular products.

Table 3. Stakeholders, products, characteristics of products, purposes of providing products in a research institute

Stakeholder	Product (form)	Product characteristics	The purpose of providing a product
Supervising ministry	Documented information concerning the content-related course of works, financial and personnel situation, predictive analyses	Punctuality of provision, completeness, correctness and substantial adequacy, presented scope, verification of compliance with legal regulations, rules of due diligence, usefulness, frugality	Analysis and supervision of the compliance of the activities of the institute with legal provisions and institute's statute, the institute's handling of basic duties; correctness of spending public assets
Ministry of Science and Higher Education	Documented information about the substantial course of works, applications for co-financing statutory and investment activity, unit questionnaire/information in the POL-on system concerning the full scope of activity	Punctuality of submission, completeness, correctness and substantial adequacy, presented scope, verification of compliance with the rules of legality, diligence, usefulness and frugality	Situation analysis and decision on the granting of funds financing statutory and investment activity, decision on the awarding of a scientific theory in course of a parametrization procedure
Ministry of Finance	Documented information concerning financial and personnel situation	Punctuality of submission, completeness, correctness and substantial adequacy, presented scope, verification of compliance with the rules of legality, diligence, usefulness and frugality	Analysis of the correctness of conducted activities in terms of finances and human resources
National Science Centre, National Centre for Research and Development, remaining institutions managing co-financing programmes	Applications for research, investment, demonstrative projects, current documentation concerning conducted projects, reports on the effects of completed projects	Punctuality of submission, completeness, correctness and substantial adequacy, presented scope, verification of compliance with the rules of legality, diligence, usefulness, frugality	Analysis of applications, making a decision granting projects for implementation, analysis of the process of handling funds during the implementation of the project, decision on project clearing
Territorial administration units	Applications for projects financed by regional funds	Punctuality of submission, completeness, substantial correctness and adequacy	Analysis of applications, making decision on granting projects for implementation, analysis of handling funds during the implementation of the project, decision on project clearing

cont. table 3

Stakeholder	Product (form)	Product characteristics	The purpose of providing a product
Public institutions (Social Insurance Institution, Tax Office, courts, Central Statistical Office)	Payments - social insurance fees, taxes, fees paid to the Treasury of State, opinions and analyses, documented information about indicators of activity	Punctuality of submission, completeness	Analysis of documents
Companies from the branch of activity of the research institute	R&D results; research, analyses, opinions, expert evaluations	Professional preparation of a solution based on the utilization of modern research methods and technologies, compliance with legal requirements and norms, safe usage, ergonomics, reliability	Utilization compliant with the purpose of a product competitive in terms of professionalism of preparation and execution
Companies from a branch other than that of the research institute	R&D results; research, analyses, opinions, expert evaluations	Professional preparation of a solution based on the utilization of modern research methods and technologies, compliance with legal requirements and norms, safety of usage, ergonomics, reliability	Utilization compliant with the purpose of a product competitive in terms of professionalism of preparation and execution
Polish and foreign scientific and R&D institutions	Cooperation in the area of R&D works	Professional preparation of solutions based on the utilization of modern research methods and technologies, compliance with legal requirements and norms, safety of usage, ergonomics and reliability	Utilization compliant with the purpose of a product competitive in terms of professionalism of preparation and execution
Main Council of Research Institutes	Documented information concerning substantial course of works, financial and personnel situation, predictive analyses	Punctuality of submission, completeness, correctness and substantial adequacy, presented scope	Opinions and conclusions concerning the state's scientific and scientific-technical policy, as well as conditions and rules for the functioning of research institutes

cont. table 3

Stakeholder	Product (form)	Product characteristics	The purpose of providing a product
Research institutes	Cooperation on conducting R&D works, working out common stance on the country's scientific and economic policy	Professional preparation of a solution based on the utilization of modern research methods and technologies, compliance with legal requirements and norms; punctuality of submission of joint projects, completeness, correctness and substantial adequacy, presented scope	Utilization compliant with the purpose of a product competitive in terms of professionalism of preparation and execution; opinions and conclusions concerning scientific and scientific-technical policy of the state, as well as the conditions and rules for the functioning of research institutes
Scientific council and employees	Cooperation within research institutes in the area of statutory, administrative, personnel-related activity	Efficiency of activity	Generating the results of scientific activity, R&D, organizational efficiency

Source: Own materials prepared on the basis of the act on research institutes from.

On the basis of the products defined in detail (the above table is not a full list of stakeholders and products) it is necessary to determine the strategy of activity and development. It is a key issue to analyse the expectations of all interested entities in comparison to the current capacities of a research institute. Such a comparison can reveal gaps in the current situation. The possibility of satisfying expectations determined based on the analysis of both the internal situation and on limitations, as well as chances arising from e.g. the legal regulations will constitute the fundamental values that a particular organization — research institute — will strive to achieve. Creating a specialized organizational unit, which would have as one of its goals broadly understood quality management, will allow continuous analysis and coordination of activities defined in the strategy as those especially significant for achieving the desired values and thus updating the offer and adapting it to the needs of all stakeholders.

Rules governing the operation of quality management platform

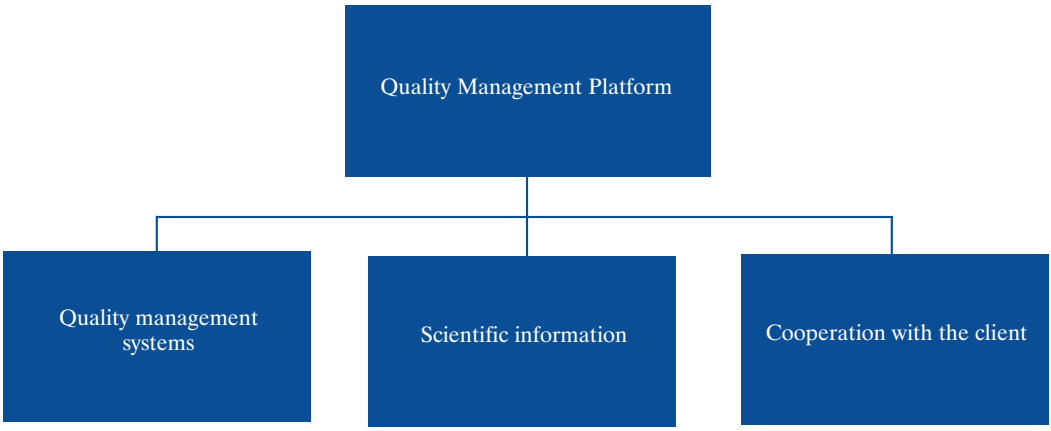
The creation of a quality management platform requires establishing a new entity within the organizational structure of research institute — called in this paper "Quality Management Platform" — and next integrating within it three pillars responsible for broadly understood provision of quality in the activity of the research institute. The platform may take the shape of a physically separated team of employees working full time, responsible for implementation and functioning of an IT, service management platform. The purpose of creation of the platform is consolidation of dispersed structures of the Institute and raising the research potential, as well as the degree of dissemination and exchange of research results with other scientific-research centres in Poland and abroad. According to the author, based on the product analysis and the analysis of the recipients' expectations, it is possible to form the following teams, which would best serve the purpose of providing quality of activity in research institutes:

1) Section of Quality Management Systems (QMS);
2) Section of Scientific Information (SI);
3) Section of Cooperation with the Client (CC).

The criterion for the integration of three particular teams into one quality management platform is the product, its features and the group of stakeholders.

The section called "Quality Management Systems" is responsible for the analysis and satisfying the systemic requirements in order to eliminate potential flaws in the product (taking into consideration the complaints and suggestions made by clients, monitoring the results of audits, analysis of internal opinion concerning the system, employee training aimed at raising the awareness of the concept of quality of activity of research institutes and shedding light on the methods of providing quality). The direct stakeholders of the team are employees and the management of the institute. Indirectly the operations of the section has an impact on the assessment of the organization by its external clients. The QMS Section

Picture 2. Structure of the quality management platform



Source: Own materials.

would be responsible for preparing, conducting and analysing questionnaires among employees and the management of the institute. Its results would provide information on the opinions of the personnel concerning further maintenance of the system. Assessments from the surveys should be juxtaposed with non-biased data — audit results, feedback from external clients, balance of costs and revenues from the activity covered by the system, analysis of the environment concerning potential chances and threats arising from changes in the legal-administrative order in Poland and the European Union. In order to obtain a credible and full effect of the survey, it is necessary to take advantage of commonly known tools for the assessment of quality management systems, well described in literature on the subject (Hamrol A. 2005, Zieliński G. 2012) and prepare original, appropriate methods of assessment for a particular institution. Such collections of data and next, comparisons with previous periods would give the management full view of the functioning of the quality management system.

"Scientific Information" Section is responsible for handling scientific reporting, records of scientific-research works, databases, managing library resources within the scientific library, digitalization of libraries, reviewing methods of management and organizational structures,

improving services for users. The recipients of this activity are both employees using systematically arranged information, as well as external entities (national and foreign public institutions, companies, scientific centres and individuals looking for information about an institute and its achievements). Scientific information currently constitutes an important aspect in scientific policy — the issue of open access and dissemination of research results is becoming a key value in R&D activity in Poland and the European Union (European Commission 2012, Ministry of Science and Higher Education 2015, European Parliament and Council (EU) 2013).

The "Cooperation with the Client" Section takes care of securing an efficient form of contact with the client, using modern marketing tools dedicated to the characteristics of research institutes (Niemczyk A. 2013, Walasik M. 2015).

Every team from the platform is responsible for continuous analysis of the situation in a particular area. On the basis of the results of these analyses the unit informs the management about the necessity to take appropriate pro-quality measures. On the basis of the management's authorization every team takes the necessary steps, or passes on the guidelines to other teams

Conclusions

Research institutes are specialized units with skilled scientific personnel and technologically advanced research equipment. The strategy of development of a research institute has to take into consideration dynamic development of the economy. This leads to the necessity to adapt management methods to the challenging reality. The concept of creation of a Quality Management Platform fits in this strategy of development. Its purpose is integration of three sections responsible for control over the functioning of implemented quality systems, modern tools for publication and promotion of scientific achievements and efficient cooperation with the Client (domestic and foreign clients).

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mgr Agnieszka Klembalska, Przemysłowy Instytut Maszyn Rolniczych, Polska — absolwentka Wydziału Prawa i Administracji Uniwersytetu im. Adama Mickiewicza w Poznaniu. Ukończyła studia podyplomowe dla Kandydatów na Tłumaczy Przysięgłych na Wydziale Neofilologii Uniwersytetu im. Adama Mickiewicza w Poznaniu oraz Studia Podyplomowe „Zarządzanie jakością w teorii i praktyce" na Politechnice Poznańskiej. Uzyskała świadectwa Auditora Wewnętrznego Systemów Zarządzania Jakością, Auditora Wewnętrznego Zintegrowanych Systemów Zarządzania i Auditora Wewnętrznego w Laboratorium oraz certyfikaty Asystenta i Pełnomocnika Systemu Zarządzania Jakością Polskiego Centrum Badań i Certyfikacji. Uczestniczyła w szeregu konferencji i szkoleń z zakresu sytuacji sektora badawczo-rozwojowego, zarządzania jakością, normalizacji oraz informacji naukowej i digitalizacji zasobów. Pracuje w dziale Marketingu, Współpracy z Zagranicą i Standaryzacji w Przemysłowym Instytucie Maszyn Rolniczych na stanowisku starszego specjalisty. Pełni także funkcję auditora wiodącego systemu wg PN-EN ISO/IEC 17025:2005 w Laboratorium Badawczym Maszyn Rolniczych PIMR.

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