

## TESTING THE NEW PRO-INNOVATIVE SERVICE FOR ENTERPRISES OF MATERIALS PROCESSING INDUSTRY

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**Purpose:** The paper presents the process of testing pro-innovative service Monitor of Innovative Organization Development (MIOD) tailored for enterprises of material processing industry.

**Design/methodology/approach:** In the process of new service testing practical verification of the concept were used. Created service prototype were realized fully in four enterprises. In the process of designing service an eclectic approach were used – various methods were implemented, corresponding to design research approach (Faste&Faste, 2012). The paper contributes to area of service design, service management and innovation management because the the main purpose of the service is to support innovation in enterprises.

**Findings:** In the paper two important findings were presented: the roadmap of pro-innovative service commercialization and the results of the MIOD service testing.

**Research limitations/implications:** The designed pro-innovative service is devoted to enterprises of materials processing industry only. The testing process was limited to only four enterprises of this sector operating in śląskie region, Poland. However the service could be adopted to be delivered to the enterprises of other sectors. General observations could be expanded to other business services.

**Practical implications:** The verified prototype of pro-innovative service is the main results of the project entitled *A Network of Regional Specialist Observatories in the Process of Entrepreneurial Discovery in Śląskie Voivodeship (SO RIS II)*. The service could be used by regional business environment institutions.

**Originality/value:** The approach to service design is new in the paper. Moreover the observation form testing the service prototype are quite valuable. Presented knowledge could be interesting for service designers (practitioners) as well as scientists exploring and evaluating services.

**Keywords:** service design, pro-innovative services, innovation management, innovation policy.

**Category of the paper:** technical paper.

## 1. Introduction

Nowadays nobody neglects the fact the innovations are the gate towards competitiveness for every kind of enterprises. Innovations not only bring benefits for business but they contribute to social development and improve the situation on the labour market. Governments and regional administration support the innovativeness of enterprises using different measures (financially, fiscally, organizationally or by offering places for developing new ideas). This is in contradiction to so-called Chicago School paradigm for promoting competitiveness and innovation which created a belief in the free market to maximize innovation and productivity (Trott, 2017). Delivering knowledge about innovation management in the form of tailored services is one of the method fostering innovation management used worldwide. Innovation support services or in other words pro-innovative services are designed for enterprises to help them on different stages of innovation process.

In the project entitled *A Network of Regional Specialist Observatories in the Process of Entrepreneurial Discovery in Śląskie Voivodeship*<sup>1</sup> one of the most important objective was the development of the offer of the network. The general idea was to develop new, valuable services for regional enterprises in the area of innovation management. The service called Monitor of Innovative Organization Development (MIOD) was designed and tested as the result of the project. In the paper the process of designing one of the services is described as well as the results of testing the pro-innovative service is presented.

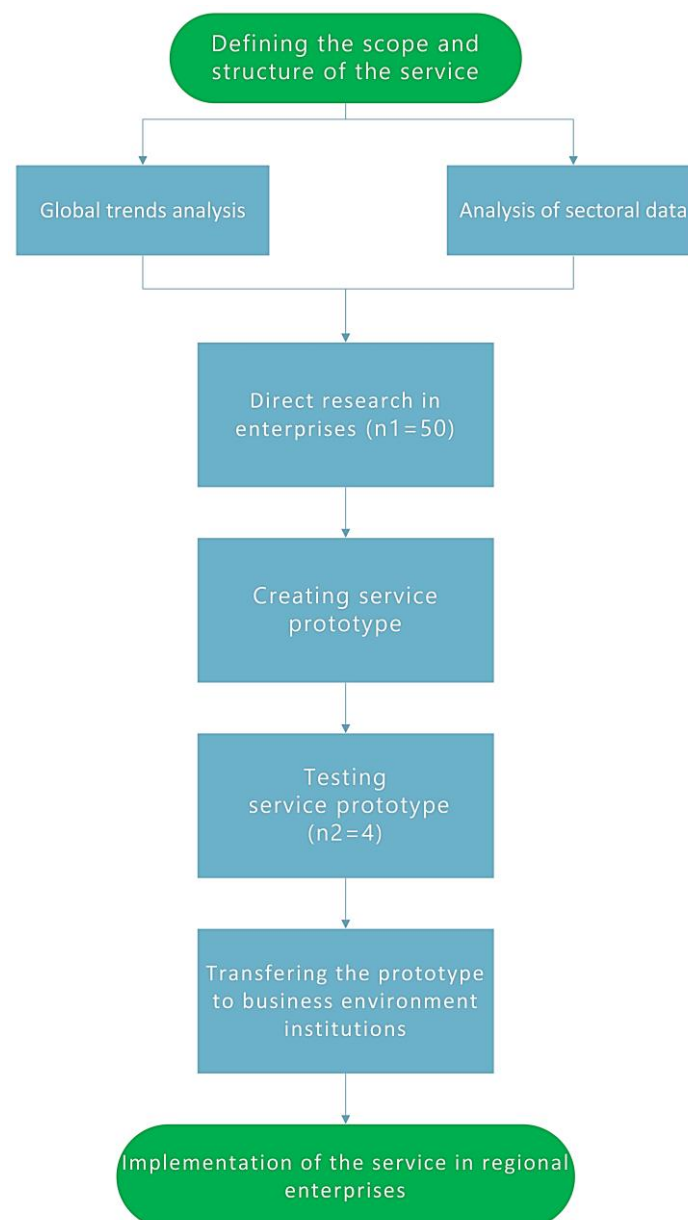
## 2. Methods – service design

Service design is specific because of characteristics of services like Intangibility, Inseparability, Variability, and Perishability (Kotler, Keller, 2007). Trott (2017) also emphasized the service characteristics in the process of creating services (new service innovation). The author adopts after Scheuing and Johnson (1989) service innovation process – a sequential model of creation of new services. The model has three main stages: idea generation, evaluation and realization. The stages corresponding to traditional new product development process, however the activities on each stage are typical for services. Moreover the concurrent service development models were presented by the author, including cycle model that enables the parallelization of the activities. Like New Product Development (NPD) models, New Service Development (NSD) models are derived from the process models that

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<sup>1</sup> The project was conducted from 2020 to 2023 and co-financed by the European Union under the European Regional Development Fund and state budget. The regional Marshall Office was the leader of the project, while eleven regional institutions constitute the project consortium.

initially were created for the development of manufactured products especially on consumer markets (Fitzsimmons, Fitzsimmons, 2000). Business sector requires new types of tailored services delivering knowledge about new products (innovation). Den Hertog (2002) calls this services Knowledge-intensive business services (KIBS), identifying five basic service innovation patterns. Aslesen and Isaksen (2007) expand this concept of services and shows the role of knowledge-intensive service activities (KISA) and verifies this two approaches by studying the use of knowledge-intensive services in two Norwegian industries (aquaculture and software industry). In Canadian economy and ICT sector the role of KIBS is investigated by Doloreux and Frigon (2019).



**Figure 1.** Roadmap of the new pro-innovative service commercialization.

Source: own elaboration – result of the SO RIS II project.

In Poland, there are examples of innovation support services under the general name of innovation audit, with a diverse range of content (Olko, 2017). Positive and negative experiences of the implementation of these services between 2010 and 2015 were used in the development of the new service.

Two methods were considered during the phase of designing the service: Quality Function Deployment (QFD) and SERVQUAL. The QFD is the approach and set of tools used to effectively define customer requirements and convert them into detailed engineering specifications and plans to produce the products and services that fulfil those requirements (Ćwiklicki, 2017). Chan and Wu (2002) on the basis of wide literature review shows that QFD is widely used in designing services, including business services. The second considered method SERVQUAL is used particularly to evaluate services. According to the work of Parasuraman, Zeithaml and Berry (1991) the general service quality consists of five parameters: tangibility, reliability, responsiveness, assurance and empathy. In this areas clients perceive gaps between their expectations and realization.

Eventually considered approaches (QFD, SERVQUAL) were not fully implemented in the process of service design. The team assumed that designed service must be based on direct research addressed to enterprises in śląskie region representing materials processing industry. The scope of the research was the same as the problems raised in the designed service.

The entire process of service commercialization is presented on fig. 1. The team started with determining the scope and structure of the service. The following assumptions were made at this stage:

- the service should be short and simple for the enterprise, not involving a large number of company personnel,
- the feedback should refer to global trends within the technological area of materials production and processing, but also to regional policies that support the business sector,
- the service should meet the needs of small and medium-sized enterprises covering the areas of market, organization of innovation, intellectual property and innovation financing.

In the next stage, a parallel analysis of global trends and a sector analysis was conducted. Both analyses were focused on the materials production and processing sector. Global trends analysis shows that following challenges should be undertaken in the service:

- Industry 4.0 – how the enterprise is prepared to the challenges of Industry 4.0? What activities the enterprise can undertake to cooperate with other businesses more advanced in Industry 4.0 solutions?
- circular economy – How the enterprise is currently meeting the challenge of a circular economy? In which areas to take action to realize the idea of a circular economy?

- Sustainable development - What are the areas of sustainability closest to the company? What sustainable innovation actions to take in accordance with the essence of the ISO 56000 series standards?
- Corporate Social Responsibility (CSR) - What are the enterprise's current CSR strengths? What actions can be taken to improve the enterprise's social responsibility according to ISO 26 000 series standards?

It was assumed that the essence of the service is the identification of business model changes related to the organization's innovation orientation - corresponding to the concept of business model innovation (Afuah, 2018). During the development of the service prototype, it was decided that the main issue would be the development of an innovation capability model tailored to regional (śląskie region) and industry specifics (manufacturing and materials processing sector). According to the OSLO Manual (2018), a company's attainment of competitive advantage is based in the long term on the development of a model for generating innovation, that is, the ability to create new products (product innovation) or new processes (business process innovation). Among the theoretical concepts relating to the general model of innovation creation by companies, it is important to point out:

1. The concept of the New House of Innovation (Prahalad, Krishnanan, 2008) covering four areas: enterprise technical architecture (including IT systems and software), co-created but personalized customer value leveraging experience, access to global resources and talent, flexible and resilient business processes with focused analytics, and enterprise social architecture.
2. Business Model Innovation (Massa, ucci, 2014; Afuah, 2018, Brzóska, 2014) explaining how innovations affect the business model.
3. Inventory of organizational innovativeness (Tang, 1998) – resource-based view on organizational innovativeness.
4. Model of innovation capability (Lawson and Samson 2001) extended by Machnik-Słomka (2020), where innovation capability is understood as *a multidimensional capability that highly integrates various capabilities ensuring an appropriate level of continuous management of the process of creating and implementing innovations that meet the needs of stakeholders in order to achieve the expected effects and competitive advantage.*

### 3. Results

As a result of the design process the prototype of the service called Monitor of Innovative Organization Development (MIOD) was obtained, consisted of:

1. Service provision manual – general manual describing how the service should be provided (procedure and all activities comprising the service).
2. Form of collecting information – form for collecting information about the enterprise, the basis for preparing the report for enterprise. The form consists of 30 questions and fits on 10 pages.
3. Report template – the template of report for the enterprise showing how the content of the report should look like.

**Table 1.***Structure and content of the MIOD service*

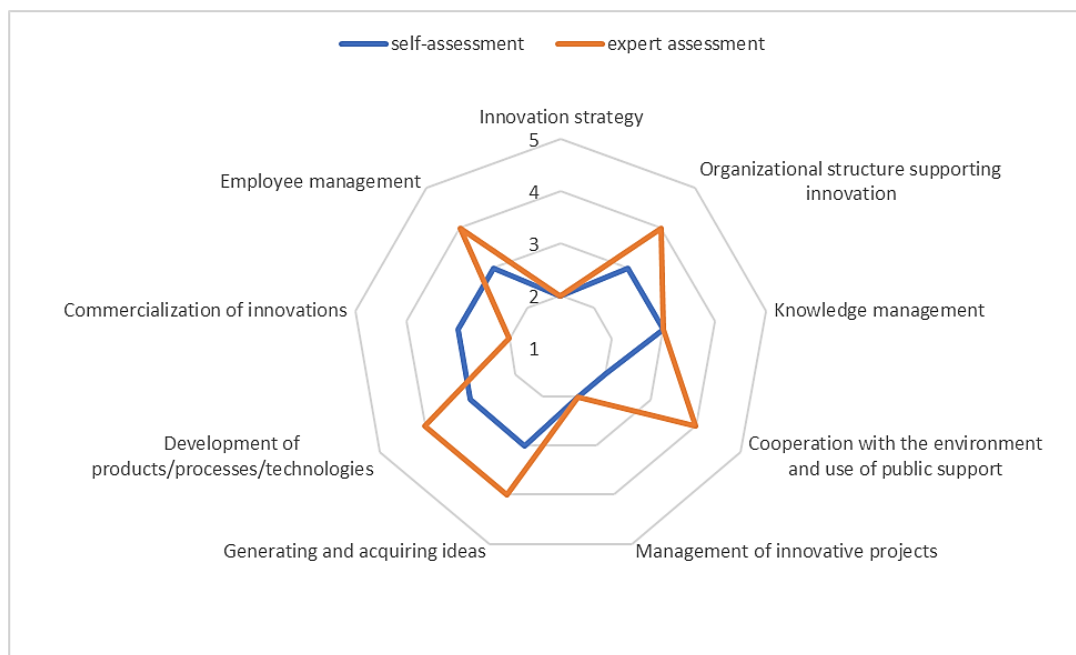
No	Section	Problems - questions
I	Basic data	Company name, addresses, contacts
II	General characteristics of the company	1. company size 2. dominant area of activity (NACE) 3. percentage of revenue allocated to innovation 4. implemented standards
III	Innovation management practice	5. type of implemented innovation 6. sources of financing innovation
IV	Enterprise strategy and business model	7. areas of enterprise activity directly linked with innovation 8. areas of enterprise activity that should be linked with innovation 9. innovation and strategy change 10. innovation and business model change 11. innovation and performance 12. used strategic measures of innovation 13. strategic measures of innovation that should be used
V	Organizational structure	14. organizational unit responsible for research, development and innovation 15. plans about organizational unit responsible for research, development and innovation
VI	Knowledge management	16. knowledge management instruments 17. project management system 18. using a project management system for innovation 19. using a risk mapping 20. areas of risk mapping 21. risk assessment – factors
VII	Employees	22. employee development in innovation 23. detailed areas of employee development in innovation
VIII	The needs and expectations of the enterprise, cooperation with the environment	24. used tax reliefs for innovation 25. cooperation with other entities in innovation 26. expected public support (innovation)
IX	Self-assessment of innovation management	27. Self-assessment of innovation in eight areas

Source: own elaboration.

The MIOD service is focused on practice of innovation management, strategy and business model, organizational structure, knowledge management, employees, needs and expectations of the enterprise, cooperation with the environment. The full characteristics of the service, related to the questions in the form are presented in Table 1. The idea for the service was to collect data during the first visit to the enterprise using a created form. Then, based on the collected data, a report for the company is prepared. To prepare the report external information are used:

- global patent activity and scientific activity (scholarly works) for the specific keywords representing enterprise specialisation derived from lens.org,
- information about the turnover representing enterprise specialisation (according to NACE) for Poland and other selected European countries derived from Eurostat.

The last question in the form referred to the self-assessment of innovation management in the enterprise. This information is used to prepare a visualization of the innovation management assessment, an example of which is presented in Fig. 2.



**Figure 2.** An example of self-assessment and expert assessment in MIOD report for the enterprise.

Source: MIOD final report for one of the enterprises.

The prototype was tested in  $n_2 = 4$  selected enterprises located in the śląskie voivodship. The characteristics of companies where the MIOD was tested is presented in Table 2. After completing the service enterprise representatives were asked about their overall assessment of the service. The following closed-ended questions were asked with Likert-scale responses:

1. After implementing the Monitor for Innovative Organizational Development service in our company, we evaluate it as: (definitely not useful) — (definitely useful) – assessment of service suitability.
2. Are you satisfied with the cooperation during the service? – assessment of satisfaction with cooperation.
3. Did the service meet your expectations? – assessment of fulfilment of expectations.
4. Would you recommend the service to other companies in the industry? – recommendation of the service to other companies in the industry.

**Table 2.***Characteristics of the enterprises in which the MIOD service were tested*

Enterprise id	Size	Organizational form	location	specialization
P1	medium size enterprise	joint stock company	Gliwice	production of cold-drawn of wire, nails and special nails (collated nails, nails for thermal insulation)
P2	small enterprise	limited liability company	Zabrze	production of ceiling support netting for the mining industry
P3	small enterprise	limited liability company	Paniówki	manufacture of components for transformers and electric motors
P4	microenterprise – spin out	limited liability company	Katowice	production of metal matrix composites, consultancy services – material technologies

Source: own elaboration.

Figure 3 presents the average values of the assessment - the results of answers for the above closed questions. As we can see, the overall assessment of the service was very positive. Moreover, the following open-ended questions were asked to determine the usefulness of individual elements of the MIOD service:

- What issues are most useful in the activities of your company?
- What issues are the least useful in the activities of your company?
- What issues regarding the innovative development of the enterprise were not addressed?

Participants of the tests indicated the following most useful issues implemented as part of the MIOD service:

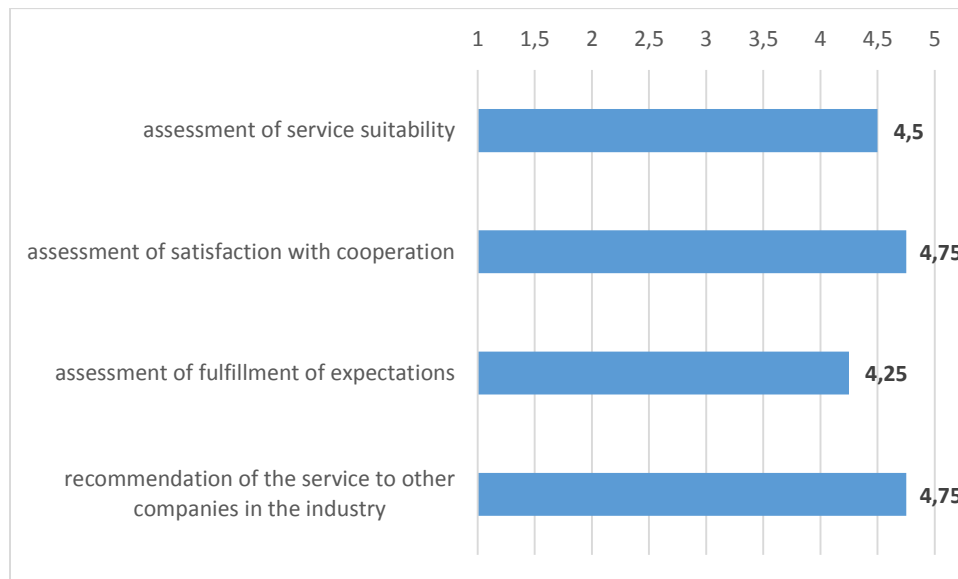
- analysis of the market situation, innovation management assessment (P1)
- processes automation and robotization (P2),
- innovation management and innovation management system (P3),
- market analysis (P4).

Only one participant (P3) indicated the issues that were least useful in the company's operations and it was Industry 4.0. The rest of the participants did not indicate any issues that was least useful in the activities of his company. Also only one participant (P1) indicate the issues that were not addressed in MIOD service, which were:

- detailed analysis of sales value for the company's products (based on public statistics),
- the issue of the impact of production volume on efficiency.

Based on the evaluation of the test services, we can conclude that the service was rated as highly useful and its substantive scope was well suited to the needs of enterprises.





**Figure 3.** Assessment of the MIOD service by enterprises after the service has been provided [ $n_2 = 4$ ].

Source: own elaboration.

The MIOD method and its practical verification are the key findings of the presented research. The practical nature of the results obtained should be emphasized: the MIOD was designed for production companies in the materials processing industry.

#### 4. Conclusions

Designed service MIOD could be useful for enterprises only if the regional business environment institutions could adapt it to their real offer. In the process of service creation no additional resources were devoted to training the staff of business environment institutions about MIOD service realization. To obtain high quality of the service the knowledge of the personnel is crucial. The leading consulting companies offers different types of services for mastering innovation management practices<sup>2</sup>. The test of the MIOD service shows that the basic improvement of the innovation management process could be limited to nine areas (Fig. 2), as the starting point to in-depth analysis.

A full, scientifically based critical assessment should also include a peer review by a business consulting institution and a scientific opinion. Such reviews have not been conducted - so this is the basic limitation of the presented results. The service is devoted to enterprises of materials processing industry only and it was tested in four small companies in Poland – it is the second practical limitation of the presented method. However lessons learned from the testing of MIOD service could be also very valuable for management science. The importance

<sup>2</sup> For example AT Kearny offers at least eight types of consulting services in innovation management for business, see: Consulting Imp<sup>3</sup>rove, <https://www.imp3rove.de/services/consulting/>.

of strategic level of innovation management is the first key findings of the service testing. The second one is the role of innovation management measures/indicators for implementing innovation management strategy.

Moreover the following observations were made during the process of designing the service:

1. Tests of the new service confirmed its usefulness and value for enterprises in the materials processing industry. A positive assessment during the tests is a condition for further commercialization of the MIOD service.
2. Full commercialisation of the service can be carried out once the service has been formally handed over to the business environment institutions. By the time the article was published (the end of 2023), this had not happened.
3. Further development of the MIOD service could include the creation of a web-based version. In its current version, MIOD is based on a manual and relies heavily on the knowledge of the experts implementing the service. Creating an online version would certainly reduce the individual value for the entrepreneur but would increase the reach to other businesses in Poland.
4. An important part of the process of developing and testing the MIOD service was the practical knowledge about the companies in the sector of materials processing industry. While quantitative research can provide general overview of innovation management in enterprises, services realized in four enterprises shows the details of innovation management practices and indicate the causes of problems in this area.
5. Future works in this area will be extended not only in the area of organization innovation capability but also maturity of innovation system in organizations. Meeting this challenge will require a combination of theoretical and practical elements. The conducted studies have shown that both the practical offer of consulting companies and the theoretical knowledge related to innovation management in enterprises are developing. The author's further research will be devoted to these problems.

## **Acknowledgements**

The paper presents the selected results of the project *A Network of Regional Specialist Observatories in the Process of Entrepreneurial Discovery in Śląskie Voivodeship* WND-RPSL.01.04.01-24-06C8/19-009 co-financed by the European Union under the European Regional Development Fund and state budget.

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