

# GUIDE TO GOOD PRACTISES IN THE AREAS OF THE SMART SPECIALISATION IN MAZOVIA



## Contracting Authority:

**Mazowieckie Voivodeship**

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Guide to good practices in the areas of the smart specialisation in Mazovia

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## Summary

Mazowieckie Voivodeship is characterised by an integrated approach to economic cooperation, striving to increase the level of entrepreneurship, economic competitiveness and innovation in the region. Smart specialisation constitutes one of processes adopted for this purpose.

Smart specialisation concentrates knowledge resources on a limited number of measures considered as priorities in the context of the voivodeship's objectives. The identification of a limited number of intervention areas with the participation of stakeholders representing the enterprise sector resulted in extracting activities focused on the most significant aspects in order to ensure sustainable development of the region in the future with an effective use of development opportunities specific to the Mazovia region.

Key features of smart specialisation include the adequate use of specific opportunities and potentials with an appropriate diagnosis of the region's economic and social conditions, building scientific and economic potential with the development of cooperation networks, and striving for a high level of product and service innovation.

Abovementioned aspects led to the separation of areas of smart specialisation concerning the most considerable development potential of the voivodeship. The areas were identified as a result of a series of undertaken activities including conducted diagnosis and identification of potentials, cooperation with interested entities, implemented surveys and data analyses. The outcome of the implementation of activities in this scope was the identification of four areas of smart specialisation in Mazowieckie Voivodeship. These areas are:

- Safe food;
- Intelligent management systems;
- Professional services for business;
- Quality of life.

A considerable number of projects contributing to the region's smart specialisation are implemented in Mazowieckie Voivodeship, among which good practices can be identified. Good practices constitute activities that ensure significant, positive results and are innovative, sustainable and repeatable; this report presents some of identified good practices in the scope of innovative projects implemented in the Mazovia region. The additional objective of the study was to enable the conduct of the analysis of practical application of financial instruments implemented by the region's authorities, which, as the result, might support further effective implementation of the region's development policy in the future.

The implementation of smart specialisation combines resources at various levels of administration, therefore the examples of good practices presented in the publication include projects conducted by representatives of various industries and focused on different aspects, implemented under the Regional Operational Programme of Mazowieckie Voivodeship 2014-2020 and the Smart Growth Operational Programme 2014 -2020. Each of presented projects is highly innovative, often having an international impact, contributing to the development of four aspects of smart specialisation of the region in the scope of safe food, management systems, services for business and high quality of life.

The research was implemented with the use of methods including in-depth individual interviews (IDI) conducted with representatives of companies responsible for individual projects under ROP MV and OP Smart Growth, IDI with experts characterised by the experience in smart specialisation of Mazowieckie Voivodeship, and CAWI method using an online questionnaire, conducted with the beneficiaries of ROP MV 2014-2020 and Smart Growth Operational Programme in the Mazovia region. Analysis of results of the research led to main conclusions and recommendations for the authorities of the voivodeship.

## Introduction

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The objective of the present report is to present identified good practices implemented in the four areas of smart specialisation of the Mazovia region.

The crucial significance in the preparation of the report should be attributed to experts in the field of smart specialisation of Mazowieckie Voivodeship and entities implementing R+D projects in the scope of development of the innovation potential and entrepreneurship, support for conducting R+D works and increasing research and scientific potential.

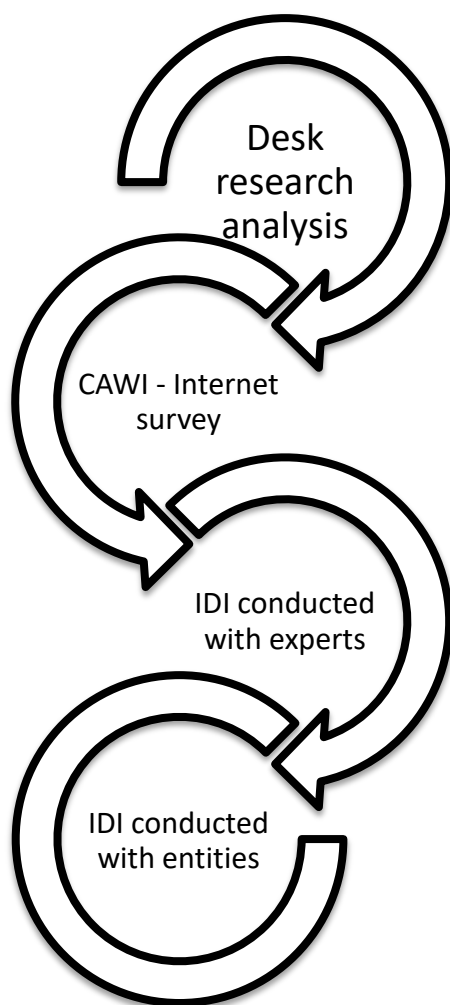
Conducted interviews and a survey made it possible to gather information necessary to prepare the Guide – the analysis of results of the research led to the identification of main conclusions and recommendations for the Management Board of the Mazowieckie Voivodeship.

This publication might contribute to the identification of measures that, if undertaken in the future, could increase the effectiveness of the implemented development policy of the Mazowieckie Voivodeship.

## Research methods

A number of research methods and techniques were used as part of the study. Information below includes the quantity of used methods.

Figure 1 Research methods used in the research process



Source: Own research.

## Desk research analysis

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### Reasons behind the use of this method:

Desk research analysis led to obtaining objective information constituting an initial step to the next stages of research and directing the research team to specific problems that were further deepened and explained as a result of reactive research.

Desk research analysis included:

- publications on smart specialisation of Mazowieckie Voivodeship;
- documentation on individual projects undergoing the process of classification for present report.

## CAWI – Internet survey

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CAWI (*Computer Assisted Web Interview*) was used in the form of placing a questionnaire on the website in a manner that would provide respondents with an easy access to it from a web browser. Study participants received an invitation to participate in the study via email. The invitation included a generated survey link.

**Population of the research:** beneficiaries of ROP MV 2014-2020 and Smart Growth Operational Programme, implementing projects in the scope of smart specialisation of Mazovia.

The list of Priority Axes under which respondents were invited to participate in the study is presented below:

- **ROP MV 2014-2020:**
  - ✓ PA I - Use of research and development activity in economy;  
Measure 1.1. Research and development activity of scientific units  
Measure 1.2. R+D activity of enterprises
  - ✓ PA III - ENHANCING OF INNOVATIVE AND ENTREPRENEURSHIP POTENTIAL;  
Measure 3.3 Innovation in SMEs
- **Smart Growth Operational Programme 2014-2020:**
  - ✓ PA I Support for R&D activity of enterprises;  
Measure 1.1: R&D projects of enterprises  
Measure 1.2: Sectoral R&D programmes



- ✓ PA II Support for the environment and capacity of enterprise for R&D&I activity;  
Measure 2.3: Pro-innovation services for enterprises  
Measure 2.4: Cooperation within the framework of the national innovation system
- ✓ PA III Support for innovation in enterprises  
Measure 3.2: Support for R&D results implementation
- ✓ PA IV Increasing the research potential  
Measure 4.1: Research and development

**Size of the research sample:** An invitation was sent to all beneficiaries implementing projects in Mazovia as part of the Measures selected for the study. 120 entities participated in the study.

In-depth interview (IDI) with experts in the field of smart specialisation of Mazowieckie Voivodeship

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The IDI method constituted of conducting a conversation with the use of a specific pattern called an interview scenario.

**Population of the research:** experts in the field of smart specialisation of Mazowieckie Voivodeship.

Representatives of following institutions participated in the research:

- Fundacja Akcelerator Innowacji;
- Mazovian Unit of EU Programmes Implementation in Warsaw;
- National Centre for Research and Development (NCBR);
- The Polish Agency for Enterprise Development (PARP);
- Warsaw University of Life Sciences WULS – SGGW;
- The Office of the Marshal of the Mazowieckie Voivodeship in Warsaw, Department of Regional Development and European Funds, Development and Management of the Regional Innovation Strategy;
- The Office of the Marshal of the Mazowieckie Voivodeship in Warsaw, Department of Regional Development and European Funds, Regional Innovation System.

**Determining the sampling:** purposive – Experts participating in the study were selected in terms of their knowledge of the smart specialisation of Mazovia and projects implemented in the voivodeship.

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**Size of the research sample:** 12 interviews.

In-depth interview (IDI) with entities implementing projects qualified as good practices

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Similarly to interviews conducted with experts in the field of smart specialisation of Mazowieckie Voivodeship, IDI with entities implementing projects qualified as good practices also constituted of conducting a conversation with the use of an interview scenario.

**Population of the research:** Beneficiaries of ROP MV 2014-2020 and Smart Growth Operational Programme, implementing good practices in the scope of smart specialisation in the Mazovia region.

**Determining the sampling:** Purposive – Respondents who implement the project in a model manner were asked to participate in the study; interviews were conducted with respondents characterised by the most considerable knowledge. The selection was based on an analysis of the respondents' answers in the CAWI research and IDI research conducted with experts.

**Size of the research sample:** 24 interviews, 6 in each area of smart specialisation of Mazovia.

## Smart specialisation in the Mazovia Region

Smart specialisation identifies areas with the most considerable potential for development, aiming at the competitiveness development of countries and regions in the scale of global economy. Selecting a limited number of priorities with the participation of stakeholders representing the enterprise sector leads to the focus of knowledge and resources on activities concerning the areas characterised by potential for the future development of a region<sup>1</sup>.

Region's smart specialisation uses development opportunities relating to specific economic and social conditions of a given area, in particular by using identified potential development areas. The competitive advantage consists not only of high innovation of products or services but is also built on the basis of scientific and economic potential and on a network of cooperation between the spheres of science and business<sup>2</sup>. Cooperation in the field of innovation can take place as part of joint works focused on new products and processes. Understanding the needs of regional entities and their intent to cooperate is very important for the development of smart specializations. This situation promotes continuous analysis of development trends in the economy, including technological trends, as well as identification of economic niches and analysis of functioning of the regional innovation market actors<sup>3</sup>.

### Smart specialization of Mazovia Voivodeship (*pl. Województwo Mazowieckie*)

The Regional Innovation Strategy for the Mazovia Region 2020 (RIS) was adopted by the Mazovia Voivodeship Local Government on 16 March 2015. The document defines the development potential of the region<sup>4</sup> taking its characteristics into account.

Referring to RIS, *the smart specialization is a tool fused to program the innovation policy aimed to contribute to the implementation of the Strategy for smart and sustainable growth, promoting social inclusion*<sup>5</sup>. The concept of the smart specialization described in the RIS is based on the Guide to Research and Innovation Strategy for the smart specialization, leading to the necessity of identifying a limited number of priority economic activities realization of

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<sup>1</sup> <https://innowacyjni.mazovia.pl/dzialania/inteligentna-specjalizacja.html>, [access: 26.08.2019 r.].

<sup>2</sup> <https://innowacyjni.mazovia.pl/aktualnosci/kierunek-innowacyjne-mazowsze.html>

<sup>3</sup> L. Palmen, M. Baron, Guide for animators of cluster initiatives in Poland, [https://www.pi.gov.pl/PARPFiles/file/klastry/animatory\\_p3\\_interaktywny.pdf](https://www.pi.gov.pl/PARPFiles/file/klastry/animatory_p3_interaktywny.pdf), s. 31. [access: 26.08.2019 r.].

<sup>4</sup> M. Sulmicka, Territorialisation of the intervention and use of endogenous potentials of the Mazovia Region development policy, <http://www.czasopisma.pan.pl/dlibra/publication/123877/edition/108078/content/terytorializacja-intervencji-i-wykorzystanie-endogenicznych-potencjalow-w-polityce-rozwoju-mazowska-sulmicka-malgorzata>, p. 6. [access: 26.08.2019 r.].

<sup>5</sup> Regional Innovation Strategy for the Mazovia Region 2020, p. 9.

which is intended to gain and to maintain the competitive advantage globally by the Mazovia Region<sup>6</sup>.

Having the above in mind, the smart specialization of the Mazovia Voivodeship, in the context of the regional innovation policy is characterized by the following assumptions<sup>7</sup>:

- focus of the aid on key priorities, challenges and regional needs for knowledge-based development;
- use of the strengths and competitive advantages of the region and its potential to head for the excellence;
- promotion of the technological and practical innovations,
- basing identified fields on objective data and evidences (evidence-based), use of robust systems for implementation, monitoring, evaluation and updating.

An in-depth analysis of subregions in the Mazowieckie Voivodeship enabled identification of its varied potentials. The territorial dimension of intervention and individual areas was included in the Development Strategy for the Mazowieckie Voivodeship<sup>8</sup>. Diversity of the Mazovia Region was the reason for the choice of a specialization covering key sectors of the economy, technology and service processes responding to the needs of the inhabitants; they are also in line with global trends<sup>9</sup>. Identification of the smart specialization is a complex, multi-stage process that involves a range of activities:

- diagnosis and identification of fields having the greatest endogenous potential,
- cooperation with entities interested in the growth and the development of innovativeness in the region (entrepreneurial discoveries),
- questionnaire regarding the smart specialization of the Voivodeship,
- prioritization of practical action fields<sup>10</sup>.

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<sup>6</sup> Ibidem, p. 10.

<sup>7</sup> Ibidem.

<sup>8</sup> M. Sulmicka, Territorialisation of the intervention and use of endogenous potentials of the Mazovia Region development policy, <http://www.czasopisma.pan.pl/dlibra/publication/123877/edition/108078/content/terytorializacja-intervencji-i-wykorzystanie-endogenicznych-potencjalow-w-polityce-rozwoju-mazowsza-sulmicka-malgorzata>, p. 6. [access: 26.08.2019 r.].

<sup>9</sup> <https://innowacyjni.mazovia.pl/dzialania/ris-mazovia/dokumenty/regionalna-strategia-innowacji-dla-mazowsza-do-2020-r.html>[access: 26.08.2019 r.].

<sup>10</sup> The Regional Innovation Strategy for Mazovia Region 2020, Warsaw, 2015, p. 10-11

Implementation of the above operations in the Mazovia Voivodeship enabled identification of four smart specialization fields; the fields in question enable presentation of the scientific and economic diversity of the region. The selected areas are:

- Safe food;
- Intelligent management systems;
- Professional services for business;
- Quality of life.

## Identification of good practices

The study identified good practices related to the following subject-matter areas:

- scientific infrastructure and scientific potential in the field of researches and innovations,
- public-private cooperation in the area of the scientific researches and the innovations,
- Hybridization of/combining the potential of the local economy individual sectors in order to create new, more innovative products or services.

The developed catalog of good practices includes all four areas of the Mazovia Region's smart specialization:

- safe food - 6 good practices (2 projects co-financed from the Smart Growth Operational Programme, 4 projects co-financed from the ROP MV),
- quality of life - 6 good practices (3 projects co-financed from the Smart Growth Operational Programme, 3 projects co-financed from the ROP MV),
- professional services for business - 6 good practices (6 projects co-financed from the ROP MV),
- intelligent management systems - 6 good practices (4 projects co-financed from the Smart Growth Operational Programme, 2 projects co-financed from the ROP MV).

All of the presented good practices are a part of the Regional Innovation Strategy (hereinafter RIS) and their implementation has the potential to contribute significantly to the development of the Mazowieckie Voivodeship. Most projects may also have an European or even international impact. Projects were evaluated according to the following criteria:

1. the degree/grade and the type of an innovation (technical, environmental, social, economic) achieved in the framework of a good practice:
  - The degree/grade of innovations was evaluated on the basis of such factors as:
    - level of the novelty of the innovation implemented in the area of the company,
    - level of the novelty of the innovation implemented in the area of a market,
    - number of months when the implemented innovation is used,

- range (cover) of innovation - range of implemented innovation in a company<sup>11</sup>,
- universality of an innovation - availability of a solution in the market.
- The degree of an innovation was assessed basing on deepened desk research analysis and analysis of conducted interviews.
- Therefore, good practice was assessed acc. to a 5-point scale:
  - Very high level of innovation - innovative solutions not used so far in a particular enterprise, a radical innovation<sup>12</sup> from the perspective of the market, implemented idea, no previous similar solution in the market.
  - high level of innovation - significant change in the company, an incremental innovation<sup>13</sup>, an idea at the stage of implementation (project at the stage of implementation), similar solutions existing in the market.
  - neither high nor low level of innovation - a small change (micro solution) in the company, an incremental innovation<sup>14</sup> in the market, an idea not implemented yet, a large number of similar solutions available in the market.
  - low level of innovation - very small change (micro solution facilitating operating of the production department) in the company, an incremental innovation in the market, an idea still at the design stage, a large number of similar solutions available in the market.
  - very low level of innovation - minimal change (micro solution facilitating the use of product) in the company, an incremental

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<sup>11</sup> K. Tomczak-Horyń, R. Knosala, The Study Project on Employees Creativity Effect on Innovation in a Manufacturing Company, w: Proceedings of the 30th International Business Information Management Association Conference, ed. K. S. Soliman, Madrit 2017, p. 1918–1926.

<sup>12</sup> Radical innovation is the introduction of new, previously unused solutions. Definition in accordance with the "Assessment of the level of introduced innovations in selected enterprises", [http://www.ptzp.org.pl/files/konferencje/kzz/artyk\\_pdf\\_2018/T1/2018\\_t1\\_130.pdf](http://www.ptzp.org.pl/files/konferencje/kzz/artyk_pdf_2018/T1/2018_t1_130.pdf), p. 2 [access: 16.09.2019].

<sup>13</sup> Incremental innovation relates to improvements consisting in improving existing forms or their appropriate modification to serve new purposes. Definition in accordance with the "Assessment of the level of introduced innovations in selected enterprises", [http://www.ptzp.org.pl/files/konferencje/kzz/artyk\\_pdf\\_2018/T1/2018\\_t1\\_130.pdf](http://www.ptzp.org.pl/files/konferencje/kzz/artyk_pdf_2018/T1/2018_t1_130.pdf), p. 2 [access date: 16.09.2019].

<sup>14</sup> Incremental innovation relates to improvements consisting in improving existing forms or their appropriate modification to serve new purposes. Definition in accordance with the "Assessment of the level of introduced innovations in selected enterprises", [http://www.ptzp.org.pl/files/konferencje/kzz/artyk\\_pdf\\_2018/T1/2018\\_t1\\_130.pdf](http://www.ptzp.org.pl/files/konferencje/kzz/artyk_pdf_2018/T1/2018_t1_130.pdf), p. 2 [access date: 16.09.2019].

innovation in the market, an idea at the design stage, a very large number of similar solutions available in the market.

2. type of the provided aid (technical, economic, subsidized financing, non-returnable financing, other, etc.):
  - information prepared in accordance with information originating from applications for grants.
3. assessment of the repeatability level and possibility to implement a good practice in other entities in the region, as well as reasons why other partners of the regional innovation system or partners from other regions could be interested in the good practice:
  - information prepared on the basis of an in-depth research desk analysis, analysis of applications for co-financing, results of interviews held with beneficiaries.
4. extent of the impact of a good practice - regional/national or international relevance:
  - information prepared on the basis of an in-depth research desk analysis, analysis of applications for co-financing, analysis interviews held with beneficiaries.
5. impact of a good practice on the innovation/regional development policy:
  - evaluation on the basis of an in-depth analysis of secondary sources and results of conducted studies, with consideration to the subject-matter scope of the RIS strategic objective indicators.
6. assessment whether the good practice contributes to the realization of the Regional Innovation Strategy in the Mazovia Region:
  - evaluation on the basis of an in-depth analysis of secondary sources and results of carried out studies, with consideration to the RIS strategic objectives.



## Safe food

Safe food is an area of the smart specialization; it is associated with *undertakings increasing the quality and the safety of food products, leading to the improvement of techniques and processes related to production, storage, distribution, food processing and neutralization or re-use of waste originating from the agricultural production*<sup>15</sup>.

This area constitutes an immense potential for the development of the Mazowieckie Voivodeship due to the well-developed production base of primary agricultural products. Very serious competition of agricultural and food industry processing plants means that it is necessary to put pressure on promotion of a competitive position of the region<sup>16</sup>.

In the scope of the area "Safe Food", the following good practices have been identified:

- The use of countercurrent mass exchange and membrane filtration techniques to obtain preparations of colouring food from plant material;
- The digital analysis of image in agricultural technology. Development of a strategy, methods and algorithms and their use in the intelligent mechanism for destroying weeds in plant crops.;
- Development of a new product - an innovative biostimulator KMS03 Agro Fonds Consulting Agata Kowalczyk;
- Food and nutrition centre - modernisation of the Warsaw University of Life Sciences campus to establish the Research and Development Centre for Food and Nutrition (Centrum Badawczo-Rozwojowe Żywności i Żywienia - CŻiŻ);
- Innovative technology for the production of fresh pasta supporting healthy eating;
- Bio Active Healthy Food.

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<sup>15</sup> <https://innowacyjni.mazovia.pl/dzialania/inteligentna-specjalizacja/obszary-inteligentnej-specjalizacji.html>[access: 26.08.2019 r.].

<sup>16</sup> [https://www.funduszedlamazowska.eu/g2/oryginal/2015\\_11/e9aa1b5a90790233a94a1e2ccc84dcba.pdf](https://www.funduszedlamazowska.eu/g2/oryginal/2015_11/e9aa1b5a90790233a94a1e2ccc84dcba.pdf), p. 79. [access: 26.08.2019 r.].

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## The use of countercurrent mass exchange and membrane filtration techniques to obtain preparations of colouring food from plant material

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The project was carried out by ZENTIS POLSKA. It is an international family company specializing in fruit processing. Zentis has a wide range of components, including:

- components for bakery products;
- components for dairy products;
- components for <sup>17</sup>milk replacing products.

The project was co-financed by the Smart Growth Operational Programme (OP Smart Growth – submeasure 1.1.1. Industrial researches and development works carried out by enterprises) and it has been classified as good practice due to its innovative character. As a result of the conducted works certain very modern technological solutions were implemented. They significantly improved the production process and made it possible to use the so-called fruit pomace for food dyeing. A good practice resulted in researches aimed to develop a production of dyed foods. The company decided to use various techniques to separate dyeing substances from fruit pomace, i.e. the waste from the juice production. It should be noted that the dyeing extract is a natural food ingredient and it is not classified as a pure coloring substance.

The good practice matches the subject-matter objective very well: the infrastructure and scientific potential/ abilities in terms of tests and innovations. The company received the aid in the form of non-refundable funds, and the total cost of the projects equaled PLN 20,605,437.37. During the project implementation, a number of research works were carried out, intended to promote the development of the entire process of dyed food production. The project responds to such challenges as:

- aiming at the use of natural ingredients,
- "clean label."
- manufacture by means of a physical transformations,
- high quality,
- microbiological safety.

The implementation of the project contributed to the reduction of the negative impact on the environment in the processing plant, which is in line with challenges specified in regional strategic documents. It should be emphasized that the dyeing extract is fully natural and

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<sup>17</sup> All information about the company from: <https://www.zentis.pl/> [access: 26.08.2019 r.].

therefore, it is safe for users. Good practice can be effectively used primarily by other entities in the food industry.

As a result of the project, the only food dyeing installation has been erected in Poland. In addition, it enabled the company to expand its product base and to conduct further researches resulting in use of other by-products occurring in the course of the production process. Due to the broad scope of operating of the food production sector this solution has a very high potential of the knowledge transfer.

Despite certain difficulties (including a need for a specialized production hall), the project has been successful. The following table provides a detailed summary.

<b>Evaluation criteria</b>	<b>Project evaluation</b>
<b>Degree and type of the innovation</b>	The project is characterized by a high innovation degree. Innovation: technical
<b>Type of support granted</b>	Financial support - non-returnable funds
<b>Assessment of the repeatability level of the good practice and possibility to promote the good practice among other partners</b>	The practice is an innovative solution and therefore, it can be an example for other partners. The product is addressed primarily to the food industry, i.e. entities using dyeing extracts for their production. Despite the fact the implementation of the project by other entities will require a specialist knowledge it is possible to repeat the results of the work and, most importantly, to apply them in other companies.
<b>Scope of the impact of the good practice</b>	The good practice is characterized by a national (range) impact
<b>Impact of good practice on regional innovation policy/regional development</b>	Implementation of good practice has an impact on regional innovation policy and regional development as it answers regional challenges and problems. The project is coherent with the environmental undertakings, hence being complementary with the Regional Innovation Strategy. It also affects the innovation policy and regional development by: <ul style="list-style-type: none"> <li>- commercialization of results of R+D works</li> <li>- increase of an income of the enterprise</li> <li>- establishing cooperation with foreign partners</li> <li>- increase in revenues from the sale of new technologies.</li> </ul>

Evaluation criteria	Project evaluation
<p><b>Impact of good practice on the implementation of RIS</b></p>	<p>The project is coherent with the smart specialisation of the region. Implementation of the project will contribute to the achievement of following objectives of RIS:</p> <ul style="list-style-type: none"> <li>- increasing and strengthening cooperation in innovation development processes – by developing forms of cooperation in the business-science-environment relation, increasing the activeness of business entities, and intensifying scientific research works, results of which correspond to the needs of entrepreneurs.</li> <li>- increasing the internationalisation focused on development of innovation in Mazowieckie Voivodeship – by increasing the activity of entrepreneurs on the international arena and increasing the number of international research and development projects.</li> <li>- increasing effectiveness of support and financing of pro-innovation activities in the region – by supporting entrepreneurs.</li> </ul>

*Source: desk research analysis, analysis of the results of CAWI and IDI research methods.*

**Figure 2 The use of countercurrent mass exchange and membrane filtration techniques to obtain preparations of colouring food from plant material - pictures of the project**



*Laboratory tests of the process of colorant separation*



*Liquid processing system*



*Laboratory tests of the process of colorant separation*

*Source: Company's pictures*

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## The digital analysis of image in agricultural technology. Development of a strategy, methods and algorithms and their use in the intelligent mechanism for destroying weeds in plant crops

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MCMS Warka (Mazowieckie Centrum Maszyn Sadowniczych) is a company offering mowers, soil conditioners, augers, fruit planters, grinding mowers, hydraulic lifts, platforms and trailers as well as other machines and equipment for the fruit farming and the agriculture<sup>18</sup>. The company's activities are focused on the Polish market and neighboring countries: the Baltic Countries, France, Slovakia, Hungary, Bulgaria, Moldova, Ukraine, Russia and Lithuania.

In the framework of the project the company cooperated with the Warsaw University of Technology during conducting scientific research and innovations, i.e. to develop concepts, methods and algorithms and to implement them into a weed destroying mechanism to be applied for needs of plant cultivation. The project was selected as a good practice because it is fully in line with the region development and the smart specialization of Mazovia, and the proposed solution is characterized by a high innovation degree. It should also be emphasized that it is possible to use the project in other areas, which indicates a relatively high degree of project's repeatability. Project was intended for a broad range of stakeholders and end users, which is the reason why the project can be a good practice for potential partners. The mechanization seems to be a natural development trend in every region, which is why it is so important to carry out works in this area. Moreover, the developed solution can be used in other areas of economy, e.g. where it is necessary to recognize shapes and colors (inter alia waste segregation).

Project was financed under OP Smart Growth, measure 1.1, and its total cost was PLN 4 545 472,25. The goal was to develop an innovative three-dimensional Detection and Decision System (TSDD) and a robotized machine supporting the agricultural production. Implementation of the project will facilitate the possibility to remove weeds from spacings and rows on the basis of picture analysis. This system enables use of a digital picture analysis in specialized machines supporting the agricultural production. The company also plans to develop an advanced algorithm to control a work tool, using as input data (among others) results of video signal processing.

The target product, where the TSDD is to be implemented into, is agricultural machinery intended to control the weeding process of:

- row crops of berries, such as strawberries;

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<sup>18</sup> Information about the company originate from: <http://webmail.mcms.pl/pl> [access: 26.08.2019 r.].



- row vegetable crops;
- maize at the early stages of vegetation;
- tree and shrub nurseries.

Due to the universal character of the project, solution can be commercialized in Poland and abroad. The project responds to a common limited human resources issue in the agricultural sector and it enables to automate processes that previously required a considerable amount of work (i.e. weeding of rows and spacings). It is addressed mainly to a group of farmers, i.e. farms dealing with cultivation of the fruit and the vegetables.

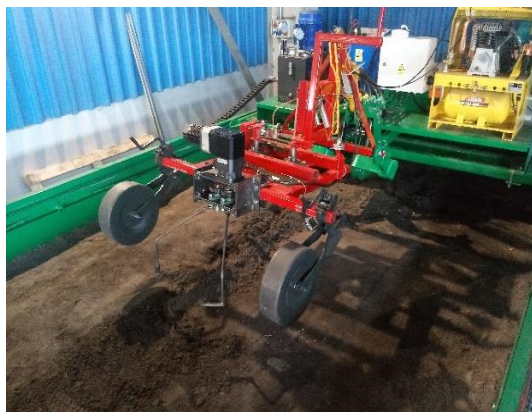
Evaluation criteria	Project evaluation
Degree and type of the innovation	The practice is characterized by a high degree of innovation. Innovation: technical
Type of support granted	Support: economic and non-returnable funds.
Assessment of the repeatability degree of the good practice and possibility to promote the good practice among other partners	Due to the international impact of the project, good practice can be a model to be followed by other partners. Furthermore, the project can be used in other industries (e.g. waste segregation, strawberry picking), proving a relatively high repeatability of good practice. It is possible to buy a license and use the final product in various areas of the economy.
Scope of the impact of the good practice	Impact: international.
Impact of good practice on regional innovation policy/regional development	<p>The project significantly affects the development of the region due to its innovative character. Increasing the efficiency of weeding processes has a positive effect on the development of farms using the solution. Moreover, the company's development ensures benefits, among others in the form of the increase of the employment. It should also be emphasized that the effects of applying good practice may be visible in the development of other industries, because it is possible to adapt the system to other market needs.</p> <p>Implementation of good practice has an impact on regional innovation policy and regional development by:</p> <ul style="list-style-type: none"> <li>- commercialization of results of R+D works</li> <li>- increase in revenues from the sale of new technologies</li> </ul>

Evaluation criteria	Project evaluation
	- increase in sales of new or significantly improved products.
<b>Impact of good practice on the implementation of RIS</b>	<p>The project is coherent with the smart specialisation of the region. Implementation of the project will contribute to the achievement of following objectives of RIS:</p> <ul style="list-style-type: none"> <li>- increasing and strengthening cooperation in innovation development processes – by developing forms of cooperation in the business-science-environment relation, increasing the activeness of business entities, and intensifying scientific research works, results of which correspond to the needs of entrepreneurs.</li> <li>- increasing the internationalisation focused on development of innovation in Mazowieckie Voivodeship – by increasing the activity of entrepreneurs on the international arena and increasing the number of international research and development projects.</li> <li>- increasing effectiveness of support and financing of pro-innovation activities in the region – by supporting entrepreneurs.</li> </ul>

*Source: desk research analysis, analysis of the results of CAWI and IDI research methods.*

**Figure 3 The digital analysis of image in agricultural technology. Development of a strategy, methods and algorithms and their use in the intelligent mechanism for destroying weeds in plant crops - pictures of the project**





*The use of digital analysis in agricultural technology - picture taken in*



*The use of digital analysis in agricultural technology - picture taken in natural conditions part 1*



*The use of digital analysis in agricultural technology - picture taken in natural conditions part 2*

*Source: Company's pictures.*

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## Development of a new product - an innovative biostimulator KMS03 Agro Fonds Consulting Agata Kowalczyk

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Agata Kowalczyk "AGRO FONDS CONSULTING" Company deals with:

- looking for opportunities to co-finance a particular project;
- preparation of the entire project documentation;
- settlement of investments which are implemented in the framework of granted co-financing<sup>19</sup>.

The goal of the project was to conduct researches aimed to expand the knowledge and to acquire and evidence new information in order to create a safe, innovative product protecting plants in the agriculture, i.e. development of a new product - an innovative bio-stimulator. The total cost of the project was PLN 145 140, with the financing under Measure 1.2 of ROP MV.

The final result of the project is a complete documentation concerning the composition and recommendations for a product, and its operation mechanism. The project enabled to establish and to expand cooperation between Agro Fonds Consulting and the research scientific sector due to inclusion of a research unit into the project and purchase of pro-innovative services from it, in the framework of which an innovative bio-stimulator is to be developed.

A good idea is to use the silicon as an innovative bio-stimulator. However, the project does not rely on so-called 'pure' element, which is available in the market. As a result, production of the bio-stimulator is more expensive compared to other solutions available in the market. However, It should be emphasized that the offered solution is innovative and safe as it does not contain any harmful substances. Therefore, the final price of the product may be the main challenge for the originators and producers of the project. Nevertheless, other entities (including distributors) are already showing a great interest in the good idea.

The innovation of the project means use of a modern form of the silicon as a bio-stimulator for the crops. Application of the project (results) to crops will reduce use of other chemicals applied to protect plants. It is a result of the fact that the produced bio-stimulator is a natural one and it does not have a negative impact on plants and their environment. This means that the innovative form of the silicon results in a natural strengthening of the crops. Using a biostimulator, it is possible to naturally support plants and reduce the number of chemicals.

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<sup>19</sup> All information about the company from the website: <http://prowdotacje24.pl/kontakt> [access: 26.08.2019 r.].

The solution, by its nature, can be applied by other entities (development of products similar to the developed one). Since the product is safe and it does not contain any toxic substances, it can be applied to all plants. The project responds to the problems related to difficult meteorological conditions, which determines a wide range of possibilities for its use in the world (due to the fact the problem is very common).

Evaluation criteria	Project evaluation
<b>Degree and type of the innovation</b>	High degree of product innovation. The modification of the chemical element facilitated development of a highly innovative product. The use of a safe biostimulator makes it possible to naturally protect plants without the need for chemicals. Innovation: technical and environmental.
<b>Type of granted aid</b>	Technical and financial support - non-returnable.
<b>Assessment of the repeatability degree of the good practice and possibility to promote the good practice among other partners</b>	A similar bio-stimulator is offered in the international market, however, the most frequently it is imported from India. Also in Europe there are 2-3 entities offering a similar product. Nevertheless, the offered bio-stimulator is not available exactly in this form. Partners (manufacturers of bio-stimulators, adjuvants, fertilizers, distributors) may show interest in the good practice in order to improve it, extend it, modify it or use it. Good practice aims at reduction of use of plant protection products - partners may be very interested in the good practice because of the "ECO" global trend i.e. reduction of chemicals, reduction of negative environmental impacts, etc. A high innovation degree of the good practice can significantly contribute to increase in the interest of other partners in the project.
<b>Scope of the impact of the good practice</b>	The good practice may have the international impact.
<b>Impact of good practice on regional innovation policy/regional development</b>	Implementation of good practice has an impact on regional innovation policy and regional development by: <ul style="list-style-type: none"> <li>- commercialization of results of R+D works</li> <li>- increase of an income of the enterprise</li> <li>- establishing cooperation with foreign partners</li> </ul>

Evaluation criteria	Project evaluation
	- increase in revenues from the sale of new technologies.
<b>Impact of good practice on the implementation of RIS</b>	<p>The project is coherent with the smart specialisation of the region. Implementation of the project will contribute to the achievement of following objectives of RIS:</p> <ul style="list-style-type: none"> <li>- increasing and strengthening cooperation in innovation development processes – by developing forms of cooperation in the business-science-environment relation, increasing the activeness of business entities, and intensifying scientific research works, results of which correspond to the needs of entrepreneurs.</li> <li>- increasing the internationalisation focused on development of innovation in Mazowieckie Voivodeship – by increasing the activity of entrepreneurs on the international arena and increasing the number of international research and development projects.</li> <li>- increasing effectiveness of support and financing of pro-innovation activities in the region – by supporting entrepreneurs.</li> </ul>

*Source: desk research analysis, analysis of the results of CAWI and IDI research methods.*

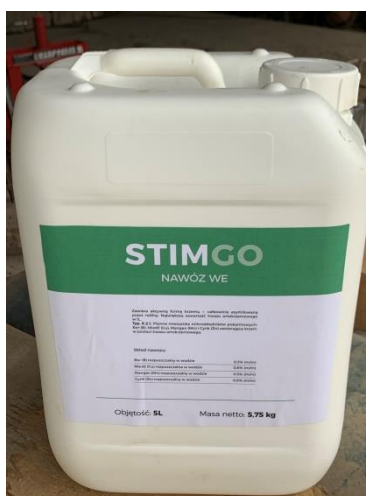
**Figure 4 Development of a new product - an innovative biostimulator KMS03 Agro Fonds Consulting Agata Kowalczyk - pictures of the project**



*Picture of the product for the French market- biostimulator KMS03*



*Picture of the product for the Hungarian market- biostimulator KMS03*



*Picture of the product for the Polish market- biostimulator KMS03*

*Source: Company's pictures.*



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## Food and nutrition centre - modernisation of the Warsaw University of Life Sciences campus to establish the Research and Development Centre for Food and Nutrition (Centrum Badawczo-Rozwojowe Żywności i Żywienia - CŻiŻ)

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The beneficiary of the project is the Warsaw University of Life Sciences: Faculty of Nutrition Sciences and Faculty of Human Nutrition and Consumption Sciences (*Szkoła Główna Gospodarstwa Wiejskiego w Warszawie. Wydział Nauk o Żywieniu i Wydział Nauk o Żywieniu Człowieka i Konsumpcji*). Project was co-financed under ROP MV, its total cost was PLN 42 273 378.

The aim of the project is to create a modern Research and Development Center for Food and Nutrition, where certain researches will be conducted, among others, concerning production of safe and high quality food and researches aimed to develop nutrition strategies intended to improve the quality of life of the society. In the framework of the project, modern scientific and research laboratories will be established along with a hall of modern technologies, where new technological and technical solutions in the field of food and nutrition will be tested and implemented.

The beneficiaries of the Center will be domestic and foreign companies representing the food processing and pharmaceutical sectors. Realization of the project will enable strengthening and extending cooperation with entrepreneurs as well as consequent transfer of the know-how.

As part of the project, 10 economic research and development directions have been planned. They meet needs and expectations of both, market entities and institutions operating in the field of the bio-economy. It stimulates possibility to implement innovative solutions and to consolidate developed production and processing standards. The project is fully in line with the idea of the sustainable development and high energy efficiency, which, in turn, is in line with the objectives of the regional policy.

The Food and Nutrition Center performs operations aimed to support entrepreneurs when gaining a competitive advantage, which means the opportunity to work on new products and to improve properties of food products already existing in the market.

Purchased equipment will contribute to development of facilities necessary for entrepreneurs to prepare a comprehensive catalog of researches, at the highest global level. Purchase of the modern equipment will contribute to increased number of contracts and works for external stakeholders (i.e. development of the unit due to extended number of products, increased sales, larger number of potential customers and users) and the number and value of commissioned works (i.e. increase in the employment rate in particular units).

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The scientific and research infrastructure, along with the scientific base, will enable to extend the offer of trainings for external stakeholders.

Evaluation criteria	Project evaluation
Degree and type of the innovation	High innovation degree. Innovation: technical.
Type of granted aid	Financial support - non-returnable funds
Assessment of the repeatability degree of the good practice and possibility to promote the good practice among other partners	Other entities may show a very high interest in the practice due to the chance to cooperate with foreign and domestic companies from the food processing and pharmaceutical sectors. As part of the project, a research infrastructure was created to providing research possibilities for various entities.
Scope of the impact of the good practice	Impact: international.
Impact of good practice on regional innovation policy/regional development	<p>The project significantly affects the development of the region due to its innovative character. Good practice is fully coherent with the idea of sustainable development and high innovation of energy efficiency. The project will contribute to strengthening the competitive position of the region and regional agri-food sector.</p> <p>Implementation of good practice has an impact on regional innovation policy and regional development by:</p> <ul style="list-style-type: none"> <li>- commercialization of results of R+D works (by testing and implementing new technological and technical solutions in the field of food and nutrition);</li> <li>- increase of an income of the enterprise</li> <li>- establishing cooperation with foreign partners</li> <li>- increase in revenues from the sale of new technologies.</li> </ul>
Impact of good practice on the implementation of RIS	<p>The project is coherent with the smart specialisation of the region. Implementation of the project will contribute to the achievement of following objectives of RIS:</p> <ul style="list-style-type: none"> <li>- increasing and strengthening cooperation in innovation development processes – by developing</li> </ul>

Evaluation criteria	Project evaluation
	<p>forms of cooperation in the business-science-environment relation, increasing the activeness of business entities, and intensifying scientific research works, results of which correspond to the needs of entrepreneurs.</p> <ul style="list-style-type: none"> <li>- increasing the internationalisation focused on development of innovation in Mazowieckie Voivodeship – by increasing the activity of entrepreneurs on the international arena and increasing the number of international research and development projects.</li> <li>- increasing effectiveness of support and financing of pro-innovation activities in the region – by supporting entrepreneurs.</li> </ul>

Source: desk research analysis, analysis of the results of CAWI and IDI research methods.

**Figure 5 Food and nutrition centre - modernisation of the Warsaw University of Life Sciences campus to establish the Research and Development Centre for Food and Nutrition - pictures of the project**

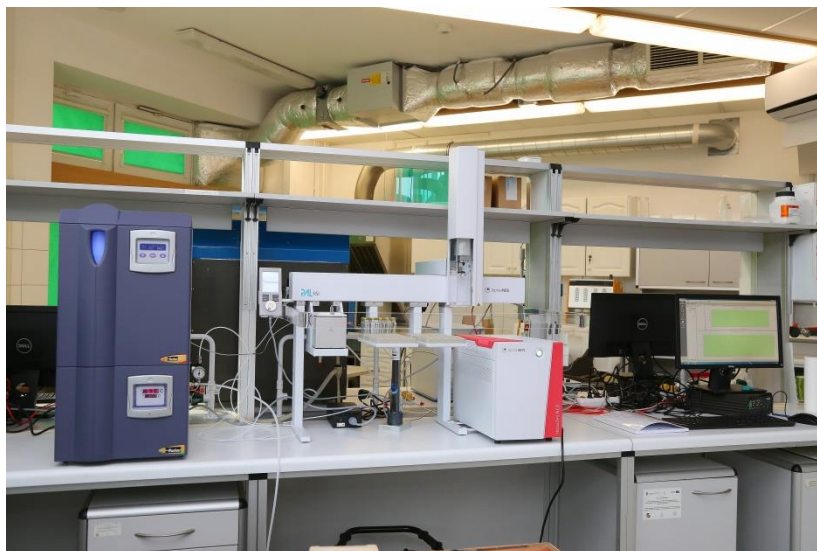


*Bioflo 3000 - bioreactor for the fermentation and cell culture system*



*Apparatus used as part of the project- part 2.*





*Apparatus used as part of the project- part 3.*

*Source: Company's pictures.*

## Innovative technology for the production of fresh pasta supporting healthy eating

Perino is a company that has developed an innovative production technology of fresh healthy pasta, as part of the project. The company specializes in the production of pasta, noodles, couscous and similar flour products<sup>20</sup>.

The aim of the project was to provide the market with new, innovative food products addressed to niche groups of customers: people suffering from the coeliac disease, those on a gluten-free diet, clients suffering from allergies.

As part of the production the beneficiary assumed modern solutions having a positive impact on the natural environment, including the application of solutions reducing amounts of waste, prolonging the expiry date of products, not emitting pollutants into the atmosphere.

The implementation of the project promotes development of a healthy nutrition model. Due to the infrastructure developed in the framework of the project the Beneficiary may continue expansion of its product base and to conduct researches focused on the production of innovative, health-oriented food promoting healthy nutrition. The total cost of the project was PLN 16 798 770, it was co-financed under ROP MV 2014-2020, measure 3.3.

Evaluation criteria	Project evaluation
<b>Degree and type of the innovation</b>	High innovation degree. Innovation: technical, economic.
<b>Type of granted aid</b>	Financial support - non-returnable funds
<b>Assessment of the repeatability degree of the good practice and possibility to promote the good practice among other partners</b>	Combination of potentials of individual sectors of the local economy intended to create a new, more innovative service or a product may be very tempting for other partners. The project is in line with a very obvious global trend (healthy eating, gluten free), which gives the other partners a chance to use it.
<b>Scope of the impact of the good practice</b>	Impact: international.
<b>Impact of good practice on regional innovation policy/regional development</b>	Implementation of good practice has an impact on regional innovation policy and regional development by:  - possibility of commercialization of results of R+D

<sup>20</sup> All information about the company at: <http://perino.pl/pl/> [access: 26.08.2019 r.].

Evaluation criteria	Project evaluation
	<p>works</p> <ul style="list-style-type: none"> <li>- increase of an income of the enterprise</li> <li>- establishing cooperation with foreign partners</li> <li>- increase in revenues from the sale of new technologies.</li> </ul>
<p><b>Impact of good practice on the implementation of RIS</b></p>	<p>The project is coherent with the smart specialisation of the region. Implementation of the project will contribute to the achievement of following objectives of RIS:</p> <ul style="list-style-type: none"> <li>- increasing and strengthening cooperation in innovation development processes – by developing forms of cooperation in the business-science-environment relation, increasing the activeness of business entities, and intensifying scientific research works, results of which correspond to the needs of entrepreneurs.</li> <li>- increasing the internationalisation focused on development of innovation in Mazowieckie Voivodeship – by increasing the activity of entrepreneurs on the international arena and increasing the number of international research and development projects.</li> <li>- increasing effectiveness of support and financing of pro-innovation activities in the region – by supporting entrepreneurs.</li> </ul>

*Source: desk research analysis, analysis of the results of CAWI and IDI research methods.*

**Figure 6 Innovative technology for the production of fresh pasta supporting healthy eating  
- pictures of the project**



*Tank purchased as part of the project*



*Polish factory for the production*



*Headquarters of Perino*

*Source: Company's pictures.*

## Bio Active Healthy Food

The beneficiary of the project was Papagrin. It provides retail sale services via mail-order stores or via the Internet stores<sup>21</sup>. Project was implemented under ROP MV 2014-2020, Measure 3.3, and its total cost was PLN 1 603 920.

The objective of the project was to establish a production infrastructure which, due to implementation of the results of R&D works focused on activation of seeds, enables production of innovative, bio-active food products including flavored seed mixtures, mousses based on activated seeds and nuts, bars based on activated nuts.

A Computerized Activation Chamber enables activation of seeds and nuts, using a modern technology that automatically controls the entire activation processes. This means that due to the use of a special computer software, after all the parameters have been entered, it enables activation of seeds but also the entire process of raw materials dehydration is controlled.

As a result of the project the company acquired the infrastructure for production of innovative and a bio-active food. In this way, the company's product range has also been increased. It should be emphasized that the company's representatives are still working on consequential developmental research, which is fully in line with needs of the healthy food market.

Evaluation criteria	Project evaluation
Degree and type of the innovation	High innovation degree. Innovation: technical.
Type of granted aid	Financial support - non-returnable funds
Assessment of the repeatability degree of the good practice and possibility to promote the good practice among other partners	The project is characterized by a high degree of repeatability potential by other entities. Other partners may show a very high level of interest in the proposed solution. The project is coherent with ecological consumption trends, which significantly increases the possibilities of using end products by other partners.
Scope of the impact of the good practice	Impact: international.
Impact of good practice on regional innovation policy/regional development	Implementation of good practice has an impact on regional innovation policy and regional development by:

<sup>21</sup> All information about the company from the website: <http://www.papagrin.com/> [access: 26.08.2019 r.].



Evaluation criteria	Project evaluation
	<ul style="list-style-type: none"> <li>- commercialization of results of R+D works</li> <li>- increase of an income of the enterprise</li> <li>- establishing cooperation with foreign partners</li> <li>- increase in revenues from the sale of new technologies.</li> </ul>
<p><b>Impact of good practice on the implementation of RIS</b></p>	<p>The project is coherent with the smart specialisation of the region. Implementation of the project will contribute to the achievement of following objectives of RIS:</p> <ul style="list-style-type: none"> <li>- increasing and strengthening cooperation in innovation development processes – by developing forms of cooperation in the business-science-environment relation, increasing the activeness of business entities, and intensifying scientific research works, results of which correspond to the needs of entrepreneurs.</li> <li>- increasing the internationalisation focused on development of innovation in Mazowieckie Voivodeship – by increasing the activity of entrepreneurs on the international arena and increasing the number of international research and development projects.</li> <li>- increasing effectiveness of support and financing of pro-innovation activities in the region – by supporting entrepreneurs.</li> </ul>

*Source: desk research analysis, analysis of the results of CAWI and IDI research methods.*

**Figure 7 Bio Active Healthy Food - pictures of the project**



*Bio active food*



*Natural products of the Papagrín company*



*Healthy snacks produced by the company*

*Source: Company's pictures.*

## Quality of life

The area of specialization related to quality of life is *a focus on technological and organizational solutions intended to provide social services, in particular in scope of education, health, safety, work and leisure time, as well as operations aimed to stimulate social innovations, develop social capital and to counteract negative effects of the regional development popularization*<sup>22</sup>. All actions are to contribute to the increase in attractiveness of the Mazowieckie Voivodeship.

In the framework of this area of regional smart specialization the following projects have been selected:

- Development of an innovative line of dermocosmetics with high therapeutic activity based on innovative, previously unused derivatives of vitamin D;
- Multivariant formulations of DOTATATE peptide as a precursor for the preparation of radiopharmaceuticals;
- Masovian Research and Development Centre for Mother and Child Diagnosis;
- Prototype of the Intelligent System Supporting Diagnostics of Pathomorphology;
- Microcable prototypes for use in highly advanced industries;
- OrganFarm- system for the long-term ex vivo organ storage.

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<sup>22</sup> [https://www.funduszedlamazowska.eu/g2/oryginal/2015\\_11/e9aa1b5a90790233a94a1e2ccc84dcba.pdf](https://www.funduszedlamazowska.eu/g2/oryginal/2015_11/e9aa1b5a90790233a94a1e2ccc84dcba.pdf), s.79. [access: 26.08.2019 r.].



## Development of an innovative line of dermocosmetics with high therapeutic activity based on innovative, previously unused derivatives of vitamin D

Laboratorium kosmetyczne dr Irena Eris Sp. z o.o. specializes in production of luxury body care cosmetics. The company's activities focus on modern formulas designed on the basis of its own patents and innovative technologies<sup>23</sup>. The company completed a research and development project aimed to prove beneficial therapeutic effects for patients suffering from inflammatory dermatoses, of new active substances incorporated into certain cosmetics.

As a result, 8 cosmetic products were developed for patients suffering from varied dermatoses (including acne, AD, vitiligo, psoriasis), designed to improve the condition of their skin and to increase their self-esteem and quality of life.

The project was qualified as a good practice due to its innovative character. Furthermore, the final product answers the needs of society, therefore its implementation will significantly contribute to the improvement of the quality of life of residents. The project obtained funding from ROP MV – Measure 1.2 and its total cost was PLN 841 560.50.

The project may also have an impact on the further development of researches, aim of which is to find solutions to the problems of people suffering from the dermatoses.

Evaluation criteria	Project evaluation
Degree and type of the innovation	Very high level of innovation. Innovation: technical
Type of granted aid	Non-refundable financial support
Assessment of the repeatability degree of the good practice and possibility to promote the good practice among other partners	Partners may be interested in the good practice due to the fact that the project responds to problems reported by increasing number of patients. The good practice may be repeated by other health sector partners, but this would require modification of the product formulation in order to address it to similar problems. On the other hand, it may stimulate partners to solve other problems of the users of this product.
Scope of the impact of the good practice	National and international.
Impact of good practice on regional innovation policy/regional development	The project answers regional challenges due to its innovative nature.

<sup>23</sup> All information about the company from the website: <https://www.drirenaeris.com/> [access: 26.08.2019 r.].

Evaluation criteria	Project evaluation
	<p>This R+D project concerned research on the use of vitamin D derivatives in the cosmetics industry. It may also have an impact on the further development of the research in this scope in order to solve the problems of people with dermatoses.</p> <p>Implementation of good practice has an impact on regional innovation policy and regional development by:</p> <ul style="list-style-type: none"> <li>- commercialization of results of R+D works</li> <li>- increase of an income of the enterprise</li> <li>- establishing cooperation with foreign partners</li> <li>- increase in revenues from the sale of new technologies.</li> </ul>
<p><b>Impact of good practice on the implementation of RIS</b></p>	<p>The project is coherent with the smart specialisation of the region. Implementation of the project will contribute to the achievement of following objectives of RIS:</p> <ul style="list-style-type: none"> <li>- Orientation for innovations (analysis of market trends to introduce improvements and use of innovative solutions in the enterprise).</li> <li>- increasing and strengthening cooperation in innovation development processes – by developing forms of cooperation in the business-science-environment relation, increasing the activeness of business entities, and intensifying scientific research works, results of which correspond to the needs of entrepreneurs.</li> <li>- increasing the internationalisation focused on development of innovation in Mazowieckie Voivodeship – by increasing the activity of entrepreneurs on the international arena and increasing the number of international research and development projects.</li> <li>- increasing effectiveness of support and financing of pro-innovation activities in the region – by supporting entrepreneurs.</li> </ul>

Source: desk research analysis, analysis of the results of CAWI and IDI research methods.

**Figure 8 Development of an innovative line of dermocosmetics with high therapeutic activity based on innovative, previously unused derivatives of vitamin D – pictures of the project**



*Dr Irena Eris Research and Development Centre*



*Dr Irena Eris Laboratory*



*Employees of the R+D Centre*

*Source: Company's pictures.*

## Multivariant formulations of DOTATATE peptide as a precursor for the preparation of radiopharmaceuticals

The NATIONAL CENTRE FOR NUCLEAR RESEARCH POLATOM Radioisotope Centre is focused on the production and distribution of isotopic goods, as well as on R+D. Conducted research and development works concern radiopharmaceuticals, chemistry and nuclear technology as well as medicine, research and development, industry and environment protection. The result of the research is the development of innovative technologies implemented by the institute<sup>24</sup>.

The project is implemented under Measure 1.2 of the Smart Growth Operational Programme 2014-2020, and the total cost of it was PLN 3 942 833,58<sup>25</sup>. The objective of the project was to develop various pharmaceutical formulations of the DOTATATE peptide taking the form of dry sets containing peptide and excipients, in order to improve the process of preparing radiopharmaceuticals directly by its recipients (health care facilities) for the individual patient. The project addresses the needs of national nuclear medicine and of foreign recipients, offering a modern approach to personalised medicine.

Technology developed under the project leads to the production of a highly innovative product characterised by its high quality confirmed by control tests. High-tech peptide synthesizer purchased as part of the project was used for the peptide production, leading to the automation of the process.

Implemented project addresses the demand for innovative medicine technology, corresponding also with the needs in the scope of the region's economic development, and for environmentally friendly technology. The main recipients of the product are patients, and, indirectly, nuclear medicine facilities. Due to the fact that such facilities currently do not have an access to this type of technology in Poland, they have to use foreign sources. Moreover, good practice adopted highly innovative technology, experience and knowledge, therefore the implementation of the project prevents the production of incomplete products and the pollution generated during their production resulting from works conducted by entities that do not have the access to this type of technology.

The implementation of good practice is not only considerably significant for the development of the institution, but also for the development of the national radiopharmaceutical industry. The innovative technology developed under the project will

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<sup>24</sup> All information about the company from: <https://www.polatom.pl/o-nas> [access: 29.10.2019].

<sup>25</sup> Implementation of the project is planned until 31.03.2020.

expand the area of radiopharmaceuticals and nuclear medicine in the future, and develop new products on its base. Developed scheme of conduct has already been used for subsequent innovative preparations developed by the institution, affecting the extension of the scope of R+D works.

Assessment criteria	Project assessment
Degree and type of innovation	Very high degree of innovation. Type of innovation: technical, economic, environmental.
Type of financing/aid	Aid: non-returnable subsidy
Degree of repeatability of the implemented solution and the possibility of implementing good practice by other entities	Technology developed as part of the project is unique on a global scale due to its possibility of a new use of radiopharmaceuticals. Developed procedures have the potential to be used by other entities on a large scale, especially in the production of active substances for conventional medicines. The institution promotes developed technology in publications and during scientific conferences. Developed scheme can also be implemented by various types of entities - including private entities for the production of conventional medicines, as well as highly specialised entities in the field of radiopharmaceuticals.
Range of impact of good practice	Range of impact: international
Impact of good practice on regional innovation policy/regional development	The extension of the offer of the institute increases its significance and competitiveness - the Centre is the largest institute in the country and the largest producer of radiopharmaceuticals, therefore its development has a significant positive influence on the region's development in the scope of innovativeness. Moreover, good practice is characterized by innovations concerning the environment. Project included assumptions of development of a technology that would limit the production of harmful substances as the by-product. Developed technology reduces the negative impact of chemical reagents on the environment by 8x. Implementation of good practice has an impact on regional innovation policy and regional development by:

Assessment criteria	Project assessment
	<ul style="list-style-type: none"> <li>- commercialization of results of R+D works</li> <li>- increase of an income of the enterprise</li> <li>- establishing cooperation with foreign partners</li> <li>- increase in revenues from the sale of new technologies.</li> </ul>
Impact of good practice on the implementation of RIS	<p>The project is coherent with the smart specialisation of the region. Implementation of the project will contribute to the achievement of following objectives of RIS:</p> <ul style="list-style-type: none"> <li>- increasing and strengthening cooperation in innovation development processes – by developing forms of cooperation in the business-science-environment relation, increasing the activeness of business entities, and intensifying scientific research works, results of which correspond to the needs of entrepreneurs.</li> <li>- increasing the internationalisation focused on development of innovation in Mazowieckie Voivodeship – by increasing the activity of entrepreneurs on the international arena and increasing the number of international research and development projects.</li> <li>- increasing effectiveness of support and financing of pro-innovation activities in the region – by supporting entrepreneurs.</li> </ul>

Source: desk research analysis, analysis of the results of CAWI and IDI research methods.



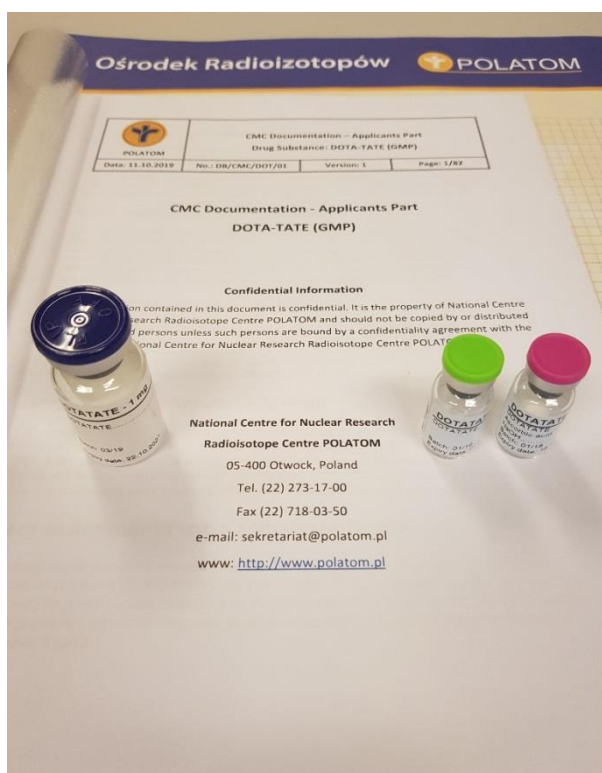
**Figure 9 Multivariant formulations of DOTATATE peptide as a precursor for the preparation of radiopharmaceuticals - pictures of the project**



Apparatus purchased under the project for the automated peptide production



Process of producing the DOTATATE peptide, the effect of the implemented project



Documentation and DOTATATE peptide formulations

Source: Company's pictures.



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## Masovian Research and Development Centre for Mother and Child Diagnosis

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Mazowieckie Centrum Badawczo-Rozwojowe Diagnostyki Matki i Dziecka (Mazovia R&D Center for Mother and Child Diagnostics) is an innovative project implemented by the Institute of Mother and Child in Warsaw. In the framework of the project, the Department of Medical Genetics and the Department of Screening and Metabolic Diagnostics will merge into a single institute. The Institute will be equipped with highly specialized research equipment for diagnostic tests in the field of genetics, diagnostics of congenital metabolic defects and diagnostic screening of newborns<sup>26</sup>. It will assure development of improved and completely new diagnostic methods. Due to them, the diagnostic accuracy and the range of analyzed parameters will improve. It will be also possible to detect diseases at an early stage more quickly. The total value of the project equaled PLN 13,581,753.66. The project obtained funding under ROP MV, Measure 1.1.

So far, equipment/machinery have been launched successfully, currently used for diagnostic works. Implementation works are still ongoing. Until now, it is possible to enumerate the following effects of the project:

- increase in the number of tests/examinations carried out due to increased availability and feasibility;
- accurate preparation and completion of the first implementations according to the adopted methodology.

As a result of the project, the availability of the genetic tests for genetically determined diseases has been improved. The recipients of the project are, most of all, patients, medical entities, genetic clinics, specialist clinics, society of the region and the country, expert doctors and diagnosticians.

Good practices are also implemented to the best of the latest knowledge. Since the medical diagnostics is a very dynamically developing branch of medicine and its importance and application will increase, activities in this area are extremely important to meet demand of the market.

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<sup>26</sup> All information is available at the following website:  
<http://www.imid.med.pl/pl/aktualnosci/dofinansowanie-z-rpo-wm-2014-2020-dla-imid> [access: 26.08.2019 r.].

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Evaluation criteria	Project evaluation
Degree and type of the innovation	Good practice is characterized by a very high degree of innovation. Innovation: technical, environmental, economic.
Type of granted aid	Technical support, non-refundable financing.
Assessment of the repeatability degree of the good practice and possibility to promote the good practice among other partners	The project is characterized by a high level of repeatability and realization opportunities by other entities due to the dynamically developing field of medicine - medical diagnostics, importance of which, application and availability will increase.
Scope of the impact of the good practice	Local, regional, national impact.
Impact of good practice on regional innovation policy/regional development	Implementation of good practice has an impact on regional innovation policy and regional development by: <ul style="list-style-type: none"> <li>- commercialization of results of R+D works</li> <li>- increase of an income of the enterprise</li> <li>- establishing cooperation with foreign partners</li> <li>- increase in revenues from the sale of new technologies.</li> </ul>
Impact of good practice on the implementation of RIS	The project is coherent with the smart specialisation of the region. Implementation of the project will contribute to the achievement of following objectives of RIS: <ul style="list-style-type: none"> <li>- increasing and strengthening cooperation in innovation development processes – by developing forms of cooperation in the business-science-environment relation, increasing the activeness of business entities, and intensifying scientific research works, results of which correspond to the needs of entrepreneurs.</li> <li>- increasing the internationalisation focused on development of innovation in Mazowieckie Voivodeship – by increasing the activity of entrepreneurs on the international arena and increasing the number of international research and development projects.</li> <li>- increasing effectiveness of support and financing of pro-innovation activities in the region – by supporting entrepreneurs.</li> </ul>

Source: desk research analysis, analysis of the results of CAWI and IDI research methods.

**Figure 10 Masovian Research and Development Centre for Mother and Child Diagnosis - pictures of the project**



*Operating lamps*



*Operating lamps*



*Headquarters of the Institute*

Source: Company's pictures.

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## Prototype of the Intelligent System Supporting Diagnostics of Pathomorphology

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Marcel, a joint-stock company, is a manufacturer of IT systems for diagnostic laboratories<sup>27</sup>.

In the framework of the project, operations were focused on development of a Diagnostics Support Intelligent System for Pathomorphological Examinations due to development of a system supporting generation of high quality protocols from pathomorphological tests for the most frequently intraoperatively tested cancers. Project was co-financed under ROP MV, Measure 1.2.

The implementation of the project enables:

- improving the quality of pathomorphological diagnosis in Poland by providing a tool intended to support tests and to ensure improvement of the quality of accompanying information;
- increasing availability of intra-operative pathomorphological tests, by enabling diagnosticians to participate in tests remotely (tele-pathomorphology);
- increasing the scope of verification (more adequate interpretation of results) and reduction of the number of mistakes during the diagnostic process, due to standardization of information and use of the knowledge base & a tele-consultation tool;
- entering certain unique verification rules of the tested material into the market;
- comprehensive support for the process of pathomorphological diagnostics at many stages, by integration, automation and computerization of applied methods and tools.

The research works were conducted in cooperation with a scientific unit in the field of pathomorphology. The designed solution also helps to create/authorize medical records. The final result of the work was the development of rules and standardization of test/examination descriptions, algorithms of data validation and a system of making diagnostic decisions based on the relations between algorithms. A unique hardware infrastructure (automatic process logging, remote control of the medical tools, including voice control) will also be developed to meet the needs of the researches, necessary for optimal - and ergonomic - acquisition of information about the tests/examinations.

Concluding, works during the project will enable/assure:

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<sup>27</sup> All information about the company from the website: <https://marcel.pl/> [access: 26.08.2019 r.].

- possibility to perform an intraoperative examination without physical presence of a pathomorphologist, which should indirectly alleviate personnel issues and related poor access to pathomorphologist's services;
- high quality diagnosis;
- automatic data validation, thanks to which mistakes are eliminated;
- comparability of cases based on their description (semantic search within a knowledge base);
- on the basis of speech recognition algorithms, it will be possible to control the recording (voice) of the examination so that the doctor can focus directly on manual activities.
- the stakeholders of the project results are public and private health care entities/units. The acquired results have already been transferred to a public hospital in the Krakow district.

Realization and implementation of results will also contribute to the achievement of measurable profits in economic, social and pro-health aspects, in form of:

1. Increased availability of the pathomorphological services
2. improved patients' health thanks to the speed, the accuracy (including the possibility to obtain various opinions by means of tele-consultation) and increased probability of getting a correct diagnosis
3. reduced costs due to the accelerated diagnostic processes and elimination of mistakes.
4. works concerning an integrated system (ISD) will enable, among other things, reduction of the cost of a unit pathomorphological examination due to a remote access for a pathomorphologist, automatic recording of the process and improvement of quality and availability of collected information.

Evaluation criteria	Project evaluation
Degree and type of the innovation	Very high level of innovation. Innovation: technical.
Type of granted aid	Support: non-refundable financing.
Assessment of the repeatability degree of the good practice and possibility to promote the good practice among other partners	The practice could be repeated to a relatively high extent and realized by other entities. Surveys have proved a strong demand for smart solutions. Market needs indicate a demand for such solutions and other stakeholders in the sector may show a strong interest in the offered solution.
Scope of the impact of the good practice	National impact.

Evaluation criteria	Project evaluation
<b>Impact of good practice on regional innovation policy/regional development</b>	<p>The project answers regional challenges due to its innovative nature, it is also considerably significant in the context of the development of Mazovia. Obtained results have already been transferred to a public hospital.</p> <p>Implementation of good practice has an impact on regional innovation policy and regional development by:</p> <ul style="list-style-type: none"> <li>- commercialization of results of R+D works</li> <li>- increase of an income of the enterprise</li> <li>- establishing cooperation with foreign partners</li> <li>- increase in revenues from the sale of new technologies.</li> </ul>
<b>Impact of good practice on the implementation of RIS</b>	<p>The project is coherent with the smart specialisation of the region. Implementation of the project will contribute to the achievement of following objectives of RIS:</p> <ul style="list-style-type: none"> <li>- increasing and strengthening cooperation in innovation development processes – by developing forms of cooperation in the business-science-environment relation, increasing the activeness of business entities, and intensifying scientific research works, results of which correspond to the needs of entrepreneurs.</li> <li>- increasing the internationalisation focused on development of innovation in Mazowieckie Voivodeship – by increasing the activity of entrepreneurs on the international arena and increasing the number of international research and development projects.</li> <li>- increasing effectiveness of support and financing of pro-innovation activities in the region – by supporting entrepreneurs.</li> </ul>

Source: desk research analysis, analysis of the results of CAWI and IDI research methods.



**Figure 11 Prototype of the Intelligent System Supporting Diagnostics of Pathomorphology - pictures of the project**



Headquarters of the Marcel company



ISD Intelligent Diagnostic Station  
prototype



Workplace in the Laboratory Information System

*Source: Company's pictures.*



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## Microcable prototypes for use in highly advanced industries

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Technokabel is a modern cable factory selling its products in Poland and abroad. The company designs, manufactures and sells high quality cables and conductors for the industry - energy, construction and transport infrastructure sectors<sup>28</sup>.

The project involves development of a technology of micro-cables production. The aim of the project was to examine possibility to miniaturize cables due to development of a unique technology meaning putting various plastics on a wire (shield) characterized by a reduced diameter, and use of new insulation materials. Apart from designing of the new technology, 5 groups of cable prototypes have been created. The result of the project is an innovative micro-cable manufacturing technology ready to be implemented. Good practice obtained funding under the OP Smart Growth, Measure 1.1, Submeasure 1.1.1.

The project assumes:

- making an insulation from various materials on small dimension conductors;
- physical foaming of insulation materials on small dimension conductors;
- extrusion of fluorine based plastics.

In order to achieve this goal a special technological “pilot” line was designed and erected; it enabled to conduct industrial and development tests. As part of the work on the pilot line:

- In the course of the researches on the wire drawing and glow process, there was established a correction factor for the annealing voltage and the velocity; it enables to achieve optimal mechanical properties of the drawn wire.
- In case of an extruder for plastics, there was used a floor steel with a high nickel content, which enabled a test of insulation applied on conductors made of uniform fluorine plastic (insulation used for the production of cables with high thermal resistance and miniature coaxial cables).

Use of the described technology (i.e. obtaining a very high degree of insulation material foaming) enabled reduction of the size of the cables and better transmission parameters as well.

The good practice is very innovative and tests confirmed usefulness of the equipment applied in the pilot line. Finally, five groups of cables were elaborated:

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<sup>28</sup> All information about the company from: <https://www.technokabel.com.pl/pl/> [access: 26.08.2019 r.].

- miniature cables resistant to environmental conditions for use in machines and automating & robotic equipment, with increased permissible number of bends (robots working in special conditions, controllers and grippers and mobile robots),
- miniature coaxial cables with increased thermal and chemical resistance, designed for vision systems in automation and robotization,
- coaxial cables with reduced diameter and weight, resistant to the environmental impacts, designed for vision systems in automation and robotization,
- new hybrid wires with glass fiber and copper conductors for HD cameras, enabling transmission of audio, video and power signals over long distances (larger than coaxial cables),
- flame retardant symmetrical cables for the data transmission in dedicated transmission protocols.

Evaluation criteria	Project evaluation
Degree and type of the innovation	Very high level of innovation. Innovation: technical.
Type of granted aid	Support: non-refundable financing.
Assessment of the repeatability degree of the good practice and possibility to promote the good practice among other partners	Development of a physical foaming technology of plastics applied on insulation of cables of miniaturized dimensions, is characterized by a relatively high level of repeatability. The good practice can be used by others. The results of the tests were presented on the portal <a href="http://AutomatykaOnline.pl">AutomatykaOnline.pl</a> , enabling access to them for other cable manufacturers.
Scope of the impact of the good practice	International impact.
Impact of good practice on regional innovation policy/regional development	The project answers regional challenges and is considerably significant in the context of the development of Mazovia.  The result of the project is an innovative microcable manufacturing technology ready for the implementation.  Implementation of good practice has an impact on regional innovation policy and regional development by:  - commercialization of results of R+D works  - increase of an income of the enterprise

Evaluation criteria	Project evaluation
	<ul style="list-style-type: none"> <li>- establishing cooperation with foreign partners</li> <li>- increase in revenues from the sale of new technologies</li> <li>- increase in sales of new or significantly improved products.</li> </ul>
Impact of good practice on the implementation of RIS	<p>The project is coherent with the smart specialisation of the region. Implementation of the project will contribute to the achievement of following objectives of RIS:</p> <ul style="list-style-type: none"> <li>- increasing and strengthening cooperation in innovation development processes – by developing forms of cooperation in the business-science-environment relation, increasing the activeness of business entities, and intensifying scientific research works, results of which correspond to the needs of entrepreneurs.</li> <li>- increasing the internationalisation focused on development of innovation in Mazowieckie Voivodeship – by increasing the activity of entrepreneurs on the international arena and increasing the number of international research and development projects.</li> <li>- increasing effectiveness of support and financing of pro-innovation activities in the region – by supporting entrepreneurs.</li> </ul>

Source: desk research analysis, analysis of the results of CAWI and IDI research methods.

**Figure 12 Microcable prototypes for use in highly advanced industries - pictures of the project**



*Miniature cables resistant to environmental conditions*



*Miniature coaxial cables*



*Miniature coaxial cables with a reduced mass*



*Innovative hybrid cables*

*Source: Company's pictures.*

## OrganFarm- system for the long-term ex vivo organ storage

Nanosanguis is a R&D company in the field of the biotechnology<sup>29</sup>. The project assumes development of a system of long-term ex-vivo organ storage based on an author's perfusion fluid. Co-financing was obtained under OP Smart Growth, Measure 1.2.

The Organ farm is a system of long-term storage of organs ex vivo (outside the organism) due to the development of a perfusion fluid. As part of the implementation of the project, donor organs would be stored in a near-natural environment due to the development of a perfusion fluid able to transfer respiratory gases and nutrients. The aim is to be able to store organs outside the body for 72 hours. This is a significant increase in the time of storage of organs outside the body, which makes that the project is extremely innovative one. The project was selected because of its enormous potential. Moreover, the good practice is a response to problems related to the storage of organs outside the human organism and its implementation will largely affect the innovation policy of the Mazovia Region. The group of stakeholders interested in the solution comprises mainly the larger players in the pharmaceutical sector.

Works on the commercialization of the solution are ongoing. The innovative potential is very serious, a letter of intent has already been signed with a Korean pharmaceutical company interested in commercialization of the results of this project.

Evaluation criteria	Project evaluation
<b>Degree and type of the innovation</b>	Very high level of innovation. Innovation: technical.
<b>Type of granted aid</b>	Support: non-refundable financing.
<b>Assessment of the repeatability degree of the good practice and possibility to promote the good practice among other partners</b>	The development of a system for the long-term storage of organs is a very innovative solution and hence, the repeatability level is lower compared to other good practices. However, other entities may show interest in the project. The group of stakeholders interested in the solution comprises mainly the larger players in the pharmaceutical sector.
<b>Scope of the impact of the good practice</b>	International impact.
<b>Impact of good practice on regional innovation policy/regional development</b>	Implementation of good practice has an impact on regional innovation policy and regional development.

<sup>29</sup> All information about the company from: [http://nanosanguis.com/?page\\_id=495](http://nanosanguis.com/?page_id=495) [access: 26.08.2019 r.].

Evaluation criteria	Project evaluation
	<p>development by:</p> <ul style="list-style-type: none"> <li>- commercialization of results of R+D works</li> <li>- increase of an income of the enterprise</li> <li>- establishing cooperation with foreign partners</li> <li>- increase in revenues from the sale of new technologies.</li> </ul>
<p><b>Impact of good practice on the implementation of RIS</b></p>	<p>The project is coherent with the smart specialisation of the region. Implementation of the project will contribute to the achievement of following objectives of RIS:</p> <ul style="list-style-type: none"> <li>- increasing and strengthening cooperation in innovation development processes – by developing forms of cooperation in the business-science-environment relation, increasing the activeness of business entities, and intensifying scientific research works, results of which correspond to the needs of entrepreneurs.</li> <li>- increasing the internationalisation focused on development of innovation in Mazowieckie Voivodeship – by increasing the activity of entrepreneurs on the international arena and increasing the number of international research and development projects.</li> <li>- increasing effectiveness of support and financing of pro-innovation activities in the region – by supporting entrepreneurs.</li> </ul>

*Source: desk research analysis, analysis of the results of CAWI and IDI research methods.*

**Figure 13 OrganFarm- system for the long-term ex vivo organ storage - pictures of the project**



*CEO in NanoSanguis*



*Apparatus used in Nanosanguis*



*Nanosanguis research team working on the project*

*Source: Company's pictures.*



## Professional services for business

Professional services for business constitute mainly of mechanisms supporting entrepreneurial activity. Factors that also should be taken into consideration are services tailored to individual needs, providing beneficiaries with capital, infrastructure and knowledge resources necessary for the development and growth of innovative activity of enterprises<sup>30</sup>.

Mazowieckie Voivodeship undertakes activities focusing on shaping the business environment by developing the market of modern business services. It should be emphasized that for several years the stock of office space has been steadily increasing, and Warsaw is becoming an increasingly significant business centre, positively influencing the development of entities from the region. Due to the strong competition of other large cities, activities in this area are focused on shaping the business environment by developing the market of modern business services.

Analysed good practices in this area of smart specialisation include:

- Implementation of the innovative technology for production of systems for power transmission of electric vehicles;
- Development of an innovative pilot line for the production of composite bicycle frames based on carbon fibre;
- 360 method in the transfer of knowledge;
- Development of an ultra durable composite bicycle frame with the use of graphene, and development of technology for its production;
- NOE - the collection with the Braille alphabet;
- Extending the offer of AVIT Adam Rytel by implementing R+D works concerning technology for the leaf vegetable processing.

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<sup>30</sup>[https://www.funduszedlamazowska.eu/g2/oryginal/2015\\_11/e9aa1b5a90790233a94a1e2ccc84dcba.pdf](https://www.funduszedlamazowska.eu/g2/oryginal/2015_11/e9aa1b5a90790233a94a1e2ccc84dcba.pdf), s. 78. [access: 26.08.2019 r.].

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## Implementation of the innovative technology for production of systems for power transmission of electric vehicles

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Activity of TMW Sp. z o.o. revolves around production of parts using the method of mechanical processing, and selling manufactured products for companies producing cars, tractors and machines. The company responds to the needs of the automotive industry adopting current know-how and modern technologies, manufactures parts for the first assembly line of well-known automotive companies, drawbar eyes for trains in series production, gear transmissions used in electric vehicles and in agricultural machinery construction, also offering services in the field of forging tools such as: dies, punches, cutting plates, rectifiers, inserts, etc.<sup>31</sup>.

Project was implemented under ROP MV 2014-2020 - Measure 3.3. Innovation in SMEs, and its total cost was PLN 5 626 973,00. It focused on the implementation of TMW's own production technology for systems for power transmission of electric vehicles and initiating the production of an innovative product - articulated shafts adapters and a significantly improved product - TM type gearshift. The objective of the project was to implement in the company a new technology for the production of power transmission assemblies for electric vehicles, responding to the market needs concerning electromobility development. Good practice has an international impact given the fact that a similar solution has not been yet used anywhere in the world. Project concerns the area of hybridising/conjoining the potential of individual industries of local economy in order to develop new, more innovative products or services as well as infrastructure and scientific potential/research and innovation capacity.

Implementation of the project and the introduction of innovative technological solutions are particularly significant given the nationwide trend of the increasing interest in electro mobility and the increase of the production of electrically driven vehicles. Results of the implemented project include development of company's technical and production capabilities, and the potential to manufacture innovative products that would meet the needs of the market, therefore increasing the competitiveness of the company. Development of technical and production capabilities positively affects the possibility of undertaking further measures aimed at increasing the innovation and competitiveness of the company.

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<sup>31</sup> All information about the company from: <http://tmw-wyszkow.pl/> [access: 26.08.2019 r.].

Assessment criteria	Project assessment
Degree and type of innovation	Very high degree of innovation. Type of innovation: technical, environmental
Type of financing/aid	Aid: technical, economical, non-returnable subsidy
Degree of repeatability of the implemented solution and the possibility of implementing good practice by other entities	Technology developed as part of the project can be used on a broad scale. The project is coherent with the global trend of electromobility, therefore the production of a new type of electric vehicles determines a high potential for commercialization of developed solution and may result in the interest of other entities from the electromobility industry to implement good practice
Range of impact of good practice	Range of impact: national, international
Impact of good practice on regional innovation policy/regional development	Considering global statistics indicating a rapid growth of the number of electric vehicles, development of innovative technology in the field of electromobility in the regional market may result in the increase of innovation and competitiveness of the region. Implementation of good practice has an impact on regional innovation policy and regional development by: <ul style="list-style-type: none"> <li>- commercialization of results of R+D works</li> <li>- increase of an income of the enterprise</li> <li>- establishing cooperation with foreign partners</li> <li>- increase in revenues from the sale of new technologies.</li> </ul>
Impact of good practice on the implementation of RIS	The project is coherent with the smart specialisation of the region. Implementation of the project will contribute to the achievement of following objectives of RIS: <ul style="list-style-type: none"> <li>- increasing and strengthening cooperation in innovation development processes – by developing forms of cooperation in the business-science-environment relation, increasing the activeness of business entities, and intensifying scientific research works, results of which correspond to the needs of entrepreneurs.</li> <li>- increasing the internationalisation focused on development of innovation in Mazowieckie Voivodeship – by increasing the activity of entrepreneurs on the international arena and increasing the number of international research and</li> </ul>

Assessment criteria	Project assessment
	development projects. - increasing effectiveness of support and financing of pro-innovation activities in the region – by supporting entrepreneurs.

Source: desk research analysis, analysis of the results of CAWI and IDI research methods.

**Figure 14 Implementation of the innovative technology for production of systems for power transmission of electric vehicles - pictures from the project**



Picture of the product – crowbar eyes



Apparatus used in the company



Coordinate Measuring Machine Zeiss Eclipse Picture of the product – crowbar eyes

Source: Company's pictures.

## Development of an innovative pilot line for the production of composite bicycle frames based on carbon fibre

Kross is one of the largest Polish companies producing bicycles and bicycle accessories for the European market. The company offers clothing, parts and accessories for bicycles designed by experienced engineers and technicians<sup>32</sup>.

With the aid under the Measure 1.2 *R+D activities of enterprises* of the ROP MV 2014-2020 enterprise implemented project, the total cost of which was PLN 4 588 871,25. As the result of the B+R works conducted as part of the project, the company aimed at the development of an innovative pilot line for the production of composite bicycle frames based on carbon fibre. Adopted technologies enabled the possibility to manufacture bicycle frames with significantly increased quality parameters - lower weight and expanded strength, therefore developing the solution characterised by a high level of competitiveness and innovativeness.

The conduct of a research and development project was adopted based the company's strategy - the aim of good practice was to conduct industrial R+D works in order to develop original, innovative technology, resulting in an innovative method of using carbon fibres in bicycle frames and development of two new products: a composite bicycle frame and a bicycle with a composite frame.

Given the innovativeness and practicality of the implemented solution, good practice has an international impact. Few factories equipped with such modern production line and developed technology of the unique product are operating in Europe. The innovative pilot line for the production of composite bicycle frames based on carbon fibre, developed as part of the project, will be used to produce a model of a bicycle for the Polish representative during the Olympic Games in Tokyo in 2020, proving the innovativeness and significance of the solution implemented in the project. Good practice significantly increases the innovativeness and competitiveness of the enterprise, furthermore, the implemented R+D works have the potential to ensure the possibility for the further growth.

Assessment criteria	Project assessment
Degree and type of innovation	Very high degree of innovation. Type of innovation: technical
Type of financing/aid	Aid: non-returnable subsidy
Degree of repeatability of the implemented solution and the possibility of	A considerably high degree of repeatability of good practice may result in the increase of interest in the project by other entities given the market demand for

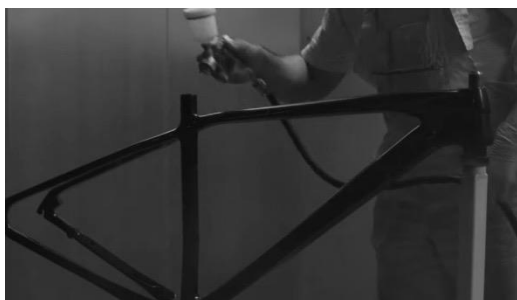
<sup>32</sup> All information about the company from: <https://www.kross.pl/> [access: 26.08.2019 r.].

Assessment criteria	Project assessment
<b>implementing good practice by other entities</b>	<p>such solutions. The company uses innovative technologies and manufactured product is appreciated by professionals using bicycle equipment. The repeatability of the practice determines the fact that the project can be implemented by other partners.</p> <p>The company's development resulting from the introduction of an innovative pilot production line positively influences the high potential for commercialization of implemented solutions and provides enterprise with the opportunity to develop unique products using proprietary technology that can be used on a large scale to ensure the high quality of innovative products.</p>
<b>Range of impact of good practice</b>	Range of impact: international
<b>Impact of good practice on regional innovation policy/regional development</b>	<p>Implementation of good practice has an impact on regional innovation policy and regional development by:</p> <ul style="list-style-type: none"> <li>- commercialization of results of R+D works</li> <li>- increase of an income of the enterprise</li> <li>- establishing cooperation with foreign partners</li> <li>- increase in revenues from the sale of new technologies.</li> </ul>
<b>Impact of good practice on the implementation of RIS</b>	<p>The project is coherent with the smart specialisation of the region. Implementation of the project will contribute to the achievement of following objectives of RIS:</p> <ul style="list-style-type: none"> <li>- increasing and strengthening cooperation in innovation development processes – by developing forms of cooperation in the business-science-environment relation, increasing the activeness of business entities, and intensifying scientific research works, results of which correspond to the needs of entrepreneurs.</li> <li>- increasing the internationalisation focused on development of innovation in Mazowieckie Voivodeship – by increasing the activity of entrepreneurs on the international arena and increasing the number of international research and development projects.</li> <li>- increasing effectiveness of support and financing of pro-innovation activities in the region – by supporting entrepreneurs.</li> </ul>

Source: desk research analysis, analysis of the results of CAWI and IDI research methods.



**Figure 15 Development of an innovative pilot line for the production of composite bicycle frames based on carbon fibre – pictures of the project**



Composite bicycle frame – picture of the product



Carbon fibre used for the production of composite bicycle frames



Pilot line for the production of bicycle frames

*Source: Company's pictures.*



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### 360 method in the transfer of knowledge

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The main area in which Digital Knowledge Observatory Foundation operates concerns development of IT solutions in the general field of ICT for the improvement of education processes, conducting business and establishing management standards. The foundation promotes the exchange of experience and cooperation in a managerial environment and encourages Polish managers to increase their professional qualifications. The enterprise offers webinars and online training services as well as the possibility to record multimedia content using a professional recording studio with a green box. Digital Knowledge Observatory Foundation is on the Ministry of Development's list of innovative units<sup>33</sup>. Under ROP MV 2014-2020 (Measure 1.2 *R+D activities of enterprises*) project concerning the Digital Knowledge ecosystem was implemented – total cost of the project was PLN 4 136 776,40.

The objective of good practice was the research concerning ICT technology and conceptual and substantive works. Project aimed at the development of an innovative model for the design, production and distribution of multimedia educational content in virtual reality (VR) and augmented reality (AR) formats, basing on R+D. Development of a research-based methodology for designing, creating and distributing content is aimed at removing currently existing barriers by standardizing the product and the process under which it is created. The objective is to develop a production method including prosumer equipment based on the most significant properties of professional equipment. The model based on a new type of content, designed and developed in accordance with an autonomous author's method is created as part of R+D, enabling the possibility to publish materials to their final recipients, that is LCMS-type educational platforms. Conducting research and development works as part of an ongoing research project on the introduction of educational content in the VR/AR format is another step in the development of the company's competitiveness and innovation.

The innovativeness of good practice constitutes of the implementation of R+D works to develop modern technology that responds to the challenges and needs of the current technology market, at the same time being universal - the effects of the project can be adopted worldwide due to the possibility of a linguistic and cultural localisation of the developed material. Moreover, implementation of the project will lead to the development of a methodological and technological model which will later be appropriately standardized and adapted to current and future technological trends in order to ensure the possibility that it could be used by people not directly associated with the industry of new technologies or by those who do not have a knowledge regarding the issues of VR/AR technology. Such

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<sup>33</sup> All information about the company from: <https://digitalknowledge.pl/o-nas/> [access: 26.08.2019 r.].

approach will lead to a design, production and distribution process in the self publishing model. Good practice is, therefore, innovative, durable and repeatable.

Assessment criteria	Project assessment
Degree and type of innovation	High degree of innovation. Type of innovation: technical
Type of financing/aid	Aid: technical (possibility to rent machinery and experts to conduct the research), non-returnable subsidy
Degree of repeatability of the implemented solution and the possibility of implementing good practice by other entities	Developed innovative model being the result of the completed project has significant potential for a broad use of the product that responds to the needs in the context of development of modern technologies. Innovation and the possibility of comprehensive use of multimedia educational content in VR/AR formats influences a high degree of repeatability of good practice. Developed model will be used not only by other entities from the modern technologies industry and the LCMS platforms, but also by educational institutions and entities not associated with the ICT industry.
Range of impact of good practice	Range of impact: international
Impact of good practice on regional innovation policy/regional development	The project might positively impact regional development given the considerable innovation of developed model. The result of the project is being developed ensuring the possibility of its use on a global scale and by other entrepreneurs, therefore increasing innovativeness in the region. Implementation of good practice has an impact on regional innovation policy and regional development by: <ul style="list-style-type: none"> <li>- commercialization of results of R+D works</li> <li>- increase of an income of the enterprise</li> <li>- establishing cooperation with foreign partners</li> <li>- increase in revenues from the sale of new technologies.</li> </ul>
Impact of good practice on the implementation of RIS	The project is coherent with the smart specialisation of the region. Implementation of the project will contribute to the achievement of following objectives of RIS: <ul style="list-style-type: none"> <li>- increasing and strengthening cooperation in innovation development processes – by developing forms of cooperation in the business-science-</li> </ul>

Assessment criteria	Project assessment
	<p>environment relation, increasing the activeness of business entities, and intensifying scientific research works, results of which correspond to the needs of entrepreneurs.</p> <ul style="list-style-type: none"> <li>- increasing the internationalisation focused on development of innovation in Mazowieckie Voivodeship – by increasing the activity of entrepreneurs on the international arena and increasing the number of international research and development projects.</li> <li>- increasing effectiveness of support and financing of pro-innovation activities in the region – by supporting entrepreneurs.</li> </ul>

Source: desk research analysis, analysis of the results of CAWI and IDI research methods.

Figure 16 360 method in the transfer of knowledge - pictures of the project



The process of producing educational materials  
with the use of the green box technology



The process of producing educational materials with  
the use of the green box technology



Software for previewing and editing materials produced with the use of the green box technology

*Source: Company's pictures.*

## Development of an ultra durable composite bicycle frame with the use of graphene, and development of technology for its production

The main focus of Engineo is the comprehensive management of a new product development for the bicycle industry. The area of operating of the company concerns activities such as generating ideas, developing construction documentation and implementing product technology for the mass production<sup>34</sup>.

The total cost of the project implemented under ROP MV 2014-2020 (Measure 1.2. *R+D activities of enterprises*) was PLN 4 744 380,96. The project was implemented in cooperation with the Partner - AGP, and with the research unit - Łódź University of Technology, influencing development of researches and innovations in the industry and determining the possibility to enlarge implemented activities in the scope of innovations in the future. Good practice concerned thematic scopes of infrastructure and scientific potential/research and innovation capacity, and public-private cooperation in the scope of research and innovation.

Project results in the development of an innovative ultra durable composite bicycle frame with the use of graphene. Good practice was selected not only because of its innovativeness but also considering the fact that developing new technology led to the increase of the research potential of the beneficiary.

The significantly improved product (a bicycle frame with graphene), developed as a result of own R+D works is a novelty on a global scale among current solutions in the scope of manufacturing frames, therefore good practice has an international impact.

Implementation of the project enabled the international commercialisation in industries on the international scale. It might initiate the mass use of developed innovative technology for the production of a durable composite bicycle frame with the use of graphene – an exclusive and professional product characterised by a considerably high quality.

Assessment criteria	Project assessment
Degree and type of innovation	High degree of innovation. Type of innovation: technical, environmental
Type of financing/aid	Aid: technical, non-returnable subsidy
Degree of repeatability of the implemented solution and the possibility of implementing good practice by other entities	A globally innovative technology was developed in cooperation with various types of entities as a result of the project, responding to the market needs, and, therefore, being useful and having significant potential for commercialization. Good practice

<sup>34</sup> All information about the company from: <http://engineo.pl/> [access: 26.08.2019 r.].



Assessment criteria	Project assessment
	could be repeated and implemented by other entities due to the fact that it is possible to introduce the product and technology of its production to the mass use.
<b>Range of impact of good practice</b>	Range of impact: international
<b>Impact of good practice on regional innovation policy/regional development</b>	<p>The project might positively affect regional development in a considerable scale - due to the innovation of the developed technology the implementation of the project enabled an international commercialisation in industries around the world. Developed technology is coherent with current trends on the international bicycle market. Implementation of good practice has an impact on regional innovation policy and regional development by:</p> <ul style="list-style-type: none"> <li>- commercialization of results of R+D works</li> <li>- increase of an income of the enterprise</li> <li>- establishing cooperation with foreign partners</li> <li>- increase in revenues from the sale of new technologies.</li> </ul>
<b>Impact of good practice on the implementation of RIS</b>	<p>The project is coherent with the smart specialisation of the region. Implementation of the project will contribute to the achievement of following objectives of RIS:</p> <ul style="list-style-type: none"> <li>- increasing and strengthening cooperation in innovation development processes – by developing forms of cooperation in the business-science-environment relation, increasing the activeness of business entities, and intensifying scientific research works, results of which correspond to the needs of entrepreneurs.</li> <li>- increasing the internationalisation focused on development of innovation in Mazowieckie Voivodeship – by increasing the activity of entrepreneurs on the international arena and increasing the number of international research and development projects.</li> <li>- increasing effectiveness of support and financing of pro-innovation activities in the region – by supporting entrepreneurs.</li> </ul>

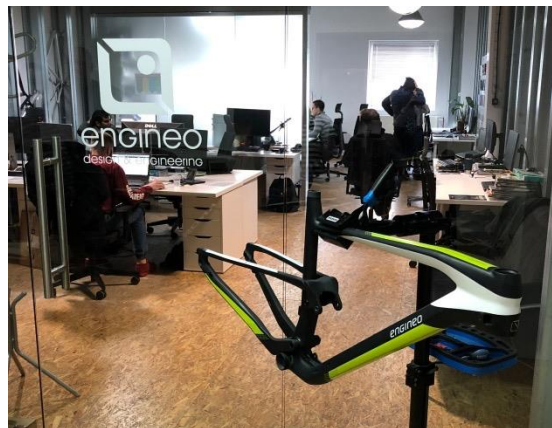
Source: desk research analysis, analysis of the results of CAWI and IDI research methods.



**Figure 17 Development of an ultra durable composite bicycle frame with the use of graphene, and development of technology for its production - pictures of the project**



Production of the bicycle frame with the use of graphen



Headquarters and the product – ultra durable composite bicycle frame



The effects of the implemented project – bicycle with the ultra durable frame

*Source: Company's pictures.*

## NOE - the collection with the Braille alphabet

Barcz is a family company operating in the field of production, import and distribution of construction fittings. Production includes door and window handles, accessories, padlocks, wall hangers, decorative items and casting services<sup>35</sup>.

Project „NOE - the collection with the Braille alphabet” was implemented under Measure 3.3. *Innovations in SMEs* of ROP MV 2014-2020, with the total cost equal to PLN 6 305 485,00. The project consisted of the implementation of an innovative pressure-casting technology, as a result of which the offer of the company was extended with four new products (door handles using the Braille’s Alphabet and products facilitating their use) adapted to the needs of the visually impaired and the blind. Machinery and equipment purchased as part of the project ensured diversification of the enterprise's production by introducing products that were not manufactured there before.

The objective of good practice was the implementation of the results of R+D works in order to strengthen the innovation and competitiveness of the company through expanding its offer by the production of a new product, manufactured with the use of an innovative technology. Due to the relatively low number of local companies offering products adopting Braille's Alphabet that responds to the needs of the blind and the visually impaired, initiating such production at Barcz significantly increases the competitiveness of the company, therefore positively affecting the level of innovation and competitiveness of the region. The indirect effect of the implemented project is also the creation of new jobs and an increase of employment in the enterprise.

Assessment criteria	Project assessment
Degree and type of innovation	High degree of innovation. Type of innovation: technical
Type of financing/aid	Aid: non-returnable subsidy
Degree of repeatability of the implemented solution and the possibility of implementing good practice by other entities	Innovative die casting technology and the implementation of R+D works made it possible for the company to expand its offer with a new product which was not manufactured before - machinery and equipment purchased as part of the project enable mass production, affecting the considerable potential for commercialisation due to the high demand for this type of product - the collection with the Braille Alphabet responds to the needs of the blind and visually impaired.

<sup>35</sup> All information about the company from: <http://pl.barcz.pl/> [access: 26.08.2019 r.].

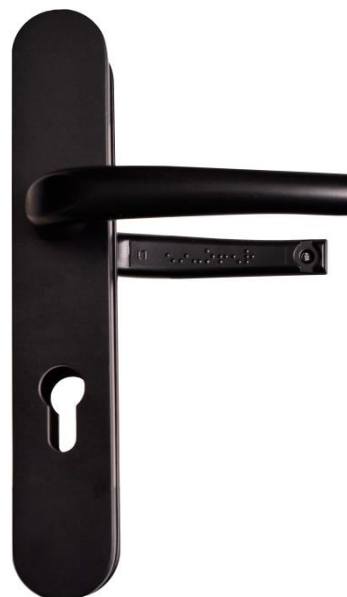
Assessment criteria	Project assessment
Range of impact of good practice	Range of impact: international
Impact of good practice on regional innovation policy/regional development	<p>Implemented project is coherent with regional challenges related to responding to the needs of people with disabilities, adopting modern technologies for this purpose. Enterprise contributed to the increase of the region's innovation, competitiveness and the potential for further R+D works in this area by expanding its offer with this type of product.</p> <p>Implementation of good practice has an impact on regional innovation policy and regional development by:</p> <ul style="list-style-type: none"> <li>- commercialization of results of R+D works</li> <li>- increase of an income of the enterprise</li> <li>- establishing cooperation with foreign partners</li> <li>- increase in revenues from the sale of new technologies.</li> </ul>
Impact of good practice on the implementation of RIS	<p>The project is coherent with the smart specialisation of the region. Implementation of the project will contribute to the achievement of following objectives of RIS:</p> <ul style="list-style-type: none"> <li>- increasing and strengthening cooperation in innovation development processes – by developing forms of cooperation in the business-science-environment relation, increasing the activeness of business entities, and intensifying scientific research works, results of which correspond to the needs of entrepreneurs.</li> <li>- increasing the internationalisation focused on development of innovation in Mazowieckie Voivodeship – by increasing the activity of entrepreneurs on the international arena and increasing the number of international research and development projects.</li> <li>- increasing effectiveness of support and financing of pro-innovation activities in the region – by supporting entrepreneurs.</li> </ul>

Source: desk research analysis, analysis of the results of CAWI and IDI research methods.

**Figure 18 NOE - the collection with the Braille alphabet - pictures of the project**



*Collection with the Braille alphabet*



*Door handle with the Braille's Alphabet*



*Door knob with the Braille's Alphabet*

*Source: Company's pictures.*

## Extending the offer of AVIT Adam Rytel by implementing R+D works concerning technology for the leaf vegetable processing

AVIT Adam Rytel is a company producing fresh vegetables and freshline salads. The company cooperates with the largest Polish commercial networks and foreign clients because of modern machinery and equipment, and the specialised technical department. The company uses modern technologies and aims at environmental friendly operations<sup>36</sup>.

Under ROP MV 2014-2020 (Measure 3.3. *Innovations in SMEs*) AVIT Adam Rytel implemented project the total cost of which was PLN 10 925 475,00. The main objective of the project was to implement the results of R+D works, leading to the introduction of new products and an innovative production process to the company's offer, significantly affecting its innovativeness and competitiveness. Conducted R+D works resulted in developing three product innovations in the form of new products (pesto of collard, fruit and vegetable cocktails, mixed lettuce with herbs) and six process innovations, that is the the innovative technology in the field of leafy vegetable processing. Project effects respond to the demand for healthy food and the use of modern, environmentally friendly technology. Equipment that could affect the expansion of the offer in the future and further implementation of R+D was purchased as part of the project.

Good practice was selected because of its process innovations but also due to a significant increase in the innovativeness and competitiveness of the company, the increase in the quality of offered services, established cooperation with scientific units and the increase of the employment.

Assessment criteria	Project assessment
Degree and type of innovation	High degree of innovation. Type of innovation: technical
Type of financing/aid	Aid: non-returnable subsidy
Degree of repeatability of the implemented solution and the possibility of implementing good practice by other entities	Good practice is characterised by a considerably high potential for commercialization of implemented solutions due to the nature of the product introduced to the offer, answering the market needs in the context of healthy food production and the purchase of equipment for mass production. The implemented works in the field of leafy vegetable processing technology determine also the possibility of undertaking works with entities from the R+D area in order to further

<sup>36</sup> All information about the company from: <http://www.avit.com.pl/o-nas.html> [access: 26.08.2019 r.].

Assessment criteria	Project assessment
	develop the technology.
<b>Range of impact of good practice</b>	Range of impact: national
<b>Impact of good practice on regional innovation policy/regional development</b>	<p>Good practice contributed to the introduction of new products and an innovative production process to the company's offer, resulting in an increase in the company's innovativeness and competitiveness in the regional market, determining also the possibility to establish cooperation with scientific units in order to expand R+D works and leading to an increase in employment.</p> <p>Implementation of good practice has an impact on regional innovation policy and regional development by:</p> <ul style="list-style-type: none"> <li>- commercialization of results of R+D works</li> <li>- increase of an income of the enterprise</li> <li>- establishing cooperation with foreign partners</li> <li>- increase in revenues from the sale of new technologies</li> </ul>
<b>Impact of good practice on the implementation of RIS</b>	<p>The project is coherent with the smart specialisation of the region. Implementation of the project will contribute to the achievement of following objectives of RIS:</p> <ul style="list-style-type: none"> <li>- increasing and strengthening cooperation in innovation development processes – by developing forms of cooperation in the business-science-environment relation, increasing the activeness of business entities, and intensifying scientific research works, results of which correspond to the needs of entrepreneurs.</li> <li>- increasing the internationalisation focused on development of innovation in Mazowieckie Voivodeship – by increasing the activity of entrepreneurs on the international arena and increasing the number of international research and development projects.</li> <li>- increasing effectiveness of support and financing of pro-innovation activities in the region – by supporting entrepreneurs.</li> </ul>

Source: desk research analysis, analysis of the results of CAWI and IDI research methods.



**Figure 19 Extending the offer of AVIT Adam Rytel by implementing R+D works concerning technology for the leafy vegetable processing - pictures of the project**



The use of leafy vegetable processing technology



Promoting the effects of implemented project



The use of eco-friendly technology

*Source: Company's pictures.*

## Intelligent management systems

Measures in the area of intelligent management systems focus on process solutions and solutions relating to infrastructure. They are characterized by a considerably high degree of adaptability, leading to the increase in automation and enabling effective monitoring of processes concerning economic activity. Furthermore, the result of measures undertaken in this scope is the increase of raw material and energy efficiencies and the improvement in the quality of life, also in the context of human safety<sup>37</sup>.

Activities undertaken under the area of smart specialisation relating to intelligent management systems aim at the dissemination of resource management (including infrastructure, human resources, knowledge resources) in order to build an innovative potential. Therefore, solutions should increase the cost and material efficiency of enterprises from the region of Mazowieckie Voivodeship.

Analysis of projects in this scope led to the identification of following good practices:

- Wireless and maintenance-free, "eternal" monitoring system for large-scale building facilities, in compliance with the concept of IoT (Internet of Things);
- Research and development work on the design of the hybrid rotor impeller at AVIATION ARTUR TRENDAK;
- Innovative, multi-fuel power generator as the basic and auxiliary power supply system of the charger for quick charging of electric cars with elements of SMART-GRID functionality;
- The world's first intelligent anti-collision system based on data transmission by VLC light communication designed to improve safety of road and rail transportation;
- New medium voltage disconnecter station equipped with a 3-way (ecological) vacuum switch disconnecter mounted in the axis of a single-pole station;
- Innovative flight stabilization system with the use of trimmers.

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<sup>37</sup> [https://www.funduszedlamazowska.eu/g2/oryginal/2015\\_11/e9aa1b5a90790233a94a1e2ccc84dcba.pdf](https://www.funduszedlamazowska.eu/g2/oryginal/2015_11/e9aa1b5a90790233a94a1e2ccc84dcba.pdf), p. 76. [access: 26.08.2019 r.].

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## Wireless and maintenance-free, "eternal" monitoring system for large-scale building facilities, in compliance with the concept of IoT (Internet of Things)

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Wisene company operates in the technology industry. The objective of the enterprise is to develop, manufacture and sell applications deploying the innovative technology of Wireless Sensor Networks, especially in the area of Remote Monitoring Systems and Active Security Systems. The company promotes innovative systems that detect potential security risks<sup>38</sup>.

The WISENE system has been developed since 2010, under ROP MV 2014-2020 (Measure 1.2. *R+D activities of enterprises*) it was possible to implement project WISENE 6, the total cost of which was PLN 4 075 664,00. WISENE Roof Monitoring with the WISENE Management Centre cloud app constitute a tool supporting facility management and its maintenance - e.g. periodic testing of buildings. The broad scope of stakeholders include owners, managers and people responsible for large-scale buildings.

All intended and planned objectives of the project were achieved, particularly:

- metrological reliability - physical quantities, measuring system and intelligence of data processing;
- intelligent, remote and global management;
- the ability to automatically adjust the system parameters to changes in the environment - intelligence and resistance to these changes;
- project increases the safety of people and property, and legal security in relation to the use of large-surface buildings, including public buildings.

Good practice was selected because of its durability, repeatability, potential for commercialisation of effects, and potential for further development of the implemented solution. WISENE Roof Monitoring is an application that can be scaled in technical and logistics areas. Based on the results of the project, other contracts for the implementation, distribution and promotion of this globally innovative solution were signed. Achieving metrological credibility is a key aspect distinguishing WISENE on a global scale and promoting the solution among entities that could adopt the development technology significant in the social and business spheres.

Implementation of developed solution was possible due to the use of the results of previous research initiated in 2010 (including the results of the project co-financed under the OP IE, Measure 1.4 (contract number UDA POIG.01.04.00 14 109/13 03, mainly: wireless digital inclinometer and conclusions from the research and the invention of the "Method of

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<sup>38</sup> All information about the company from: <https://wisene.pl/o-firmie-wisene/> [access: 26.08.2019 r.].

monitoring of variable loads on the roof structure", submitted to the Patent Office of the Republic of Poland on 2015.11.30). The solution for monitoring of roof structures was developed as the result of the project, initiating a "new market ", that is similar solutions which have never been yet offered anywhere in the world. The project has a considerable potential in the scope of its use and further development of the company in the context of its innovativeness and competitiveness.

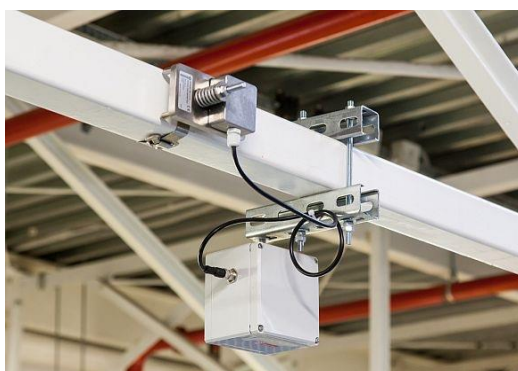
Project responds to problems related to the occurrence of threats concerning construction disasters. Measures required qualified employees from the following sectors: electronics, IT, mechanics and business development.

<b>Assessment criteria</b>	<b>Project assessment</b>
<b>Degree and type of innovation</b>	Very high degree of innovation. Type of innovation: technical, economic
<b>Type of financing/aid</b>	Aid: non-returnable subsidy
<b>Degree of repeatability of the implemented solution and the possibility of implementing good practice by other entities</b>	Good practice has a considerably high commercialisation potential, already used by the company - another contracts for the implementation, distribution and promotion of this globally innovative solution were signed. The project is addressed to a large group of stakeholders, therefore the project is characterised by a considerable potential for its broad use.
<b>Range of impact of good practice</b>	Range of impact: international
<b>Impact of good practice on regional innovation policy/regional development</b>	The project contributes to the effort to increase innovation, entrepreneurship and competitiveness of the region - a unique product was developed as part of the implemented project, determining the international impact of good practice. Similar solutions have not been offered anywhere in the world until now, proving the high level of innovativeness of good practice and the possibilities for the further development by the enterprise. Implementation of good practice has an impact on regional innovation policy and regional development by: <ul style="list-style-type: none"> <li>- commercialization of results of R+D works</li> <li>- increase of an income of the enterprise</li> <li>- establishing cooperation with foreign partners</li> <li>- increase in revenues from the sale of new technologies.</li> </ul>
<b>Impact of good practice on the implementation of RIS</b>	The project is coherent with the smart specialisation of the region. Implementation of the project will

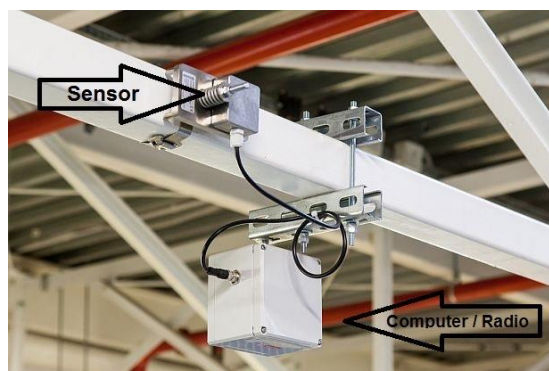
Assessment criteria	Project assessment
	<p>contribute to the achievement of following objectives of RIS:</p> <ul style="list-style-type: none"> <li>- increasing and strengthening cooperation in innovation development processes – by developing forms of cooperation in the business-science-environment relation, increasing the activeness of business entities, and intensifying scientific research works, results of which correspond to the needs of entrepreneurs.</li> <li>- increasing the internationalisation focused on development of innovation in Mazowieckie Voivodeship – by increasing the activity of entrepreneurs on the international arena and increasing the number of international research and development projects.</li> <li>- increasing effectiveness of support and financing of pro-innovation activities in the region – by supporting entrepreneurs.</li> </ul>

Source: desk research analysis, analysis of the results of CAWI and IDI research methods.

**Figure 20** Wireless and maintenance-free, "eternal" monitoring system for large-scale building facilities, in compliance with the concept of IoT (Internet of Things) - pictures of the project

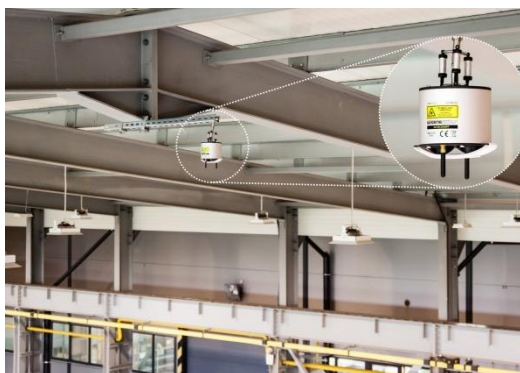


The use of the wireless monitoring system

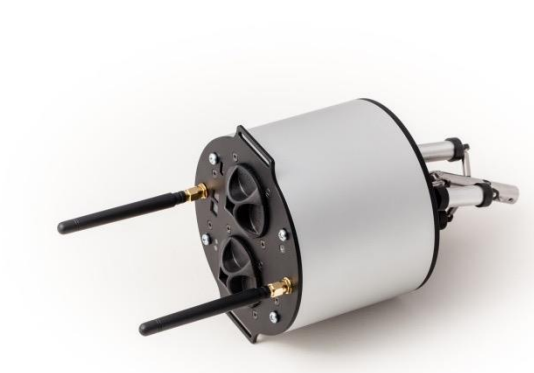


Sensor - the maintenance-free wireless monitoring system





Technology of the Wireless Sensor Networks



Technology of the Wireless Sensor Networks –  
close up

*Source: Company's pictures.*



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## Research and development work on the design of the hybrid rotor impeller at AVIATION ARTUR TRENDAK

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Aviation Artur Trendak is a gyroplane manufacturer, the main focus of the company are sales, service, production and trainings. The company has a research department where teams of engineers use the latest computer simulation techniques and CAD (computer-aided drafting) design for continuous improvement of the quality and performance of machines. The company adapts its products to the latest technologies in the field of photogrammetry and terrain scanning. It cooperates with universities and scientific institutes (such as Instytut Agrofizyki im. Bohdana Dobrzańskiego PAN, Institute of Geodesy and Cartography, Lublin University of Technology, University of Life Sciences in Lublin) in implementing other technologies, such as biological plant protection<sup>39</sup>.

Basing on own experience in implementing innovations, the company could initiate another project under ROP MV 2014-2020 (Measure 1.2. *R+D activities of enterprises*), the total cost of which is PLN 5 432 241,00. The aim of the research is to design and construct a hybrid propeller for aircraft, being an universal rotor impeller system. Implementation of the project began in November 2018. R+D works constituted a significant part of the project, enabling the diagnosis of needs and resources, allowing the company to prepare for an effective project implementation, including the design of specific solutions for a modern hybrid power unit that is the subject of the project. The current stage of the implementation focused on the R+D works, allowing the company to precisely define the energy demand of the produced aircraft, taking a step which was necessary for future activities relating to designing specific solutions for the modern hybrid propulsion system. Innovativeness of developed propulsion will consist of the ability to significantly reduce the noise level generated in the vicinity of landing pads and populated centres. This technology will also ensure the possibility of using an electric motor during emergencies, after a combustion engine failure, significantly affecting the increase of the aircraft use safety.

Design is based on the type of a rotocraft (helicopter, gyroplane). Such aerodyne has an additional propulsion system that can be omitted when using this propulsion system for other aircraft (aircraft type where the airframe produces lift). The solutions being the result of the project will improve the economy of flying through lower fuel consumption and reduction of the amount of exhaust gas emitted to the atmosphere, as well as the reduction of the noise level.

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<sup>39</sup> All information about the company from: <http://www.trendak.eu/pl/o-nas/wiatrakowce-artur-trendak/> [access: 26.08.2019 r.].

Good practice was selected because of the considerably high level of innovativeness on a global scale - The solution developed in the form of a hybrid propulsion system designed for light aircraft is unique and has not yet been used anywhere in the world. Effects of the project are mainly intended for a broad range of buyers of small aircraft and numerous branches of air services. Research on a new type of propulsion could, therefore, inspire the implementation of similar solutions by other manufacturers of this type of vehicle.

Assessment criteria	Project assessment
Degree and type of innovation	Very high degree of innovation. Type of innovation: technical
Type of financing/aid	Aid: technical, economical, non-returnable subsidy
Degree of repeatability of the implemented solution and the possibility of implementing good practice by other entities	Good practice is characterized by a considerably high potential for the commercialisation and for the repeatability, which results from the innovative products from the implemented project. The solution developed in the form of a hybrid propulsion system designed for light aircraft is unique and has not yet been used anywhere in the world. Project responds to the needs in the field of the aeronautical industry development. Innovativeness of the solution determines the interest in good practice expressed by other entities. The possibility of repeatability of good practice results also from the fact that the system can also be used in other types of vehicles, such as light transport quadricycles or boats.
Range of impact of good practice	Range of impact: international
Impact of good practice on regional innovation policy/regional development	Global innovativeness of good practice might result in a significant increase in the competitiveness and innovation potential of the company, leading to the possibility to initiate the production of vehicles with a new type of hybrid propulsion, which, conducted in the region, would affect Mazovia's innovativeness and contribute to the promotion of the region. Implementation of good practice has an impact on regional innovation policy and regional development by: <ul style="list-style-type: none"> <li>- commercialization of results of R+D works</li> <li>- increase of an income of the enterprise</li> <li>- establishing cooperation with foreign partners</li> <li>- increase in revenues from the sale of new technologies.</li> </ul>

Assessment criteria	Project assessment
Impact of good practice on the implementation of RIS	<p>The project is coherent with the smart specialisation of the region. Implementation of the project will contribute to the achievement of following objectives of RIS:</p> <ul style="list-style-type: none"> <li>- increasing and strengthening cooperation in innovation development processes – by developing forms of cooperation in the business-science-environment relation, increasing the activeness of business entities, and intensifying scientific research works, results of which correspond to the needs of entrepreneurs.</li> <li>- increasing the internationalisation focused on development of innovation in Mazowieckie Voivodeship – by increasing the activity of entrepreneurs on the international arena and increasing the number of international research and development projects.</li> <li>- increasing effectiveness of support and financing of pro-innovation activities in the region – by supporting entrepreneurs.</li> </ul>

Source: desk research analysis, analysis of the results of CAWI and IDI research methods.

**Figure 21 Research and development work on the design of the hybrid rotor impeller at AVIATION ARTUR TRENDAK - pictures of the project**



The use of the hybrid rotor impeller developed as the result of the implemented project



Rotocraft with the hybrid rotor impeller



Production hall in the AVIATION Artur Trendak  
company

*Source: Company's pictures.*

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## Innovative flight stabilization system with the use of trimmers

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Instytut Lotnictwa - Sieć Badawcza Łukasiewicz - operates on the global research market. The objective of the Institute is to introduce new technologies. The implementation of objectives in the company is supported by a team of experts, with the use of certified procedures and accredited laboratories. The Institute is divided into seven main centres: the Centre for Research of Construction Materials, Centre for New Technologies, Centre for Composite Technologies, Centre for Space Technologies, Centre for Transport and Energy Conversion, Engineering Design Centre<sup>40</sup>.

Project concerning the introduction of an innovative technology concerning flight stabilisation system of a light aircraft with the use of trimmers is one of complementary projects of the institute, aiming at developing a holistic approach to the innovative measures, is implemented under Smart Growth Operational Programme, with the total cost of PLN 5 996 835,00.

The objective of the project is to design, construct and examine the light aircraft flight stabilization system with the use of trimmers. Such solution is highly innovative given the fact that it is a new technology that in a considerable degree will facilitate currently used solutions and will address the needs of the modern aeronautic industry. Aircraft flight stabilization is ensured by complex Flight Management Systems (FMS), and particularly by autopilot systems which are expensive and not included in all aircraft vessels. However, most aircraft, especially airplanes, have relief/balance surfaces installed usually on the main controls of the aircraft (elevator and rudder). This type of technology is called trimmers. Conducted R+D works led to the conclusion that trimmers can be used to stabilize the flight of some types of aircraft, with this solution being relatively cheap and possible to be implemented in numerous light vessels of the General Aviation. Such technology significantly improves the safety of aircraft, affecting also the increase in the availability of this type of transport for users through mass production. This is particularly significant considering the fact that the aeronautics industry is currently developing and the scope of general aviation is increasing.

One of the key objectives of the project was the ongoing analysis of market needs in terms of a development of modern technologies. The possibility to adopt good practice in a broad scope results from the fact that the project's effects are directed to both internal (through training and promotion of good practice) and external stakeholders, i.e. the business environment or regional and central authorities.

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<sup>40</sup> All information about the company from: <https://ilot.edu.pl/> [access: 26.08.2019 r.].

Assessment criteria	Project assessment
Degree and type of innovation	High degree of innovation. Type of innovation: technical, environmental
Type of financing/aid	Aid: non-returnable subsidy
Degree of repeatability of the implemented solution and the possibility of implementing good practice by other entities	Project is addressed to a broad scope of stakeholders: entities from the aeronautics industry, buyers of aircraft, business environment, regional and central authorities - affecting the high potential for commercialization of the developed technology and the potential for repeatability of good practice. The universality of the implemented technology, which may be used in the future for various types of vehicles, is particularly important in this context.
Range of impact of good practice	Range of impact: local, regional, national
Impact of good practice on regional innovation policy/regional development	Development of an innovative technology and initiating its production in the Mazowieckie Voivodeship might positively affect region's competitiveness and innovativeness. Good practice might also contribute to the development of entrepreneurship and cooperation in the field of R+D works given the fact of the increased recognition of the Institute and its opinion as a reliable and trustworthy business partner. Implementation of good practice has an impact on regional innovation policy and regional development by: <ul style="list-style-type: none"> <li>- commercialization of results of R+D works</li> <li>- increase of an income of the enterprise</li> <li>- establishing cooperation with foreign partners</li> <li>- increase in revenues from the sale of new technologies.</li> </ul>
Impact of good practice on the implementation of RIS	The project is coherent with the smart specialisation of the region. Implementation of the project will contribute to the achievement of following objectives of RIS: <ul style="list-style-type: none"> <li>- increasing and strengthening cooperation in innovation development processes – by developing forms of cooperation in the business-science-environment relation, increasing the activeness of business entities, and intensifying scientific research works, results of which correspond to the needs of entrepreneurs.</li> <li>- increasing the internationalisation focused on</li> </ul>



Assessment criteria	Project assessment
	<p>development of innovation in Mazowieckie Voivodeship – by increasing the activity of entrepreneurs on the international arena and increasing the number of international research and development projects.</p> <p>- increasing effectiveness of support and financing of pro-innovation activities in the region – by supporting entrepreneurs.</p>

Source: desk research analysis, analysis of the results of CAWI and IDI research methods.

**Figure 22 Innovative flight stabilization system with the use of trimmers - pictures of the project**



Developing a stabilization system using trimmers



Promotion of the effects of implemented project



Flight Management Systems for the stabilization of the flight of an aircraft

Source: Company's pictures.

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## Innovative, multi-fuel power generator as the basic and auxiliary power supply system of the charger for quick charging of electric cars with elements of SMART-GRID functionality

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GEECOGEN is a technology company specialising in the electrical mobility industry and seeking environmentally friendly solutions. The company implements the production of modular fast electric car charging stations. Having its own resources and cooperating with related companies (including Elimen City, Elimen Racing, CityEL), GEECOGEN uses the resources dedicated to solutions for electric mobility<sup>41</sup>.

The objective of the project implemented under Smart Growth Operational Programme 2014-2020 - Measure 1.2. *Sectoral R+D programs* was to conduct industrial research and development works on the prototype of an innovative, multi-fuel power generator as the basic and auxiliary power supply system of the charger for quick charging of electric cars with elements of SMART-GRID functionality. The total cost of the project was PLN 5 899 686,96. Good practice concerned the thematic area infrastructure and scientific potential/research and innovation capacity.

The project resulted in developing a product innovation in the form of a modular power generator working with batteries, powered by LPG or gasoline, with increased efficiency and reduced emissivity, serving as a complementary or basic power supply for electric car charging stations, in various charging standards. Conventional, currently available on the market solutions are based on one high power inverter, which, in the event of an emergency, affects the charging station proving it impractical, therefore it was significant to develop an innovative, alternative solution.

Good practice is characterised by a high potential for its broad use - the result of the project ensures also the possibility of its alternative use in a mobile form, as an electric car charger (functionality: "range-extender"<sup>42</sup>) for electric cars. Both cases assume the use of LPG alternative fuel or gasoline as the energy carrier. In both cases the aim is to use alternative LPG fuel or, alternatively, gasoline as the energy carrier. The solution under good practice will be ecological by reducing emissions in the production of electricity for electric mobility, it will also affect the more efficient use of energy infrastructure for electric vehicles by reducing the load on the network, enabling the possibility for more cars to be charged.

Key functionalities of the project result consist of:

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<sup>41</sup> All information about the company from: <https://geecogen.com/o-nas/> [access: 26.08.2019 r.].

<sup>42</sup> A system designed to increase the range of electric vehicles

- supplementary power supply for the charging station (for example, 100 kW of charging power may be obtained from: 25kW connection to the power grid, 25kW from 5 generator modules of 5kW each, 50kW from the charging station's energy buffer), where the energy carrier for the generator is LPG, considerably reducing the load on the energy network during the development of the electric mobility market
- use of the buffer of the energy of the charging station (battery) as an auxiliary element for the power grid (Charger-to-Grid operation similarly to Vehicle-to-Grid, as part of an intelligent power grid)<sup>43</sup>,
- the use of the generator as a mobile electric car charger, with LPG as the energy carrier (functionality: "range-extender").

Good practice is characterised by high potential for commercialisation and for repeatability by other entities due to its considerably broad group of target recipients - petrol stations are one of the main groups of recipients of project's results. Another potential group of recipients constitute entities which include in their activities a strategy for promoting electric mobility, e.g. electric water equipment or vehicle rentals, such as scooters or go-karts. The next group of recipients are electric bus manufacturers or transport companies. Public transport management boards of larger cities (Warsaw, Kraków, Sosnowiec, Jaworzno, Polkowice, Gdańsk and Wrocław) also express their interest in electric buses. The next target groups consist of courier companies, including DHL (which in Germany has already started the process of replacing the car fleet with electric vehicles). The main recipients of the project's result may also include: electric vehicle charging infrastructure operators (e.g. Slovak GREENWAY which started building a network of charging stations also in Poland), developers and local government units - due to the requirements of installing electric car charging stations as part of new investments, or producers of solutions for electromobility in the field of infrastructure.

Assessment criteria	Project assessment
Degree and type of innovation	Very high degree of innovation. Type of innovation: technical
Type of financing/aid	Aid: technical, economical, non-returnable subsidy
Degree of repeatability of the implemented solution and the possibility of implementing good practice by other entities	The possibility of establishing cooperation and adopting good practice by other entities might be possible due to the favourable market environment and the demand for this innovation in the context of breakdown frequencies of currently used solutions.

<sup>43</sup> The Vehicle-to-grid (V2G) system connects an electric vehicle to the power grid/charging station. The concept of Charger-to-Grid was developed similarly to this method, involving the use of the energy buffer of the charging station (battery) as an element supporting the power grid.

Assessment criteria	Project assessment
	<p>The key assumption regarding the implementation of good practice by other entities is to provide a ready-made, scalable solution that facilitates the installation of fast charging stations in locations with a limited connection to the power grid.</p> <p>The result of the project will consist of a new service intended for a new target group: the generator can be used as a mobile charger in various charging standards (CHaDEMO, COMBO 2) as a device connected at the DC output with CAN - as a portable charger for taxi, pizza cars, couriers. Basing on the results it is possible to develop a new emergency charging service for electric cars, in the form of a mobile service.</p>
Range of impact of good practice	Range of impact: international
Impact of good practice on regional innovation policy/regional development	<p>An innovative solution developed as part of the project has a potential to further develop electromobility both in Poland and globally. Due to its experience and developed innovative technology the company became a partner in the innovative project <i>Elimen Racing</i> and <i>Elimen City</i>, concerning the introduction of an electric rallycross racing car and an ultralight electric delivery car for urban use on the global market.</p> <p>Implementation of good practice has an impact on regional innovation policy and regional development by:</p> <ul style="list-style-type: none"> <li>- commercialization of results of R+D works</li> <li>- increase of an income of the enterprise</li> <li>- establishing cooperation with foreign partners</li> <li>- increase in revenues from the sale of new technologies.</li> </ul>
Impact of good practice on the implementation of RIS	<p>The project is coherent with the smart specialisation of the region. Implementation of the project will contribute to the achievement of following objectives of RIS:</p> <ul style="list-style-type: none"> <li>- increasing and strengthening cooperation in innovation development processes – by developing forms of cooperation in the business-science-environment relation, increasing the activeness of business entities, and intensifying scientific research works, results of which correspond to the needs of entrepreneurs.</li> </ul>

Assessment criteria	Project assessment
	<ul style="list-style-type: none"> <li>- increasing the internationalisation focused on development of innovation in Mazowieckie Voivodeship – by increasing the activity of entrepreneurs on the international arena and increasing the number of international research and development projects.</li> <li>- increasing effectiveness of support and financing of pro-innovation activities in the region – by supporting entrepreneurs.</li> </ul>

*Source: desk research analysis, analysis of the results of CAWI and IDI research methods.*



**Figure 23 Innovative, multi-fuel power generator as the basic and auxiliary power supply system of the charger for quick charging of electric cars with elements of SMART-GRID functionality - pictures of the project**



The cylinder head of the ACC Engine system



Assembled functional ACC  
Engine prototype



Charging the world's first electric car dedicated to rallycross  
with the use of the GEECOGEN modular system

*Source: Company's pictures.*



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## The world's first intelligent anti-collision system based on data transmission by VLC light communication designed to improve safety of road and rail transportation

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Wojskowa Akademia Techniczna (Military University of Technology) is a public university supervised by the Ministry of National Defense. The university serves both the Armed Forces and science, the economy and the society by educating cadets and students, developing research and teaching staff, and conducting research and development works in the areas of exact science and technical and social sciences<sup>44</sup>.

Project implemented under Submeasure 4.1.2. *Regional Science and Research Agendas* of Smart Growth Operational Programme aimed at the development of an integrated anti-collision system intended for rail vehicles in urban traffic (trams), using an innovative signal transmission system with VLC (Visual Light Communication) technology. The system adopted the innovative use of the LED lighting technology and the signal transmission using VLC light to transmit information, aiming at preventing accidents involving trams and to autonomously support tram vehicles. Total cost of the project was PLN 4 049 067,00.

Good practice concerns thematic areas of infrastructure and scientific potential/research and innovation capacity, and public-private cooperation in the scope of research and innovation. The implementation of the project answered the challenges in the context of the need to increase the level of safety in urban traffic. As a result of the implementation of the project it was possible to develop a technical innovation, launch the designed devices and conduct preliminary verifications of the OP Smart Growth operation.

The results of conducted B+R works should meet the interest of a broad scope of stakeholder due to the universality of the problem of insufficient road safety in larger urban areas. City managers are the main stakeholders of the project results.

Assessment criteria	Project assessment
Degree and type of innovation	Very high degree of innovation. Type of innovation: technical
Type of financing/aid	Aid: economical, non-returnable subsidy
Degree of repeatability of the implemented solution and the possibility of implementing good practice by other entities	The high potential for the repeatability of good practice is related to the fact that the technology developed as part of the project responds to the demand in the context of developing a solution that would improve the level of public transport safety.

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<sup>44</sup> All information about the company from: <https://www.wat.edu.pl/o-uczelni/> [access: 26.08.2019 r.].

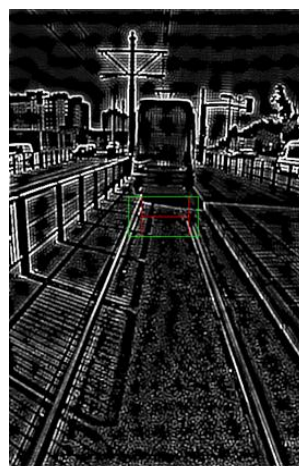
Assessment criteria	Project assessment
	Developed image recognition systems ensure the possibility to use this technology in other areas, determining the partners' interest in the good practice, as well as extending R+D works in this area.
<b>Range of impact of good practice</b>	Range of impact: national, international
<b>Impact of good practice on regional innovation policy/regional development</b>	<p>Development of innovative technology results in the increase of innovativeness and competitiveness of a scientific unit which is considerably significant for the Mazovian region. Technology developed as part of implemented project responds to the needs related to the use of technology improving the level of safety in land traffic.</p> <p>Implementation of good practice has an impact on regional innovation policy and regional development by:</p> <ul style="list-style-type: none"> <li>- commercialization of results of R+D works</li> <li>- increase of an income of the enterprise</li> <li>- establishing cooperation with foreign partners</li> <li>- increase in revenues from the sale of new technologies.</li> </ul>
<b>Impact of good practice on the implementation of RIS</b>	<p>The project is coherent with the smart specialisation of the region. Implementation of the project will contribute to the achievement of following objectives of RIS:</p> <ul style="list-style-type: none"> <li>- increasing and strengthening cooperation in innovation development processes – by developing forms of cooperation in the business-science-environment relation, increasing the activeness of business entities, and intensifying scientific research works, results of which correspond to the needs of entrepreneurs.</li> <li>- increasing the internationalisation focused on development of innovation in Mazowieckie Voivodeship – by increasing the activity of entrepreneurs on the international arena and increasing the number of international research and development projects.</li> <li>- increasing effectiveness of support and financing of pro-innovation activities in the region – by supporting entrepreneurs.</li> </ul>

Source: desk research analysis, analysis of the results of CAWI and IDI research methods.

**Figure 24 The world's first intelligent anti-collision system based on data transmission by VLC light communication designed to improve safety of road and rail transportation - pictures of the project**



Effect of the project – intelligent anti-collision system



Presenting effects of the data transmission by VLC light communication



Test of the data transmission by VLC light communication for the improvement of the safety in public transport – part 1



Test of the data transmission by VLC light communication for the improvement of the safety in public transport – part 2

*Source: Company's pictures.*

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## R+D works on developing a detailed design for an innovative installation for the separation of refrigerant waste mixtures

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The PROZON Climate Protection Foundation is a non-commercial institution focusing on works in the scope of ozone depleting substances - the main objective of the foundation is to support undertaken activities aiming at the reduction of the emission of ozone-depleting substances (i.e. freons and halons) and to increase environmental awareness among users of these substances. Institution conducts activities related to the smart use of HFC components (so called f-gases) and the reduction of their emission into the atmosphere. These substances are currently being used in air conditioning and refrigeration systems in the European Union. Prozon focuses on this aspect due to their high risk for contributing to the greenhouse effect<sup>45</sup>

The project with a total value of PLN 492,000 was implemented under the sub-measure 2.3.2. of OP Smart Growth<sup>46</sup>. It aimed at the development of an executive design of an innovative installation for the separation of refrigerant waste mixtures. New laboratory installation was developed and constructed as part of the project, ensuring the possibility to conduct tests and the separation of refrigerant mixtures. The key objective of the project was to develop a design of such installation. Such conduct will lead to the possibility to reuse the substances by refrigeration service technicians, therefore limiting their damaging emissions to the atmosphere.

Conducted R+D works led to the development of a detailed design that aims at the reduction of the emission of refrigerant substances into the atmosphere, enabling their separation into homogeneous substances. Good practice is characterized by a considerably high degree of innovativeness on a global scale given the fact that a similar solution has not been used before. Implementation of the project will positively impact the natural environment by limiting the emission of refrigerants to the atmosphere. The solution will also contribute to the protection of the natural environment and answer the need for an innovative technology in this field. The innovation and usability of the implemented technology translates into a broad scope of its use on the international market, not only in Europe but also in the United States. Good practice was already met with interest from entities from European countries (Italy, Spain, Germany) which expressed the desire to implement developed technology. Furthermore, the implementation of the project might contribute to establishing cooperation in the field of further R+D works on the detailed design adopting the potential of technology to develop other solutions based on the effects of the completed project.

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<sup>45</sup> All information about the company from: <http://prozon.org.pl/> [access: 26.08.2019 r]

<sup>46</sup> The project is set to be completed and settled by 30.11.2019.

Effects of the project are intended for a broad range of end users - predominantly to service technicians and operators of refrigeration and air-conditioning equipment, but also to technical schools and universities.

The key factor of the good practice is the fact that implemented project concerns activities in the field of the natural environment and climate change. It results in the transfer of technology and contributes to the development of cooperation between universities and enterprises in the voivodeship, but it also increases the scientific research and technological development and contributes to the innovativeness of the region.

Assessment criteria	Project assessment
<b>Degree and type of innovation</b>	Very high degree of innovation. Type of innovation: technical, environmental, economic
<b>Type of financing/aid</b>	Aid: non-returnable subsidy
<b>Degree of repeatability of the implemented solution and the possibility of implementing good practice by other entities</b>	Good practice is characterized by a high degree of repeatability, which was also one of the key objectives of the implemented project. Other entities have already expressed interest in the effects of the project. The PROZON Foundation received letters of intent from, inter alia, Italy, Spain and Germany from enterprises interested in using similar installations for the effective reduction of refrigerant emissions to the atmosphere. Due to the high innovativeness of the solution and the fact that this type of technology has not yet been used in other countries it will be possible to implement developed detailed design on a large scale. Good practice responds to the needs for the environmental-friendly solutions.
<b>Range of impact of good practice</b>	Range of impact: international
<b>Impact of good practice on regional innovation policy/regional development</b>	With the use of the modern technology that has not been used before anywhere in the world, implemented project increases the region's level of innovativeness, also contributing to the development of cooperation between universities and the SME sector, which may have a further impact on the possibility of undertaking R+D works in the future. The project responds to the needs of the region in the context of innovative solutions for environmental protection. New jobs are also being created as part of the project. Implementation of good practice has an impact on



Assessment criteria	Project assessment
	<p>regional innovation policy and regional development by:</p> <ul style="list-style-type: none"> <li>- commercialization of results of R+D works</li> <li>- increase of an income of the enterprise</li> <li>- establishing cooperation with foreign partners</li> <li>- increase in revenues from the sale of new technologies.</li> </ul>
<p><b>Impact of good practice on the implementation of RIS</b></p>	<p>The project is coherent with the smart specialisation of the region. Implementation of the project will contribute to the achievement of following objectives of RIS:</p> <ul style="list-style-type: none"> <li>- increasing and strengthening cooperation in innovation development processes – by developing forms of cooperation in the business-science-environment relation, increasing the activeness of business entities, and intensifying scientific research works, results of which correspond to the needs of entrepreneurs.</li> <li>- increasing the internationalisation focused on development of innovation in Mazowieckie Voivodeship – by increasing the activity of entrepreneurs on the international arena and increasing the number of international research and development projects.</li> <li>- increasing effectiveness of support and financing of pro-innovation activities in the region – by supporting entrepreneurs.</li> </ul>

*Source: desk research analysis, analysis of the results of CAWI and IDI research methods.*



**Figure 25 R+D works on developing a detailed design for an innovative installation for the separation of refrigerant waste mixtures - pictures of the project**



Apparatus used for the tests in the laboratory - part 1



Apparatus used for the tests in the laboratory - part 2



Promotion of the effects in the PROZON company

*Source: Company's picture*

## Conclusions from conducted analysis

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Supporting the implementation of projects characterised by a high degree of innovation constitutes a key factor in economic development, both in regional and national terms. However, in order to ensure the largest possible effects, the support has to be coherent with conditions of the local and regional economy, including in particular the activities and measures undertaken by enterprises operating in this area. Given above, support intended for the implementation of projects in the scope of smart specialisation of the region is crucial for the development of the Mazovia region. Such aid stimulates the development of innovation in sectors and niches of local and regional enterprises, encouraging cooperation between economic and scientific environments.

Conducted research made it possible to analyse good practices implemented in the areas of smart specialisation of Mazovia - it should be emphasized that the effects of implemented projects will have an impact on the regional development of the entire Mazowieckie Voivodeship.

Identified and selected examples of good practices are related to various thematic objectives coherent with the smart specialisation, resulting in the cohesion with regional innovation policy and the impact on the implementation of all strategic objectives of the Regional Innovation Strategy for Mazovia, that is:

- Increasing and strengthening cooperation in innovation and innovativeness development processes;
- The increase of internationalisation focused on the development of innovativeness of the Mazowieckie Voivodeship;
- Increase in the effectiveness of support and financing of pro-innovation activities in the region;
- Creating and promoting pro-innovative and entrepreneurial attitudes conducive to creativity and cooperation;
- Development of the information society.

Moreover, due to the implementation of individual projects it will be possible to achieve such objectives as: increasing the region's competitiveness, attracting new investors to the Mazowieckie Voivodeship, improving the quality of life of residents, increasing the safety of residents, increasing the number of enterprises, increasing employment, increasing cooperation of private entities operating in the region with regional universities.

All projects have an impact on at least regional scale. Attention shall be drawn to the fact that the international impact of the project is difficult to achieve due to high competitiveness on the global market. Furthermore, given the characteristics of projects, the international impact of them can only be achieved in the longer term. All implemented projects are innovative, because of which the interest of international entities in the region/country would increase only after projects' implementation. Despite this fact, some of selected good practices (e.g. organ storage system) achieved high interest from foreign entities already at their research stage, therefore it should be concluded that some among good practices might achieve international impact later in the future, creating opportunities for further strengthening of the regional economy.

Attention should be drawn to the fact that implementation of innovative projects significantly differs from the typical aid offered to enterprises. Each of these projects is characterised by the so-called "element of novelty" which might influence other entities operating in a given industry. It is, therefore, significant to ensure a sufficient promotion of offered aid. The catalog of good practices developed as part of this research may also constitute a source of knowledge concerning new products/solutions for the recipients (target groups targeted by a given product/service).

Good practices subjected to the analysis are characterised by a high level of repeatability and the possibility to be implemented also by other entities. Projects are innovative, therefore in order to repeat similar project a special focus should be put on securing an adequate infrastructure of the entity and employing a competent staff.

Beneficiaries observed a significant amount of the support intended for projects, including technical aid or non-returnable subsidies. Project participants would be supported in the process of submitting applications, allowing them to prepare complete documentation necessary to obtain aid under individual competitions (according to beneficiaries, support at this stage was particularly useful).

However, respondents mentioned difficulties during the CAWI research with beneficiaries of the Regional Operational Programme of Mazowieckie Voivodeship and the Smart Growth Operational Programme, implementing projects in Mazowieckie Voivodeship, and with entities operating in the areas of smart specialisation of the region. Such obstacles were related both to the implementation of individual good practices and to procedural problems concerning obtaining subsidies.

The most frequently observed problems related to preparing the complete documentation necessary to obtain funding and the settlement of the project. According to respondents,

due to the highly innovative nature of projects it was considerably difficult to estimate the exact costs of the implementation and to prepare a detailed work schedule.

Some of beneficiaries reported also a problem relating to the cooperation with scientific units. For small enterprises it was a considerable difficulty to find a scientific partner with the ability to conduct relevant scientific researches. Medium and large companies frequently cooperated with universities and had knowledge where to seek information on opportunities to establish cooperation.

Respondents drew their attention to the achievements of final effects of projects. According to beneficiaries, competitions implemented under programmes for support intended for innovative projects are mainly focused on granting funding at the initial phase (for the idea to be developed), which proves it difficult for potential beneficiaries to find information about the possibility of obtaining support during further stages of work, that is the implementation of already developed technology. Therefore, it is significant to conduct promotional activities aimed at popularising information for potential beneficiaries, concerning the possibility of obtaining support for both the research and development works as well as for the stage of implementation of results of conducted research.

Respondents participating in the research believe that the work undertaken as part of projects is crucial for the development of the region. However, there is a lack of regular publishing of studies on good practices (innovative activities) that would include identification of key problems, challenges for beneficiaries, and local and regional needs.

## Recommendations for the authorities of the Mazovia Region

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Development of modern technologies has a significant impact on the competitiveness of the region. In this way, a competitive advantage is stimulated, which may affect the development of a particular area. Appropriate economic and technical background attracts potential investors and it also translates into the quality of life of the inhabitants in the given area. The proposed good practices are characterized by a high level of uniqueness in the global scale. Beneficiaries who have been granted the aid for the implemented projects may contribute significantly to the development of the Mazowieckie Voivodeship. The projects are coherent with the Mazovia Region's smart specialization and respond to the needs of the local economy.

All projects are connected to the potential of the region and, due to a broad thematic scope, their implementation affects the achievement of all strategic objectives identified in a Regional Innovation Strategy for the Mazovia Region, that is:

- increasing and strengthening cooperation in the processes of innovation and innovativeness development;
- increasing internationalisation focused on the development of innovativeness of the Mazowieckie Voivodeship;
- increase in the effectiveness of providing aid and financing for pro-innovation activities in the region;
- developing and promoting pro-innovative and entrepreneurial attitudes conducive to creativity and cooperation;
- development of the information society.

Moreover, good practices are also coherent with the European and global development trends (especially in the field of medicine or intelligent management systems, affecting e.g. mobility development), which may contribute to the success of the entities implementing them. All entities are also characterized by appropriate technical facilities, staff and R+D cooperation. Given that all projects have unique characteristics and they respond to the needs identified in the RIS, they should constitute a role model for potential beneficiaries.

The data analysis proved a synergy between the applied regional development policy measures/instruments (ROP) and national programmes. Therefore, there was no conflict between possibilities to provide funds for individual projects from different programmes.

An increase in the role of returnable financing instruments for innovative projects investments can be expected in next programming periods. According to the representatives

of the Ministry of Investment and Economic Development returnable instruments enable more effective use of public funds as they can be reused to realize other investments<sup>47</sup>. Beneficiaries, on the other hand, appreciated the opportunity for subsidies under organized contests. However, some challenges were identified and they should be analyzed by the regional authorities.

According to some beneficiaries, conducting joint projects, i.e. R+D and implementation, should be considered. Some entrepreneurs expressed their concern that they would not be able to receive co-financing necessary at the implementation procedure stage. This translates into difficulties to achieve assumed results and objectives. Therefore, more efforts should be made to promote co-financing opportunities in the framework of the contest, to implement the results of R+D works. In this way, beneficiaries will get more information on realization of the entire project (instead of just the development stage). It is recommended to prepare a publication focused on co-financing in case of preparation and implementation of a solution.

Survey participants also drew their attention to a relatively low number of solutions dedicated for start-ups. According to them, such companies often have highly innovative ideas but do not have adequate financial capabilities. What is more, entities frequently do not have knowledge about the possibility to acquire the co-financing, and the contest procedure is too complicated for them. It is recommended to organize cyclic contests such as "Start from the Mazovia Region". Organized competitions should enable startups to acquire the funds, but also required advisory support. Contests should provide the opportunity to take part in workshops that supply information on legal, financial, business and implementation issues.

Participants of CAWI and IDI surveys frequently pointed out problems related to cooperation with research institutions. These problems regard mainly difficulties to find information about the cooperation opportunities (e.g. laboratories in individual universities, a desire to cooperate with the private sector, etc.). Given above, it is recommended to create a special tab in the website, focused on clear and transparent information in this field. Preparation of a list of universities in the region which have adequate laboratory facilities and offer of the universities in terms of use of both, the equipment and the experience and knowledge of the members of a particular faculty.

In the opinion of the survey participants, the information in the website is not sufficient. Although there are descriptions of specializations, there is no information so broadly

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<sup>47</sup> <https://www.funduszedlamazowska.eu/aktualnosci/nie-tylko-dotacje-czyli-rzecz-o-instrumentach-finansowych-w-projektach-unijnych/> [access: 26.08.2019 r.].



described in RIS, i.e. a regional potential, objectives, links with the smart specialization. Number of examples of the good practices being implemented within contests is also short. It is recommended to promote publications on good practices and update of the website (smart specializations tab) and supplementation of the information regarding the good practices.

Experts pointed out the fact that the basic errors of beneficiaries in the contest documentation have been constantly repeated. This frequently results in extension of the entire co-financing acquisition process or even rejection of very interesting ideas due to the lack of accurate and specific information in this area. Such situation can be avoided by encouraging gaining the experience of others, by publishing a guide of the most common mistakes made by the beneficiaries of the contest. Such measure should be accompanied by the promotion of trainings and offering publicly available materials in this scope, or using good practices during study visits.

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