

SOCIAL INNOVATION IN SOLVING SIGNIFICANT AND COMPLEX PROBLEMS OF THE MAZOVIA REGION

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Purpose: The purpose of this study is to demonstrate the role of social innovation in solving significant and complex problems of the Mazovia region by using the results of research conducted at the university and thus supporting the achievement of sustainable development goals by the university.

Design/methodology/approach: The paper describes the results of workshops organized for scientists from all over Poland by 2 universities, i.e. the Warsaw University of Technology and the University of Warsaw. The main objective of the workshops was an attempt to identify studies conducted by their participants, the results of which could contribute to solving specific problems of the region. This publication also refers to the results of the Lean Management in Healthcare project aimed at improving the Polish health care system, and thus also at solving a very important social problem.

Findings: Although the nature of these 2 projects was different, they had one objective, which was to use research results in solving important social problems. The first project can be considered as an equivalent of a technological-push model, while the second one corresponds to the market-pull model.

Research limitations/implications: The article contains preliminary research related to proposing the use of conducted research to solve important social problems.

Practical implications: The article can help to establish cooperation between scientists and other institutions in using the conducted research for a new purpose of solving social problems, but also be an inspiration for further search for them by modifying or planning new research.

Social implications: The development of the proposed new directions of using the conducted research may contribute to solving important social problems. This should be the role of research conducted in universities to fulfill all their missions.

Originality/value: An attempt to combine the social problems of Mazovia with specific research carried out by the participants of the workshops should be considered a novelty. Many participants admitted that thanks to this workshop they were motivated to continue working on a new way of using the results of their research.

Keywords: social innovation, third mission of universities, social responsibility.

Category of the paper: Case study.

1. Introduction

Recently, social innovation has become a very popular topic for research and an area of support from authorities at regional, national, and international level. This is mainly due to their role in solving significant social problems, such as unemployment, socio-economic inequalities, digital exclusion, homelessness, ageing population, civilization diseases and many others.

Social innovation can be defined in many ways. According to L. Białoń: “Social innovation consists of implemented projects aimed at creating a social change, resulting in an increase in the well-being of society (level and quality of life) and creating new forms of interpersonal relations, leading to: preventing social disintegration, increasing the democratisation of life and strengthening social capital” (Białoń, 2015, p. 6).

It is worth emphasizing the role of social innovation in solving important social problems. According to J.A. Phills Jr., K. Deiglmeier, D.T. Miller the term “social innovation” refers to “a novel solution to a social problem that is more effective, efficient, sustainable, or just than existing solutions and for which the value created accrues primarily to society as a whole rather than private individuals” (Phills, Deiglmeier, Miller, 2008, p. 36).

In Polish literature, one of the first authors who specified the concept of social innovation is B. Ileczo (Białoń, 2015), according to whom it refers to interpersonal relations and improves various aspects of human life (Ileczo, 1973). The essence of social innovation can be described as follows (Białoń, 2015):

- new ideas – a new way of organising actions and interpersonal relations,
- permanent changes,
- social innovation is innovation in human capacity to organise and finance social and economic undertakings,
- new solutions to social problems,
- ideas inspired by the intention of the good of society,
- creation, development and implementation of new ideas for products and services,
- new or improved actions and solving social problems,
- new forms of social relations, including institutional and organisational innovation, new forms of production and consumption and new relations between social and economic development,
- exploiting social and environmental incentives, creating new ways of working, new products and services,
- new rules aimed at social objectives,
- new solutions, being more efficient, productive and stable than the already existing ones, create social values, relate to different sectors; they can be products, processes and technologies.

In the context of the above characteristics of social innovation, it is also worth referring to the so-called “third mission” (TM) of universities, that means that they should become “engines that contribute to the social, economic and cultural development of the regions in which they operate, by transferring knowledge and technologies to industry and to society at large” (Compagnuccia, Spigarelli, 2020, p. 1). Therefore, it is worth emphasizing that the use of the results of research conducted at universities, especially in the context of solving significant social problems, fits into the third mission of universities, proves their social responsibility, and supports the objectives of sustainable development.

The approach to innovation based on co-creation by the members of a community, to which they refer, is key to creating and implementing social innovation. “Co-creation/co-production seems to be considered as a cornerstone for social innovation in the public sector” (Voorberg, et al., 2014, p. 22) and is a new form of social responsibility of science. According to some researchers, social innovation is a critical type of innovation (Pol, Ville, 2009) necessary to solve many complex problems (Moore, Westley, 2011).

Social responsibility of universities, like the responsibility of any organisation, can be defined as the responsibility for the impact of its decisions and actions on the society and the environment, provided through transparent and ethical conduct, which (The International Organization for Standardization, 2010, p. 3):

- contributes to sustainable development, including prosperity and health of society,
- takes into account the expectations of stakeholders,
- is compliant with applicable law and is consistent with international standards of conduct,
- is integrated into the organisation’s activities and practised in its relations.

While talking about the social responsibility of universities, it is worth mentioning the national programme “Social Responsibility of Science” financed by the Ministry of Education and Science, the aim of which is to support entities of the higher education and science system and other organisational units involved in the dissemination of science in the implementation of projects aimed at popularizing science or promoting academic sports and projects related to the maintenance of library resources important for science or its heritage (Ministry of Education and Science, 2019).

This is the programme, within the framework of the project “Social responsibility of Science – from promotion to social innovation”, which financed workshops aimed at popularizing the concept of social responsibility of science, in particular the role of researchers in this process, as well as acquiring useful knowledge by their participants in the field of: social responsibility of science, current social problems of Warsaw and Mazovia, academic entrepreneurship and creating social innovations.

One of the organizers of the workshops was the Warsaw University of Technology which has a rich tradition of taking into account social aspects in the conducted research or highlighting their importance in the management of production enterprises. This opinion can

be confirmed by the work of prof. Karol Adamiecki, employed at the Warsaw University of Technology since 1919, who many years ago noticed that when managing an industrial plant one should assess the results of work from many points of view, taking into account the benefits for a given industrial plant, for the whole industry, for employees, for the capital contributed to the industrial plant, and finally for one's own manager. However, he considered that "the general public balance stands above all said balances. As citizens of a civilised country, we do not have the right to summarise the results of our work from any perspective, when we ignore the interests of general social interests" (Adamiecki, 1970, p. 110).

2. Workshops „Whether and why turn research results into social innovation?”

The main objective of the workshops organized by the Warsaw University of Technology and the University of Warsaw was an attempt to identify studies conducted by their participants, the results of which could contribute to solving specific problems of the region. Both individuals with experience in conducting research projects and implementation activities, as well as those at the beginning of their scientific path, including doctoral students, could participate in the workshops.

The participants of the workshops received a number of practical tips on analysing the ongoing research work in the context of creating social innovations (impact of scientific activities on the functioning of society and the economy). In order to identify significant and complex issues of Mazovia, assuming that social responsibility of science is aimed, among other things, at responding to existing social problems, analysing them and searching for solutions, an approach related to creating social innovation was adopted, based on the six-phase process of social innovation indicated by Murray, Caulier-Grice and Mulgan, (2010). The individual phases of the model are as follows (The Young Foundation, 2012):

- Prompts (which highlight the need for social innovation).
- Proposals (where ideas are developed).
- Prototyping (where ideas get tested in practice).
- Sustaining (when the idea becomes everyday practice).
- Scaling (growing and spreading social innovations).
- Systemic change (involves re-designing and introducing entire systems and will usually involve all sectors over time).

Due to the objectives and scope of the project ("Social responsibility of Science – from promotion to social innovation", four first phases of social innovation were used, while the fourth phase was completed by popularising the designed solutions, without developing a business model.

In order to identify social problems of Mazovia, the authors of the study reviewed scientific literature aimed at determining the role of social responsibility of science in solving complex social problems. The second stage was the analysis of the existing data concerning the Mazovian voivodship in terms of social and economic diversity and the indication of implications for the process of identifying social problems. An important role in the process of identifying the region's main problems was also played by an analysis of the main strategic documents aimed at creating a wide list of problems and challenges identified therein. Two documents were analyzed in particular: "Strategy of the Mazowieckie Voivodship until 2030" and "#Warsaw2030 Strategy". In these documents, the identified problems were based on an earlier overview of existing sources and studies. When identifying problems, authors answered the following questions (Hołdanowicz et al., 2020):

- What is the key problem to solve and why is it important?
- Who is concerned by the identified problem?
- What is the socio-cultural context of this problem?
- Why is it important to solve the problem? –What evidence proves this?
- Can the problem be solved in different ways?

The answers to these questions allowed the identification the problems listed in Table 1.

Table 1.
Identified problems in both strategies

No.	Area	Problem	Capital city of Warsaw	Mazovian Voivodship	Common
1.	Society and culture	Lack of social involvement, poor social ties, and sense of local identity	x		
2.	Society and culture	Low openness to changes and diversity of inhabitants	x		
3.	Society and culture	Low institutional performance	x		
4.	Society and culture	Reinforcement of social exclusion (increasing social stratification)		x	
5.	Society and culture	Uncontrolled migration		x	
6.	Space	Low tourist attractiveness of the region		x	
7.	Space	Low use of the potential of cities as centres of cultural activity		x	
8.	Society and culture/Economy	Untapped potential of the creative sector			x
9.	Society and culture	Ageing population			x
10.	Society and culture	Insufficient access to basic services (i.e. health care, social assistance) and social infrastructure tailored to the needs of the local population			x
11.	Society and culture	Low level of social capital			x
12.	Society and culture	Digital exclusion and low digitalization			x
13.	Society and culture/ Space	Low care for cultural heritage			x
14.	Space	Insufficiently met housing needs, non-subordination of the communal real estate management to the city's land-use policy	x		

Source: Hołdanowicz et al., 2020, p. 55.

The workshops focused mainly on using the research conducted by the participants to solve the identified problems, but this did not prove possible in all the cases. In such situations, participants of the workshop were asked to work in groups and try to identify an appropriate research centre of the Warsaw University of Technology, the employees of which could be interested in trying to solve a defined problem through research results from the group of priority areas of the university, including (Warsaw University of Technology, 2021):

- Photonic technologies (focused on the development and research of a new generation of photonics and on the development of modern technologies based on the use of light).
- Artificial intelligence and robotics (work focused on crossing the areas of artificial intelligence, robotics and applied mathematics).
- Cybersecurity and data analysis, including biomedical data analysis, BigData processing and data stream analysis, machine learning methods, mathematical basis for data analysis.
- Biomedical technology and engineering (development of new diagnostic methods in the treatment of civilisation diseases, especially in the areas of oncology and cardiology).
- Material technologies (concerns issues related to the development of new materials and technologies of breakthrough importance for science and economy, including nanotechnologies and incremental technologies).
- High energy physics and experimental technique, and the physics of nuclear collisions, plasma physics, quantum computers, their electronic, programming, mechanical, structural experimental techniques.
- Conversion and storage of energy applies in particular to issues related to batteries, fuel cells, power electronic converters, photovoltaics and solar energy.

As a part of the workshops, the following ideas/areas concerning the use of research results to solve significant problems of Mazovia were submitted (Table 2).

Table 2.

Proposed solutions/areas of research that may solve the problems of Mazovia

Problem	Subject of conducted research/potential solution
Increasing of social exclusion and social stratification	Education of children and young people in the scope of generally understood social problems, e.g. presentation of social groups that are in need.
Infrastructure and cultural exclusion of elderly and disabled persons	Lack of access to public places, architectural barriers. Non-invasive monitoring of the elderly living alone.
Homelessness crisis	Exiting homelessness through new solutions in the field of architecture, designing residential buildings based on the needs of a contemporary man.
Inclusive education, remote education in the age of the pandemic, support for students from rural areas	B-learning (combination of remote and stationary learning in very small groups); Remote learning of electronics and programming using low-cost solutions to build a robot at the participant's home.

Cont. table 2.

Deterioration of mental health of the inhabitants of Mazovia (including increase in cases of depression among young people and adults)	A prototype of a device for relaxation between sessions at a psychologist/psychiatrist. Designing residential buildings based on the needs of a contemporary man
Pollution and degradation of the environment	Using biomedical engineering solutions in creating building materials. Research on construction materials that are easy to recycle/using recycled materials (e.g. recycled concrete aggregates, fibre-reinforced composite). Designing residential buildings based on the needs of a contemporary man.
Poor air quality	Artificial intelligence and robotics - used in optimisation of municipal transport. Cheap IoT air quality sensors. Reducing flammability of flexible polyurethane foams.
Low quality of surface waters	Use of a photocatalysis reaction to remove contaminants in water.
Light pollution by artificial light sources	Intelligent light sources.
Carbon footprint emission by data centres and server rooms located in Warsaw	Integrated data and IT services management system (process and system approach). Use of the SOFC (Solid Oxide Fuel Cells) fuelled with natural gas.
Degradation of soil as a result of problems in waste management	Eco-design of packaging to enable more efficient segregation of waste and recycling of used materials.
Noise and light pollution of the "Natura 2000" area	Fuel cells.
Low capacity of the Mazovian region to take-up educated staff	Decision support systems. Increasing the availability of transport (intelligent and autonomous vehicles as a support for transport in the Mazovia urban centres).
Inefficient flow of information between public authorities, science, industry and society	Implementation of artificial intelligence solutions in the exchange of information between the private and public sectors. Communication systems protecting privacy. Low level of information flow in the area of construction materials related to the selective use of their possibilities. Implementation of joint R&D projects of the university and industry, publishing research results.
Ageing population	Creating better conditions for starting families and retaining people in the city. Non-invasive monitoring of the elderly living alone. Designing residential buildings based on the needs of a contemporary man.
Increasing demand for care and nursing services	Analysing the growth rate for the demand for care and nursing services in the Mazovian region. Increasing the number of available day care centres. Prototypes of devices for telemedicine and monitoring of life parameters of the elderly. Remote measurements and provision of results to the doctor.
Low availability of geriatricians, especially at the level of local clinics	Cabinets for doctors for rent. Use of printed sensors for remote, monitoring of condition of patients.
Promoting and developing lifelong learning and digital competences	Training and courses provided by doctoral students for people aged 60 and more.
Not meeting the needs of society in terms of access to basic social services and infrastructure (i.e. health care, social assistance)	Computer - Aided Diagnosis.

Cont. table 2.

Insufficient availability of psychiatric services for children and young people	Lack of availability to qualified and experienced people who would support this social group, e.g. in trained clinics that would be available in hours available to working parents. Devices for relaxation between sessions at a psychologist/psychiatrist (prototype).
Relatively low use of new technologies in the rehabilitation of people with disabilities	Non-invasive monitoring of health in the domestic environment. Use of artificial intelligence to support rehabilitation (e.g. real-time analysis of limb movement). Use of printed sensors for the collection of data about real-time patient's movements, 24/7 remote monitoring.
Degradation of land, unsustainable development	Tree alleys (actions of planting trees for student academic circles and schools). Paint application technology/blasting and waste management. Designing residential buildings based on the needs of a contemporary man. Use of ecological sealing methods such as biocement, polymers.
Insufficient and uneven provision of residents with ecosystem services (e.g. recreation, access to nature, air cooling, noise reduction)	Analysis of the area of the capital city of Warsaw covered by the Local Spatial Development Plan. Coverage of the entire capital city of Warsaw by the Local Spatial Development Plan for the purpose of broad planning of the emerging and transforming city spaces.
Low use of RES (necessity to produce energy from renewable sources)	Storage of energy in the form of hydrogen produced in the process of electrolysis from RES and then its use for continuous production of electricity by means of fuel cells. Lack of education on energy. Designing residential buildings based on the needs of a contemporary man.
Underdeveloped energy storage facilities	Use of innovative 2D materials with high energy storage capacity.
Unused potential of renewable energy production from RES related to biomass and biogas resources	Fuel cells with high electrical efficiency and low greenhouse gas emissions can be fuelled with biogas.
Risk of natural disasters (draught, flood, water deficit, hurricanes)	All POBs (research centres of the university). System for optimising the movement of vehicles on roads (access to services).
Existing water deficit resulting in a more frequent occurrence of drought	Biotechnology and bio-medical engineering. Designing residential buildings based on the needs of a contemporary man.
Deficits in power supply paralysing the city	Photovoltaics, energy storage facilities. Designing residential buildings based on the needs of a contemporary man.
Adapting the city to a changing, more unpredictable climate	Fuel cells.
Low efficiency of waste management	Bioproduction from waste (use of living organisms for the decomposition of organic matter). Designing residential buildings based on the needs of a contemporary man.
Low ecological awareness of residents, characterised by a low degree of waste segregation at source, incineration of waste in domestic boilers, illegal disposal of waste	Shaping the inhabitants' awareness through Science Picnics, conducted by the members of scientific circles. Advertising spots showing the process of waste reuse. Special industrial waste management – problem of neutralisation and disposal. Use of intelligent packaging in the initial waste segregation process.
High costs for residents related to the waste management system	Lack of sufficient places to dispose of plastic waste. Artificial intelligence and robotics - autonomous waste collection truck. Planning the route of waste collection trucks depending on the filling of containers.
Necessity to transport waste over long distances (increase in costs)	Supplying households with filters/catalysts that would absorb pollution and transform pollution into natural substances.

Cont. table 2.

Untapped potential of the creative sector	Construction of tools democratising creation of films, games, music and other artistic and multimedia content (using, for example, Artificial intelligence).
Increased demand for the offer of traditional and social media, films and video games due to the pandemic	Artificial intelligence and robotics (analysis of customer data and profiling).

Source: own research.

As seen from the Table 2, it is possible to use the results of the conducted research in solving important problems of the region and thus assigning them utilitarian character. The results of this cooperation have also confirmed the possibility for the university to support the sustainable development goals.

It is worth emphasizing, that not all problems have been linked to current research or research centres. Such problems include:

- high costs of investment in renewable sources,
- maintaining urban greenery,
- insufficient offer of treatment of addiction for physically disabled, mentally ill and intellectually disabled patients,
- low level of saturation of the regional innovation system with services and business support institutions in the Mazovian region,
- reducing the quality of care provided in overfilled care and nursing facilities,
- excessive sealing of the city surface, resulting in an increase in the surface runoff and drying of soil and creating heat islands,
- hampered use of urban space from the point of view of pedestrians resulting from an inadequate space management,
- limitation of the possibility of introducing new greenery due to the density of development elements (e.g. roads, underground infrastructure),
- crisis in the cultural sector and in the event industry due to the pandemic.

These problems can therefore be an inspiration to initiate new research and establish cooperation to eliminate them and create a more innovative and friendly place for work and living in the Mazowieckie Voivodeship.

3. Example of social innovation in the health sector

An example of other activities in the area of using the results of conducted research in solving significant social problems is the “Lean management in healthcare”. The project was implemented over the period 2015-2018 as part of the Social Innovation programme (project financed from the National Centre for Research and Development funds under contract

no. IS-2/200/NCBR/2015) by a consortium composed of: Medical University of Warsaw, Institute of Psychiatry and Neurology and Polish Society of Health Economics. project in health protection implemented

The main objective of the project was to develop National Standards of value stream mapping and pilot implementation of Lean Management tools in the process of treatment of patients after brain stroke. In an ageing society, a stroke is now a major social problem.

In view of the existing financial and staff shortages in health care, the use of the innovative Lean Management method may constitute an alternative way to increase the effectiveness of the Polish health care system and thus contribute to solving or even minimizing another and very important social problem. It was possible to develop the standards mainly thanks to the involvement of health care institutions, which provided both substantive and practical support in the scope of information on their treatment processes of patients with stroke. These were the following institutions:

1. Institute of Psychiatry and Neurology in Warsaw.
2. Mazowiecki Specialist Hospital in Radom.
3. Mazowieckie Voivodship Hospital in Siedlce.
4. Mazowiecki Bródnowski Hospital in Warsaw.
5. Mazowiecki Hospital Complex in Płock.

The developed LeanOZ standards have an impact on the results on various levels of treatment. These are mainly four types of results (Korkosz-Gębska, Gębski, 2018):

1. Process, directly related to the conducted medical procedure (in this case this applies to treatment of patients with ischaemic stroke).
2. Medical (technological), related to discovering a flaw of a medical procedure.
3. Organisational, related to organising a full process of preparation for treatment, treatment and rehabilitation stage.
4. Economical, related to alternative methods of treatment from the point of view of costs and time savings, expressed in cost form.

The scope of application of the LeanOZ standards in health care may be very broad. It results from high possibility of adaptation of the method, expressed at three levels:

- a) process, expressed through different node configurations with variable (flexible) time and cost parameters,
- b) technological, expressed through different levels of acceptable deviations of individual structural elements of medical processes,
- c) organisational, expressed through various adaptation activities at various structural points of organisation of the holistic process of treatment.

Thanks to these objectives, adaptation of the presented method described in the standards may prove very useful from many points of view (technological, organisational, economic) in a very broad and diverse range of medical procedures.

4. Conclusion

The development of Poland remains steady and fast. Poland has huge potential in implementation of innovative projects, including implementation of social innovations. However, despite the huge potential, it takes an unsatisfactory place in many rankings concerning innovation. The reason for this can be the unsatisfactory cooperation between the scientific sector and companies that do not have knowledge of research carried out by scientific bodies. These in turn deal with research that very often results from the interests of researchers and not the real needs of the region or society. This was the case, but the projects described in Article 2 allow an optimistic view of the future. The workshops for researchers have been given a favourable assessment among its participants, for whom identification of a potential, specific and important problem has become an additional motivation to act and continue research. In the case of the medical project, it turned out that cooperation between representatives of the medical community and “organisers” is possible and can also bring many benefits. Developing standards for mapping value streams in health care has been an innovative activity (at national level) and can contribute to improving organisation of work, increasing resource efficiency, reducing losses and waste and, above all, reducing patient treatment times, while ensuring high quality services. Issues raised as part of the projects also inspire preparation of diploma papers and planning of new research.

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