KTP—Collectively Improving Air Quality in Krakow: A New Air Quality Plan for the Małopolska Region

Agnieszka Włodarczyk-Gębik, Aleksandra Gabriel, Maria Dubis,
and Monika Machowska

KTP's project relates to the challenge of air pollution and the need to improve quality of life in Kraków and the Kraków Metropolitan Area. The aim is to improve the quality of the air by motivating citizens to change their ecological attitudes, transport and heating habits and support decision makers with relevant tools and instruments for better co-creation of local new policies with a user-centered approach. The chapter describes the preparation of the new Air Quality Plan for Małopolska, and the creation of a common space for citizens, policymakers, entrepreneurs and other stakeholders where self-development, realisation and business take place.

1 Introduction

The Kraków Technology Park (*KTP*) is a leading technology park in Poland. It is the most complete business one-stop-shop operating in the Małopolska Region, in the south of Poland. With entrepreneurs, academia, and territorial authorities, the *KTP* created a unique and dynamic ecosystem to boost the regional economy. The core area of its operations are IT and ICT, and e-driven solutions. As a business innovation centre, *KTP* directly supports over 150 innovative hi-tech startups and SMEs and 170

A. Włodarczyk-Gębik (✉) · A. Gabriel · M. Dubis · M. Machowska
Krakowski Park Technologiczny, Krakow, Poland
e-mail: awlodarczyk@kpt.krakow.pl

A. Gabriel
e-mail: agabriel@kpt.krakow.pl

M. Dubis
e-mail: mdubis@kpt.krakow.pl

M. Machowska
e-mail: mmachowska@kpt.krakow.pl

other manufacturing companies from different sectors (i.e. software, Industry 4.0, automotive, cybersecurity, aerospace, engineering, BPO/SSC, FMCG) in the special economic zone and Polish Investment Zone. Around 40 startups and 40 mature companies, mainly SMEs (active in Industry 4.0, IoT, automotive, software, games, cybersecurity, Smart City, spacetechnology and other industries) work in the park's office spaces. The *KTP* cooperates with over 100 partners on international and national projects financed from such programmes as Interreg, Horizon 2020, Erasmus+, and national and regional ones.

The *KTP* is well recognised on both regional and international levels for being a key actor in co-creating and implementing the Regional Innovation Strategy and promoting smart specialisation and user-driven innovation approaches in the region. Two of the many initiatives run by the *KTP* are certainly worth mentioning: the Kraków Living Lab (est. 2015) and the Digital Innovation Hub (est. 2019). The *KTP* is also an active member of EBN, IASP, ENoLL, and SOOIP networks.

The company has been involved in an array of activities and projects dealing with climate change and air pollution issues, among others SMART KOM and SISCODE projects. These are umbrella projects for actions aimed at raising awareness of climate change issues among decision makers and supporting start-ups and SMEs that deliver smart products and services to fight climate change.

The *KTP* introduced innovative methods, including webinars and such digital tools as mural, miro and deskle, to strengthen and enrich cooperation with stakeholders [2]. It also organises hackathons, workshops and other events presenting best practices in public innovation. The *KTP* is also experienced in developing e-learning platforms.

2 Ecosystem, Context and Challenge Addressed

The Polish National Air Pollution Control Programme is a document that regulates issues connected to air pollution in Poland. It lays a special emphasis on areas of high pollutant concentration and high population density, as air pollution in those areas has a major impact on resident health and life. Poland is obliged to observe EU law to meet the goals defined by the World Health Organisation by 2030 [6]. These laws urge Poland—even more intensive work is done for the sake of clean air, which is one of the greatest ecological challenges of these days.

A large share of the responsibility to meet the obligations and improve the quality of air throughout the country is vested in the regions, self-governments, decision-makers, and the residents themselves. It is only through the cooperation between these groups and through a joint effort that the defined goal—improvement of air quality—can be achieved, and the general awareness can be improved. In Poland, each region must create a plan for protecting air quality. If such a plan is to answer the real needs of the population, it has to be discussed and consulted in more extensive circles of representatives of business, administration, the civil society, academia, and the local residents together.

The Małopolska Region has designed a strategic act officially functioning as the Air Quality Plan (also called air protection plan) [1]. It is an act of law in force until 2023 that contains the descriptions of long-term remedial activities, a plan for short-term actions that includes:

- introduction of grading for air pollution dangers
- fine-tuning of questions connected to the stocktaking of emission sources
- quality analysis
- description of economic, environmental, and local conditions and circumstances
- selected courses of remedial actions, and
- introduction of control tools and instruments to allow an efficient implementation of the programme.

Important for the region, this publication contains specific goals both for the long and short terms, e.g. the introduction of warnings issued when pollution reaches certain levels, and recording and stocktaking of emission sources.

The strategy was developed in cooperation with the Kraków Technology Park, which joined the project in January 2019, becoming actively involved in the process of consulting the programme with representatives of non-governmental organisations, experts, scientists, civil servants, representatives of business, and primarily with local residents [3]. For the first time, such extensive and open consultations with the civil society were organised around the creation of regional documents.

It is also the first such programme to provide a tangible support tool for households, namely co-financing of modernisation of heating sources. Moreover, the local communities were offered support from a group of specialised environmental experts. They helped to streamline the process and advise the locals on how to embrace the change in the best way possible and how to adjust their homesteads to it.

The work of the environmental consultants has already brought the first results: the concentration of PM 10 (particulate matter) in the heating season lasting from October 2019 to March 2020 dropped by 30% compared to the same period in 2014/15 [5].

The support of the Kraków Technology Park helped to create a true-to-life, fact-based strategic document reflecting the needs and expectations of broad stakeholder groups that is highly feasible, measurable, and scalable.

The work has brought good effects, however the design team also faced challenges. The first was to create the programme with such an extensive range of stakeholders, often with opposing expectations and demands. The other was to found the document on credible data, with assumptions that could be measurable and scalable. It is worth emphasising that apart from the work on the development of the new Air Quality Program, the KPT team was also involved in the coordination of works on the implementation of a platform for monitoring industrial pollution [4]. It was the winning project of the hackathon dedicated to the solutions for improving air quality that the KPT co-organised in December 2019. Implementation of that solution included tests with final users, that is people living in the municipality, and representatives of the production facilities located on its territory.

3 The Co-creation Journey

The project aimed at the development of an open and transparent environment for the development of the Air Quality Programme for the Małopolska Region. A very important aspect within it was to understand the needs and expectations of the stakeholders, and involve them into the creation of the best solutions for the improvement of quality of life. The journey from concept to the creation of a solution lasted for 18 months, and included intensive work with representatives of local authorities and the consumers of the solution.

To ensure the widest possible insight into the residents' opinions on air quality issues, the Kraków Technology Park planned and conducted a series of four co-creation workshops organised in the Living Lab methodology. They provided an open forum of dialogue for people interested and involved in the improvement of air quality in Małopolska. The goal of the workshop was to analyse together the factors and issues that cause poor air quality in the region, and to work out suggestions for solutions that should be introduced sooner or later to improve the status quo. The workshops turned out project fiches that are a significant contribution to the consultation process for updating the Air Quality Plan.

Additionally, to reinforce the diagnosis and to learn the opinions of the residents of the Kraków Metropolitan Area, the Kraków Technology Park conducted two workshops with residents of two smaller communes from the Kraków Metropolitan Area.

The workshops with participation of representatives of the locals, non-governmental organisations, academia, business, and territorial governments, were held from March to April 2019.

The co-creation workshops with participation of the residents of Małopolska initiated an open process of dialogue and exchange of positions and experiences between representatives of various social and professional groups. Thanks to the application of the design thinking method in the process of co-creating the innovative tools and instruments for combating smog, a creative approach to problem solving and creation of new innovative solutions and projects was implemented. Such an approach allows to consider further even those ideas that are hardly rational and feasible, and yet bear a high potential of creativity. Participants of the process actively created innovative and unorthodox solutions, and, by talking and listening to one another, were able to expand the spectrum of understanding of the context of the problem, gaining a fresh insight into specific circumstances, and also to redefine the problem to propose new solutions. These solutions were subjected neither to expert assessment nor voting, and although the ideas were taken down and presented during the wrap-up session, and accounted for in the detailed report that covers general and specific recommendations for the new programme being developed for the Marshal's Office of the Małopolska Region.

The first workshop was conducted in five parallel groups. The objective was to understand the situation of individual persona representative for the residents of Małopolska. The product of the workshop was the definition of key challenges that

the people of Małopolska grapple with in the context of air quality and the areas that require intervention. Workshop participants proposed a great deal of potential solutions, and those considered most innovative and feasible were chosen from among their number.

Moreover, the information delivered by people resident in the Kraków Metropolitan Area was used to create a catalogue of good practices and ideas for the future, to be implemented in both short and long perspective.

Then the KPT team created three thematic categories, to which the ideas obtained were assigned. They are: Mobility and public transport, Efficient communication and information, and Monitoring and control.

The work during the second workshop ran in parallel sessions in three thematic groups corresponding to the scopes listed above. As the result, the participants worked out eight detailed concepts for action in the form of project fiches:

- Category: Mobility and public transport (sustainable public transport and low emissions zone in transport)
 - Project: Clean transport zone
 - Project: Metropolitan transport
- Category: Efficient communication and information (how to inform efficiently about the duties imposed by the resolution, and how to persuade to have them implemented in the shortest possible time)
 - Project: Creation of a model community approach to the problem of smog, case study of Skala municipality
 - Project: Involvement of the Roman Catholic Church in fighting smog
 - Project: “I don’t believe in smog” information campaign
 - Project: Educational activity in schools
- Category: Monitoring and control (how to monitor efficiently the implementation of the resolution and control infringements of the law)
 - Project: Standardising the system of control in the Małopolska Region
 - Project: Educational aspect of controls.

One of the main courses of activities furthering air quality improvement listed in the Air Quality Plan for Małopolska Region is the reduction of industrial emissions to the environment, and another—ecological education for the locals. An efficient system for monitoring industrial pollution will make it possible to obtain reliable knowledge in the area, and to react quickly and adequately to environmentally adverse developments. These recommendations were aligned with the suggestions of the participants in the co-creation workshops on the reinforcement of monitoring and control competences and efficiency of action that the KPT conducted.

Answering that need, the Kraków Technology Park became involved in the co-organisation of Smogathon. The winner of the hackathon organised in December 2019 and dedicated to working out innovative solutions supporting the fight against

smog, was the solution proposed by Qubit team, who prepared the concept of an online platform for monitoring industrial pollution. The prize for the winning team was the implementation of the project in one of Małopolska municipalities. The pilot implementation of their solution was conducted in the municipality of Skawina, after prior reconnaissance of the interest and potential in other communes in the Kraków Metropolitan area. After eight months of co-creation work and preparation, the platform was launched officially. The pilot project on monitoring industrial pollution was presented on the official website of the Małopolska Region and tests were conducted from August to December 2020. That pilot implementation became a tangible effect of the co-creation journey.

Thanks to the pilot solution conducted in that municipality, data from 50 companies were used to identify key challenges connected to the systemic approach to controlling and monitoring industrial pollution on the regional scale. It was very important to have it tested in real life with the locals and potential users.

Such “in-vivo” tests made it possible to winnow both the technical and content errors on the platform, but also to listen to the expectations of the consumers of such a tool. Often both the feedback and the comments surprised both platform developers and the KPT team working on its final shape. Tester comments made it possible to implement an “out of the box” approach, which is hard to obtain while creating so demanding projects in such a short time. The platform was divided into the resident zone and the industrial zone, which were adjusted to user groups and their reasons to use it.

The platform of Qubit team is the other deliverable of the programme. Its improvement will continue so that it can be introduced in other Polish regions. The young innovator team has already entered the concept into their business plan, and are now eagerly pursuing it.

The process of co-creation ended in success both on the public and administrative, and the private local levels. Moderated and co-managed by the Kraków Technology Park, this process of co-creation is an example of well conducted and implemented public–private partnership, in which either party obtains measurable benefits, being at the same time open and ready to give up infeasible claims. Added value that serves the whole region has been created thanks to the mutual understanding of the needs, different standpoints, expectations, and also barriers of legal, cultural and technological nature. The newly designed Air Quality Plan, accounting for the majority of the comments and suggestions submitted during the consultation phase, has been approved, and a prototype of a practical tool for reporting and monitoring ecological incidents has been delivered for the use of the locals and production facilities.

4 Experimentation: Output, Transformations, Outcomes

The intensive co-creation work resulted in the development of the Air Quality Plan, a binding document for the entire Małopolska Region, with key assumptions and

tools for significant ecological changes in the whole region. The Air Quality Plan is a document that, when binding, will regulate issues connected to air pollution in the years to come. In turn, the Kraków Technology Park experts will participate in the assessment of its impact, and attainment of its goals. It is important that the document created will have its effects diligently monitored (Fig. 1).

The prototype of the Air Quality Plan also resulted in the development of an innovative tool: a platform for monitoring industrial pollution to be used by all groups in the commune: for residents to report ecological incidents in their nearest environment, for administration to monitor, prevent and react to such incidents, and for the responsible and conscious enterprises for reporting and documenting potential incidents and emission levels (Figs. 2 and 3).

5 Lessons Learnt and Reflections

The journey of co-creation proved that grassroots initiatives only make sense if properly managed, and following appropriate principles, guidelines, and frameworks. To succeed, it is important to have a good objective, and then co-creative work and appropriately planned processes help to attain it.

The role of the Kraków Technology Park in the process of co-creation of the new Air Quality Plan is worth emphasising. The management of the co-creation process by the KPT, in which extremely different expectations and perspectives were presented, made it possible to maintain objectivism and neutrality of the discussion. To understand the need of the ordinary people of Małopolska, representing smaller municipalities, a few meetings were organised in two small locations near Kraków, with the timing, location, and tools of the workshops adjusted to the expectations of the participants.

The team of the Kraków Technology Park proved high mobilisation, professionalism, and experience in conducting a project of that type. The role of the facilitator and moderator of the co-creation process that the KPT shouldered while co-creating the foundations of the Air Quality Plan proved that there is a huge demand for such an open, innovative, and creative approach at various levels of administration. Working in a group of people with different attitudes and expectations requires an in-depth understanding of the problem, the stakeholders' fears and barriers, to be able to propose non-standard solutions and instruments of support that will help to introduce the much welcome technological improvements in heating sources and environmental policy. The KPT project team was officially introduced into the company structure as the main team dealing with design thinking. Its members continue to improve their qualifications and competences, and the team builds its rich experience on a range of training and consultation projects for various groups of customers.

Running SISCODE project, the team confirmed its leading position of one of two Living Labs in Poland. It is precisely thanks to the experience gathered in that project that the KPT has increased the scope and number of activities of the Living Lab, which has become a significant part of the strategy of the technology park for

a

Towards a healthy atmosphere

IS CLEAN AIR PROFITABLE?

b

Towards a healthy atmosphere

REDUCTION OF EMISSIONS FROM THE INDUSTRY

Fig. 1 a–d Air protection programme for the Małopolska Region

Fig. 1 (continued)

Fig. 2 a, b Presentation of the platform for the monitoring of industrial pollution

the years to come. Such activities also help the KPT to play a significant role in the developing and driving the economy, and efficiently supporting administration and decision-making groups.

SISCODE and co-creative effort showed the importance of cooperation with multiple customer groups with various needs and requirements on a single project focused on a single goal. It is precisely co-creation that on the one hand allows ordering such consultations in a more extensive group, and on the other elicits the creativity potential from different groups of customers.

The important aspects that, from the start, have accompanied cooperation of the KPT with public administration have been trust, transparency, and openness to new ideas. It is thanks to such a form of cooperation that both the Air Quality Plan for Małopolska Region and the innovative platform for monitoring industrial pollution have become highly successful, and now may be helpful in the years to come.

Fig. 3 The project team, left to right: Monika Machowska, Agnieszka Włodarczyk-Gębik—project coordinator, Aleksandra Gabriel

Work among so many groups proved that each of them also has its internal interests, for example there are often disagreements between administration and business. Similarly, the perspective of looking at the environmental issues among the residents of major cities differs from that of people living in small villages. The case is similar with external factors including financing, human resources, and acts of law that have not always been helpful for the development and progress of work. However, even these obstacles have been a precious experience, as they made it possible to understand and see what elements can be improved, and what can be still tweaked on the path to clean air in the region and in Poland.

An extremely important result of the work was making it possible for the representatives of administration to become familiar with the needs and to listen to the requests of various social groups, which for a variety of reasons they can hardly do in their daily work. Bringing these two groups closer together also inspired such solutions in the future, and encouraged somewhat deeper civil consultations while creating regional policies.

Thanks to SISCODE, stakeholder groups have understood that it is often so that the paths followed are different, yet the goal remains the same. In this case, the goal is clean air not only for today's residents but also for the future generations. Ecological and social changes the team has worked with are idea for whose sake it was worthwhile to employ all the feasible methods of work.

References

1. Air Protection Programme for the Małopolska Region FAQ. <https://powietrze.malopolska.pl/en/news/air-protection-programme-for-malopolska-2020-frequently-asked-questions/>. Last accessed 2021/03/30
2. KTP Academy. <https://www.kpt.krakow.pl/en/about/akademia-kpt/>. Last accessed 2021/03/30
3. KTP. Summary report on co-creation workshops. <https://www.kpt.krakow.pl/wp-content/uploads/2019/08/summary-report-on-co-creation-workshops.pdf>. Last accessed 2021/03/30
4. Platform for Monitoring Industrial Pollution – Test Version. <https://powietrze.malopolska.pl/zanieczyszczenia-przemyslowe/>. Last accessed 2021/03/30
5. Traczyk P, Gruszecka-Kosowska A (2020) The condition of air pollution in Kraków, Poland, in 2005–2020, with health risk assessment. *Int J Environ Res Public Health* 17(17):6063
6. World Health Organization (2009) Protecting health from climate change: connecting science, policy and people

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