An Experience of International Cooperation Between Poland (EU) and Panama: Case Study

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Abstract

This paper presents a case study about an experience of international cooperation between Poland (*European Union, EU*) and Panama. The results obtained of this international collaboration have been two elements. The first element corresponds to representation of the *AGH University of Science and Technology* (Poland) like an active member of the International Editorial Committee Team *Magazine Prisma Tecnológico.* The second element corresponds to scientific research work including: realization, collection, conceptualisation, resources, description, analysis and making available of materials covering the state of the rail transport infrastructure and suprastructure like support to the Panama railway engineering research group at the *Universidad Tecnologica de Panama*. The authors present the results and discussion

about this synergy between both universities. Finally, the conclusion and future research are presented.

Keywords: international cooperation collaboration, Poland, Panama, science diplomacy, AGH University of Science and Technology, AGH University, AGH, Universidad Tecnológica de Panamá, UTP, inter-university cooperation, railway engineering and transport

1. Introduction

The science diplomacy is the use of scientific collaborations between diferents countries to address the common problems to build constructive international partnerships (Fedoroff, 2009) (Turekian, 2009) (Elorza et al., 2020). The essential key of the activity of science diplomacy is the increasing role and relevance of science in the world (Elorza et al., 2020), in other words, science diplomacy is more than just international scientific collaborations between scientific staff. International research cooperation is a cornerstone of modern higher education and science systems (Kwiek, 2020). The trend towards internationalisation of research is emerging as the most salient feature of the new global geography of science. Science is increasingly defined by multidimensional collaborative networks. Despite the unprecedented growth of scientific collaboration around the globe—the collaborative turn—geography still matters for the cognitive enterprise. The spatial location and distance between scholars and research organisations affect their likelihood to collaborate and to achieve results that expand the knowledge frontier (Kwiek, 2020) (Olechnicka, Płoszaj, Celińska-Janowicz, 2019). The new global science enables scientists to 'freely join forces to solve common problems, no matter where they are'. The shift from big science to global networks creates unprecedented opportunities for developing countries to tap science's potential (Kwiek, 2020) (Wagner, 2008). At the same time, individual researchers seeking to collaboration with the best, wherever they are located, are recognised as the main driving force behind the development of international research collaboration in Europe. The growth of the new communicative technologies and the rise of openness as an ontology in the digital age is facilitating global science as a more private sphere, one of sociability rather than sovereignty, and one that is characterized by loose ties and curiosity-driven scientific ambitions (Kwiek, 2020) (King, 2011).

The Ministry of Foreign Affairs of Panama and the National Secretariat of Science and Technology (*SENACYT*) organized a Workshop on Scientific Diplomacy for different actors from civil society and authorities from different institutions to establish the establishment of the Road Map of the Panamanian Scientific Diplomacy Strategy. One of the participants was

the *UTP* to help define the diagnosis, objectives, strategies, and indicators of Scientific Diplomacy in Panamá (Ministerio de Relaciones Internacionales, 2019).

This paper presents a case study about an experience of international cooperation between Poland (*European Union, EU*) and Panama. The actors of this international collaboration are the Department of Engineering Surveying and Civil Engineering of the Faculty of Mining Surveying and Environmental Engineering at the *AGH University of Science and Technology* (*AGH, AGH University*) (*AGH University of Science and Technology*, 2021) and the *Universidad Tecnológica de Panamá* (*UTP*) (*Universidad Tecnológica de Panamá*, 2019).

The *Universidad Tecnológica de Panamá*, within its Institutional Development Plan 2018-2030, has included as one of its five development areas Internationalization (*Universidad Tecnológica de Panamá*, 2018). The Internationalization is a key factor to strengthen the educational quality and improve the living conditions of society.

Through the International Affairs Office of the *UTP*, initiatives, and relations with foreign universities, international organizations, and agencies are promoted, as well as the promotion, planning, coordination, monitoring, and evaluation of plans, programs, and international cooperation projects to enhance the quality of teaching, research and extension of the *UTP* (*Universidad Tecnológica de Panamá*, 2021c). Science diplomacy is linked to the 2030 Agenda for Sustainable Development (Echeverría King et al., 2020).

Since the beginning of this scientific research opportunities were sought to improve their qualifications and acquire new skills related to our common research topics. Research activity carried out by us in more than one university, came to fruition with active collaboration with scientists, researchers, target users, industry, decision makers from many countries and professional communities. The purpose of this international cooperation was and is to exchange views, expand knowledge and discuss key issues. This is a new and exciting scientific and research experience entirely devoted to existing and recent advances in ´railway engineering and transport', with other surrounding disciplines, lead to interdisciplinarity of the scientific and research activities carried out. This activity draws attention to particular areas of promising technological development and supports topics that combine social and business environment technologies, engaging in interdisciplinary discussion. Our scientific research activity in ours home research institutions, then at other national and foreign universities has allowed and allows the discovery of new points of view and fields of research. These new viewpoints and fields of research become intellectual seeds that, over time, expand the understanding of our specific disciplines. Scientific and research activities carried out simultaneously in our

universities, as well as our professional experience in the industry, allowed and allows - to create a network of influential and like-minded colleagues. It also ensures that we share and continue to enrich our life's accomplishments and expand our ever-growing understanding of our specific disciplines, and learn about new disciplines.

2. Metodology and actors

Figure 1 shows the presentation of significant scientific activity carried out at more than one university, scientific, cultural institution, especially at foreign institutions carried out and implemented by *A. Kampczyk* with the Department of Engineering Surveying and Civil Engineering of the Faculty of Mining Surveying and Environmental Engineering at the *AGH University of Science and Technology* (*AGH University of Science and Technology*, 2021) and the *Universidad Tecnológica de Panamá* (*UTP*) (*Universidad Tecnológica de Panamá*, 2021f). The *UTP* is represented by Faculty of Mechanical Engineering (Universidad Tecnológica de Panamá, 2021e), Faculty of Electrical Engineering and Electrical (Universidad Tecnológica de Panamá, 2021d), Mechanical and Industry Research and Innovation Center (*Universidad Tecnológica de Panamá*, 2021a). *Berbey-Alvarez* funded the Panama Railway Engineering research group (*Universidad Tecnológica de Panamá*. VIPE, 2021) in 2009 with a group of enthusiastic colleagues.

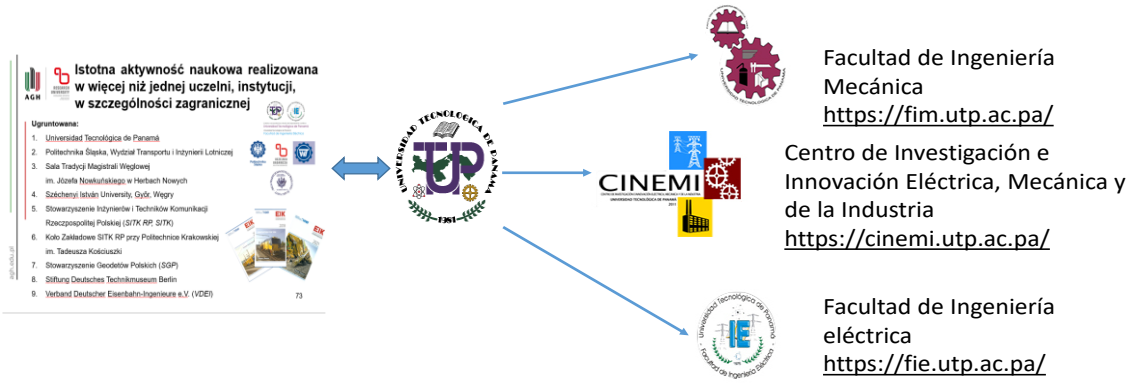

Figure 1. Scheme of significant scientific activity carried out at more than one university, scientific, cultural institution, especially at foreign institutions - international collaboration between *AGH* (Poland) and *UTP* (Panama)

3. Results and discussion

Key scientific research activities carried out between AGH University of Science and Technology (Poland) and Universidad Tecnológica de Panamá are a strong and important activity. It has established itself as a joint venture to combine and coordinate scientific and research efforts in research and innovation on an international level. The collaboration is transnational and aims to advance technology and science in terms of interdisciplinary content. Significant scientific and research activity has been established in the core elements:

Element I

The *AGH University of Science and Technology* (Poland) is an active member of the International Editorial Committee Team *Magazine Prisma Tecnológico / Revista Prisma Tecnológico* (P-ISSN 2076-8133 y E-ISSN 2312-637X) as its member on *Universidad Tecnológica de Panamá* (*en-gb. Technological University of Panama, pl. Politechnika w Panamie, UTP*) (Universidad Tecnológica de Panamá, 2021f) *(Universidad Tecnológica de Panamá*, 2021b). *Prisma Tecnológico* is a technological and scientific journal of a general nature, whose articles or essays are of a scientific nature. The magazine is aimed at professionals and students of various engineering fields, researchers and the general public, as well as the national and international public, with clarity, comprehensiveness and responsibility. *Prisma Tecnológico* is an annual publication *UTP*, issued by the *Departamento de Editorial Universitaria,* overprint *Editorial Tecnológica*. In *Magazine Prisma Tecnológico* it is noted that science communication is very important. It represents a strategic and stable character for any country claiming to be a developed country *(Universidad Tecnológica de Panamá*.VIPE., 2019).

Element II

Concretely, research and teaching associate (*pl. adiunkt, en-gb. assistant profesor*) *A. Kampczyk* of the Department of Engineering Surveying and Civil Engineering actively participated in scientific research work including: realization, collection, conceptualisation, resources, description, analysis and making available of materials covering the state of the rail transport infrastructure and suprastructure. Covering the area of Central Europe in the scope of the project of the research team represented with *Universidad Tecnológica de Panamá* (*en-gb. Technological University of Panama, pl. Politechnika w Panamie, UTP*), *Facultad de Ingenieria Eléctrica* (*en-gb. Electrical Engineering Faculty, pl. Wydział Inżynierii*

Elektrycznej), which conducts railroad research with a group of enthusiastic researchers. Element II of these scientific research activities included:

- Continuous Welded Rail (*CWR*),
- Marshalling yard (Rail brakes, Railway track scales (Wagon scales, rail weighbridge) (Figure 2),
- Ridge of the hump, Hump, Doppler radar speeds),
- Automatic train braking system – SHP,
- Single points, Turnouts on the route,
- Snow Plough,
- Rail fastenings,
- Semaphors,
- Railway Level Crossings,
- Surveying Railway Special Grid, Monuments, Datum plater, Track Axis Adjustment Signs, Surveying Sign, Railway Warp Special,
- Thermit weld (Figure 3),
- Catenary in railways line (Figure 4),
- Overhead conductor rail,
- Passenger stops,
- Tram tunel.

Figure 2. Marshalling yard Tarnowskie Góry, voivodeship Silesian, Poland – rail brake / technical and exploitation device

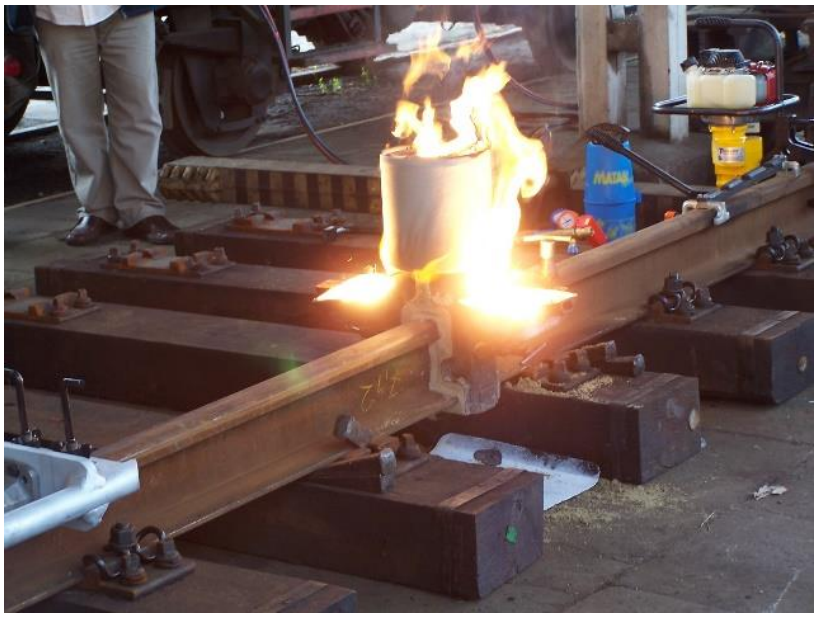

Figure 3. Thermit weld - implementation process. Place: Rybnik, voivodeship Silesian, Poland.

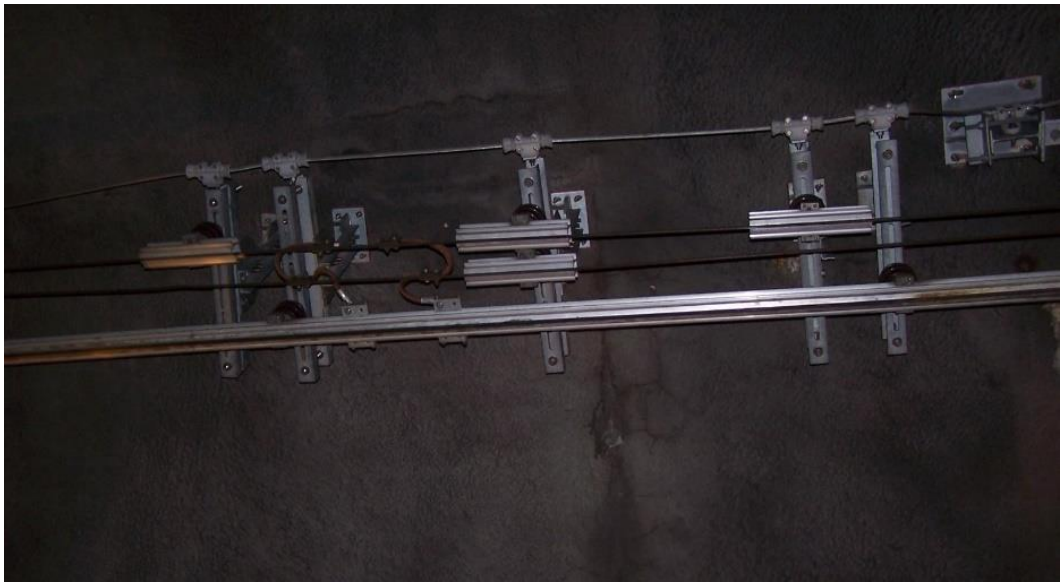

Figure 4. Construction of the transition from the classic network to the rigid catenary network (catenary). Tunnel object located on railway line no. 8: Warszawa Zachodnia - Kraków Główny Osobowy, route - open line: Tunnel - Kozłów in railway track no. 1 (near the Tunnel station) - Poland, with installed overhead rigid catenary (overhead conductor rail) hooked up to the ceiling (taking up less space than classical contact wires).

The results of the *assistant profesor A. Kampczyk* with the Department of Engineering Surveying and Civil Engineering have completed, have been solidified by the submission of the aforementioned materials. Scientific achievements with the included content is an application to the book position entitled '*Fundamentos de Ingenieria Ferroviaria: Casos metros, ferrocarriles, tranvias modemos* (*en-gb.* '*Fundamentals of railway engineering: Modern subways, railways, tramways*', *pl.* '*Podstawy inżynierii kolejowej: Nowoczesne metra, koleje, tramwaje*') ' in Spanish prepared by Berbey-Alvarez (Aranzazu Berbey-Alvarez, 2018) (A Berbey-Alvarez, 2021) with *UTP* along with a team of the scientific and researchers (*Universidad Tecnológica de Panamá*, 2016).

The active sientific and research activities at the international level of the *AGH University of Science and Technology* (Poland) working with *Universidad Tecnológica de Panamá* (*en-gb. Technological University of Panama, pl. Politechnika w Panamie, UTP*), strengthened and developed comprehensive institutional cooperation, national and international. Additionally, it has increased recognition from academic and industry community. It has allowed and allows not only to increase the level of internationalization and academic mobility of the home scientific and research institution, but also allows its global promotion in other countries. Active collaboration between *AGH* and *UTP* permit established international scientific and research activity is also the basis for shaping higher education and science, while being a distinctive feature of global science. International cooperation including activity at a foreign university is also motivated by research curiosity. This type of active scientific activity pursued at more than one university has formed mutual ties. Enable the pooling of competencies and the achievement of synergy effects. The results of the formed international ties, open many new ideas that are successfully are incorporated into our scientific research activities. New viewpoints become seeds for further development, being intellectually challenged and thinking innovatively. Active involvement of the *AGH University of Science and Technology (Poland)* with *Universidad Tecnológica de Panamá* (*en-gb. Technological University of Panama, pl. Politechnika w Panamie, UTP*), emphasize the international character, while allowing for an interdisciplinary level of communication and research results, encouraging to take the next step in learning, challenging further, and stimulating growth in knowledge. This activity embraces the talent and innovation of the world with participants from all parts of the globe. Striving to learn, research, share knowledge, build relationships, make connections - across cultural boundaries.

Strong scientific and research activity by *AGH University* at *Universidad Tecnológica de Panamá* (*en-gb. Technological University of Panama, pl. Politechnika w Panamie, UTP*)

established not only in the above two essential elements I and II. This activity is also reflected in *Centro de Investigación e Innovación Eléctrica, Mecánica y de la Industria* (*pl. Centrum Badań i Innowacji Elektrycznych, Mechanicznych i Przemysłowych*) and in *Facultad de Ingeniería Mecánica* (*pl. Wydział Inżynierii Mechanicznej*) *UTP*. This important and international scientific and research activity is part of the cooperation between Poland (and at the same time the European Union, EU) and Panama (*Universidad Tecnológica de Panamá*. VIPE, 2019) (*Universidad Tecnológica de Panamá*, 2016).

The active cooperation with other national and foreign scientific research institutions expresses the results of which serve a wide audience, not only domestically but also internationally. This activity is an essential part of developing international scientific and research cooperation. Cooperation with *Universidad Tecnológica de Panamá* has diversified the profile of modern and interdisciplinary solutions. While developing innovative research in many fields, they have also not allowed to forget the tradition that creates the silhouette of today's and tomorrow's research, while strengthening and building a high rate of internationalization of the scientific and research institution.

The significant research and development activities between both universities are part of the development of competitive capabilities. Significant research and development activities performed between both universities have provided:

- improving academic and industry skills,
- increasing the level of foreign languages,
- to raise awareness about social, ethnic, linguistic and cultural diversity,
- interdisciplinary communication of research to achieve flexibility,
- interdisciplinary thinking,
- to raise awareness and reputation of your skills and qualifications,
- to learn about practices, strategies and editorial systems,
- deepen your performance, conduct and satisfaction with your business,
- working together to develop new and better solutions and share best practice,
- exchange of experience and communication with other market players and representatives of foreign universities with a global reach.

Conclusions

Collaboration with others on the national and global stage has opened new horizons . Providing opportunities to link disciplinary research to other disciplines as well as to their other academic activities. This activity is well established in performance, active and ongoing collaboration with researchers and others in specific activities in diverse areas. Established scientific and

research knowledge, allowed and allows to successfully implement a number of, sometimes very demanding projects in active scientific and research activities carried out in more than one university, fostering creativity and interdisciplinary communication of research. Encouraging the free exchange of knowledge and sharing of tips among a diverse group of scientists and practitioners who are experts in their disciplines. The scientific and research, teaching and practical activities permit provided visibility and recognition, finding, inter alia, confirmation in this study.International scientific and research cooperation represented by *A. Kampczyk* from *AGH* and *A. Berbey-Alvarez* from *UTP* is a component of the international driving force to cooperate with the best, regardless of where they are located. This collaboration confirms the scientific and research mature ability to share results in professional and international achievements. The willingness to follow trends and further developments are qualities highly valued in such a significant achievement.

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Methodology, A.K. (40%) and K.D. (10%); A.B.A.(50%)
Validation, A.K.(30%), K.D. (20%) and A.B.A. (50%);
Formal analysis, A.K. (20%); A.B.A.(80%)
Investigation, A.K. (50%) and A.B.A. (50%);
Resources, A.K. (100%)
Data curation, A.K. (45%), K.D. (15%) and A.B.A. (40%);
Writing—original draft preparation, A.K. (70%) and A.B.A. (30%);
Writing—review and editing, A.K. (70%) and A.B.A. (30%);
Visualization, A.K. (30%), K.D. (20%) and A.B.A. (50%);
Supervision, A.K. (50%) and A.B.A. (50%);
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Research, selection, use of literature, regulations and other scientific state of the art studies, A.K. (30%); K.D. (20%) and A.B.A. (50%);
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