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PROBLEMS OF INNOVATION IN THE POLISH ECONOMY

PROBLEMY INNOWACYJNOŚCI W POLSKIEJ GOSPODARCE

Keywords: innovation, polish economy, economic growth, challenges, competitiveness
Słowa kluczowe: *innowacyjność, polska gospodarka, wzrost gospodarczy, wyzwania, konkurencyjność*

Abstract
This article explores the critical role of innovation in Poland's economic growth and the challenges that hinder its potential. Despite significant advancements in transitioning from a centrally planned to a market-driven economy, Poland faces structural and systemic barriers in fostering innovation. Key issues include a fragmented R&D infrastructure, limited collaboration between academia and industry, insufficient support for start-ups, bureaucratic obstacles, and inadequate funding mechanisms. The education system also struggles to align with the evolving demands of an innovation-driven economy. Through a detailed analysis of these barriers, the article presents actionable solutions, such as enhancing research-industry partnerships, improving regulatory frameworks, expanding funding opportunities, and addressing the skills gap in education. By overcoming these obstacles, Poland can strengthen its innovation ecosystem and sustain its economic progress in an increasingly competitive global landscape.

Streszczenie
Niniejszy artykuł analizuje kluczową rolę innowacji we wzroście gospodarczym Polski oraz wyzwania, które ograniczają jej potencjał. Pomimo znaczących postępów w przechodzeniu od gospodarki centralnie planowanej do gospodarki rynkowej, Polska napotyka strukturalne i systemowe bariery we wspieraniu innowacji. Kluczowe kwestie obejmują rozdrobnioną infrastrukturę badawczo-rozwojową, ograniczoną współpracę między środowiskiem akademickim a przemysłem, niewystarczające wsparcie dla start-upów, przeszkody biurokratyczne i nieodpowiednie mechanizmy finansowania. System edukacji ma również trudności z dostosowaniem się do zmieniających się wymagań gospodarki opartej na innowacjach. Poprzez szczegółową analizę tych barier, artykuł przedstawia możliwe do zastosowania rozwiązania, takie jak wzmocnienie partnerstw badawczo-przemysłowych, poprawa ram regulacyjnych, rozszerzenie możliwości finansowania i zajęcie się luką w umiejętnościach w edukacji. Pokonując te przeszkody, Polska może wzmocnić swój ekosystem innowacji i utrzymać postęp gospodarczy w coraz bardziej konkurencyjnym globalnym krajobrazie.

[1] In this article, the definition of the concept of "innovation" has been omitted. For a more detailed discussion, see, among others: Ph. Greenacre, R. Gross, J. Speirs, *Innovation Theory: A review of the literature.* Imperial College Centre for Energy Policy and Technology, London, 2012; J.P. Lundblad, *A review and critique of Rogers' diffusion of innovation theory as it applies to organizations*. Organization Development Journal, 2003, 21(4), 50; Zupok S., *Innowacje jako element budowy wartości dla klienta – studium przypadku RCGW S.A. w Tychach*. Zarządzanie i Finanse, 2017, 15(2/2); Zupok S., *Wpływ innowacji na kreowanie wartości dla klienta.* Studia i Prace Wydziału Nauk Ekonomicznych i Zarządzania, 2015, nr 39.

INTRODUCTION

The Polish economy has undergone substantial transformation since the end of the communist era, evolving into one of the most dynamic economies in Central Europe. Following the fall of communism in 1989, Poland embraced market reforms that transitioned it from a centrally planned economy to a vibrant market-driven system. This shift has been marked by impressive economic growth, with Poland achieving consistent GDP increases, attracting significant foreign investment, and witnessing a flourishing private sector. The country's integration into the European Union in 2004 further bolstered its economic development, providing access to broader markets and financial support mechanisms.

Despite these positive developments, Poland's economic progress is not without its challenges. In the context of a rapidly evolving global economy, innovation has become a key determinant of a country's economic success. Innovation, which includes the development of new products, processes, and technologies, plays a critical role in driving economic growth, enhancing productivity, and maintaining competitive advantage. For Poland, fostering innovation is essential not only to sustain its current economic momentum but also to address emerging challenges and capitalize on new opportunities.

The importance of innovation for Poland's economy cannot be overstated. In a globalized world where technological advancements and competitive pressures are relentless, countries that excel in innovation are better positioned to adapt, thrive, and lead. Innovation enables businesses to improve their processes, reduce costs, and offer new or enhanced products that meet the evolving needs of consumers. Furthermore, it drives the creation of high-value jobs and can attract international investment, fueling further economic growth.

This article aims to provide a comprehensive analysis of the problems facing innovation in the Polish economy. The focus will be on identifying and exploring the key challenges that hinder the country's innovative potential. These challenges include structural issues within the economic and regulatory framework, limitations in funding and investment, gaps in education and skills, and bureaucratic obstacles that stifle entrepreneurial activity. By examining these issues in detail, the article seeks to present a clear picture of the barriers that must be overcome to enhance Poland's innovation ecosystem.

The scope of this article includes an in-depth analysis of the aforementioned challenges, supported by relevant case studies and examples that highlight the practical implications of these issues. The objective is to provide valuable insights for policymakers, business leaders, and other stakeholders who are involved in shaping Poland's innovation landscape. Ultimately, the article aims to offer actionable recommendations and strategies that can help address these challenges and support the continued growth and development of Poland's economy through innovation.

CHALLENGES FACING INNOVATION IN POLAND

Innovation is a cornerstone of economic growth and global competitiveness, crucial for nations seeking to thrive in an increasingly interconnected and technologically advanced world. For Poland, a country that has made substantial economic progress over the past few decades, nurturing a vibrant innovation ecosystem is essential for sustaining this growth and addressing emerging challenges. Despite the country's advancements, several structural and systemic issues impede its ability to fully capitalize on innovation. This section provides an in-depth analysis of these challenges.

Innovation is a key driver of economic development, yet Poland faces several structural issues that hinder its full potential [Chmieliński, Wieliczko, 2022]. The fragmented nature of the country's R&D infrastructure leads to inefficiencies and missed opportunities for collaboration among research institutions. Additionally, the limited interaction between academia and industry impedes the effective commercialization of research findings. Inadequate support infrastructure for start-ups further exacerbates these challenges, creating disparities in resource availability. Addressing these structural issues is crucial for fostering a more cohesive and effective innovation ecosystem in Poland.

1. **Fragmented Research and Development (R&D) Infrastructure**. A significant structural challenge for innovation in Poland is the fragmented nature of its R&D infrastructure. The Polish research landscape comprises numerous independent institutions, including universities, dedicated

research centers, and private companies. While this diversity can foster a range of research activities, it also leads to inefficiencies and a lack of coordination. Research entities often work in isolation, resulting in duplicated efforts and missed opportunities for collaboration. For instance, while there are multiple research centers focusing on similar technological areas, their findings may not be integrated or shared effectively, limiting the potential for breakthrough innovations [D'ippolito, Rüling, 2019].

2. **Limited Collaboration Between Academia and Industry.** The gap between academic research and industry application is another critical structural issue. Although Polish universities and research institutions produce a substantial amount of research, translating this research into commercial products and processes remains challenging. The mechanisms for knowledge transfer, such as joint research projects and industry partnerships, are not sufficiently developed. This disconnect results in a slower pace of innovation and limits the ability of Polish businesses to leverage cutting-edge research for competitive advantage. Effective collaboration between academia and industry is essential for accelerating the commercialization of research and fostering a culture of innovation [Jędrzejczak, Sterniczuk, 2017].
3. **Inadequate Infrastructure for Start-ups**. Poland's start-up ecosystem has grown considerably, but the infrastructure supporting these ventures often falls short. Start-ups face challenges in accessing critical resources such as venture capital, mentorship, and business development services. Furthermore, the distribution of physical infrastructure, including co-working spaces and innovation hubs, is uneven across the country. While major cities like Warsaw and Kraków have developed vibrant start-up communities, smaller towns and rural areas lack adequate support structures. This disparity can hinder the growth of innovative start-ups and contribute to regional imbalances in economic development [Paradkar et al., 2015].

Systemic challenges play a significant role in shaping the innovation landscape in Poland. Bureaucratic and regulatory barriers create substantial obstacles for businesses and researchers, often leading to delays and increased costs. Inadequate funding mechanisms, including limited private investment in R&D, further constrain the ability to pursue innovative projects. Additionally, the education system faces a growing skills gap, leaving graduates unprepared for the demands of a rapidly evolving economy. Addressing these systemic issues is essential for creating a more supportive and dynamic environment for innovation in Poland.

1. **Bureaucratic and Regulatory Barriers**. Systemic barriers, particularly bureaucratic and regulatory obstacles, pose significant challenges to innovation in Poland. The regulatory environment can be complex and cumbersome, creating hurdles for businesses and researchers. Navigating through various regulations, permits, and compliance requirements can be time-consuming and costly, which deters potential innovators from pursuing new ventures or research initiatives. Simplifying regulatory processes and reducing bureaucratic red tape are crucial for fostering a more supportive environment for innovation. Streamlining these processes would enable businesses to focus more on innovation rather than administrative compliance [Cinar et al., 2019].
2. **Inadequate Funding Mechanisms**. Funding is a critical component of the innovation ecosystem, yet Poland faces notable challenges in this area. Public funding programs exist, but private investment in research and development remains relatively low compared to other European countries. The venture capital market in Poland is still developing, with investors often hesitant to support high-risk, high-reward projects. This lack of sufficient funding can limit the ability of businesses and research institutions to undertake innovative projects and bring new ideas to market. Expanding funding mechanisms and encouraging private investment in R&D are essential for stimulating innovation and supporting the growth of high-potential ventures [Wonglimpiyarat, 2001].
3. **Education and Skills Gap**. The education system in Poland, while robust, faces challenges in aligning with the needs of the modern economy. There is a growing skills gap between the competencies acquired through the education system and those required by an innovation-driven economy. The traditional focus on established disciplines often leaves graduates unprepared for the rapidly changing technological landscape. Emphasizing STEM (Science, Technology, Engineering, and Mathematics) education and fostering a culture of lifelong

learning are critical to addressing this gap. Ensuring that the workforce has the skills needed to drive innovation is vital for maintaining Poland's competitive edge in the global economy [Biasi, Ma, 2022].

Addressing the structural and systemic issues that hinder innovation in Poland is essential for enhancing the country's innovation ecosystem. By improving coordination among research institutions, fostering stronger collaborations between academia and industry, and strengthening the support infrastructure for start-ups, Poland can better leverage its innovative potential. Additionally, streamlining regulatory processes, expanding funding mechanisms, and bridging the education and skills gap are crucial steps toward creating a more dynamic and effective innovation environment. Overcoming these challenges will not only support Poland's continued economic growth but also position the country as a competitive player in the global innovation landscape.

CONCLUSION

Innovation is widely regarded as the engine of modern economic growth. In the context of Poland, its ability to compete on the global stage hinges on effectively addressing both structural and systemic barriers to innovation. These challenges, as identified in earlier sections, range from fragmented R&D infrastructure to bureaucratic bottlenecks and an underdeveloped venture capital market. As the world becomes increasingly interconnected and technologically driven, failing to confront these issues will not only hinder Poland's economic potential but also jeopardize its position as an emerging leader in Europe. This section will offer conclusions based on the identified challenges, forecast Poland's future innovation trajectory, and provide actionable solutions to address these barriers.

Poland's innovation ecosystem, while demonstrating progress, is still in its developmental stage. Key structural barriers include the fragmented nature of the R&D infrastructure and the limited collaboration between academia and industry. Systemically, the bureaucratic environment and inadequate funding mechanisms exacerbate the difficulties faced by start-ups and established firms alike. Moreover, the skills gap within the education system threatens to create a workforce misaligned with the needs of an innovation-driven economy.

At the heart of the problem lies a fundamental misalignment between Poland's growth ambitions and the practical mechanisms required to achieve them. Innovation cannot flourish in a vacuum. It requires not just the introduction of new technologies and products but also the creation of an ecosystem that supports entrepreneurship, knowledge transfer, and collaboration across sectors. Despite the challenges, Poland's innovation landscape holds immense potential, provided that it can resolve its structural and systemic deficiencies.

In the coming years, several key trends will shape the future of innovation in Poland. These include the accelerating pace of technological change, the rise of digitalization, and the increasing importance of sustainability in innovation strategies. The ability to adapt to these trends will determine the success of Poland's innovation ecosystem.

1. The Impact of Digitalization and Technological Advancements. One of the most prominent global trends is the rise of digital technologies, which are revolutionizing industries worldwide. For Poland, digital transformation offers both opportunities and challenges. Sectors such as artificial intelligence (AI), cybersecurity, and the Internet of Things (IoT) present opportunities for Polish innovators to lead on the global stage. However, success in these fields requires a significant investment in infrastructure and education, as well as a regulatory environment that is conducive to experimentation and risk-taking.
2. As technology evolves rapidly, the pace of innovation will continue to accelerate, making it essential for Poland to stay ahead of the curve. The ability to rapidly adopt and integrate emerging technologies will be a key determinant of success. If Poland can address the existing barriers, it has the potential to become a leader in digital innovation, particularly in areas like fintech, biotech, and software development.

3. The Growing Importance of Sustainable Innovation. Sustainability is becoming an increasingly important driver of innovation, with businesses and governments alike recognizing the need to address environmental challenges. The European Union's Green Deal and its focus on transitioning to a low-carbon economy will push Poland to innovate in areas like renewable energy, energy efficiency, and sustainable agriculture. This shift towards sustainability will require Poland to invest in green technologies and develop policies that encourage businesses to innovate with sustainability in mind.

While sustainability represents a significant challenge, it also offers an opportunity for Poland to position itself as a leader in green innovation. Companies that embrace sustainability can gain a competitive edge by developing products and services that address the needs of an environmentally conscious market. However, this will require changes in both the regulatory framework and the funding landscape to support innovation in green technologies.

4. Global Competition and Talent Retention. Poland's innovation landscape will increasingly be shaped by global competition. As the world becomes more interconnected, Polish companies will face growing competition from both established and emerging economies. To compete effectively, Poland must focus on attracting and retaining top talent, particularly in high-tech sectors.

One of the most significant challenges for Poland in the coming years will be retaining highly skilled workers. The country has long faced a "brain drain", with many of its best and brightest seeking opportunities abroad. To reverse this trend, Poland must create an environment that not only nurtures talent but also offers opportunities for professional growth and innovation. This includes investing in education, offering competitive salaries, and fostering a culture of innovation within companies.

PROPOSED SOLUTIONS

Addressing the structural and systemic issues that impede innovation in Poland will require a multifaceted approach. Below are key strategies that could help Poland unlock its innovation potential: One of the most pressing issues is the gap between academic research and commercial application. To bridge this gap, Poland must foster closer collaboration between universities, research institutions, and businesses. This can be achieved through the creation of innovation clusters that bring together academia, industry, and government to collaborate on joint projects. Additionally, the government could offer incentives, such as tax breaks or grants, for companies that partner with academic institutions on R&D initiatives. Knowledge transfer offices (KTOs) should be further developed to facilitate the commercialization of academic research. These offices can play a crucial role in helping researchers navigate the complex process of patenting and licensing their discoveries, as well as connecting them with potential industry partners. To address the growing skills gap, Poland must reform its education system to better align with the demands of an innovation-driven economy. This means placing a greater emphasis on STEM (Science, Technology, Engineering, and Mathematics) education, as well as fostering critical thinking and problem-solving skills from an early age. Universities should also work more closely with industry to ensure that graduates are equipped with the skills needed in the modern workforce. In addition to formal education, there should be a greater focus on lifelong learning and reskilling programs. As technology continues to evolve, workers will need to continuously update their skills to stay competitive in the labor market. The government could introduce initiatives that encourage continuous learning, such as subsidies for online courses or vocational training programs. Bureaucratic and regulatory barriers are a significant hindrance to innovation in Poland. Simplifying the regulatory environment is essential for fostering a culture of entrepreneurship and innovation. The government should focus on reducing administrative burdens for start-ups and streamlining the process for obtaining permits and licenses. One potential solution is the creation of innovation-friendly regulatory sandboxes. These sandboxes would allow companies to test new products and services in a controlled environment without being subject to the full spectrum of regulatory requirements. This would encourage experimentation and reduce the risk for companies looking to bring innovative products to market. Poland's venture capital market is still developing, which limits the funding available for innovative start-ups. To address this

issue, the government could introduce measures to incentivize private investment in innovation. One potential solution is the creation of public-private investment funds that match private venture capital with government funding to support high-risk, high-reward projects. Additionally, the government could expand its support for R&D by increasing grants and subsidies for research initiatives. This would help to de-risk innovation projects and encourage businesses to invest in R&D. Furthermore, Poland should focus on attracting international investors by promoting the country as a hub for innovation and entrepreneurship. While major cities like Warsaw and Kraków have developed strong start-up ecosystems, other regions of Poland lag behind in terms of innovation infrastructure. To address this imbalance, the government should invest in developing regional innovation hubs across the country. These hubs could provide start-ups with access to co-working spaces, mentorship programs, and funding opportunities. Regional hubs would not only help to distribute economic growth more evenly across the country but also foster innovation in areas that may be underserved by traditional infrastructure. This would encourage entrepreneurship and create new opportunities for businesses in less developed regions.

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