

Qualitative analysis of the Sustainability aspect of the Innovation Ecosystem of Cornélio Procópio

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Abstract. This research paper presents a comprehensive qualitative analysis of the innovation ecosystem in Cornélio Procópio, a small city situated in the northern region of Paraná State, Brazil, with a specific focus on sustainability aspects of the city's development. The study evaluates the city's current innovation landscape, encompassing its strengths, weaknesses, opportunities, and threats while examining the collaborative efforts of key stakeholders, including non-profit organizations, businesses, local government entities, and university leaders and students. The research methodology relies on a meticulous review of scientific papers, publicly available data, and interviews with community members actively engaged in promoting sustainability within the ecosystem.

Keywords: Innovation Ecosystem, sustainability, development, SWOT Analysis

1. Introduction

The city of Cornélio Procópio is a small city with only 45.206 habitants ([1] IBGE, 2022) but it has 2 university campuses and 4 other Colleges, while also having a working business incubator and a technological park under construction ([2] Jacometti, M., Oliveira, L.C., Oliveira, J., et al., 2023), making it a hub for scientific innovation. But it also has its downfalls, it is located in a less developed region of the state, and is still not very industrialized, its surroundings still are a very rural and traditional area.

The study aims to assess the current state of the innovation ecosystem in Cornélio Procópio, a small city located in the north of Paraná State, Brazil, including its strengths, weaknesses, opportunities, and threats, as well as the efforts being made by key stakeholders in the city, such as non-profits, businesses, local governmental agents and University leaders and students, while focusing on the sustainability aspects of development. This analysis is based on a review of scientific papers and publicly available data related to the city's tech innovation landscape and interviews with the community acting directly with the sustainability narrative.

This research paper presents a qualitative analysis of the tech innovation ecosystem in Cornélio Procópio, the data collected to be presented aimed to illustrate the situation of the city's development, and was presented as part of the "Challenge" for the

competitors of the third edition of Hackabee, a hackathon that has the mission to incentivize the development of new startups in the city, to solving or easing the problems observed in the challenge presented, while also promoting and teaching entrepreneurship to Students, it is organized at the Technological Federal University of Paraná-Cornélio Procópio, business incubator, called Sprint, by students, teachers, and entrepreneurs.

2. Methodology

The following topics were analyzed as a strategy to find the faults and advantages of the Innovation ecosystem of Cornélio Procópio, PR, Brazil.

2.1 Literature Review

To understand the innovation ecosystem of Cornélio Procópio, conducted a review of existing scientific papers and reports. This literature review allowed us to gather insights into the historical development of the tech innovation ecosystem in the city, the role of educational institutions, and the initiatives undertaken by local government, non-profits, and businesses.

2.2 Selection of Scientific Papers

Searched systematically all the keywords cited before through academic databases, Google Scholar and SciELO, for relevant papers published between 2010 and 2023.

2.3 Public Data Sources

In addition to academic papers, we accessed publicly available data sources such as government reports, industry publications, and websites and social media of local businesses.

2.4 SWOT Analysis

SWOT analysis is an effective framework for analyzing the Strengths, Weaknesses, Opportunities, and Threats of an organization (or a project) that helps to address the effectiveness of a project planning and implementation. ([3] Sabbaghi and Vaidyanathan, 2004)

To assess the strengths, weaknesses, opportunities, and threats of the sustainability aspect of the innovation ecosystem of Cornélio Procopio, it was conducted a SWOT analysis supported by the protagonists of the matter (Fig. 1), the people living in economic and social vulnerability, and those working with them, for the social aspect of sustainability, we heard from non-profits that provide education and other basic needs such as access to nutrition and medical assistance to those in vulnerability. For the environmental aspect of sustainability, we heard from people in the fields of agronomy, recycling, basic sanitation, and public health. This allowed us to identify critical areas of focus for the city's future development, while also learning the strengths available to lean onto.



Fig. 1 – Workshop to develop the SWOT Analysis

2.5 Interviews

We also conducted interviews with the same protagonists of the matter mentioned in the topic above (Fig. 2), basically constituting a testimony of their view on the matter and how it is when day-to-day life is directly affected by the challenges associated with the ongoing development of a more sustainable innovation ecosystem, where they were asked the following questions:

- What are the main problems facing the entity you represent?
- How do these problems affect your daily life and that of the community?
- Why is solving this problem important? What difference would that make?
- Who will be impacted by resolving this issue?



Fig. 2 – Conducting interviews

3. Results

The findings from our comprehensive analysis of Cornélio Procopio's innovation ecosystem, with a particular emphasis on sustainability, provide valuable insights into the city's strengths, weaknesses, opportunities, and threats (SWOT analysis). Emerged from a combination of group work, data collection, and interviews with key stakeholders involved in sustainability initiatives within the city.

3.1 SWOT Analysis of Environmental Sustainability of Cornélio Procopio

Strengths:

One of the notable strengths identified in terms of environmental sustainability is Cornélio Procopio's status as a "lean city." This suggests that the city has the potential for efficient resource management and reduced waste. Additionally, the presence of periodic solid waste collection, green areas, and a well-established sewage and water treatment network contribute positively to environmental sustainability. Furthermore, the existence of selective waste collection programs, equipped recycling cooperatives, and government bodies overseeing compliance with environmental laws provides a solid foundation for sustainable practices.

Weaknesses:

However, certain weaknesses in the environmental sustainability domain were also unveiled. Despite the availability of resources, there appears to be a cultural gap when it comes to promoting selective waste collection, indicating a need for greater public awareness and engagement. Flooding issues, which can have adverse environmental consequences, pose another challenge. The presence of middlemen negatively affecting the sale of recyclables and a general lack of responsibility among the population further hinder progress in this area.

Opportunities:

Several opportunities for enhancing environmental sustainability in Cornélio Procopio were identified. The city's status as a university hub presents a platform for knowledge exchange and innovation in environmental practices. Collaboration with companies focused on environmental solutions and

expanding professional courses in the environmental sector are promising avenues. There is also potential to increase organized waste collection efforts and establish environmental organizations and partnerships, such as the Environmental Partner Seal, to further promote sustainability.

Threats:

The threats to environmental sustainability include an uncertain future, ongoing flooding challenges, and insufficient investment in environmental issues. Addressing these threats will require concerted efforts, including the development of proactive policies, improved public awareness, and long-term solutions to mitigate flooding risks. Tackling clandestine sewage and spillage into storm sewers remains a pressing concern for preserving the city's environmental integrity.

3.2 SWOT Analysis of Social Sustainability of Cornélio Procópio

Strengths:

In terms of social sustainability, Cornélio Procópio demonstrates strengths in its infrastructure and human resources. The presence of the Social Assistance Reference Center, numerous social assistance professionals, halfway houses, and being a regional hub city are vital assets. The city also benefits from an emerging job market, educational institutions, and engaged community organizations and churches, which play a crucial role in social welfare.

Weaknesses:

Nonetheless, certain weaknesses in the social sustainability domain were identified. A welfare culture, characterized by an emphasis on rights over duties, poses a challenge. Additionally, there is a lack of integration between social entities and a need for more comprehensive family support systems. Access to information, education, and collective knowledge remains limited, and the issue of accumulated garbage is a concern.

Opportunities:

Opportunities for improving social sustainability include fostering intersectoral collaboration, promoting solidarity enterprises, and preparing the workforce for emerging job opportunities. Greater coordination among institutions, including universities, can facilitate community engagement and knowledge sharing. Leveraging university resources and expertise can be particularly advantageous for enhancing social sustainability.

Threats:

Similar to environmental sustainability, social sustainability faces threats such as an uncertain future and persistent flooding challenges. Additionally, limited investment in addressing social issues and the time required for solutions to emerge represent ongoing concerns. The lack of effective public policies and issues related to sewage and stormwater further compound the challenges.

4. Discussion

One of the key strengths of this study lies in its comprehensive analysis of the innovation ecosystem in Cornélio Procópio. The research draws from multiple sources of data, publicly available information, and interviews with stakeholders directly involved in sustainability initiatives. This multi-pronged approach ensures a holistic understanding of the ecosystem, capturing a wide range of perspectives and insights.

The incorporation of interviews with community members who are directly affected by sustainability challenges is a notable positive aspect of this research. These interviews provide firsthand accounts of the issues faced by the city's residents and the impact of sustainability efforts on their daily lives. This community engagement adds depth and authenticity to the analysis.

One potential limitation of the study is the limited historical data available for Cornélio Procópio's innovation ecosystem. While the research draws on data up to 2023, a longer historical perspective could provide deeper insights into the ecosystem's evolution. This limitation may restrict the ability to track long-term trends and changes.

Cornélio Procópio's unique characteristics, such as its size, location, and socio-economic context, may limit the generalizability of findings to other regions or cities. The study's findings may not be directly applicable to larger urban centers or areas with vastly different economic and social dynamics. This regional specificity should be considered when interpreting and applying the research.

The study primarily relies on qualitative data, including interviews and literature review, to assess the innovation ecosystem. While qualitative data offers rich insights and perspectives, the absence of comprehensive quantitative data may limit the ability to quantify the impact of sustainability efforts or compare them to numerical benchmarks.

The findings and insights derived from this research on Cornélio Procópio's innovation ecosystem may vary significantly when applied to other contexts. Several factors can contribute to these differences:

Cornélio Procópio's status as a small city with a rural hinterland influences the dynamics of its innovation ecosystem. In contrast, larger urban centers may have more diverse ecosystems, with different challenges and opportunities. In rural areas, sustainability initiatives may face unique agricultural and environmental considerations.

The socio-economic conditions of a city or region can significantly impact the innovation ecosystem. Cornélio Procópio's position as a less industrialized city in a developing region of Brazil shapes its ecosystem in distinctive ways. In more economically developed regions, different drivers and challenges may emerge.

The scale of a city, its available resources, and the extent of university and business engagement can differ widely. Larger cities may have greater resources for innovation, while smaller towns may rely more on community-driven initiatives.

Cultural factors and regulatory frameworks also play a role. Different regions may have varying levels of government support for innovation, as well as different cultural attitudes towards entrepreneurship and sustainability.

5. Conclusion

In conclusion, this SWOT analysis underscores the complex interplay of strengths, weaknesses, opportunities, and threats within the innovation ecosystem of Cornélio Procópio. It highlights the need for a multipronged approach, involving active collaboration between government, academia, businesses, and non-profit organizations, to harness the city's potential for sustainable development. Addressing the identified weaknesses and threats while capitalizing on strengths and opportunities will be essential for fostering a more resilient and sustainable innovation ecosystem in this small but promising city.

While the study provides valuable insights into Cornélio Procópio's innovation ecosystem and its sustainability aspects, it is essential to recognize the context-specific nature of these findings. The positives of the research, including its comprehensive analysis and community engagement, enhance its relevance. However, the regional specificity and limitations, such as a lack of historical and quantitative data, should be considered when applying these findings to other contexts. Recognizing these differences will be crucial for policymakers, researchers, and practitioners seeking to adapt and implement strategies for innovation and sustainability in diverse settings.

It is clear that the city has a lot of potential, and quite good infrastructure to be the hub of an innovation ecosystem, especially a Sustainable one, considering all the efforts being made to achieve that, but for it to happen, it still needs a lot of work, open communication, programs and other tactics to enfold the hole population and make big moves not only to its habits but to the hole culture, so even with some advantages, it is still not an easy walk to this destination.

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