

Leonardo Gonçalves
Unisinos University (Brazil)

 <https://orcid.org/0000-0003-1752-9026>

Clarissa Teixeira Federal
Federal University of Santa Catarina, UFSC
(Brazil)

 <https://orcid.org/0000-0003-1362-1255>

Josep Miquel Piqué
Innova Institute. La Salle – Ramon Llull University
(Spain)

 <https://orcid.org/0000-0002-0215-0139>

Ruta N - fostering the innovation ecosystem of Medellín

Abstract

The aim of this paper is to identify which factors have contributed to the success of Ruta N. Ruta N fostered the innovation ecosystem of Medellín, but until now it remains open how it happened from the inside perspective, which actors were involved in the process and which practices were made. Secondary data collection, interviews with directors directly involved and technical visits were made, and some important points emerged from the field that can shed light in order to apply those practices and configurations intentionally in other cities with similar contexts.

Keywords: Ruta N, Medellín, Innovation ecosystem

Ruta N - fomentant l'ecosistema d'innovació de Medellín

Resum

L'objectiu d'aquest document és identificar quins factors han contribuït a l'èxit de Ruta N. Ruta N fomentava l'ecosistema d'innovació de Medellín, però fins ara segueix inexplicat com va ocórrer des de la perspectiva interna, quins actors van participar en el procés i quines pràctiques es van fer. Mitjançant la recollida de dades secundàries, entrevistes amb directors directament implicats i visites tècniques que es van fer, apareixen alguns punts importants que poden il·lustrar com es va desenvolupar el projecte i així poder aplicar aquestes pràctiques i configuracions intencionadament en altres ciutats amb contextos similars.

Paraules clau: Ruta N, Medellín, ecosistema d'innovació

Ruta N- promoviendo el ecosistema de innovación de Medellín

Resumen

El objetivo de este documento es identificar qué factores han contribuido al éxito de Ruta N. Ruta N fomentó el ecosistema de innovación de Medellín, pero hasta ahora no está explicado cómo esto ha sido posible desde una perspectiva interna, analizando los agentes involucrados en el proceso, y sus prácticas. A través de la recopilación de evidencias secundarias, entrevistas con directores directamente involucrados, y visitas técnicas, se han obtenido conclusiones importantes que pueden ilustrar cómo se ha desarrollado el proyecto, y proporcionar lecciones que puedan aplicarse intencionadamente a otras ciudades con contextos similares.

Palabras clave: Ruta N, Medellín, ecosistema de innovación

Corresponding author: e-mail: leonardo_fgoucalves@yahoo.com.br

Received 1 October 2021 - Accepted 2 March 2022

This is an Open Access article distributed under the terms of the Creative Commons Attribution-Non-Commercial-No Derivatives License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial re-use and distribution, provided the original work is properly cited, and is not altered or transformed in any way.

Introduction

Medellin is one of the most populated cities in Colombia. The city is located in the Antioquia region, a prosperous and economically important region. The city of Medellin have four historical phases of development according to Morrison (2019): (1) in the 1880s, an expansion with coffee and mining; (2) in 1900s, the industrialization phase arriving in the 1970s as one of the largest industrial centers in Latin America; (3) in the 1980s, the worst period in the city's economic and social history, the city became a narcotic center due a deep structural industrial crisis bringing a lot of poverty and crime. At this point the city had 381 homicides per 100,000 inhabitants, the most dangerous in the world (Hylton 2007); and (4) after that, becoming the knowledge city due to the decline of violence, social programmes and innovation policies. It is called the 'Medellin miracle' (Maclean 2015). In 2013, the Urban Institute, the Wall Street Journal, and Citi Group named Medellín the "Innovative City of the Year", recognizing the city's unique makeover (Ruta N 2018). In 2015 the city showcased its success hosting the first "Cities for Life" global forum. After that, Medellín was declared a world innovation hub by the annual ranking created by the Australian firm 2ThinkNow. The actor at the center of this transformation was Ruta N, created to foster Medellin's transition from an industrial into a knowledge city.

Ruta N was created on 11 November 2009 as an institution to upgrade the region and its actors. The plan was drafted in 2010 by more than 250 regional leaders, namely, entrepreneurs, business leaders, policymakers and academics. The objective was to promote policies to support scientific, technological and innovative development in Medellin, identifying new knowledge-based businesses and transforming Medellin into the 'most innovative city in Latin America'



(Molina Betancur, López de Mesa and Hincapié 2015, Higueta-Palacio, 2015; Morriszon and Bevilacqua 2018; Morrison 2019, Morisson and Panetti 2020, Pineda and Scheel 2011).

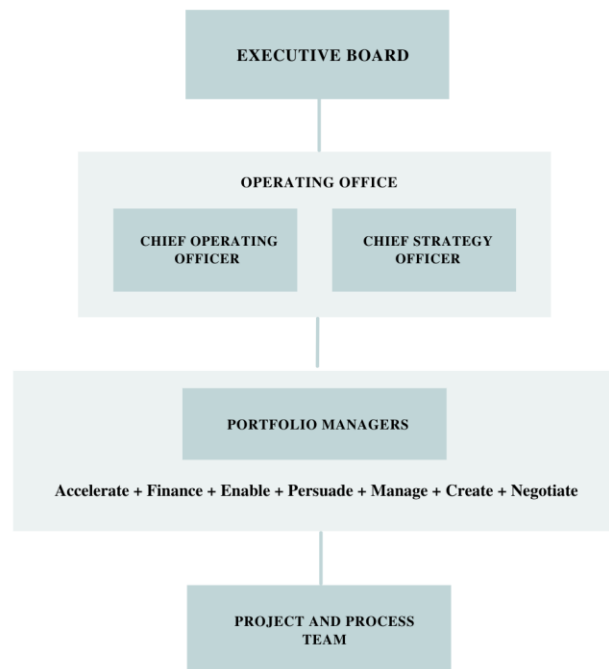
The creation of Ruta N Corporation had the idea to better connect Medellín to innovation hubs around the world. The four actors that have played a fundamental role in the creation and formulation of Ruta N are the mayor of Medellín, the public multi-utility and communications company EPM-UNE Empresas Públicas de Medellín - Empresa de Telecomunicaciones (Public Enterprises of Medellín - Telecommunication Company), Proantioquia, and the CTA Centro de Tecnología de Antioquía (Science and Technology Center of Antioquia). The mayor from 2008 to 2011 suggested the project in the Municipal Development Plan. EPM-UNE was in charge of funding the project. Proantioquia became the institutional incubator for Ruta N shaping its mission and model. And, CTA was in charge of defining Ruta N's programmes and structures (Morrison 2019).

The initial plan of Science, Technology and Innovation (STI) — involving universities and industrial groups in the city — targeted three sectors: STI, energy and health, that were selected by their potential growth and prior capabilities (Salazar et. al. 2019). Ruta N was made to connect and energize the innovation ecosystem and foster collaboration between science, technology and innovation actors, it means: promote, coordinate and articulate local policies and institutions working for economic development, generating favorable conditions for the expansion and consolidation of the entrepreneurial tissue (Ruta N 2018).

Ruta N has already provided Medellín with more than 3,000 qualified jobs, supported more than 500 projects and attracted more than 150 domestic and foreign businesses to settle on its premises within less than 10 years (Ruta N 2018).

The governance of Ruta N is structured as an association between public entities, non-profit, of common utility and social interest, constituted in accordance with Colombian law by private act of November 11, 2009 with a duration that expires on November 11, 2059. The governance, management, administration and control of the Corporation is as follows: The General Assembly of Associates is the highest authority of the Corporation and is made up of its active associates. The Board of Directors has 9 principal members and 2 alternates (Salazar et. al. 2019).

FIGURE 1. The organizational structure of the Corporation



Source: Adapted from Ruta N (2020).

The Executive Director is the legal representative of the corporation, executor of the decisions of the Executive Board and those assigned by the assembly. The organizational structure of the Corporation is made up of an Executive Board, an Operating Office, in which there is a Chief Operating Officer and a Chief Strategy Officer, then the Portfolio Managers — divided by themes: Accelerate, Finance, Enable, Persuade, Manage, Create, and Negotiate —, and the Project and Process Team (Ruta N 2020). Figure 1 shows the full structure.

Ruta N's vision involves institutionalizing innovation as the main catalyser of the city's economy and welfare, based on a world-class ecosystem. The mission is executing the STI Plan that consists of three directions: Innovation Platforms, Knowledge-based Business, and Innovation Culture (Ruta N 2018).

Innovation platforms strengthen the regional innovation system by targeting universities and other interface institutions such as business incubators and technology development centers. Knowledge-based businesses are responsible for creating an environment for businesses and entrepreneurs to carry out knowledge-based activities, and high-value transactions. Finally, Innovation Culture facilitates the promotion of social appropriation of science, technology and innovation in the city of Medellín, to ensure social inclusion and sustainability (Ruta N 2018).

These three key goals are achieved through the focus of Ruta N on talent, enabling capital, network growth and generating the necessary infrastructure (Ruta N 2018).

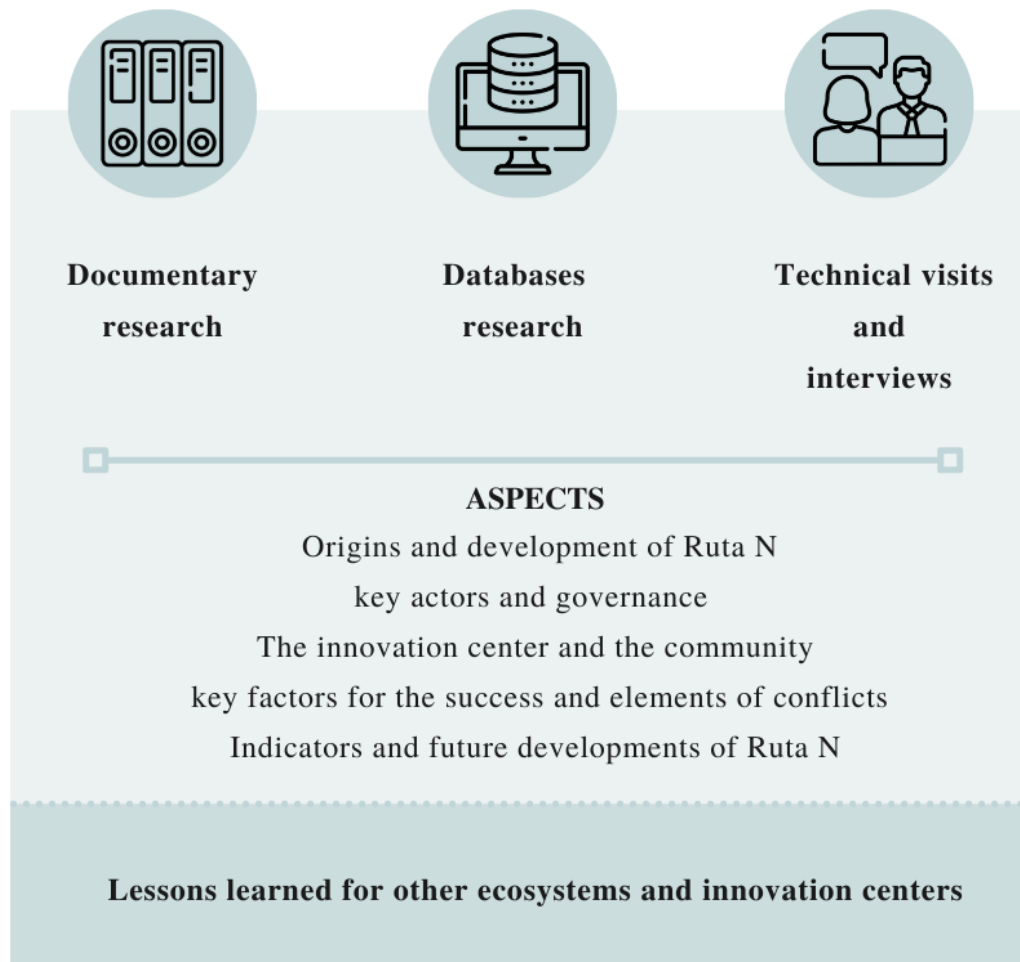
Methodology and theoretical framework

The study is an exploratory research, as it seeks to provide a closer view of the object of study (Gil 2008). The approach can be considered as qualitative and applied in terms of nature. Figure 2 illustrates the framework used to obtain the results.

To obtain the data, a documentary research was carried out with information made available by Ruta N in its official publications, without any previous analytical treatment (Gil 2008). The triple helix model was used (Etzkowitz and Leydesdorff 2000) that considers the dynamics of the relationships between the actors: industry, government and academia, bringing an evolutionary and systemic vision of innovation. It was also considered the helixes included after

that model: the fourth helix (Carayannis and Campbell 2009) as the civil society and the fifth helix (Carayannis and Campbell, 2010) as the environment.

FIGURE 2. The methodological framework used to obtain the results



Source: Own elaboration.

In addition, a search was carried out in the Scimedirect and Scopus databases to search for articles on the innovation habitat (Silveira and Córdova 2009). The literature searches aimed to identify five aspects:

- i) origins and development of Ruta N,
- ii) key actors and governance,
- iii) the innovation center and the community,

- iv) key factors for the success and elements of conflicts, and
- v) Indicators and future developments of Ruta N.

To complete the information, two technical visits and interviews with the managers were carried out. From these results, information was selected prioritizing what can be lessons learned for other ecosystems and innovation centers.

The case of Ruta N

Origins and development of Ruta N

Medellin is among the world's top cities (IEE Smart Cities Initiative 2015), and has received the Nobel for social urbanism (Caracol News 2016) and also advances in the “Best Cities for Doing Business” ranking (Intersoftware 2016), as well as being considered by Innovation Cities Index (2017) as one of the continent's most attractive places to do business.

The global need for development based on innovation, intellectual and technological empowerment influenced the creation of Ruta N in 2009, which had the function of boosting growth and generating knowledge and technology (IEE Smart Cities Initiative 2015). Considering that one of the goals set for and by Medellin is the recognition of the city as a world innovation hub, the Innovation and Business Center Ruta N brings this synergy and collective construction (Franco 2017). The director of Ruta N, Maria Paulina Villa Posada, director of the Medellinnovation district and architect of Ruta N (Technical Visit 2016), discusses the transformation that the habitat has made in the city for the creation of the culture of innovating:

The word “innovation” is new to Latin American society and comes from the influence of developed countries. Here in Medellin, the efforts are centered on the society assuming ownership of innovation, feeling that they can innovate, and innovate everywhere (Technical Visit 2016).

Key actors and governance

Created by the Municipality of Medellín, public companies and UNE telecommunications, Ruta N is considered a Center for Innovation and Business. Due to the strategic partnership of various actors who have worked together, Ruta N is one of the largest portfolios of innovation and research to improve the quality of life of the citizens.

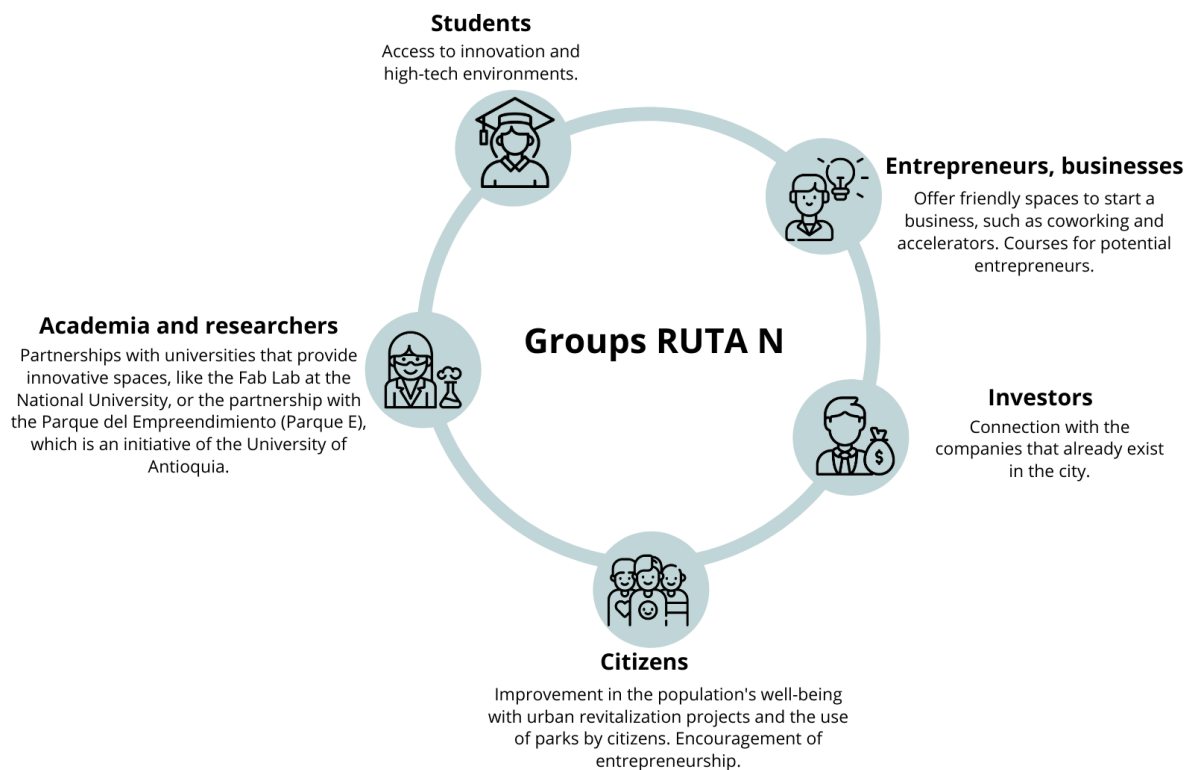
Public and private organizations, educational institutions, and various actors in the science and technology system have supported the corporation since it was created (Ruta N 2016). Ruta N is a new driver for the city as it advances the consolidation of Medellín as a knowledge city (Ruta N 2016). Some actions taken in the last twenty years allow the city to stand out in creative economy and innovation (Cavalcanti, Andreza and Santiago 2014).

Innovation is the transformation of knowledge, of any nature, into new products and services in the market. For Ruta N the innovation process is not a choice but a duty. Analysis made about Colombia's Innovation Policies in 2014 shows that innovation is important for ensuring the sustainable growth of the future of a country attractive and competitive for investors and other large governments (Guedes and Teixeira 2017). Aiming at this point, Ruta N set out to work as the innovative pillar of the city of Medellín uniting academia, government, and business (Ruta N 2016).

Based on an ecosystem of global class, the Ruta N focused on the development and growth of the city, so that it became increasingly recognized internationally as a city prominent in innovation and quality of life. Working with this perspective was important, as it formed a comparative over time, to measure its performance over the years, until it reaches its goal (Ruta N 2016b).

Ruta N is intended for business, academia and science, also involving investors and the community. To address this, the Innovation and Business Center presents different resources for each group, as described in Figure 3.

FIGURE 3. Practices made by Ruta N in each group



Source: Adapted from Ruta N (2016b).

Although the services are open to everyone, it can be observed that the public most intensively assisted are the entrepreneurs. The active services (grouped by categories) offered are in table 1.

TABLE 1. Services provided by Ruta N

Groups	Services
Entrepreneurs	<p>Training: Training for funding in Small Business, Funding for Acceleration</p> <p>New Businesses: Orange Route, Corporate Venturing, Open Innovation through challenges,</p> <p>Technology Trades: CATI (Center for Technology and Innovation) Ruta N</p> <p>Internationalization: Leads, Market entry network, Open US for startups</p> <p>Physical space: Orange route, Business Landing.</p> <p>Intellectual property: CATI (Center for Technology and Innovation) Ruta N</p> <p>Funding: Funding possibilities, Startup funding tracking</p> <p>Trends: Corporate Venturing</p> <p>Connections: Open Innovation through challenges</p> <p>Innovation Guides: Self-Diagnosis of innovation, Corporate Venturing</p>
Academia	<p>Training: Training Spaces for Teachers.</p> <p>Intellectual property: CATI (Center for Technology and Innovation) Ruta N.</p> <p>Education in Innovation: Training Spaces for Teachers.</p> <p>Technology Trades: CATI (Center for Technology and Innovation) Ruta N.</p>
Investors	<p>Expert Information: Inversómetro (Investmeter).</p>
Students	<p>Entrepreneurship: Orange route.</p> <p>Training: Digital robotics, funding.</p>

Source: Adapted from Ruta N (2021).

About academia, it is important to highlight the actions that Medellín has carried out in partnership with many universities:





Posada highlights that the culture of innovation is something complex, and that in Medellín the need for people who are engaged and who are replicators and disseminators of this culture was perceived. Thus, university professors played a fundamental role in the actions carried out in favor of entrepreneurship and innovation (Technical Visit 2016).

There are some services for academia that are the same as those made available to entrepreneurs, such as ViveLab Medellín, Innovation for All, Patent Squad and the Open Innovation Platform. However, Generation N — a project for teachers from educational institutions in Medellín that seeks to transform the experience of students through project-based learning — stands out. The projects carried out with Ruta N make connections with other environments. In the case of Generation N, it is operated by Explora Park, which aims to benefit about 1,500 students in education between 3rd-11th grades in areas of science, technology, engineering and mathematics (STEM) by working directly with their teachers.

Regarding investors, Ruta N focuses on the Investmeter, a tool implemented to measure the dynamism of active investors in the city, members of the Smart Capital Network, which brings together actors such as domestic and foreign Private Capital Funds (FCP), angel investors and private investors. In the 2016 report, investments were \$31.5 million benefiting 25 companies, with \$8.7 million from Private Capital Funds, \$1.7 million from the Angel Investor Network and \$21 million from other investment channels.

In general, the groups have access according to the needs defined by Ruta N in figure 4.

FIGURE 4. Needs defined by Ruta N for the groups

 ENTREPRENEURS	 ACADEMIA	 INVESTORS	 STUDENTS
Technology	Technology		
Commercialization	Commercialization		
Training	Training		Training
Internationalization			
Technologies and Solutions			
Connections	Connections	Connections	
New businesses			
Space			
Funding			
Innovation Driven			
Intellectual Property	Intellectual Property		
	Innovation in Education		
		Expert information	
		Investment	
		Opportunities	

Source: Adapted from Ruta N (2021).

For the operation of the Ruta N there are some dimensions - Organizational Innovation; Business Knowledge; Innovation Culture Management; Research and Development Management (R&D) — and the strategies connected with that, as seen in table 2.

TABLE 2. Dimensions and strategic areas of Ruta N

Dimensions	Strategies
Organizational Innovation	It aims to enhance the capabilities for innovation and knowledge development, for better conditions to implement innovation in the city.
Business Knowledge	The intention is to disseminate the proposal to innovate, both in existing companies and in new ones, thus providing an opportunity for the development axis between science, technology, and innovation.
Innovation Culture Management	To provide activities that stimulate science, technology, and innovation for society, thus making Medellín the city of knowledge.
Research and Development Management (R&D)	The Science, Technology and Innovation plan is developed as a result of a collective construction of the Regional Innovation System and becomes the public policy of the city of Medellín in Agreement 024 of 2012 with the City Council.

Source: Adapted from Ruta N (2016b).

The Innovation center and the community

As a way to attract people into the Innovation Center, identify opportunities and foster the culture of innovation and entrepreneurship in the community, the Ruta N provides the event called Open House, which emerged from the need of society to connect with the offer of entrepreneurship and innovation in the city.

Business owners, investors, entrepreneurs, researchers, and citizens who are interested in knowing what the Ruta N and the other institutions of the Regional Innovation System have to offer are invited to attend on specific days for this event that is prepared for the community (Technical Visit 2016).

The call for the Open House is: “If you have a project with potential or simply want to know what the Ruta N and the various entities of the innovation ecosystem are for, the Open House is a space for connection between venture offers and innovation” (Technical Visit 2016).

At the Ruta N Open House it is possible:

- § Connect with the city and the innovation and entrepreneurship offer, make friends and businesses;
- § Find mentoring or training on business models, product development, funding or internationalization;
- § Learn about the work of Ruta N and other entities in the Regional Innovation System.

With startup movement dynamics, the Open House actions initially encourage entrepreneurs to explain their ideas through pitches. In addition, the ecosystem available to get ideas off the ground are presented during the activity. As a form of presentation, the environments also quickly present the potentials for supporting the entrepreneur, and at the end they are all available in a large showroom so that the entrepreneurs feel free to ask questions and deepen their understanding of the potentials of each actor in the ecosystem. Thus, at the end of the presentations the representatives of each entity are at their desks to answer questions from the public, thus forming a network among all (Technical Visit 2016).

The event is widely publicized in the city, generating crowded conferences. The promotion of local entrepreneurship happens with some entrepreneurs bringing their innovative ideas to the public and the public electing the best idea. One of the entrepreneurs participating in the Open House indicates that the high participation is due to the RUTA N's assistance in business development. (Technical Visit 2016).

Key factors for the success and elements of conflicts

Some key factors for the success of Ruta N (Salazar et. al. 2019) are: (1) Municipal government support and continuity of public policy, (2) The Bet on the University-Company-State Articulation, (3) Think not only about business development but also think about the future.

1. Municipal government support and continuity of public policy

Ruta N has been able to transcend during three different mayoralties in which the municipal government has decided to support this initiative by allocating resources and giving continuity to the STI Plan. ProAntioquia, UNE and EPM were also key players in the construction of Ruta N and for the initiative to gain strength and lead regional innovation. The challenge now is to define what follows after 2021, when the term of the current STI Plan is fulfilled.

2. The Bet on the University-Company-State Articulation

There is a University-Company-State Committee (CUEE) that meets every month to hold sessions and whose headquarters is Ruta N. The main agents of the State participate, such as the government and the mayor's office. Also participating are the group of the top 8 universities in the city, called G8, as well as the most important companies in the city. There, the STI agenda is discussed and the political will to cooperate and work together is maintained so that Medellín's innovation ecosystem can continue to grow and strengthen.

3. Think not only about business development but also think about the future.

Knowing the market and technological trends in order to keep the STI Plan at the forefront has been a constant in the history of Ruta N. The Ruta N CT+i Observatory is a unit that is in charge of constantly reviewing, analyzing and updating the trends and focus of market and technology priorities that should be developed or targeted within Ruta N. These trends that are analyzed in the observatory are global.

Ruta N also analyzed and considered the learnings from the pathway of other projects to develop their innovation ecosystems, such as Skolkovo in Moscow, 22@ in Barcelona, Porto Digital in Recife (Nikina and Pique 2016), as well as Florianópolis (Garay 2019).

But there are also some elements of conflicts detected in the Ruta N journey related to the consequences in the city as a whole, especially in other areas not considered in the first moment. The conflicts were connected with socioeconomic polarization, lack of local community participation and the loss of neighborhood identity, that were caused by the weak links between Ruta N and the Innovation District. The results were some urban fragmentation, a lack of instrumentalisation/training for the residents, and a sense of uncertainty and fear of expulsion by them (Arenas et al. 2020). These topics brought negative consequences and lessons that were included in the next steps of Medellín urban politics and planning, and are now golden experiences to be used by other cities and policy makers.

Indicators and future developments of Ruta N

Gutiérrez (2015) considers Medellín as having an innovative DNA, being Ruta N the main distinction, for the work to create one of the best innovation ecosystems in Latin America. In the management report of the corporation, it is observed that among the actions carried out by Ruta N the design carried out to achieve the objectives stands out. These delineations are associated with the creation of ecosystem parameters. To measure its success the Ruta N corporation determines measurables of success, which are: improvement in the quality of life with an increase in the fraction of new innovative companies in the city, amount of existing companies that innovate, increase in the percentage of direct and indirect jobs generated in innovative areas and value generation of these innovations (Ruta N 2016). Thus, Ruta N presented in 2015 four ecosystem enablers: talent, culture, network and capital, and in 2016 changed to: talent, capital, business and infrastructure.

For Andrés Calle Valdés — Knowledge Business Professional of Ruta N — the theme of innovation is carried out in a variety of ways to the different entrepreneurs of Medellín (Technical Visit 2016).¹

Medellín is focusing on innovation to improve the quality of life of its population. This is only possible when it is understood that the solutions to be developed must respond to real needs. With a knowledge society and a knowledge economy, more and better jobs are needed, as well as an increase in the number of people coming into higher education to contribute to innovative practices. Thus, four basic axes were addressed in the Ruta N management reports in 2016, being:

- § **Talent:** Inspiring leaders to develop the businesses of the future is presented as an important skill of an innovation ecosystem. Cities need people with technical skills and entrepreneurial spirit to manage innovation projects that generate economic development (Ruta N 2016).
- § **Capital:** Funding for innovation projects with high social and economic impact. Businesses need intelligent and flexible capital to finance their development, consolidation, and growth.
- § **Infrastructure:** Enabling spaces for innovation occurs. Innovative organizations demand spaces with services and methodologies designed especially for their needs.
- § **Business:** Support for projects that turn into innovative businesses. The city needs profitable, sustainable solutions with global vision.

Ruta N introduced features such as the ABC of innovation, videos, jobs and training, as well as the hosting of a STI observatory. The ABC of innovation works as a glossary of terms used in the world of science, technology and innovation. For entrepreneurs who want to stay up to date on opportunities, Ruta N maintains information about opportunities in the Innovation District,

¹ Capital development, city capabilities and competence, cultural development, and development of support infrastructure for businesses are the supports that entrepreneurs can find in Ruta N. Information from Andrés Calle Valdés (Technical Visit 2016)

considering the different areas, companies, dates, and qualifications needed for the positions.

In the area of training, Ruta N also maintains information about the opportunities for courses.²

Another focus is on the STI Observatory of Medellin, considered as a tool for monitoring global trends in science and technology in the markets of health, information and communication technologies, energy, and biotechnology for the agricultural sector. From this observatory it is possible to obtain information about capacities, weaknesses, actors and talents in each of the markets under observation, allowing the identification of challenges and opportunities for innovation to develop projects and businesses in the city.

Ruta N put on the management reports that most of the resources to maintain the Innovation Center are public. In addition, part of the resources available for the management and operation of the projects come from the rents of the existing spaces.³

Ruta N has been working on the challenges of continued engagement for the culture of entrepreneurship and citizen innovation. In addition, Posada indicates that work is being done with large entrepreneurs that due to the historical scenario of the country have lost accreditation in Colombia. According to Posada, little by little the networking movement is succeeding in bringing these actors back into investing in the ecosystem. Ruta N is, together with the other entities, demonstrating that it is safe to undertake and innovate in Medellin (Technical Visit 2016).

² Likewise, it keeps an agenda with events held throughout the week both in Ruta N and in the city with a focus on science, technology and innovation. Information from María Paulina Villa Posada (Technical Visit 2016)

³ However, it is expected that the revenue will generate surplus so that it can be converted into new programs and thus be less and less dependent on the government. The municipality, through the city council, signed an agreement in 2011 that Ruta N is allocated 7% of EPM's surplus. This ensures Ruta N growth and sustainability, and is expected to depend on it less and less, and become 100% self-sustaining. Information from María Paulina Villa Posada (Technical Visit 2016)

Medellín is positioned in the world scenario in a way that innovation is not an option but an imperative to guarantee sustainable growth that in the future can convert the country into an attractive and competitive country (Ruta N 2015).

Conclusions and lessons to be learned

The Ruta N case is the regional innovation agency Ruta N in Medellín, which was purposefully sampled for three reasons. First, the City of Medellín has been implementing unorthodox economic policies in a market-based economy (Bateman, Durán and Maclean 2011). Second, Ruta N and the City of Medellín have been hailed as best practices in Latin America (OECD 2015). Third, Medellín is a secondary city that is transitioning from an industrial to a more service — and knowledge — based city and which is located in the Global South on the knowledge periphery, with limited links to regions in the knowledge core (Morisson and Panetti 2020).

Ruta N was made to connect and energize the innovation ecosystem and foster collaboration between science, technology and innovation actors, it means: promote, coordinate and articulate local policies and institutions working for economic development, generating favorable conditions for the expansion and consolidation of the entrepreneurial tissue (Ruta N 2018).

For Ruta N the innovation process is not a choice but a duty. Analyses made about Colombia's Innovation Policies in 2014 shows that innovation is important for ensuring the sustainable growth of the future of a country attractive and competitive for investors and other large governments (Guedes and Teixeira 2016). Aiming at this point, Ruta N set out to work as the innovative pillar of the city of Medellín uniting academia, government, and business (Ruta N 2016).



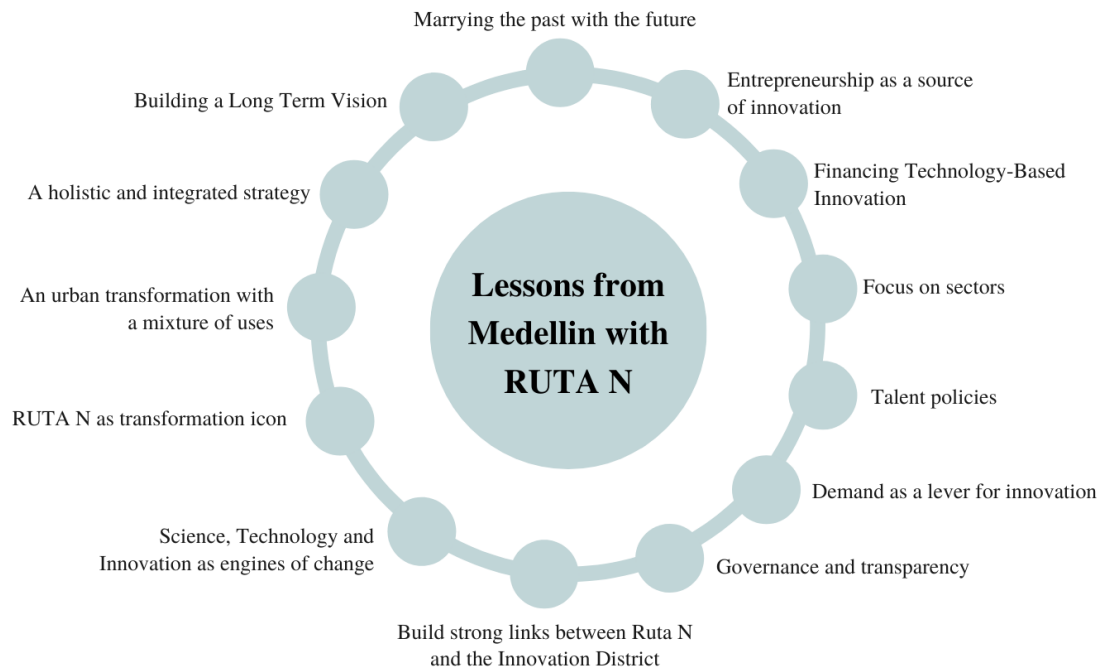
Although the socio-economic context of Colombia and the global environment were part of the story of Ruta N, it would probably occur in other contexts due to the drivers that were used to launch it such as the percentage of EPM as surplus funding for the project, the Pact for Innovation that was made with a vision for the future, the urban transformation that was consolidated as an innovation district, and the alignment between the actors for a legal regulation, a development plan, and a coherent urban policy.

Based on a world class ecosystem, the Ruta N focused on the development and growth of the city, so that it became increasingly recognized internationally as a city prominent in innovation and quality of life. Working with this perspective was important, as it formed a comparative over time, to measure its performance over the years, until it reaches its goal (Ruta N 2016). Four basic axes were addressed in the Ruta N management reports in 2016, being: talent, capital, infrastructure and business.

Medellín has made a space for itself in Innovative Ecosystems, based on a collective desire to transform a reality that came from a critical and complex past. Ruta N is also considered as a symbol. It is part of the urban fabric of the new north of Medellin and has been converted as something that awakens different impressions. The quality of the infrastructure of its buildings is a point of reference related to science, technology and innovation in the sector where it is located, a singular prestige and urban memory with a quality and special characteristics to generate a sense of modernity, and is that “offering first class facilities that break with the traditional image of a region offers the element of unpredictable status to attract advanced companies (Amaya Vela 2012).

In figure 5 are the lessons learned from Medellin with Ruta N.

FIGURE 5. Lessons from Medellin with Ruta N



Source: Own elaboration.

1. Marrying the past with the future

Medellin has had a long industrial tradition throughout history. In times of change, it has been able to read what opportunities the future offered, and what assets could be considered a value from the past. Principles such as digitization, inclusiveness, diversity or internationality have been present in the development of the formulation of the Innovation District.

2. Building a Long Term Vision

Medellin developed an Innovation District in one of the most disadvantaged and degraded areas of the city. For that, it proposed the development of a district based on innovation. Medellin's challenges were the power for change. Understanding their own problems was the source for targeting the solutions, including equity and sustainability that was into its DNA.

3. A holistic and integrated strategy

The Innovation District addressed transformation in its urban and infrastructural, economic, social and governance dimensions. For each dimension, there were challenges to be solved and agents to be involved. It raised a common agenda with the involvement of all the agents of the Quadruple Helix: Public Administration, Universities and Educational Centers, Companies and Civil Society.

4. An urban transformation with a mixture of uses

The Innovation District makes a rethinking of the district's land uses, combining business, civic and environmental activities. This mix promotes the district as a space to live and work. It incorporated the infrastructure of a Smart City (mobility, connectivity, energy, ...) as a basis for the development of the economy and the knowledge society.

5. Ruta N as Transformation Icon

The Ruta N Building provided an icon of reference in the transformation to a district. Information point and entrance to the District, with multifunctional rooms and spaces for incubation and landing of companies. It facilitated the basic and advanced services necessary for the development of the district. It promoted activities to stimulate innovation as a meeting point for the district.

6. Science, Technology and Innovation as engines of Change

Medellín used science, technology and innovation as facilitating elements to accelerate the solutions proposed to the challenges of the city. With an explicit plan, it developed an agenda to create and use the technologies that most effectively impact the transformation of the society and the economy.

7. Entrepreneurship as a source of Innovation

The most disruptive solutions come from entrepreneurs who, using new technologies, propose new solutions to old problems, or new solutions to new problems. Medellín's vocation to support entrepreneurs in their business initiatives provided a permanent source of innovative proposals.

8. Financing Technology-Based Innovation

Ruta N incorporated the axis of financing for entrepreneurial projects with high economic and social impact. Ruta N Capital and the Intelligent Capital Network stand out, which brought various private investment agents in innovation and entrepreneurship. A R&D fund has been created to co-finance research and economic development projects.

9. Focus on Sectors

Medellín, with its cluster policy, focused on sectors to create critical mass, targeted its resources, articulated agents of the same value chain and formalized a supporting science, technology and innovation agenda. Health, ICT and Energy are leveraged in institutions and companies settled in the district, promoting innovation as a competitiveness mechanism.

10. Talent policies

The economy and the knowledge society are based on talent. Ruta N promoted a set of programs aimed at creating and developing “paisa” Talent. STEM Camps, BootCamp Web or ViveLab are examples of youth advocacy. These were combined with the training of innovation managers for companies or “Innovacampus” for the university community.

11. Demand as a lever for Innovation

Both in the public and private dimension, as well as in the economic and social dimension, innovation began with the identification of challenges, and the mobilization of technologies, talent and financing to solve them. Medellín has leveraged on business challenges and social problems to promote innovation. It has practiced innovative public procurement, using the city as a pilot testing laboratory.

12. Governance and Transparency

Medellin had the know-how to involve all the agents of the city with the “Great Pact for Innovation”, a governance mechanism and a commitment to the development of the knowledge economy and society. It stands out in the development of the district, the participation and transparency in the process, guaranteeing the continuity of the project in the long term.

13. Build strong links between Ruta N and the Innovation District

Finally, Medellín brought the lesson of building strong links with the district and the people involved (directly or indirectly) with the project. The key is to always consider, from the beginning, the local community to have participation and integration, and to instrumentalize the residents to deal with the uncertainty and fear inherent in the situation.

References

- Amaya Vela, Francy. 2012. "Análisis de los factores de localización de centros de innovación en Colombia. Estudio de caso: configuración de Ruta N en la ciudad de Medellín, a partir de la localización de proyectos estratégicos en el marco de los procesos de competitividad para la ciudad.(2007-2011)." PhD diss., Universidad del Rosario.
- Arenas, Lehyton, Miguel Atienza, and José Francisco Vergara Perucich. 2020. "Ruta N, an island of innovation in Medellín's downtown." *Local Economy* 3(5): 419-439.
- Bateman, Milford, Juan Duran Ortiz, and Kate Maclean. 2011. "A post-Washington consensus approach to local economic development in Latin America? An example from Medellín, Colombia." *An Example from Medellín, Colombia (April 25, 2011)*. doi: [10.2139/ssrn.2385197](https://doi.org/10.2139/ssrn.2385197).
- Molina Betancur, Carlos Mario, Jorge Andrés Polanco López De Mesa, and Juan Manuel Montes Hincapié. 2015. "Governance Basis For The Science, Technology And Innovation District In Medellin, Colombia." *Semestre Económico* 18(38): 191-213.
- Carayannis, Elias G., and David FJ Campbell. 2009. "'Mode 3'and'Quadruple Helix': toward a 21st century fractal innovation ecosystem." *International journal of technology management* 46(3-4): 201-234.
- Carayannis, Elias G., and David FJ Campbell. 2010. "Triple Helix, Quadruple Helix and Quintuple Helix and how do knowledge, innovation and the environment relate to each other?: a proposed framework for a trans-disciplinary analysis of sustainable development and social ecology." *International Journal of Social Ecology and Sustainable Development (IJSESD)* 1(1): 41-69.
- Caracol News. 2016. "Medellín recibe o chamado Nobel de urbanismo Mundial." Last modified July 16. <http://noticias.caracoltv.com/medellin/que-orgullo-medellin-recibe-el-llamado-nobel-de-urbanismo-mundial>
- Cavalcanti, Murilo, Solange Andreza, and Walmir Santiago. 2014. *Lições de Bogotá e Medellín: do caos à referência mundial*. Recife: Ed. INTG.
- Etzkowitz, Henry, and Loet Leydesdorff. 2000. "The dynamics of innovation: from National Systems and 'Mode 2' to a Triple Helix of university–industry–government relations." *Research policy* 29(2): 109-123.
- Franco, Alejandro. 2017. "Medellín, Hub Mundial de innovación." Last modified February 17. <http://www.rutanmedellin.org/es/actualidad/noticias/item/medellin-hub-mundial-de-innovacion>
- Garay, Jerusa Garcia. 2019. "Formação de um ecossistema de inovação o caso da cidade de Florianópolis." Ms diss., Unisinos University.
- Gil, Antonio Carlos. 2008. *Métodos e técnicas de pesquisa social*. 6. ed. Editora Atlas AS.

- Guedes, Marina, and Clarissa Stefani Teixeira. 2016. "Análise da Ruta-N: Parque de Inovação e Negócios." Congresso Nacional de Inovação e Tecnologia. Last modified October 16. <https://via.ufsc.br/wp-content/uploads/2016/11/analise-da-ruta-N.pdf>.
- Gutiérrez, Federico. 2015. Management report. Last modified December 11. https://www.rutanmedellin.org/descarga_documentos/management_report_2015.pdf.
- Palacio, Andrés Mauricio Higueta. 2015. "Medellín." *Ingeniería solidaria* 11(18): 41-56.
- Hylton, Forrest. 2007. "El cambio radical en Medellín." *New left review* 44: 66-85.
- IEEE Smart Cities Initiative. 2015. Affiliated Smart City Medellin, Colombia: General View Medellinnovation District Strategic Plan MIT. Last modified January 2015. <http://smarcities.ieee.org/news-bulletin/january-2015/ieee-smart-cities-initiative-affiliate-city-profile-medellin-colombia.html>.
- Innovation cities index. 2017. Last modified January 2017. <http://www.intersoftware.org.co/content/medellin-avanza-en-el-ranking-de-las-mejores-ciudades-para-hacer-negocios>.
- Intersoftware. 2016. Medellín avança o ranking para fazer negócio. Last modified January 2016. <http://www.intersoftware.org.co/content/medellin-avanza-en-el-ranking-de-las-mejores-ciud>.
- Maclean, Kate. 2015. *Social urbanism and the politics of violence: the Medellín miracle*. London: Palgrave Macmillan.
- Morisson, Arnault. 2019. "Knowledge Gatekeepers and Path Development on the Knowledge Periphery: The Case of Ruta N in Medellin, Colombia." *Area Development and Policy* 4(1): 98-115.
- Morisson, Arnault, and Carmelina Bevilacqua. 2018. "Beyond innovation districts: The case of Medellinnovation District." In *International Symposium on New Metropolitan Perspectives*, edited by Francesco Calabrò, Lucia Della Spina and Carmelina Bevilacqua, 3-11. Cham: Springer.
- Morisson, Arnault, and Eva Panetti. 2020. "Institutional entrepreneurs and socio-institutional changes in Medellín, Colombia." *Regional Studies, Regional Science* 7(1): 35-51.
- Nikina, Anna, Josep Piqué, and Josep Miquel. 2016. *Areas of innovation in a global world: Concept and practice*. Campanillas: IASP.
- OECD – Organisation for Economic Co-operation and Development. 2015. *Promoting the development of local innovation systems: The case of Medellín, Colombia*. Trento: OECD LEED Publ.
- Pineda, Leonardo, and Carlos Scheel. 2011. "Plan de Ciencia, Tecnología e Innovación de Medellín– 2010."
- Ruta N. 2015. Management report. Last modified December 11. http://www.rutanmedellin.org/images/rutan/informes_gestion/informe_gestion_rutan_n_2015.pdf.

- Ruta N, 2016. Parque de inovação Ruta-N, Sobre Nosotros. Last modified December 16. <https://www.rutanmedellin.org/es/nosotros/ruta-n/sobre-nosotros.pdf>.
- Ruta N, 2018. Case study Ruta N Medellín: From drug capital to innovation hub. Last modified November 18. https://www.ub-cooperation.eu/pdf/cases/I_Case_Study_RutaN.pdf.
- Ruta N, 2020. Organigrama Corporación Ruta N Medellín. Last modified December 20. <https://www.rutanmedellin.org/documentos/organigrama-corporacion-ruta-2020.pdf>.
- Ruta N, 2021. Nuestra Oferta Ruta N Medellín. Last modified July 21. <http://www.rutanmedellin.org/es/oferta>.
- Salazar, Juan Carlos, Juan Camilo Ramírez, Liliana Pinzón, and Cristina Rosember. 2019. "Estudio del modelo de Scoring de Ruta N."
- Silveira, Denise Tolfo, and Fernanda Peixoto Córdova. 2009. "A pesquisa científica." In *Métodos de pesquisa*, edited by Tatiana Engel Gherardt and Denise Tolfo Silveira, 33-44. Porto Alegre: Editora da UFRGS.
- Technical Visit. 2016. Group VIA Estação Conhecimento - Federal University of Santa Catarina.

This is an Open Access article distributed under the terms of the Creative Commons Attribution-Non-Commercial-No Derivatives License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial re-use and distribution, provided the original work is properly cited, and is not altered or transformed in any way.

