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Article

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Orchestrators of innovation networks in the city level: the case of Pacto Alegre

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Abstract

Purpose – This paper investigates the roles and activities of the orchestrators of innovation networks constituted within cities. In this sense, the authors expected to contribute for research related to the roles and activities of the orchestrators of innovation networks constituted in the scope of cities given the large number and diversity of complex and multiple dimensions social actors (Castells & Borja, 1996; Reypens, Lievens & Blazevic, 2019).

Design/methodology/approach – The authors conducted an exploratory research with a single case study in depth. The case chosen for the paper is the case of Pacto Alegre. The case selection criterion was the relevance of the Pacto Alegre Case in the construction of an innovation network in the city of Porto Alegre, Rio Grande do Sul, Brazil. The Pacto Alegre network was proposed by the Alliance for Innovation (composed of the three main Universities in the city: UFRGS, PUCRS and UNISINOS) and by the Municipality of Porto Alegre. In addition to these actors, the network counts on financial and development institutions as sponsors, with media partners, with design partners, with an advisory board (composed of five professionals considered references in different themes) and composed by more than 100 companies, associations and institutions from different areas (Pacto Alegre, 2019). Data were collected from 09/20/2020 to 11/30/2020 through in-depth interviews, documentary research and non-participant observation.

Findings – In this research, the authors highlighted the city as a community that involves and integrates various actors, such as citizens and companies, to collaborative innovation activities. For this, they proposed a framework on innovation networks and network orchestration. In this direction, seven dimensions of the “orchestration of innovation networks” were assumed as a result of the combination of previous studies by Dhanaraj and Parke (2006), Hurmelinna-Laukkanen *et al.* (2011) and da Silva and Bitencourt (2019). In the sequence, different roles of orchestrators associated with the literature were adopted based on the work by Pikkarainen *et al.* (2017) and Nielsen and Gausdal (2017).

Research limitations/implications – The authors’ results advance in relation to other fields by promoting the expansion of the “orchestration of innovation networks” model with the combination of distinct elements from the literature in a coherent whole (agenda setting, mobilization, network stabilization, creation and transfer of knowledge, innovation appropriability, coordination and co-creation) and in the validation of its applicability in the context of the innovation network studied. In addition, when relating different roles of orchestrators to the seven dimensions studied, it was realized that there is no linear and objective relationship between the dimensions and roles of the orchestrator, as in each dimension there may be more than one role being played in the orchestration.

Practical implications – Therefore, the findings suggest two theoretical contributions. First, the authors identified a role not discussed in the literature, here called the communicator. In the case analysis, the authors observed the communicator role through functions performed by a media partner of the innovation network and by a group of civil society engaged in the city’s causes. Second, the authors indicated a new dimension of



orchestration related to the management of communication in the innovation network and its externalities such as p. ex. civil and organized society, characteristic of an innovation network set up within a city.

Originality/value – Although several studies have proposed advances in the understanding of the orchestration of innovation networks (Dhanaraj & Parkhe, 2006; Ritala, Armila & Blomqvist, 2009; Nambisan & Sawhney, 2011; Hurmelinna-Laukkanen *et al.*, 2011), the discussion on the topic is still a black box (Nilsen & Gausdal, 2017). More specifically, the authors identified a gap in the literature about the role and activities of actors in the city level. Few studies connected the regional dimension with the roles and activities of the orchestrators (Hurmelinna-Laukkanen *et al.*, 2011; Pikkarainen *et al.*, 2017), raising several challenges and opportunities to be considered by academics and managers.

Keywords Innovation networks, Orchestration, Orchestrators

Paper type Research paper

1. Introduction

The importance of inter-organizational relationships and innovation networks is widely recognized (Valkokari *et al.*, 2017; Araújo, Farias, & Hoffmann, 2018). Recently, innovation has evolved beyond organizations' limits toward a more network-based approach (Choi, Kim, & Lee, 2010; Cinelli, Iovanella, & Ferraro, 2019). Organizations that invest in innovation for their internal and business borders increase their innovation opportunities (Lundvall, 2007). Therefore, innovation may be a complex process that depends on a set of capabilities that can be dispersed throughout the company's or the network's structure (Zawislak, Fracasso, & Gamarra, 2018). Consequently, these networks attracted a notable amount of theoretical and empirical interest (Hurmelinna-Laukkanen, Möller, & Natti, 2011; Möller & Halinen, 2017; Bittencourt & Figueiró, 2019).

In practical terms, a context in which this movement has been gaining expression are the cities where citizens, companies, research centers and governments can develop collaborative solutions based on innovative products and services (Appio, Lima, Haikel, Cadene, & Sotirios, 2018). Cities can be understood as complex and multidimensional social actors, expressing themselves as they articulate public and private administrations, social and civic associations, academic and professional sectors as well as social media (Castells & Borja, 1996). This articulation promotes the creation of innovation networks and enhances the city (Piqué Huerta, 2019). This articulation trajectory in innovation networks is an emerging theme in the management literature in different approaches (Martins, 2018; Leminen, Nyström, & Westerlund, 2019; Gupta, Panagiotopoulos, & Bowen, 2020).

Managing an innovation network is a multifaceted and complex task (Pikkarainen, Ervasti, Hurmelinna-Laukkanen, Nätti, 2017), especially where there is a large number and diversity of actors (Müller, do Rocio Strauhs, Queiroz, & da Silva, 2017; Reypens *et al.*, 2019). Thus, this research argues the importance to understand the key elements in the management model to be adopted for innovation networks at the city level (Majchrzak, Jarvenpää, & Bagherzadeh, 2015; Lumineau & Oliveira, 2018; Bittencourt, Zen, Schmidt, & Wegner, 2018). Then, traditional management and coordination processes based on command and control need to be replaced by collaborative and participatory processes, called "orchestration of innovation networks" (Dhanaraj & Parkhe, 2006, p. 659), requiring theorists and practitioners to understand new realities to create new learnings and advanced research in the field, as well as contribute to the understanding of best practices in real-world situations.

This paper aims to investigate the roles and activities of the orchestrators of innovation networks constituted within cities. Therefore, our research intends to contribute with studies related to the roles and activities of the orchestrators of innovation networks formed in the scope of cities given the large number and diversity of complex and multiple dimensions social actors (Castells & Borja, 1996; Reypens *et al.*, 2019). Several studies

advanced in the comprehension of the orchestration of innovation networks (Dhanaraj & Parkhe, 2006; Ritala, Armila & Blomqvist, 2009; Nambisan & Sawhney, 2011; Hurmelinna-Laukkanen *et al.*, 2011); however, the discussion on the topic in the city level remains a black box (Nilsen & Gausdal, 2017).

Cities, for instance, represent excellent examples of innovation networks; still, management scholars have not studied them in any great depth. Not only do they provide good study material, but also represent an increasingly important economic unit on its own (Visnjic, Neely, Cennamo, & Visnjic, 2016). Thus, this paper fills a literature gap about actors' roles and activities at the city level. The complexity of the relations at the city level, the diversity of actors, and the multiplicity of roles of the orchestrators corroborate the importance of this research.

2. Literature review

Innovation networks have been studied through different theoretical lenses and are organizational structures for innovation (Rasera & Balbinot, 2010), which promote interactions collaboratively and share different resources, such as knowledge (Grant, 1996; Dyer & Nobeoka, 2000). The innovation networks perspective encompasses different levels of analysis, such as countries, regions, organizations, industries, and, more recently, cities (Leminen *et al.*, 2019; Li, Wei, Miao, Wu, & Xiao, 2019; Gupta *et al.*, 2020) that operate in a quadruple helix model (Carayannis & Campbell, 2009; Mcadam & Debackere, 2018). In this model, government, industry, academy and civil participants collaborate to develop solutions beyond the scope that any organization or person could do individually.

A perspective of the innovation networks has been increasing the interest of scholars and managers is the lenses of innovation ecosystems (de Vasconcelos Gomes, Facin, Salerno, & Ikenami, 2018). These ecosystems include different stakeholders and are perhaps the broadest of the different strategic network-based constructs (Autio & Thomas, 2014), and consider the ability of territory to create a system of actors and infrastructures, and the mere construction of a network structure between companies (Nicotra, Romano, Del Giudice, & Schillaci, 2018). In the same line of Autio and Thomas (2014), innovation ecosystems are considered as a unique and specific type of networks, encompassing a diverse community of actors with multilateral and multisectoral ties, spanning the boundaries of a single industry and emphasizing increased interdependence as well as symbiotic potential among the actors. In this study, we argue that the innovation network at the city level is related to the design of innovation ecosystems (Autio & Thomas, 2014).

In this complex environment, collaborative and innovative processes are difficult to trigger and maintain without adequate innovation management and a supportive cultural and institutional environment (Sorensen & Torfing, 2016). The orchestration requires a discreet form of coordination (Provan, 1983). Considering this, this paper defends that the term orchestration seems adequate to describe the activities of development, management and coordination of innovation networks (Ritala, Armila, & Blomqvist, 2009).

2.1 Framework of orchestration of innovation networks

The orchestration of innovation networks is a theoretical approach that focuses on the mode of organization and leadership in multiple actors' relationships (Dhanaraj & Parkhe, 2006; Ritala, Hurmelinna-Laukkanen, & Nätti, 2009,b; Nambisan & Sawhney, 2011; Hurmelinna-Laukkanen, Nätti & Helin, 2014). Dhanaraj and Parkhe (2006) started this discussion by composing this capacity based on three dimensions: knowledge mobility, appropriability of innovation and network stability. Conversely, Hurmelinna-Laukkanen *et al.* (2011) chose to

unfold the previously mentioned dimensions, proposing six of them as the basis for the orchestration in innovation networks: agenda-setting, mobilization, network stabilization, knowledge creation and transfer, innovation appropriability and coordination. Later, [da Silva and Bitencourt \(2019\)](#) still add another dimension to better understand the orchestration of innovation network, called co-creation management. [Table 1](#) presents these seven dimensions to provide a better understanding of each one.

As it can be perceived in the presented data, we can apply the orchestration of innovation network perspective to a city level. In the context of this research, cities are not just physical areas where firms and individuals agglomerate and conduct economic activities; cities are networks formed through a complex set of overlapping relationships between different actors ([Visnjic et al., 2016](#)). Recent studies have shown that several orchestrators may take on a broad range of functions ([Pikkariainen et al., 2017](#)) in which the orchestrator and its role can change over time ([Nilsen & Gausdal, 2017](#)). Besides, several orchestrators with different functions can generate more value for organizations and networks ([Hurmelinna-Laukkanen & Nätti, 2018](#); [Bittencourt, Zen, & Santos, 2020](#)) in dealing with the challenges brought by the number and diversity of stakeholders ([Reypens et al., 2019](#)). [Table 2](#) sought to synthesize the main roles of orchestrators.

Dimensions	Process	Definitions
Agenda setting	Definition of network actors and their tasks	It provides the attraction of people to activities influencing the mobilization of actors and objectives
	Agenda organization	It involves creating and communicating an agenda that directs members of the network
Mobilization	Attraction and selection of partners for the innovation network	Refer to the attraction and selection of partners for the innovation network, including the motivators
Network stabilization	Maintaining collaboration between members of the network	It involves elements of culture, identity formation, values, and beliefs
	Avoid individualism and opportunism	Prevents isolation, migration, cliques and friction
Knowledge creation and transfer	Sharing knowledge that is acquired and implemented in the network	It refers to the sharing, acquisition and implantation of knowledge within the network
Innovation appropriability	Building trust	It ensures that innovators can obtain the financial results created by the collaboration in the network
	Extraction of value created by innovations	It governs an innovator's ability to capture the profits generated by innovation
Coordination	Promotion of procedural justice and joint ownership of assets	It reports appropriability, through instruments such as patents, copyrights and trademarks
	The direction of all planning and controls execution	It creates mechanisms to drive the innovation process
Co-creation	Empowerment, social connection and social engagement	It guides the actors towards the same objective It stimulates active participation in the construction of collective solutions

Source(s): Prepared by the authors based on [Dhanaraj and Parkhe \(2006\)](#); [Hurmelinna-Laukkanen et al. \(2011\)](#); and [da Silva and Bitencourt \(2019\)](#)

Table 1.
Dimensions of the
orchestration

Table 2.
Main Roles of
Orchestrators and
Their Key Activities

Orchestrator's role	Key activities
Architect	Engage in strict agenda definition and coordination activities
Conductor	Support the extraction and dissemination of information; and take care of the acquisition, transmission and sharing of information
Developer	Create substantial assets for the network based on the mobility of knowledge
Leader	Motivate and promote voluntary collaboration and identify network members' roles. Manage and instruct other members engaged in the network for a common purpose. To influence
Facilitator	Bring different parts together to collaborate

Source(s): Nyström, Leminen, Westerlund, and Kortelainen (2014); Pikkarainen *et al.*, (2017); Nielsen and Gausdal (2017); Hurmelinna-Laukkanen and Nätti (2018); Reypens *et al.* (2019) Haug (2018)

3. Methodological procedures

We conducted exploratory and descriptive research with a single in-depth case study. This approach is appropriate to reach a more in-depth understanding of orchestration itself – and the comprehension of multi-sided contextual influences – is needed (Yin, 2010).

The chosen case was Pacto Alegre, an innovation network in the city of Porto Alegre, Brazil. The case selection criterion was to be an innovation network at the city level, to involve multiple actors, and to have an organized proposal as a network. The Porto Alegre case uses strategies of other successful cases as Florianopolis, Barcelona, and Medellín (Piqué Huerta, 2019). The city seeks to become an innovation network worldwide. Then, this case study will be even more relevant in the future, if the city manages to achieve its objectives. Due to the lack of empirical papers about orchestration at the city level (Visnjic *et al.*, 2016), we followed the same research strategy as the previous network studies (Porter, 1998; Martin & Coenen, 2015).

The Pacto Alegre network had been designed by the Alliance for Innovation, composed of the three leading Universities in the city - UFRGS, PUCRS, and UNISINOS - and by the Municipality of Porto Alegre. Besides these actors, the network counts on financial and development institutions as sponsors, with media and design partners, and with an advisory board (composed of five professionals considered references in different themes) and composed by more than 100 companies, associations and institutions from different areas (Pacto Alegre, 2019).

Our protocol research aimed to analyze the dimensions of orchestration (Table 1) and the main roles of orchestrators and their key activities (Table 2). These elements were the basis for the data collection, which happened through documentary research, non-participant observation in network meetings, and depth interviews with actors involved in the network management. Data were collected from September to November 2019.

Our secondary source of innovation were official documents, videos, academic research, reports and action plans related to initiatives for Pacto Alegre, as Memorandum of Understanding (MoU) of Alliance for Innovation, Diagnostic of Innovation network of Porto Alegre, Preliminary Reports of focus groups to mapping the innovation network, Projects of Pacto Alegre available on the Websites of Pacto Alegre (<https://pactoalegre.poa.br/>), Alliance for Innovation, leading universities and Porto Alegre City Hall. The videos are available on YouTube (<https://www.youtube.com/c/PactoAlegreOficial/videos>). Also, we observed the Pacto Alegre working meetings in May 2019. The meetings were monitored, recorded, photographed, and registered in a field notebook.

Concerning primary data, we used the snowball strategy to select the key informants in the Pacto Alegre network that integrates the same members of the Alliance for Innovation. In

addition to the Porto Alegre City Hall, the international consultancy hired an association of companies and members of civil society movements. For the definition of the interviewees, the selection criteria were the involvement in the construction of the Pacto Alegre and also the representativeness of each of the helix: government, university, companies and society. We interviewed those responsible for the Pacto Alegre in the government, in each of the three universities involved, the foreign external consultant hired in addition to representatives of society and companies. The main actors involved in the articulation of the innovation network in the city were also interviewed. Altogether, we had 11 interviews representing the quadruple helix actor in the Pacto Alegre network. [Goia et al. \(2013\)](#) highlight the importance of the initial interview protocol. The interview protocol was validated by two specialists in the respective area of the research study. The interviews were recorded under the interviewees' previous consent. After, we transcribed all interviews. In [Table 3](#), it is possible to envision the data collected.

Our data analysis encompassed the dimensions of orchestration ([Table 1](#)) and the main roles of orchestrators and their key activities ([Table 2](#)). Besides, we conducted a comparative analysis of transcriptions of interviews, videos, and direct observations. Thus, a triangulation strategy was used to identify the data consistency and validate evidence. Treatment of data was based on content analysis by [Miles and Huberman \(1994\)](#). We organized the presentation of results in two sections. At first, we introduced the case of Pacto Alegre. Then, we explored the Pacto Alegre orchestration, the dimensions of orchestration, and orchestrators, presenting pieces of evidence from our different sources.

4. Results

4.1 The case of the Pacto Alegre

Since the 1990s, Porto Alegre has been experiencing important project cycles with high society's engagement to transform the city into a world-class innovation network ([Pacto Alegre, 2019](#)). Formally, the Pacto Alegre began in 2018, driven by the Alliance for Innovation. In April 2017, the Alliance for Innovation formalized an agreement between the rectors of the three leading universities in the state of Rio Grande do Sul – the University of Vale do Rio dos Sinos (UNISINOS), the Pontifical Catholic University of Rio Grande do Sul (PUCRS) and the Federal University of Rio Grande do Sul (UFRGS) - to foster the innovation network in the city of Porto Alegre. In November 2018, the Alliance for Innovation, with the

E	Actors in Pacto Alegre	Role	Duration
(I1)	External consulting	International consultant Pacto Alegre	43 min 16 s
(I2)	Porto Alegre city Hall	Porto Alegre innovation director	21 min 14 s
(I3)	Porto Alegre city Hall	Secretariat for economic development	38 min 28 s
(I4)	Porto Alegre city Hall	Member of the municipal technical support team	55 min 13 s
(I5)	Alliance for innovation	Academic dean UNISINOS university	24 min 56 s
(I6)	Alliance for innovation	Innovation superintendent PUCRS university	23 min 31 s
(I7)	Alliance for innovation	Professor and researcher UNISINOS university	48 min 28 s
(I8)	Alliance for innovation	Researcher UNISINOS university	24 min 07 s
(I9)	Alliance for innovation	Researcher UFRGS university	45 min
(I10)	Companies/Associations	Counselor at Instituto Ling Hyper Island consultant	1 h 46 min 16 s 16 s
(I11)	Society	Project monitoring technician of the Pacto Alegre Systems Analyst	41 min 34 s
(I12)	Society	Creator of the POA Inquieta project	42 min 20 s

Source(s): Prepared by the authors

Table 3.
Interviews with Pacto
Alegre actors

Porto Alegre City Hall and entities representing the capital, held a formal signing ceremony for the Pact for Innovation, called Pacto Alegre (Pacto Alegre, 2019). The purpose of creating the Pacto Alegre refers to the enhancement of high-impact actions aimed at the development of the city.

4.2 *Pacto Alegre orchestration*

This subsection describes the set of specific processes and tasks, called “orchestration of innovation networks.” Each dimension has a group of activities. Then, we mapped and related to the most appropriate orchestrating roles for each element.

4.2.1 *Agenda setting.* The first dimension of the orchestration directs the actors and their respective tasks through the organization and communication of an agenda (Silva, 2016) with all the involved. The agenda-setting brings people’s attraction to the activities developed (Dhanaraj & Parkhe, 2006), directing them towards achieving the objectives. Table 4 shows the agenda-setting.

Through non-participant observation, it was possible to perceive in meetings that intended to define the 24 projects developed by entrepreneurs and the community, that the actor responsible for setting this agenda and publicizing meetings, inviting partners to assist in the execution of the project and publicizing the activities in relevant media is the City Hall of Porto Alegre. Still, it is important to highlight that the most suitable orchestrating roles for this dimension is that of Architect and Conductor, considering the Architect as the one who engages with strict activities of definition and coordination of agendas and the Conductor as the one who supports the extraction and dissemination of information by sharing it with the network. From the materialization of the agenda-setting, the innovation network acquires credibility with society. It is understood that agenda-setting is a key factor in mobilizing the actors.

4.2.2 *Mobilization.* Mobilization refers to how easy it is to knowledge, to acquire and implement it within the innovation network (Silva, 2016). Through mobilization, members are attracted to be part of the innovation network. It is necessary to have motivating factors and the construction of well-designed planning to mobilize such actors (Dhanaraj & Parkhe, 2006). Table 5 shows how the mobilization of actors occurred in Pacto Alegre’s case and the main actions observed.

Based on the analysis, it is perceived that the orchestrating role that best relates to this dimension is new and not yet addressed by the literature: the role of communicator, that is responsible for the activity of communicating and disseminating actions and projects institutionally to the public and engage them on the network. It was possible to identify that the actors who have this role are the media partners (that are not part of the layer analyzed in the study) and the external consultant hired to assist in the development of the Pacto Alegre. The mobilization took place through meetings, agenda communication, events, courses,

Actions	Hackathons; workshops; meetings; lectures to publicize the actions under development; MBA in innovation ecosystems; 6 macro challenges; 24 projects developed by entrepreneurs and the community
Evidence	The actors were invited “to participate in the different workshops, discussions and were encouraged to contribute their visions, to support the project”, reports I7 In the meetings, representatives of the city Hall set some dates and invited all the other actors to take part in the meetings. Besides that, a university representative almost always played an important role, but even so, the organizers were related to the Porto Alegre city Hall
Actors	Porto Alegre city Hall

Note(s): Orchestrator’s Role: Architect and Conductor

Source(s): Prepared by the authors

Table 4.
Agenda setting

Table 5.
Mobilization

Actions	Promotion of meetings, events, workshops, among other activities on the Pacto Alegre agenda; prioritization of actors; creation of motivating factors
Evidence	<p><i>"The RBS media partner is a sponsor of the project and the fact that the actions are printed in the main state newspaper, generates a collective conscience,"</i> explains I7</p> <p><i>"First of all, priority was given to inviting strategic actors,"</i> comments I7</p> <p>It was observed that RBS TV (media partner) and Pacto Alegre website were the main means to attract people and mobilize them. In addition, it was noted that after the hiring of an international consultant who is famous for his work in the development of @22Barcelona, the chain gained more strength and seriousness</p> <p>Video (https://www.youtube.com/watch?v=2H1EPP0U1xI&t=267s)</p>
Actors	Media partner and external consultant
Note(s): Orchestrator's Role: Communicator	
Source(s): Prepared by the authors	

among other ways, and they are mobilized by a motivating factor that refers to benefits for all. During non-participant observation, a strong sense of collectivism was noted. It is important to highlight that the media partner seeks to disseminate the news that we also found on the Pacto Alegre website and YouTube channel. Moreover, it was noted that in the mobilization there was a certain prioritization by some actors to the detriment of others. These strategic actors would be entities that have infrastructure and resources to facilitate the construction of the network, such as, for example, the government, companies, associations, among others.

4.2.3 Network stabilization. Network stabilization occurs by promoting transparency, trust, reciprocity, problem identification and conflict resolution between the different actors (Dhanaraj & Parkhe, 2006). This stability harmonizes elements of culture, values, belief and identity (Silva, 2016). It also seeks to avoid individualistic and opportunistic attitudes (Dhanaraj & Parkhe, 2006). In this line, Table 6 presents the network stabilization:

Based on the results, we identified that the network's stabilization is low, and it is represented in the formation of the Alliance for Innovation. The partnership with the Porto Alegre City Hall and formalization of the Pacto Alegre presented in the document "Signature Invitation" is still a challenge to ensure stability with all other actors in the network. The orchestrating roles that best suit the dimension of network stabilization are: Leader and Facilitator. They are being responsible for promoting collaboration and network support in favor of a single objective, thus enabling this stabilization. Its respective representative actors

Actions	There is a minimum network stabilization guided by PUCRS, UNISINOS, UFRGS that is presented in the formalization of the Pacto Alegre, in the creation of the Alliance for innovation and its partnership with the Porto Alegre city Hall. However, except in the mentioned layer, there is no network stabilization, as cultural, values, and identity elements are not yet in agreement
Evidence	<p>In the meetings attended during the non-observant participation, there was dissonance between speeches</p> <p><i>"The separatist mentality is a challenge to be overcome,"</i> says I2</p> <p><i>"I see a stability provided by the formation of the Alliance for Innovation, the support of the City Hall and the formalization of the Pacto Alegre."</i> says, I7, but <i>"I still don't see a defined value proposal and an alignment in the discourse,"</i> adds I8</p> <p>Signature invitation of MoU – PUCRS, UNISINOS, UFRGS – through event and document of formalization, the network started to promote stabilization and credibility</p>
Actors	Alliance for innovation (PUCRS, UNISINOS, UFRGS) and Porto Alegre city Hall
Note(s): Orchestrator's Role: Leader and Facilitator	
Source(s): Prepared by the authors	

Table 6.
Network stabilization

are the Alliance for Innovation and City Hall, as they are the entities that made the creation of the network feasible and keep their relations active.

4.2.4 Knowledge creation and transfer. The creation and transfer of knowledge refer to the acquired and implanted sharing in the network ecosystem (de Vasconcelos Gomes *et al.*, 2018). With the involvement of several actors with different expertise, it is possible to combine knowledge to co-create. Table 7 refers to the creation and transfer of knowledge between the actors.

Based on the analysis of the cases, the universities' knowledge is of significant value, whereas the actors that represent the role of Developer and Driver since these roles seek to create substantial assets for the network, based on the mobility of the knowledge. These assets are based on the mobility of knowledge and the acquisition and dissemination of this acquired information. In Pacto Alegre's case, these roles are represented by the Alliance for Innovation, considering that involves the three main universities that manage Pacto Alegre and create and disseminate knowledge on the network. To orchestrate innovation networks, it is essential to have a knowledge holder, which is, in most cases, the universities, which are responsible for this role in this scenario.

4.2.5 Innovation appropriability. The innovation appropriability leads to the generation of confidence to obtaining benefits for all actors involved and the perception of this value. There must be a guarantee that the value created by the construction of the network will be created and distributed equitably, and thus, the actors will be able to extract financial results created by their innovations. This confidence is reinforced through instruments such as patents, copyrights and trademarks (Sakakibara, 2002; Teece, 2000). Table 8 addresses issues regarding innovation appropriability:

There is not exactly an immediate innovation appropriability, it is in the initial stage of forming a network. However, this appropriateness must be explicit in a future vision concerning economic, social and environmental advances. During the non-observant participation in the Pacto Alegre meetings, all projects that were being developed by the companies were in the definition, so they cannot be a guarantee of financial results yet. It was also found that the role of orchestration for such a dimension is not foreseen in the literature analyzed in Table 2 of this study. The most appropriate roles for this dimension are the Leader and Developer roles, where the Leaders will be responsible for disseminating this vision in favor of a common objective and for the impact metrics of the innovations generated and their respective profits. At the same time, companies as Developers create new businesses or greater well-being in the social environment.

Actions	Availability of knowledge and researchers by universities; creation of an MBA in innovation ecosystems; conducting meetings; use of the brainstorming technique in the observed Pacto Alegre meetings
Evidence	The actors were invited " <i>to participate in the different workshops, to discuss the problems and were encouraged to contribute with their views,</i> " reports I7 " <i>The university provided its researchers for data collection,</i> " says I8 Through non-participant observation in the observed Pacto Alegre meetings, the creation and transfer of knowledge occur fostered by the debates between a range of actors from different axes of the quadruple helix and by co-creation. The finding reflects I7's statement The process of creating the MBA about innovation ecosystems (http://www.ufrgs.br/ufrgs/noticias/alianca-para-inovacao-lanca-mba)
Actors	Alliance for innovation

Table 7.
Knowledge creation
and transfer

Note(s): Orchestrator's Role: Developer and Conductor
Source(s): Prepared by the authors

Actions	Innovation appropriability was not verified and the network innovators have no guarantee to obtain financial results for their innovations
Evidence	<p><i>"We will achieve this for the sake of an objective, for the sake of a vision,"</i> emphasizes I6 in his speech. This vision is <i>"the construction of a better future for us,"</i> added I6. According to I5, <i>"the only major investment made to date has been the hiring of an international consultant to help shape the innovation ecosystem"</i>. <i>"There was the creation of the Beer Route in Porto Alegre, offering a leisure option to citizens,"</i> reports I7. <i>"Companies produce innovations and from innovations, new jobs are created, generating benefits for the collective,"</i> points out I1. Through non-observant participation, it was noted that the projects developed in the meeting have not yet generated financial returns for their shareholders. Thus, it is not possible to verify the appropriateness of innovation in this network.</p>
Actors	All actors involved in the network
Note(s): Orchestrator's Role: Leader and Developer	
Source(s): Prepared by the authors	

Table 8.
Innovation
appropriability

4.2.6 Coordination. The coordination is responsible for creating mechanisms to guide the innovation process and managing all the resources and infrastructure necessary for its generation and seeks to lead the network's actors towards the same objective. This requires a strong reputation on the part of the coordination (Dhanaraj & Parkhe, 2006). The coordination of the network is shown in Table 9.

Coordination is essential for innovation networks, and there is not the best way for it. Despite that, it proves to be quite complex and challenging. The biggest challenges of coordination are engaging people, ensuring long-term sustainability, executing projects and cooperating, proceeding and thinking collectively. It is noteworthy that the coordinating role alternates during the process of creating and developing the network. However, the main coordination functions occur in a shared manner between the City Hall and the Alliance for Innovation. It was observed in the meetings and events witnessed that there was always an actor from these mentioned axes being the main responsible for everything and acting as a Leader (orchestrator's role). The leaders also use the Pacto Alegre website to post news and documents about the network.

Actions	Mobilization of actors; attracting strategic actors; disclosure of the pact in the media; agenda organization; fundraising, human capital, knowledge
Evidence	<p><i>"Each actor stands out in a Pacto Alegre project,"</i> claims I5. <i>"In some places, innovation ecosystems are led by the company, in others by the government, university or civil society,"</i> emphasizes I6. <i>"There is no cake recipe,"</i> says I5. <i>"We set up governance, the Pact table, we are creating projects,"</i> says I6. <i>"Ensuring long-term sustainability is a major challenge,"</i> says I3. <i>"Companies do not believe it until you show results from this network,"</i> comments I1. Pacto Alegre website plays the role of a platform to coordinate actors, and it helps with the agenda organization and communication of subsequent activities. During the meeting, we observed that people from the three main universities were involved in coordinating activities (Alliance for innovation) and some strategic actors from the city Hall.</p>
Actors	Alliance for innovation and Porto Alegre city Hall
Note(s): Orchestrator's Role: Leader	
Source(s): Prepared by the authors	

Table 9.
Coordination

4.2.7 *Co-creation management.* The management of co-creation allows different actors to control their subjects in an empowerment process (Rappaport, 1985, 1987; Hess, 2014) and stimulate social engagement. It can also be understood as the “ability to work constructively within and between social groups to create more resilient and sustainable communities” (Millican, 2009). Also, it is associated with the notion of social connection that comprises the number and quality of social interactions people have (Lancee & Radl, 2012), involving the quality and number of connections that one has with other people (Quigley & Thornley, 2011). Table 10 analyzes the issue of co-creation in the context studied:

The priority challenges were defined by a forum called “Mesa” based on the axes: social, economic, urban and governance. The documents MoU – UFRGS, UNISINOS, PURCS, Signature Invitation, PUCRS, UNISINOS, UFRGS and International Consultant, Mapping the Innovation network – Perception and Challenges of the Pacto Alegre were elaborated by these fundamental actors. There is a democratization of the different actors’ participation, giving them greater autonomy to represent their interests in a responsible way and under their authority, stimulating their presence and active participation in the construction of joint solutions. In this context, the role of the orchestration that most closely aligns with the issue of co-creation is the role of the Facilitator. It is also noteworthy that this role includes mostly members of the Alliance for Innovation, of the Porto Alegre City Hall, Companies and Society.

5. Discussions

From the analyses carried out in Pacto Alegre’s case, it is possible to raise some perceptions about the relationship between the seven dimensions of orchestration with the orchestrator’s roles in a city innovation network. It is understood that such a discussion and association is still incipient in the literature. Thus, this paper seeks to bring theoretical and managerial contributions to the beginning of this debate.

Firstly, we highlighted the multiplicity of orchestrator’s roles and activities in the orchestration process. It was identified that in each dimension, it is possible to have more than one associated role. As pointed out by Nilsen and Gausdal (2017), it is recognized that the roles of orchestrators and their activities can be changed in the network trajectory. With this relationship, it was possible to understand the key activities of the orchestrators in the innovation network of Pacto Alegre and point out what would be the key activity of each dimension (Table 11).

Table 11 presents a contribution of literature regarding the exploration of the dimensions and processes of orchestration and the orchestrator’s roles and activities. Besides, we highlighted the relevance of co-creation in this whole process. In the case of Pacto Alegre, it was possible to identify the seven orchestration processes presented by Dhanaraj and Parkhe (2006),

Actions	Creation of projects in a co-created way; engaging actors from different fields; openness to the whole society; meetings and discussions; workshops; creation of the “Table” of Pacto Alegre
Evidence	<p>“Everyone can participate and engage,” says I4</p> <p>“It is a network created jointly,” says I2</p> <p>“The most difficult part of coordination is to think about collective benefits. Each has its own experiences. A common language is a great challenge,” mentions I7</p> <p>The actors jointly selected projects and presented the results of the first round (video – https://www.youtube.com/watch?v=D_6BElj2tGs)</p> <p>Pacto Alegre website and social networks were built as a platform to engage the actors</p>
Actors	Alliance for innovation, Porto Alegre city Hall, companies and society

Note(s): Orchestrator’s Role: Facilitator

Source(s): Prepared by the authors

Table 10.
Co-creation
management

Table 11.
Relationship between
orchestration
dimensions and
Orchestrator's roles

Dimensions orchestration	Orchestrator roles	Orchestrator activities	Leverage factor
Agenda setting	Architect; Conductor	Organize meetings; set agenda; definition of dates, time and theme of the meeting	Alliance of actors
Mobilization	Communicator	Map and select members; insert members in the network; attract new members	Institutional communication
Network stabilization	Leader; Facilitator	Align interests; bring members together; set network identity	Building a collective identity
Knowledge creation and transfer	Conductor; Developer	Promote exchanges and interactions between members	Network meetings
Innovation appropriability	Leader; Developer	Create concrete assets based on knowledge mobility; manage innovations and quantify the benefits and profits obtained from innovations	Definition of projects
Coordination	Leader	Plan actions; setting goals; manage and instruct other members engaged in the network towards the common goal	Establishment of collective objectives
Co-creation	Conductor; Facilitator	Create collectively; integrate community participation	Workshops of actions co-creation

Source(s): Prepared by the authors

Hurmelinna-Laukkanen *et al.* (2011) and da Silva and Bitencourt (2019) and the five roles brought by Pikkarainen *et al.* (2017) and Nilsen and Gausdal (2017). However, based on the case analyzed, it was perceived the presence of a role not yet addressed in the literature: the role of communicator. It was identified that carrying out the activity of communicating and disseminating actions and projects institutionally to the public and engaging them in the network becomes highly relevant in the city's context. It can be seen that, in the case of Pacto Alegre, this function was performed by a media partner of the network and by a group of civil society engaged in the causes of the city.

The findings evidenced that the exercise observed communicator's role allows the indication of an additional process that arises from the practice associated with the proposal for orchestrating innovation networks presented in Table 1, here called management of the communication. This perception is supported by the comprehension that maintaining effective communication between actors facilitates and promotes collaboration between projects and intra-projects, as it is a collective process in which communication assumes relevance in the development of innovation (Nambisan, 2008; Paulini, Murty, & Maher, 2013; Wu, Rosen, Panchal, & Schaefer, 2015).

The ideas explored in this paper provided new insights into orchestrators of innovation networks at the city level. These new findings took us to three proposals for future investigations on the subject. The first is about new forms of value at the city level, which can be created with the co-creation process between the actors in the innovation network or with the involvement of others, such as citizens. The second, regarding the role of the communicator and its characterization as an individual, group or across the innovation network at the city level, in addition to the possibility of being an associated service. The third, associated with the deliberate adoption of processes of orchestration of innovation networks at the city level as a means of making efficiently the development of innovations in cities.

Co-creation combined with the other processes of orchestrating innovation networks at the city level has the potential to constitute a broader model than that commonly adopted in the literature. The known models do not take into account the possibilities of value creation by the participants and the possible integration of other actors into the network, as in the case

of the city, the citizens, who are the main beneficiaries of the development of innovations. From that, new opportunities for academic research in terms of practice opens, as well as in the public policies field by generating indications of options that would allow strengthening obtaining gains derived from the resources invested in the city.

6. Conclusion

This paper investigated the roles and activities of the orchestrators of innovation networks constituted at the city level. This research highlighted the city as a community that involves and integrates various actors, such as citizens and companies, to collaborative innovation activities. In this direction, seven dimensions of the “orchestration of innovation networks” were assumed as a result of the combination of previous studies by [Dhanaraj and Parkhe \(2006\)](#), [Hurmelinna-Laukkanen et al. \(2011\)](#) and [da Silva and Bitencourt \(2019\)](#). In the sequence, different roles of orchestrators were based on [Pikkarainen et al. \(2017\)](#) and [Nilsen and Gausdal \(2017\)](#).

Our results advance previous studies by promoting the expansion of the “orchestration of innovation networks” model with the combination of distinct elements from the literature in a coherent whole and the validation of its applicability in the context of the innovation network studied. Relating different roles of orchestrators to the seven dimensions studied, we highlight the multiplicity of orchestrator’s roles and activities in the orchestration process. In each dimension, there may be more than one role being played in the orchestration. Indeed, there is a kind of shading of the roles played in the orchestration that makes them interdependent. In other words, none of these “orchestrators” will end an effective orchestration of innovation networks, reinforcing the need for multiple competences.

Therefore, the findings suggest two theoretical contributions. At first, we identified a role not discussed in the literature, here called the communicator. In the case analysis, we observed the communicator role through functions performed by a media partner of the innovation network and by a civil society group engaged in the city’s causes. Secondly, we indicated a new dimension of orchestration related to the management of communication in the innovation network and its externalities, such as civil and organized society, characteristic of an innovation network set up within a city. Also, a special emphasis can be given to the studied network as to its collective identity, developed from the engagement of different actors (government, universities, companies and society, etc.).

In the managerial field, we believe that findings obtained can assist private and public managers in the orchestration of innovation networks with the suggestion of practices developed in the Pacto Alegre. We identified the main roles and activities to orchestrate an innovation network at the city level. Likewise, these theoretical and managerial contributions may come to be used for the replicability of the innovation network model that could be built in other cities in the world. In line with [Visnjic et al. \(2016\)](#), we argued that successful city governance requires an orchestration approach where leaders choose the appropriate structure and manage the network dynamically in a constantly changing environment.

We believe that public managers and policymakers can replicate the model discussed once we bring the main activities and roles of the actors to the orchestration of innovation networks at the city level. Therefore, cities can identify the most appropriate actors to perform the dimensions of the orchestration, based on the proposed activities and the leverage factors. In addition, we understand that the reflections developed in the paper serve to bring alert points throughout this process, as well as to define coordinated actions.

Besides, it is important to note two limitations of this study. The first is the result that the findings are specific to the body of literature studied and the case study. The possibility of expanding the body of literature, its connection with different scientific theoretical bases or conducting new empirical investigations could result in additional observations on the roles

of orchestrators and the orchestration processes in an innovation network. The second is that this article even after approximating the roles of the orchestrators and the dimensions of orchestration in an innovation network does not consider the interdependence and relationship between each of them. In this case, the complementarity between the dimensions or between the roles of orchestration.

Further research should explore the dynamic of roles in the processes of orchestrating innovation networks and the drivers of new trajectories of these networks. We also suggest future research to identify which strategic resources have been developed by innovation networks and the comparison of the process of constituting the Pacto Alegre with other innovation networks at the city level, especially in emerging economies.

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