Universidade do Contestado | www.unc.br/periodicos ISSNe: 2237-9029
DRd | Desenvolvimento Regional em debate
Revista eletrônica do Programa de Mestrado em Desenvolvimento Regional da Universidade do Contestado

FORMAS DE ORQUESTRAÇÃO DA INOVAÇÃO EM ARRANJOS PRODUTIVOS LOCAIS: UM ESTUDO NO SETOR MOVELEIRO E DE CALÇADOS

FORMS OF ORCHESTRATING INNOVATION IN LOCAL PRODUCTIVE ARRANGEMENTS: A STUDY IN THE FURNITURE AND FOOTWEAR SECTORS

FORMAS DE ORQUESTACIÓN DE LA INNOVACIÓN EN ARREGLOS PRODUCTIVOS LOCALES: UN ESTUDIO EN EL SECTOR DEL MUEBLE Y DEL CALZADO

Ezequiel Alves Lobo[1]
Luiz Alves da Silva Cruz Neto[2]
Elda Fontenele Tahim[3]
Samuel Façanha Câmara[4]

RESUMO

Gerar inovação é uma atividade complexa e não linear, sendo importante compreender como orquestra-la nos mais diversos ambientes. Desta forma, o presente estudo tem como objetivo identificar como as formas de orquestração afetam o nível de aprendizado e inovação em dois Arranjos Produtivos Locais (APLs), um do setor moveleiro e outro de calçados. A pesquisa possui uma abordagem exploratória descritiva, e tem como base a Análise de Redes Sociais (ARS). Os dados foram coletados através de questionários aplicados presencialmente com empresas dos APLs de Marco e Crajubar. Os resultados apontam, que na rede de móveis ocorre uma orquestração dominante e está, possui um maior nível de inovação. Já na rede de calçados, ficou evidente que nenhum ator a lidera, o que configura uma orquestração consensual. Além disso, foi constatado que que não há diferença com relação ao nível de aprendizado entre os APLs, independente da forma de orquestração.

Palavras-chave: Arranjo Produtivo Local; Rede; Ator; Orquestração; Inovação.

[1]Mestre e Doutorando em Administração. Universidade Estadual do Ceará. Programa de Pós-Graduação em Administração. Fortaleza. Ceará. Brasil. E-mail: ezequiellobo2013@gmail.com. ORCID: https://orcid.org/0000-0003-4004-3470.
[2]Mestre e Doutorando em Administração. Universidade Estadual do Ceará. Programa de Pós-Graduação em Administração. Fortaleza. Ceará. Brasil. E-mail: luizalvesadm@gmail.com. ORCID: https://orcid.org/0000-0002-6409-3117.
[3]Doutora em Ciências Econômicas. Universidade Estadual do Ceará. Programa de Pós-Graduação em Administração. Fortaleza. Ceará. Brasil. E-mail: fontineletahim@gmail.com. ORCID: https://orcid.org/0000-0002-4135-7714.
[4]Pós-Doutor em Gestão da Inovação. Universidade Estadual do Ceará. Programa de Pós-Graduação em Administração. Fortaleza. Ceará. Brasil. E-mail: samuel.camara@uece.br. ORCID: https://orcid.org/0000-0002-8333-6997.

ABSTRACT

Generating innovation is a complex and non-linear activity, making it important to understand how to orchestrate it in various environments. Thus, the present study aims to identify how different forms of orchestration impact the level of learning and innovation in two Local Productive Arrangements (LPAs), one in the furniture sector and the other in footwear. The research employs an exploratory descriptive approach and is based on Social Network Analysis (SNA). Data was collected through questionnaires administered in person to companies within the LPAs of Marco and Crajubar. The results indicate that in the furniture network, there is a dominant orchestration which correlates with a higher level of innovation. Conversely, in the footwear network, it became evident that no single actor leads, which constitutes a consensus-based orchestration. Furthermore, it was observed that there is no difference in the level of learning between the LPAs, regardless of the form of orchestration.

Keywords: Local Productive Arrangement; Network; Actor; Orchestration; Innovation.

RESUMEN

Generar innovación es una actividad compleja y no lineal, siendo importante comprender cómo orquestarla en diversos entornos. Por lo tanto, el presente estudio tiene como objetivo identificar cómo las formas de orquestación afectan el nivel de aprendizaje e innovación en dos Arreglos Productivos Locales (APL), uno en el sector de muebles y otro en el de calzado. La investigación tiene un enfoque exploratorio descriptivo y se basa en el Análisis de Redes Sociales (ARS). Los datos se recopilaron a través de cuestionarios aplicados en persona a empresas de los APL de Marco y Crajubar. Los resultados señalan que en la red de muebles, hay una orquestación dominante y, como resultado, un mayor nivel de innovación. Por otro lado, en la red de calzado, quedó claro que ningún actor la lidera, lo que configura una orquestación consensuada. Además, se constató que no hay diferencia en cuanto al nivel de aprendizaje entre los APL, independientemente de la forma de orquestación.

Palavras clave: Arreglo Productivo Local; Red; Actor; Orquestación; Innovación.

Como citar este artigo: LOBO, Ezequiel Alves et al. Formas de orquestração da inovação em arranjos produtivos locais: um estudo no setor moveleiro e de calçados. **DRd - Desenvolvimento Regional em debate**, v. 14, p. 300-320, 24 maio 2024. Doi: https://doi.org/10.24302/drd.v14.5066.

Artigo recebido em: 09/10/2023
Artigo aprovado em: 07/05/2024
Artigo publicado em: 24/05/2024

1 INTRODUCTION

The success of organizations, whether small or large, depends on several external and internal factors and one of these is interorganizational relations (RZEPKA, 2019; SACCARDO; BERNARDY, 2019). The motivations for organizations to collaborate are diverse. Among the

main ones are access to resources to enable innovative product projects, knowledge exchange, cost sharing and risk reduction in complex or innovative activities (FAEMS; VAN LOOY; DEBACKERE, 2005; BALESTRIN; VERSCHOORE, 2020).

Interorganizational relationships intensify over time and usually form networks of actors that are somehow interconnected and, as Faccin, Wegner and Balestrin (2020) point out, are orchestrated through a Hub institution in different types of regional environments. A favorable example of this type of environment are the Local Productive Arrangements (LPAs) of which Brazil has a great diversity, both for its territorial size and for its cultural variety (OLIVEIRA; FRANÇA; RANGEL, 2018).

LPAs can be defined as a set of companies and enterprises that are in the same territory and have some type of productive specialty and have links of articulation, interaction, cooperation and learning among themselves and with other actors, which can be: government, business associations, credit institutions, education and research (MINISTRY OF ECONOMY, 2021). These characteristics contribute to the identification of Hub actors in LPAs.

Recent studies have addressed the theme of innovation orchestration in various empirical contexts such as third sector organizations, smart and innovative cities, health, industrial communities, public sector, among others (e.g. DIRIKER; PORTER; TUERTSCHER, 2023; RITALA; KORT; GAILLY, 2023; POBLETE *et al*, 2022; MANN; KARANASIOS; BREIDBACH, 2022; REYPENS; LIEVENS; BLAZEVIC, 2021; LINDE *et al*., 2021; SCHEPIS; PURCHASE; BUTLER, 2021; PARENTE *et al*., 2021; HANSEN; SCHMITT, 2021; LOBO *et al.,* 2024). Also, recently, there are studies that have dealt with orchestration mechanisms (e.g. HURMELINNA-LAUKKANEN; MÖLLER; NÄTTI, 2022; AL ADEM; SCHEPIS; PURCHASE, 2020).

However, in the literature, there is a scarcity of studies that connect the orchestration of innovation with the interorganizational context of LPAs. Furthermore, to the best of the authors' knowledge, nothing has been done to understand how the forms of orchestration are directly related to the level of learning and innovation in these arrangements. In light of the above, the present study aims to identify how the forms of orchestration impact the level of learning and innovation in two LPAs, one in the furniture sector and the other in footwear. Addressing this gap, the study contributes to existing literature and advances the understanding of innovation orchestration in the regional context and its specificities concerning the innovation and learning process. Additionally, it provides managerial insights for public and private orchestrators regarding leadership in innovation networks within LPAs.

The study is structured as follows, after this introduction is presented the theoretical framework that addresses the orchestration of innovation in networks, forms of orchestration of innovation, orchestration, learning and innovation and a brief contextualization of LPAs. Then, the methodological procedures for conducting the research are presented and finally, the results, discussions and final considerations are socialized.

2 ORCHESTRATING NETWORKED INNOVATION

It is a fact that organizations do not subsist in isolation, but are interconnected through multiple relationships with the most diverse purposes (MARTÍNEZ-PÉREZ; ELCHE;

GARCÍA-VILLAVERDE, 2019; LOBO *et al.,* 2024). The idea that networks arise randomly or accidentally has already been overcome, although it is possible. Therefore, organizations are observed deliberately relating to several others with specific objectives (HURMELINNA-LAUKKANEN; MÖLLER; NÄTTI, 2022).

These interorganizational relationships form networks with links between several actors who collaborate and engage to deal with common problems, produce innovative solutions or even become stronger in a given market (VAN WIJK *et al*., 2013). In addition, through networks it is possible to exchange resources, knowledge, foster creativity to overcome the challenges of scale (DACIN; DACIN; TRACEY, 2011; HENRY; MOLLERING, 2022).

Given the wide range of interests and actors that are involved in networks, orchestration mechanisms are needed to promote commitment, engagement and trust, especially when the network is at an earlier stage (PAQUIN; HOWARD-GRENVILLE, 2013). In this scenario, as Henry and Mollering (2022) point out, the figure of an orchestrator is necessary to manage the various stakeholders. According to the authors, although many networks are highly dynamic and aligned, others are slow, which will require a greater presence of the orchestrator.

In this sense, Dhanaraj and Parkhe (2006) define innovation orchestration as a set of deliberate and intentional actions that are carried out by a central actor or a set of actors that manage the collaboration aspects. Nambisan and Sawhney (2011) conceptualize orchestration in this same perspective, as a set of actions and practices that are purposeful carried out by an orchestrating institution or Hub that manages the process of knowledge and innovation in the network. Ritala, Armila and Blomqvist (2009) add that orchestration is necessary for future-oriented value creation in search of innovation and business opportunities.

The literature points out that orchestration occurs through processes, which are managed by the orchestrator. Dhanaraj and Parkhe (2006) propose three practices for network management and leadership of which: a) Mobility of knowledge, refers to how knowledge is shared, acquired and deployed within the network enabling learning opportunities among actors; b) Appropriability of innovation, is related to how actors can appropriate the innovation that is produced and circulates within the network, and can result for example in patents, copyrights, trademarks among others; c) Stability of the network, movement of actors occurs constantly within the network the idea of keeping it stable is not to generate a negative growth rate.

While this study does not focus on orchestration practices, understanding them is crucial for advancing the comprehension of relevant processes in orchestration dynamics and providing appropriate support for understanding the topic (LOBO *et al.,* 2024). Next, the forms of orchestration that are the focus of this study will be discussed, aiming to provide theoretical support for the discussion

2.1 FORMS OF ORCHESTRATION

In the context of networks, managing a plurality of actors is a challenging task for those who exercise leadership (REYPENS; LIEVENS; BLAZEVIC, 2021), as orchestrating involves performing the role of leader without relying on the benefit of authority exercised through hierarchy, as occurs in most situations (DHANARAJ; PARKHE, 2006).

Davis and Eisenhardt (2011) in a study that addresses the reasons why some interorganizational relationships produce innovation and others do not, insert the terminologies of dominant and consensual leadership in the context of networks. Dominant orchestration occurs in networks that are coordinated by a central actor (or group of actors) that can be called a *hub* organization or leader. These actors assume the leadership of the network in several aspects, such as partner selection, goal setting and value sharing (REYPENS; LIEVENS; BLAZEVIC, 2021; KAZADI; LIEVENS; MAHR, 2016; ARIKKA-STENROOS *et al*., 2017).

In these networks, the orchestrators align and better delimit the strategic objectives, as well as, have control of the collaboration activities, establishment of rules and autonomy to include or remove some member of the network (ARIKKA-STENROOS et al., 2017). Leten et al. (2013) also point out that in order to keep collaboration active and engaged in some situations there are formal contracts and agreements such as intellectual property, for example. However, as Dagnino, Levanti and Destri (2016) point out, interorganizational networks, even if orchestrated, can have both formal and informal launches depending on the structure and interest of the actors.

In consensual orchestration, unlike the dominant one, organizations act as partners without any delegated hierarchical relationship and participation is usually voluntary (ROLOFF, 2008). Coordination relationships occur from the bottom up and actors have no established commitments. The idea is to act around a flexible system that can respond to changes more quickly targeting priority aspects (REYPENS; LIEVENS; BLAZEVIC, 2021; HUXHAM; VANGEN, 2000). Table 1 below summarizes the discussed characteristics of dominant and consensual orchestration:

Table 1 – Characteristics of dominant and consensual orchestration

Orchestration Mode	**Dominant**	**Consensual**
Vision	**Formulated**	**Negotiated**
Coordination	Top-down division of labor Centralization of efforts for innovation	Voluntary bottom-up self-selection at work Decentralized alignment of innovation efforts
Control over results	Setting targets and outcomes	Flexibility in objectives
Member engagement	Enforced through contracts and established mechanisms	Applied through relationships

Source: Adapted from Reypens, Lievens and Blazevic (2021)

3 ORCHESTRATION, LEARNING AND INNOVATION

As can be seen, the modes of orchestration have specific characteristics, and it is a relevant task to discuss which of them contributes most to generating innovation and learning. As Tidd and Bessant (2018) point out, innovation is a complex phenomenon that can be simplified through mechanisms and practices to explore its specificities.

However, studies suggest that learning and innovation are intrinsically related (JIMÉNEZ-JIMÉNEZ; SANZ-VALLE, 2014; NONAKA; TAKEUCHI, 1995; BELL; PAVITT, 1995; COHEN; LEVINTHAL, 1990) and that learning plays an essential role in enabling companies to achieve greater speed and flexibility in the innovation process (WEERD-

NEDERHOF *et al*, 2002; BELL; FIGUEIREDO, 2012; FIGUEIREDO; PIANA, 2021). Nonaka and Takeuchi (1995) emphasize that the ways of learning are diverse and can come from external, internal sources and through interaction, which were the mechanisms considered in this study. These forms of learning can result in innovations in product, process, position, structure as emphasized by Tidd and Bessant (2018).

In this line, the main reason for organizations to be networked is the search for innovative competitive advantage (DACIN; DACIN; TRACEY, 2011; VAN WIJK *et al*., 2013) and learning (HENRY; MOLLERING, 2022; AARIKKA-STENROOS *et al.,* 2017; RITALA; ARMILA; BLOMQVIST, 2009). Given the theoretical framework presented, two hypotheses are raised to be confirmed or refuted in this study:

H1: Dominant led networks in LPAs have a higher level of innovation.

H2: Consensus-led networks in LPAs have a higher level of learning.

4 LOCAL PRODUCTIVE ARRANGEMENTS: A BRIEF CONTEXTUALIZATION

LPAs are characterized by bringing together companies focused on the same activity and that have local specificities, collaborative and cultural ties (LASTRES; CASSIOLATO, 2005; OLIVEIRA *et al*., 2016; OLIVEIRA; FRANÇA; RANGEL, 2018). The emergence of LPAs, as pointed out by Manfré and Nardez (2019), is related to the origin of the flexible system that prioritized companies with serial production capacity and the possibility of producing with rapid changes in products, characteristics of small and medium-sized enterprises (SMEs).

Agglomerations of SMEs in Brazil intensified in the 1980s-1990s due to the exhaustion of economic growth, the crisis in the labor market, mass layoffs in industries and the growth of entrepreneurial culture encouraging the opening of own businesses. Thus, LPAs mostly consist of agglomerations of SMEs that have vertical relationships and synergistic interdependence (ALDERETE; BACIC, 2017; MANFRÉ; NARDEZ, 2019; MIRANDA; HASENCLEVER, 2023).

According to data from the Ministry of Development, Industry, Trade and Services (MDIC, 2021), Brazil has 839 LPAs that are distributed in 2,580 municipalities in all regions of the country and cover 40 productive sectors generating 3,058,244 jobs. These figures demonstrate the representativeness of these agglomerations in the national context, marked by diversity, economic development potential and size.

Dealing more specifically with the footwear sector targeted in this study, according to information from the Brazilian Footwear Industries Association (ABICALÇADOS, 2022) it is made up of more than 4,000 companies that directly employ 300,000 people (excluding indirect jobs) and produce more than 840 million pairs of shoes annually. With an excellent international performance, the sector benefited from the price of the dollar at more competitive levels that inhibited China's exports, providing 45% growth in the foreign market, totaling 1.3 billion dollars in exports.

As for the furniture sector, Brazil is one of the world's largest producers and ranks as the main one in Latin America. The sector generates more than 255 thousand direct jobs

through 18 thousand companies with an estimated production value of 78.1 billion reais (MOVERGS, 2022). In Ceará specifically, the figures indicate a growth of 111.9% in relation to exports with a growth perspective due to the creation of a strategic plan for the segment (FIEC, 2021).

5 METHODOLOGY

The methodological approach of the study is characterized as descriptive exploratory, based on the Social Network Analysis (SNA) that aims to measure and map the connections between the participants of a group, as in an LPAs, in order to show their social relations in a graphic way (KNOKE; YANG, 2008).

SNA relies on statistical tools that describe the structure of the network and facilitate the identification of how actors relate to each other. It also enables the calculation of parameters such as degree of density, local and global centrality, and the identification of subgroups in the network (WASSERMAN; FAUST, 1999). This corroborates with the identification of the forms of orchestration of an LPA. However, this analysis should be carried out in association with the observation of the characteristics of each productive arrangement.

In this study, the unit of analysis considered consists of two LPAs located in the state of Ceará. One is comprised of furniture manufacturing companies located in the municipality of Marco, and the other is composed of footwear manufacturing organizations located in the municipalities of Juazeiro do Norte, Cariri, and Barbalha (CRAJUBAR). These LPAs are composed of a set of mostly small and medium-sized private organizations specialized in the production of footwear and clothing, along with support entities stemming from public and/or private initiatives. LPAs can be understood as networks, where the actors are individual organizations and the connections between them represent the established bonds. The choice of these representative units is due to the capacity of this type of cluster to manifest diverse orchestration structures and to demonstrate levels of innovation and learning.

In this network analysis process, data was collected through a structured questionnaire. The questionnaire comprises three parts. The first part was used for constructing the networks, where respondents were asked to cite five key institutions or individuals for local producers aiming at network construction. The second part consisted of 12 items with dichotomous responses (yes/no) identifying the existence of innovations carried out by organizations in products, processes, or structure. Finally, the third part quantified the sources of organizational learning analyzed from external, internal perspectives, and through interaction via 16 items with yes/no responses.

The questions in the second and third parts are an adaptation of the questionnaire applied by the Research Network on Local Productive and Innovative Arrangements and Systems (RedeSist). The questionnaires were administered in person through field research in the furniture APL companies between September and October 2021 and in the footwear LPAs from October 2021 to January 2022. The respondents were company owners or representatives in leadership positions who had knowledge of the company and local dynamics.

The criterion used for selecting participants was based on their accessibility, as we traveled to the municipalities to conduct the research and had a schedule established for data

collection. Therefore, we prioritized respondents who were available and willing to collaborate with the study. In the context of the furniture LPAs, we identified the presence of 42 active companies, of which 32 responded to the questionnaire. Meanwhile, in the footwear LPAs, 54 companies were available to participate in the research (CENTEC, 2022a; CENTEC, 2022c).

For the construction of the sociograms, the software Gephi was used. Subsequently, their main characteristics were deduced by first analyzing the categorization of the static properties of the system and, secondly, by proceeding with the study of its dynamics and evolution. The numerical values calculated for the data collection under analysis were weighted in relation to those of a synthetic graph with the same order (number of nodes) and size (number of links) and a random distribution of links. This method enables a superior understanding of the importance and physical interpretation of the quantities involved.

After characterizing the networks, a comparison was made between them. The Mann-Whitney U hypothesis test and the Student's t-test were used to assess whether the differences observed were statistically significant at the level of innovation and network learning. The results of the study were analyzed using the R 4.3.0 software. Data are presented as mean (X) and standard deviation of the mean (SD).

6 RESULTS

6.1 CHARACTERIZATION OF LPAS

The Marco Furniture Local Productive Arrangement is located in the northwest region of the State of Ceará, 192 km from the capital, Fortaleza. The municipality is the only one in the region that expresses a high concentration of companies linked to the furniture subsector rooted in the territory, and is therefore its main economic activity (CENTEC, 2022a). Studies such as that of Gobb (2008) mention two factors that led to furniture production in Marco: the implementation of the government procurement program in 1987 by the State Government, which was an emergency measure to reduce unemployment due to drought, and the entrepreneurial vision of the Osterno Aguiar brothers, owners of the largest furniture factory in the region.

The expansion of the Aguiar brothers' store network stimulated the creation of a chain of commercial establishments and furniture manufacturing units in the city of Marco (LIMA, 2007). Thus, gradually, the entry of small manufacturers in the furniture business was occurring, and many of these with some kind of connection, family or professional, as the entrepreneurial brothers (SCIPIÃO, 2004).

In fact, the Aguiar brothers factory currently plays a leading role in structuring the LPA, having a higher hierarchical position and exerting relevant influence on other support and cooperation institutions in the Arrangement, such as FAMA (Associated Manufacturers of Marco), SINDMÓVEIS (Furniture Industries Union of the State of Ceará) and the City Hall (CENTEC, 2022a). The latter are responsible for promoting training, in addition to carrying out joint research and development projects in some specific situations. The Marco Furniture Fair and the Sustainable Forestry project can be mentioned (CENTEC, 2022b).

Regarding the Local Productive Arrangement of Footwear of CRAJUBAR, its origin is intrinsically linked to the process of social, historical and territorial formation that constitutes the metropolitan space where it is located (CORDEIRO, 2015; COSTA, 2007). Located in the Crajubar micro-region, researchers such as Amaral Filho and Souza (2003) highlight two essential elements that drove the emergence of the LPA in this region. The first is the historical component linked to the artisanal production of leather artifacts, especially aimed at meeting the needs of cowboys in the semi-arid region. The second refers to the economic dynamism of the region that was driven by the Juazeiro do Norte trade, both due to its strategic geographical location and its consolidation as a religious destination for pilgrims.

Another remarkable process that the Arrangement has undergone refers to the entry of major national competitors in the Cariri region since the 1990s. As an example, the installation of Grendene's industrial plant in 1996 after the restructuring movement of the national footwear sector gave rise, at first, to great concern among local producers (AMARAL FILHO; SOUZA, 2003). The intense competition in the local environment has driven producers to adopt defensive and innovative strategies. According to Cordeiro (2015), these strategies triggered a renewal movement in the Local Arrangement, characterized by the introduction of new production processes, cost reduction and improvement of service quality.

In the current structure of relations between the actors of the LPA, there is no prominent central actor, especially in the category of productive companies, that leads and articulates the LPA (CENTEC, 2022c). This effect is partly the result of the historical-cultural formation of the cluster, which has an organic nature, without a specific company in the region exercising this leadership.

After the closure of the Association of Shoe Manufacturers of Juazeiro do Norte (AFABRICAL), the Union of Footwear and Clothing Industries of Juazeiro do Norte and Region (SINDINDUSTRIA) has played an important role in the process of articulation and cooperation between the actors of the LPAs, together with other institutions such as SEBRAE and the Municipality of Juazeiro do Norte. These institutions carry out training actions and collective consultancies, however, no action occurs on an ongoing basis (CENTEC, 2022d).

6.2 NETWORK ANALYSIS

The resulting networks of the Marco Furniture LPA and Crajubar Footwear LPA are presented in Figure 1 and Figure 2, respectively. Table 2 contains the main metrics calculated for both networks. All connections are considered symmetric and unweighted.

Table 2 - Key Network Metrics

Indicators	Networks	
	Furniture LPA	Footwear LPA
Number of Nodes	47	67
Edge Number	99	112
Middle Grade	4,21	3,34
Density	0,092	0,051
Connected Components	3	4
Diamentro:	6	5
Average Path Length	2,58	2,58
Clustering Coefficient:	0,107	0,011
Modularity	0,313	0,372
Number of Communities	6	10

Source: Prepared by the authors (2024)

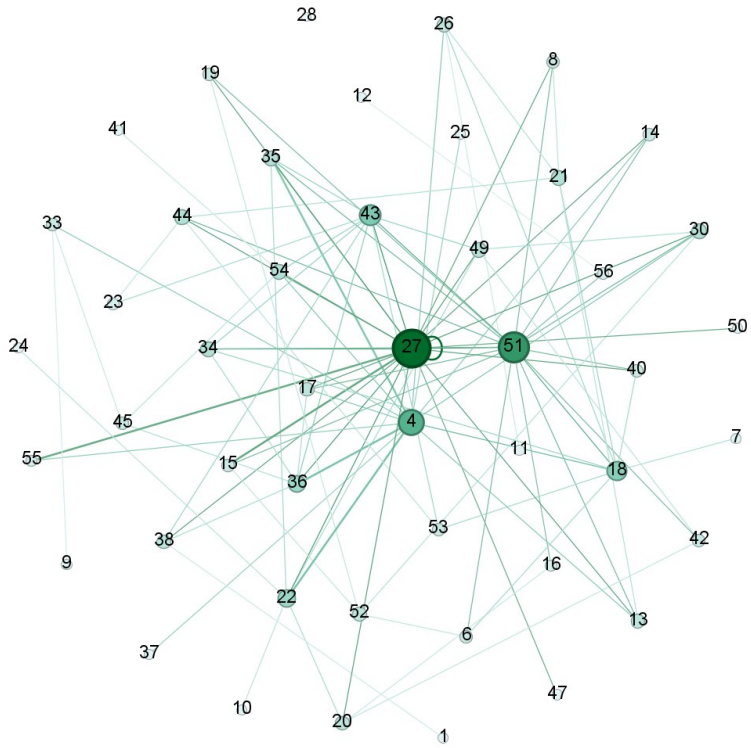
Thus, according to Table 1, the network of the Furniture LPA consists of 47 nodes, which are interconnected by 99 edges. The average degree of this network is 4.21, indicating that, on average, each node has approximately 4.21 connections with other nodes. The network density is 0.092, which suggests that the proportion of edges present in the network relative to the total number of possible edges is relatively low. This measure reveals a moderate level of connectivity in the network, with each node establishing multiple connections.

The analysis of the network structure reveals the presence of 3 distinct connected components. These components represent groups of nodes that are internally interconnected but not directly connected to other groups. Each connected component can represent a sub-network or a community within the larger network.

The clustering coefficient is 0.107, which indicates the tendency of nodes to form clusters or communities in the network. This value suggests that there is a moderate tendency for nodes to be clustered. The modularity of the network is 0.313, which indicates the division of the network into distinct communities. In this case, the network has 6 identified communities.

Figure 1 illustrates the Marco LPA network, the nodes with the highest degree of centrality are highlighted with the most intense coloring and the largest size proportional to the degree of centrality. Of the five with the highest average degree of centrality, 3 are furniture manufacturing companies (nº 27, 43 and 18) and 2 are organizational support entities (nº 51 and 4).

Figure 1 – Marco Furniture LPA network



Source: Prepared by the authors (2024)

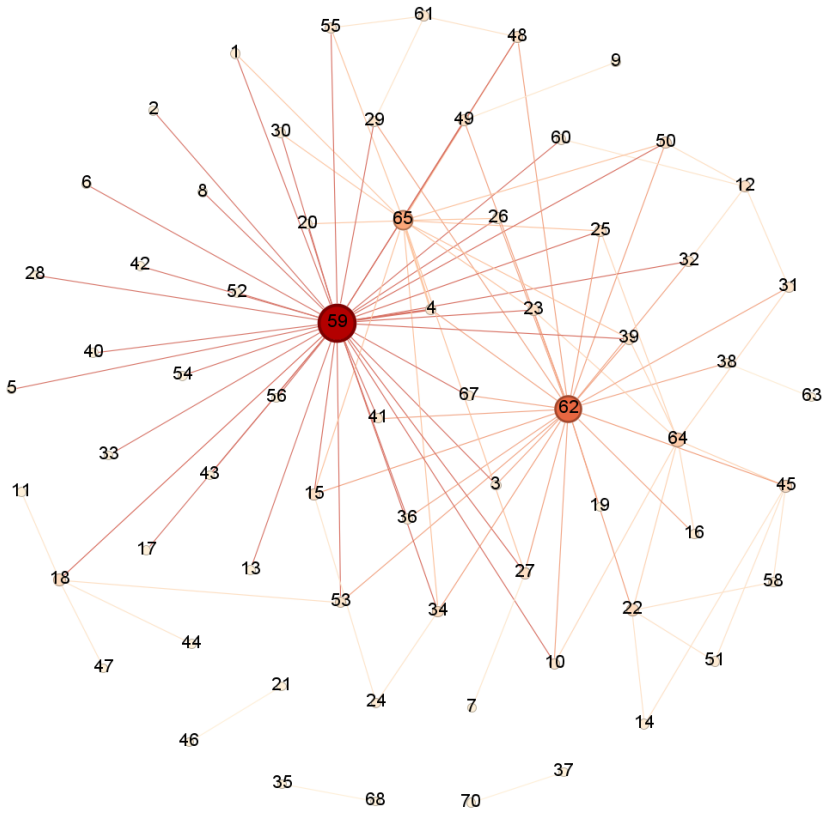
Regarding the Crajubar Footwear LPA network, according to the indicators in Table 2, it is composed of 67 nodes interconnected by 112 edges. The average degree of this network is 3.34, which indicates a moderate level of connectivity between the nodes. The network has a low density, with only 5.1% of all possible ties present in the network at the time it was mapped.

The network has 4 distinct connected components. The clustering coefficient is 0.011, indicating that the network has low cluster density. This suggests that nodes tend to have limited connections within their immediate groups, resulting in a network structure with lower density of clusters.

The modularity of the network is 0.372, which indicates a division into 10 distinct communities. This measure quantifies the presence of interconnected groups of nodes within the network, based on the structure of connections. Therefore, the network can be divided into 10 distinct communities, with nodes grouped according to their connections.

The network of the Crajubar Footwear LPA is represented in Figure 2. The nodes with the highest degree of centrality are highlighted with the most intense coloring. The five with the highest average degree of centrality are support entities (union nº 65, institutions of the S system, nº 59, 62 and 64) and 1 is a footwear production company (nº 18).

Figure 2 - CRAJUBAR Footwear LPA Network



Source: Prepared by the authors (2024)

The Social Network Analysis indicators show that the two LPA networks, Furniture and Crajubar Footwear, have distinct characteristics. In the Furniture LPA, the network is more concentrated and denser, indicating the presence of actors with greater connection and transmission of information. This signals the existence of actors playing more active roles and potentially assuming denser leadership functions.

In addition, the Furniture LPA presents manufacturers as central actors, while in the Footwear LPA it is the institutions supporting the productive sector. Relationships with support institutions are generally directed to the collective, with voluntary participation of other organizations and focused on the formation of partnerships. On the other hand, relations with other peers have a character of more evident individual interests and, in some cases, an unbalanced power relationship.

The findings of the ARS, together with the results obtained from the characterization of the LPAs indicate that we are dealing with two distinct forms of orchestration. The Furniture LPA has an orchestration closer to the dominant one, strongly centralized by the largest company in the region (nº 27). The Footwear LPA already has a form of orchestration that is close to consensual, with no productive company leading the orchestration. The LPA companies act in a more decentralized way and voluntarily, participating in organizational support entities.

6.3 HYPOTHESIS TESTING

After the characterization and the SNA of the LPAs, which aimed to identify the orchestration mechanisms present in the networks, hypothesis testing was performed to identify the difference in the level of innovation and learning within the networks.

Table 3 - Size, mean and standard deviation of innovation and learning level

LPA	Variable	N	Average	Standard deviation
1 Footwear	Learning	53	5.26	2.44
2 Footwear	Innovation	53	3.04	3.06
3 Furniture	Learning	33	5.36	3.22
4 Furniture	Innovation	33	6.58	3.82

Source: Prepared by the authors (2024)

In the analysis of the assumptions for hypothesis testing, the variable innovation in the footwear LPA group did not meet the normality assumption. All the other variables did. Regarding the homogeneity of variance, a Levene test was performed. All variables obtained a p-value greater than 0.05, confirming the homogeneity of the variables between the groups.

Because the innovation variable did not meet the normality assumption, the Mann-Whitney U non-parametric test for independent samples was performed to compare the distribution of the level of innovation in the Footwear LPA (mean rank =34.70) and Furniture LPA (mean rank =57.64) with respect to their level of innovation. The test result (U = 408, 95% CI [-4.999; -2.000], $p<0.001$) indicates a statistically significant difference between the groups. The effect size of the Mann-Whitney U test was 0.45, indicating a moderate effect. The results suggest that the level of innovation is more evident in the Marco LPA than in the Footwear LPA.

Subsequently, the t-test for two independent samples was performed with the learning variable for the two LPA networks. The result of the test ($t(84) = -0.163$; $p = 0.8713$) showed that there is no difference regarding the level of learning between the networks.

7 DISCUSSION

The results presented in the previous sections are substantial and provide a basis for assessing the acceptance or rejection of the proposed hypotheses, as presented in Table 4.

Table 4 – Results of the hypotheses

Hypothesis		Results
H1	Dominantly led networks have a higher level of innovation	Accepts
H2	Consensus-led networks have a higher level of learning	Rejected

Source: Prepared by the authors (2024)

Regarding hypothesis H1, it is evident from Figure 1 that the Aguiar furniture industry (actor 27) assumes the role of orchestrator of the network. This leadership function is also related to the historical role in shaping the Local Productive Arrangement (APL) (LASTRES; CASSIOLATO, 2005; TIZZIOTTI; TRUZZI; BARBOSA, 2019), which was encouraged as early as the 1980s and boosted by the government procurement program of the state of Ceará in 1987, as well as by the geographical position of the city of Marco, which favored wood logistics (SCIPIÃO, 2004; LIMA, 2007).

In addition, the role of orchestrator can be attributed to actor 27 due to the position of leadership and influence (DHANARAJ; PARKHE, 2006; NAMBISAN; SAWHNEY, 2011) in several initiatives that have strengthened the network of furniture producers in Marco over time, such as: FAMA, SINDMÓVEIS, Marco Furniture Fair and projects related to the incentive of Sustainable Forestry (CENTEC, 2022b), which characterizes an active orchestration with dominant features. In this sense, Reypens, Lievens and Blazevic (2021) state that in dominant orchestration the centralization of efforts occurs from top to bottom, that is, it starts from the actor who has the most influence in the network and who establishes goals and results aimed at strengthening it.

Table 3 and the non-parametric Mann-Whitney U test indicate that the level of innovation is higher in the furniture LPA than in the footwear LPA. This corroborates the acceptance of hypothesis H1. It can also be seen that in networks with dominant orchestration, the appropriability of innovation tends to be higher, due to the fact that the engagement of members is subsidized through established agreements and mechanisms (DHANARAJ; PARKH, 2006; REYPENS; LIEVENS; BLAZEVIC, 2021). The fact is that these aspects also contribute to maintaining the stability of the network and consolidate the perception of value and trust by the actors in participating in it (KAZADI; LIEVENS; MAHR, 2016). As Aarikka-Stenroos et al. (2017) point out, stability is largely maintained through institutionalization practices and formalized initiatives that in the case of the Marco LPA are greatly promoted by the association and the union.

As for hypothesis H2, no significant evidence was found for acceptance. As can be seen in Figure 2, actors 59, 62, 64 stand out in the network. However, they are not productive companies of the LPA but support entities of the S system, which does not configure them as orchestrators considering that they act mainly in the training of the workforce and necessarily, all companies at some point passed through them. As for the trade union (65), it is important to note that it is not only for the footwear industry but also for SINDINDUSTRIA, which means that its performance is limited in the LPA. In addition, the association that dealt exclusively with footwear manufacturers (AFABRICAL) was extinguished in 2018. The actor (18) of the network, on the other hand, is a footwear production organization and has the most influence in the network. However, the company is quite isolated, making it clear that it does not exercise any type of leadership, which leads us to affirm that in the footwear LPA there is a consensual orchestration. In this sense, Reypens, Lievens and Blazevic (2021) state that in consensual orchestration, efforts for innovation are decentralized and are not concentrated in any actor in the network, the engagement of members is done through relationships and there are no unique objectives to be achieved because they are flexible.

Regarding learning, the t-test identified that there is no difference in terms of the level of learning between the LPAs. This means that in the studied networks, the forms of orchestration did not interfere with the actors' learning. Despite networks with dominant

orchestration having an active leadership presence (REYPENS; LIEVENS; BLAZEVIC, 2021; DAVIS; EISENHARDT, 2011), it does not imply that this leadership will centralize all learning, as the orchestrator does not have control over all the knowledge circulating in the network, even if they have a strong grasp of a significant portion of it (LIPPARINI; LORENZONI; FERRIANI, 2014; DAGNINO; LEVANTI; DESTRI, 2016).

8 FINAL CONSIDERATIONS

This article sheds light on how the forms of orchestration affect the level of learning and innovation in two LPAs, one in the furniture sector and the other in the footwear sector. Existing studies on innovation orchestration place great emphasis on mechanisms and neglect the ways of orchestrating in various contexts, in this case, we focus on LPAs. In addition, many studies involving innovation networks are rather descriptive, and this one seeks to cross empirical insights with theoretical arguments.

The results indicate that in the furniture network there is a central orchestrator, in this case actor 27, and his leadership role is related to the historical role of network formation. In addition, based on the tests performed, it was identified that the level of innovation is higher in this LPA and that it has an orchestration with dominant characteristics. This type of network tends to stability because there are more institutionalized and agreed practices among the actors for innovation led by the orchestrator. All this evidence led us to accept hypotheses H1.

As for the footwear network, it was evident that no actor is a central orchestrator. The institutions that have more influence in the LPA (59, 62, 64,65) are support entities and offer training, only in some sporadic situations develop research and development activities together with the productive companies, characterizing the orchestration that occurs in the network as consensual. However, it is important to emphasize that this does not mean that there is no orchestration for innovation in the LPA, but that no company assumes the leadership role in this context. It was also possible to notice that there is no difference regarding the level of learning between the LPAs, regardless of the form of orchestration, which leads us to reject hypothesis H2.

This research has produced valuable insights from a theoretical and managerial point of view, for private and public managers. More specifically, it was possible to identify that: In the LPAs with dominant orchestration the level of innovation was higher, as well as, the network tends to be more stable; The forms of orchestration had no direct influence on learning; In dominant networks, the orchestrator may even hold much of the knowledge, but, does not have control over all forms of learning that circulate in the network and finally, dominant orchestrators, are usually linked to the process of historical formation of the LPA.

The limitations of this study are associated with the small number of networks analyzed, as data collection in this type of study requires a large field effort. In addition, the study did not follow the learning and innovation process over time in each network studied.

Future studies could apply the forms of orchestration to other LPAs to identify whether the results of this research are local and/or sector-specific specificities. Additionally, delving deeper into the understanding of consensual orchestration could contribute to identifying more characteristics related to this type of network. Qualitative longitudinal studies could investigate

intermediate forms of orchestration, such as hybrid orchestration, which combines dominant and consensual characteristics. Furthermore, exploring the dynamics of innovation orchestration in LPAs and linking the forms of orchestration with orchestration practices could be valuable areas for further investigation.

ACKNOWLEDGMENTS AND INFORMATION

The study received support from the Center for Technological Teaching Institute (CENTEC) and was funded by the Development Agency of the State of Ceará (ADECE), with the endorsement of the Ceará State Research Support Foundation (FUNCAP). Therefore, we would like to thank these institutions for their participation in the project and for the use of the information to generate academic contributions.

REFERENCES

AARIKKA-STENROOS, L. *et al*. How to manage innovation processes in extensive networks: A longitudinal study. **Industrial Marketing Management**, v. 67, p. 88-105, 2017. Doi: https://doi.org/10.1016/j.indmarman.2017.09.014.

AL ADEM, S.; SCHEPIS, D.; PURCHASE, S. Orchestrating network resilience within humanitarian aid networks. **Industrial Marketing Management***,* v. 107, p. 190-203, 2022. Doi: https://doi.org/10.1016/j.indmarman.2022.09.016.

ALDERETE, M. V.; BACIC, M. J. Arreglos Productivos Locales y desarrollo local en los municipios nos metropolitanos de Sao Paulo. **Cuadernos de Gestión***,* v. 18, n. 1, p. 103-124, 2018. Doi: https://doi.org/10.5295/cdg.v18i1.18907.

AMARAL FILHO, J.; SOUZA, D. L.R. **Arranjo produtivo de calçados do Cariri, Ceará**. Instituto de Pesquisa e Estratégia Econômica do Ceará – IPECE, 2003. Texto para discussão número 9. Fortaleza. Available at: https://www.ipece.ce.gov.br/wp-content/uploads/sites/45/2014/02/TD_09.pdf.

ASSOCIAÇÃO BRASILEIRA DAS INDÚSTRIAS DE CALÇADOS (ABICALÇADOS). **Quatro décadas ao lado do setor calçadista nacional.** Available at: https://www.abicalcados.com.br/noticia/quatro-decadas-ao-lado-do-setor-calcadista-nacional.

ASSOCIAÇÃO DAS INDÚSTRIAS DE MÓVEIS DO ESTADO DO RIO GRANDE DO SUL (MOVERGS). **Apresentação do setor**, 2022. Available at: https://www.movergs.com.br/apresentacao.

BALESTRIN, A.; VERSCHOORE, J. R. Inter-organizational relationships and complementarity of knowledge: proposal of a conceptual framework. **Revista de Administração Mackenzie,** v. 8, n. 4, 153-177, 2007. Doi: https://doi.org/10.1590/1678-69712007/administracao.v8n4p153-177.

BELL, M.; FIGUEIREDO, P. N. Innovation capability building and learning mechanisms in latecomer firms: recent empirical contributions and implications for research. *Canadian* **Journal of Development**, v. 33, n. 1, 14-40, 2012. Doi: https://doi.org/10.1080/02255189.2012.677168.

BELL, M.; PAVITT, K. The development of technological capabilities. *In*: UL HAQUE, I.; BELL, M.; DAHLMAN, C; LALL, S.; PAVITT, K. **Trade, technology and international competitiveness**. Washington, DC: The World Bank, p. 69-101, 1995.

CENTEC. INSTITUTO DO CENTRO DE EDUCAÇÃO TECNOLÓGICA. **Diagnóstico do arranjo produtivo local dos móveis Marco**. Fortaleza: Instituto Centec, 2022a. Available at: https://www.sedet.ce.gov.br/wp-content/uploads/sites/15/2022/11/Projeto-APL-Diagnostico-APL-de-Moveis-Marco-Versao-Final.Digital.pdf.

CENTEC. INSTITUTO DO CENTRO DE EDUCAÇÃO TECNOLÓGICA. **Diagnóstico do arranjo produtivo local de calçados no Cariri.** Fortaleza: Instituto Centec, 2022c. Available at: https://www.adece.ce.gov.br/wp-content/uploads/sites/98/2022/11/PDP-Cariri_-Ultima-versaoalterada-07.11.2022.pdf.

CENTEC. INSTITUTO DO CENTRO DE EDUCAÇÃO TECNOLÓGICA. **Plano Preliminar de Desenvolvimento do Arranjo Produtivo Local de Mobiliário do Marco** - Ceará. Fortaleza: Centec Institute, 2022b. Available at: https://www.sedet.ce.gov.br/wp-content/uploads/sites/15/2022/09/PDP-de-Marco_Centec_versaofinal_Alterado-29.09.22.pdf.

CENTEC. INSTITUTO DO CENTRO DE EDUCAÇÃO TECNOLÓGICA. **Plano Preliminar de Desenvolvimento do Arranjo Produtivo Local de Calçados do Cariri** - Ceará. Fortaleza: Centec Institute, 2022. Available at: https://www.sedet.ce.gov.br/wp-content/uploads/sites/15/2022/09/PDP-Cariri_-Ultrima-versaoalterada-27.09.2022.pdf.

COHEN, W. M.; LEVINTHAL, D. A. Absorptive capacity: A new perspective on learning and innovation. **Administrative science quarterly**, v. 35, n. 1, 128-152, 1990. Doi: https://doi.org/10.2307/2393553.

CORDEIRO, R. M. **As aglomerações produtivas de calçados, folheados e joias de CRAJUBAR (CE)**: formação, produção, trabalho, implicações socioespaciais. Rio Claro: Instituto de Geociências e Ciências Exatas /UNESP, 2015. Available at: https://repositorio.unesp.br/handle/11449/132775.

COSTA, A. B. Industrial organization and competitiveness of the Brazilian footwear industry. **Análise Econômica**, v. 20, n. 38, p. 45-66, 2020. Doi: https://doi.org/10.22456/2176-5456.10692.

DACIN, M. T.; DACIN, P. A.; TRACEY, P. Social entrepreneurship: A critique and future directions. **Organization science**, v. 22, n. 5, p. 1203-1213, 2011. Doi: http://dx.doi.org/10.1287/orsc.1100.0620.

DAGNINO, G. B.; LEVANTI, G.; DESTRI, A. M. L. Structural dynamics and intentional governance in strategic interorganizational network evolution: A multilevel approach. **Organization Studies**, v. 37, n. 3, p. 349-373, 2016. Doi: https://doi.org/10.1177/0170840615625706.

DAVIS, J. P.; EISENHARDT, K. M. Rotating leadership and collaborative innovation: Recombination processes in symbiotic relationships. **Administrative Science Quarterly,** v. 56, n. 2, p. 159-201, 2011. Doi: https://doi.org/10.1177/000183921142813.

DHANARAJ, C.; PARKHE, A. Orchestrating innovation networks. **Academy of Management Review,** v. 31, n. 3, p. 659-669, 2006. Doi: https://doi.org/10.5465/amr.2006.21318923.

DIRIKER, D.; PORTER, A. J.; TUERTSCHER, P. Orchestrating open innovation through punctuated openness: A process model of open organizing for tackling wicked multi-stakeholder problems. **Organization Studies***,* v. 44, n. 1, p. 135-157, 2023. Doi: https://doi.org/10.1177/01708406221094174.

FACCIN, K.; WEGNER, D.; BALESTRIN, A. How to orchestrate R&D networks? The role of orchestration subprocesses and collaborative practices over time. **Creativity and Innovation Management**, v. 29, n. 1, p. 161-177, 2020. Doi: https://doi.org/10.1111/caim.12355.

FAEMS, D.; VAN LOOY, B.; DEBACKERE, K. Interorganizational collaboration and innovation: Toward a portfolio approach*.* **Journal of product innovation management***,* v. 22, n. 3, p. 238-250, 2005. Doi: https://doi.org/10.1111/j.0737-6782.2005.00120.x.

FEDERAÇÃO DAS INDÚSTRIAS DO ESTADO DO CEARÁ (FIEC). O Ceará exportou US$ 265 mil em móveis em 2021. Available at: https://www1.sfiec.org.br/fiec-noticias/search/142219/ceara-exportou-us-265-mil-em-moveis-em-2021

FIGUEIREDO, P. N.; PIANA, J. (2021). Technological learning strategies and technology upgrading intensity in the mining industry: evidence from Brazil. **The Journal of Technology Transfer**, v. 46, n. 3, p. 629-659, 2021. Doi: https://doi.org/10.1007/s10961-020-09810-9.

GOBB, R. L. **Arranjos Produtivos Locais na Perspectiva da Teoria do Capital Social: um estudo no APL moveleiro de Marco/CE**. Dissertação (Mestrado Acadêmico em Administração) Curso de Pós-Graduação em Administração, Universidade Federal do Ceará, 2008. Available at: http://www.repositorio.ufc.br/handle/riufc/16246.

HANSEN, E. G.; SCHMITT, J. C. Orchestrating cradle-to-cradle innovation across the value chain: Overcoming barriers through innovation communities, collaboration mechanisms, and intermediation. **Journal of Industrial Ecology,** v. 25, n. 3, 627-647, 2021. Doi: https://doi.org/10.1111/jiec.13081.

HENRY, L. A.; MOLLERING, G. Sluggish, but innovative? Orchestrating collaboration in multi-stakeholder networks despite low commitment. **Innovation***,* v. 23, n. 3, 282-304, 2022. Doi: https://doi.org/10.1080/14479338.2022.2029707.

HURMELINNA-LAUKKANEN, P.; MÖLLER, K.; NÄTTI, S. Orchestrating innovation networks: Alignment and orchestration profile approach. **Journal of Business Research***,* v. 140, p. 170-188, 2022. Doi: https://doi.org/10.1016/j.jbusres.2021.11.084.

HUXHAM, C.; VANGEN, S. Leadership in the shaping and implementation of collaboration agendas: How things happen in a (not quite) joined-up world. **Academy of Management Journal,** v. 43, n. 6, p. 1159-1175, 2000. Doi: https://doi.org/10.5465/1556343.

JIMÉNEZ-JIMÉNEZ, D.; SANZ-VALLE, R. Innovation, organizational learning, and performance. **Journal of Business Research***,* v. 64, n. 4, p. 408-417, 2011. Doi: https://doi.org/10.1016/j.jbusres.2010.09.010.

KAZADI, K.; LIEVENS, A.; MAHR, D. Stakeholder co-creation during the innovation process: Identifying capabilities for knowledge creation among multiple stakeholders. **Journal of Business Research***,* v. 69, n. 2, 525-540, 2016. Doi: https://doi.org/10.1016/j.jbusres.2015.05.009.

KNOKE, D.; YANG, S. **Social network analysis**. London: Sage, 2018.

LASTRES, H. M.; CASSIOLATO, J. E. Innovation systems and local productive arrangements: new strategies to promote the generation, acquisition and diffusion of knowledge. **Innovation: Management Policy and Practice,** v. 7, n. 2, p. 172-187, 2005. Doi: https://doi.org/10.5172/impp.2005.7.2-3.172.

LETEN, B.; VANHAVERBEKE, W.; ROIJAKKERS, N.; CLERIX, A.; VAN HELLEPUTTE, J. IP models to orchestrate innovation ecosystems: IMEC, a public research institute in nano-electronics. **California Management Review***,* v. 55, n. 4, p. 51-64, 2013. Available at: https://www.jstor.org/stable/10.1525/cmr.2013.55.4.51.

LIMA, F. M. C. **Success Stories: Industry. Wood and Furniture**, 2007. Available at: http://www.casosdesucesso.sebrae.com.br/include/arquivo.aspx/309.pdf.

LINDE, L., SJÖDIN, D., PARIDA, V., & WINCENT, J. Dynamic capabilities for ecosystem orchestration A capability-based framework for smart city innovation initiatives. **Technological Forecasting and Social Change,** v. 166, p. 1-12, 2021. Doi: https://doi.org/10.1016/j.techfore.2021.120614.

LIPPARINI, A.; LORENZONI, G.; FERRIANI, S. From core to periphery and back: A study on the deliberate shaping of knowledge flows in interfirm dyads and networks. **Strategic Management Journal***,* v. 35, n. 4, p. 578-595, 2014. Doi: https://doi.org/10.1002/smj.2110.

LOBO, E. A.; MELO FILHO, J. I. B.; TAHIM, E. F.; CÂMARA, S. F. The orchestration approach in innovation: a systematic literature review. **International Journal of Innovation and Technology Management**, 2024. Doi: https://doi.org/10.1142/S0219877024300052.

MANFRÉ, E. R.; NARDEZ, E. Local development and the local productive arrangement-APLs. **Geography in Acts,** v. 6, n. 13, p. 96-112, 2019. Doi: https://doi.org/10.35416/geoatos.v6i13.6201.

MANN, G.; KARANASIOS, S.; BREIDBACH, C. F. Orchestrating the digital transformation of a business ecosystem. **The Journal of Strategic Information Systems***,* v. 31, n. 3, p. 101733, 2022. Doi: https://doi.org/10.1016/j.jsis.2022.101733.

MARTÍNEZ-PÉREZ, Á.; ELCHE, D.; GARCÍA-VILLAVERDE, P. M. From diversity of interorganizational relationships to radical innovation in tourism destination: The role of knowledge exploration. **Journal of Destination Marketing & Management**, v. 11, p. 80-88, 2019. Doi: https://doi.org/10.1016/j.jdmm.2018.12.002.

MDIC. MINISTÉRIO DO DESENVOLVIMENTO, INDÚSTRIA, COMÉRCIO E SERVIÇOS. **Arranjos produtivos locais**, 2021. Available at: https://www.gov.br/produtividade-e-comercio-exterior/pt-br/assuntos/competitividade-industrial/arranjos-produtivos-locais-apl#:~:text=839%20Arranjos%20Produtivos%20Locais%3B,3.058.244%20empregos%20gergerados.

MIRANDA, C.; HASENCLEVER, L. Indústria de produtos para a saúde e os loci de suas competências científicas e tecnológicas. **DRd-Desenvolvimento Regional em Debate**, v. 13, p. 339-357, 2023. Doi: https://doi.org/10.24302/drd.v13.4701.

NAMBISAN, S.; SAWHNEY, M. Orchestration processes in network-centric innovation: Evidence from the field. **Academy of management perspectives***,* v. 25, n. 3, p. 40-57, 2011. Doi: https://doi.org/10.5465/amp.25.3.zol40.

NONAKA, I.; TAKEUCHI, H. **The knowledge-creating company**: how Japanese companies create the dynamics of innovation. Oxford University Press: New York, 1995.

OLIVEIRA, F. R.; FRANÇA, S. L. B.; RANGEL, L. A. D. Challenges and opportunities in a circular economy for a local productive arrangement of furniture in Brazil. **Resources, Conservation and Recycling**, v. 135, p. 202-209, 2018. Doi: https://doi.org/10.1016/j.resconrec.2017.10.031.

OLIVEIRA, F. R.; FRANÇA, S. L. B.; SOUZA, R. G.; RANGEL, L. A. D. Environmental requirements incorporated into product development in industrial clusters and ecoparks. **Revista Espacios***,* v. 37, n. 11, p. 1-12, 2016.

PAQUIN, R. L.; HOWARD-GRENVILLE, J. Blind dates and arranged marriages: Longitudinal processes of network orchestration. **Organization Studies***,* v. 34, n. 11, p. 1623-1653, 2013. Doi: https://doi.org/10.1177/0170840612470230.

PARENTE, R.; MELO, M.; ANDREWS, D.; KUMARASWAMY, A.; VASCONCELOS, F. Public sector organizations and agricultural catch-up dilemma in emerging markets: The orchestrating role of Embrapa in Brazil. **Journal of International Business Studies**, v. 52, p. 646-670, 2021. Doi: https://doi.org/10.1057/s41267-020-00325-x.

POBLETE, L.; KADEFORS, A.; RÅDBERG, K. K.; GLUCH, P. Temporality, temporariness and keystone actor capabilities in innovation ecosystems. **Industrial Marketing Management,** v. 102, p. 301-310, 2022. Doi: https://doi.org/10.1016/j.indmarman.2022.01.012.

REYPENS, C.; LIEVENS, A.; BLAZEVIC, V. Hybrid Orchestration in Multi-stakeholder Innovation Networks: Practices of mobilizing multiple, diverse stakeholders across organizational boundaries. **Organization Studies***,* v. 42, n. 1, p. 61-83, 2021. Doi: https://doi.org/10.1177/0170840619868268.

RITALA, P.; ARMILA, L.; BLOMQVIST, K. Innovation orchestration capability-Defining the organizational and individual level determinants. **International Journal of Innovation Management**, v. 13, n. 4, p. 569-591, 2009. Doi: https://doi.org/10.1142/S136391960900242X.

RITALA, P.; KORT, C.; GAILLY, B. Orchestrating knowledge networks: alter-oriented brokering. **Journal of Management**, v. 49, n. 3, p. 1140-1178, 2023. Doi: https://doi.org/10.1177/014920632210862.

ROLOFF, J. Learning from multi-stakeholder networks: stakeholder management. **Journal of Business Ethics,** v. 82, p. 233-250, 2008. Doi: https://doi.org/10.1007/s10551-007-9573-3.

RZEPKA, A. Innovation, inter-organizational relation, and co-operation between enterprises in Podkarpacie region in Poland. **Procedia Manufacturing**, v. 30, p. 642-649, 2019. Doi: https://doi.org/10.1016/j.promfg.2019.02.091.

SACCARDO DOS SANTOS, M.; BERNARDY, R. J. A formação de redes interorganizacionais para o desenvolvimento regional. **DRd - Desenvolvimento Regional em debate**. v. 9, p. 140–159, 2019. Doi: https://doi.org/10.24302/drd.v9i0.1950.

SCHEPIS, D.; PURCHASE, S.; BUTLER, B. Facilitating open innovation processes through network orchestration mechanisms. **Industrial Marketing Management***,* v. 93, p. 270-280, 2021. Doi: https://doi.org/10.1016/j.indmarman.2021.01.015.

SCIPIÃO, T. T. **Política Industrial para promoção** de **Arranjos Produtivos Locais**: um estudo de caso em Marco-Ceará. Dissertação (Mestrado em políticas públicas e sociedade), 2004. Fortaleza: Universidade Estadual do Ceará. Doi: http://www.ric.ufc.br/observatorio/dis_tatianateofilo.PDF.

TIDD, J.; BESSANT, J. **Managing innovation**: integrating technological, market and organizational change. Hoboken: Wiley, 2018.

TIZZIOTTI, C. P. P.; TRUZZI, O. M. S.; BARBOSA, A. D. S. Local productive arrangements: an analysis based on the participation of local organizations for development. **Gestão & Produção***,* v. 26, n. 2, p. 1-14, 2019. Doi: https://doi.org/10.1590/0104-530X-2579-19.

VAN WIJK, J.; STAM, W.; ELFRING, T.; ZIETSMA, C.; DEN HOND, F. Activists and incumbents structuring change: The interplay of agency, culture, and networks in field evolution. **Academy of Management Journal**, v. 56, n. 2, p. 358-386, 2013. Doi: https://doi.org/10.5465/amj.2008.0355.

WASSERMAN, S.; FAUST, K. **Social network analysis**: methods and applications. New York: Cambridge Press, 1999.

WEERD-NEDERHOF, P. C.; PACITTI, B. J.; SILVA GOMES, J. F.; PEARSON, A. W. Tools for the improvement of organizational learning processes in innovation. **Journal of Workplace Learning**, v. 14, n. 8, p. 320-331, 2002. Doi: https://doi.org/10.1108/13665620210449164.