



RELISE

*THE USE OF INTERACTION MECHANISMS IN BUILDING RELATIONSHIPS
BETWEEN ACTORS OF AN ENTREPRENEURIAL ECOSYSTEM¹*

**O USO DE MECANISMOS DE INTERAÇÃO NA CONSTRUÇÃO DE
RELAÇÕES ENTRE ATORES DE UM ECOSSISTEMA EMPREENDEDOR**

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ABSTRACT

The concept of Entrepreneurial Ecosystems has been widely discussed in recent years and has become the subject of a growing number of studies since 2017, receiving significant attention from researchers and becoming a key topic on the research agenda of scholars worldwide. However, there are still nuances to be explored within these ecosystems. One of them refers to the relationships established between the actors that compose them and, consequently, the interfaces or communication channels used to establish these connections. These relationships, known as interaction mechanisms, are the focus of this research, which aims to identify the interaction mechanisms used in the relationships between startups and universities within the entrepreneurial ecosystem of Sergipe. Methodologically, this study has a qualitative nature, adopting an exploratory and descriptive approach to understand the relationships in Sergipe's Entrepreneurial Ecosystem. It employs the basic qualitative study strategy (Merriam, 1998) and content analysis (Bardin, 2016) to interpret the data. A total of 22 interviews were conducted - 15 with startup entrepreneurs and 7 with university professionals - ensuring a strategic and in-depth perspective on the subject. The findings indicate that WhatsApp and participation in events are the main interaction mechanisms in this ecosystem, playing a crucial role in building and maintaining relationships within the Entrepreneurial Ecosystem.

¹ Submitted on 20/06/2025. Accepted on 06/07/2025. DOI: doi.org/10.5281/zenodo.16980413

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RELISE

98

Keywords: entrepreneurial ecosystems, interaction mechanisms, relations.

RESUMO

O conceito de Ecossistemas Empreendedores vem sendo bastante abordado nos últimos anos e tem sido alvo de um número crescente de pesquisas a partir do ano de 2017, recebendo grande atenção dos pesquisadores e se tornando alvo da agenda de pesquisas de diversos estudiosos pelo mundo. No entanto, ainda existem nuances a serem exploradas em tais ecossistemas. Uma delas, se refere às relações constituídas entre os atores que os compõem e, por consequência, as interfaces ou canais de comunicação utilizados para estabelecê-las. Tais relações, denominadas como mecanismos de interação, são o foco desta pesquisa, que teve por objetivo identificar os mecanismos de interação utilizados nas relações estabelecidas entre *startups* e universidades integrantes do ecossistema empreendedor sergipano. Metodologicamente, esse estudo possui natureza qualitativa, adota uma abordagem exploratória e descritiva para compreender as relações no Ecossistema Empreendedor de Sergipe. Utiliza a estratégia de estudo qualitativo básico (Merriam, 1998) e análise de conteúdo (Bardin, 2016) para interpretar os dados. Foram realizadas 22 entrevistas, sendo 15 com empreendedores de *startups* e 7 com profissionais de universidades, garantindo uma visão estratégica e aprofundada do tema. Verificou-se que os principais mecanismos de interação utilizados neste ecossistema são WhatsApp e a participação em eventos, e que esses mecanismos são muito importantes para facilitar a construção e manutenção de relações dentro do referido Ecossistema Empreendedor.

Palavras-chave: ecossistemas empreendedores, mecanismos de interação, relações.



RELISE

99

INTRODUCTION

Entrepreneurial Ecosystems (EE) are defined as a set of interdependent actors and factors, coordinated in such a way as to enable productive entrepreneurship within a given territory (Spigel, 2018). For such ecosystems to coordinate these interdependencies and foster synergies that promote their development, it is essential for their actors to establish relationships. Martins (2023) demonstrated that the growth of EEs is closely linked to the interactions among actors, which result in relationships that, in turn, generate exchanges among them.

These ecosystems are networks of interconnected actors within a local geographic community, committed to the creation and development of sustainable businesses. They are composed of a diverse set of elements, such as leadership, culture, markets, and customers, which interrelate in a complex and dynamic manner (Cohen, 2006; Isenberg, 2010). The environment forming an EE is geographically delimited, encompassing a specific area where certain actors establish connections with each other (Napier; Hansen, 2011). These connections should act as catalysts for entrepreneurial activities, as well as promote the development of innovations.

One of the first studies to explore the concept that would later be called the Entrepreneurial Ecosystem took place in the region known as Silicon Valley, located in San Francisco, California, United States (Bahrami; Evans, 1995). Although the term Entrepreneurial Ecosystem was not yet used at the time, these authors described the main components of that ecosystem, including research institutes, universities, support infrastructure, and other fundamental elements for the functioning of an EE (Gimenez; Stefenon; Inácio Júnior, 2022).

However, there are several studies on EEs worldwide (Cao; Shi, 2021; Cohen, 2006; Kon et al., 2014; Kshetri, 2014; Spigel, 2017). Such research on EEs can become more relevant if efforts are focused on identifying the



RELISE

indispensable components for the ecosystem's operation (Roundy; Bradshaw; Brockman, 2018), allowing for a more comprehensive and in-depth understanding of their dynamics, since most research on EEs has sought to understand key factors and elements for their development based on the literature, suggesting models or proposing comparisons between different EEs. Among these components, relationships or interactions occupy a central position.

In this context, Audretsch, Cruz, and Torres (2022) point out that an EE consists of four fundamental elements: functions, actors, impacts, and interactions. According to these authors, functions correspond to the main forces or factors that drive or hinder entrepreneurship, including human capital, knowledge, resources, markets, and other elements that may function as barriers, such as regulation, investments, and cultural aspects. Actors are the entities and organizations present in the EE, such as companies, support institutions, and other organizations that play support roles for the ecosystem's functions, directly influencing entrepreneurial activity. Impacts refer to the economic and social effects generated by entrepreneurial activities within the EE. Finally, interactions refer to the relationships established among the different actors in the ecosystem, constituting interfaces that promote collaborations, bonds, and contacts, which, in turn, create unique characteristics in the environment (Audretsch; Cruz; Torres, 2022).

Such interactions among actors make each Entrepreneurial Ecosystem unique and specific, with configurations and characteristics that cannot be replicated elsewhere (Autio et al., 2014; Colombelli et al., 2019; Isenberg, 2010, 2011; Spigel, 2017). The multiple elements that make up an Entrepreneurial Ecosystem, as well as the distinct relationships established within it, are crucial to each ecosystem's success (Fernandes; Ferreira, 2021). This perspective helps explain why some regions of the same country become centers of high



entrepreneurial activity, while others have not yet reached such a level of maturity and evolution (Martins, 2023).

Contextual particularities influence the establishment of relationships among EE actors, creating dynamics and interactions of different natures, which directly affect the configuration and operation of these systems (Spigel, 2017; Spigel; Harrison, 2018). The context and relationships developed within EEs are constantly evolving, impacting both the nature and the development trajectory of the ecosystems (Colombelli; Paolucci; Ughetto, 2019; Colombo et al., 2019).

In this scenario, where interactions among EE actors are so relevant, Matos (2018) emphasizes the importance of connections between universities and companies to stimulate the creation of startups. Additionally, Fernandes and Ferreira (2021) recommend expanding research that investigates these relationships, analyzing how interactions between universities and companies influence both the emergence and structuring of startups, as well as their impact on the growth and competitiveness of entrepreneurial initiatives within the EEs in which they operate.

Based on these premises, this research sought to answer the following question: What are the interaction mechanisms used between startups and universities in the Sergipe entrepreneurial ecosystem to establish relationships among these actors?

From this question, the general objective was outlined: to identify the interaction mechanisms employed by startups and universities in the Sergipe entrepreneurial ecosystem. The relevance of this work is justified by the need to deepen the understanding of the peculiarities of entrepreneurial ecosystems (Alvedalen; Boschma, 2017; Fernandes; Ferreira, 2021), by the still limited scientific production on the subject in Portuguese (Gimenez; Stefenon; Inácio Júnior, 2022), and by the tendency of the literature to focus on successful



RELISE

102

ecosystems, such as Silicon Valley in the USA, neglecting studies on ecosystems in early stages of development (Martins, 2020).

The present study was structured in five sections: Introduction; Theoretical Framework; Methodological Procedures; Presentation and Analysis of Results; and Conclusion.

THEORETICAL FRAMEWORK

This section presents the study's theoretical framework, developed from a literature review on the following topics: a) Relationships in Entrepreneurial Ecosystems and b) Interaction Mechanisms among Actors in Entrepreneurial Ecosystems.

Relationships in Entrepreneurial Ecosystems

Entrepreneurs significantly increase their chances of success when inserted into an entrepreneurial ecosystem (Kuratko et al., 2017; Kuckertz, 2019; Spigel; Kitagawa; Mason, 2020). However, simply being part of an entrepreneurial ecosystem may not be enough to ensure their permanence in the market. It is essential for actors to establish collaborative interactions, leveraging their competitive advantages, promoting resource sharing, exploring strategic advantages, and fostering innovations (Spigel, 2017; Autio et al., 2018; Audretsch et al., 2019).

As pointed out by Roundy et al. (2018), entrepreneurial ecosystems are dynamic and intricate systems, composed of multiple actors and the interactions that connect them, so that the actions performed by one actor can trigger adaptations or transformations throughout the ecosystem. Spigel and Harrison (2018) also emphasize the relevance of establishing relationship networks that enable the continuous flow of resources and information among the different actors, arguing that connectivity is fundamental to ensuring the sustainability and



RELISE

longevity of entrepreneurial ecosystems. In this sense, the relationships established in each entrepreneurial ecosystem are important, peculiar, and particular, as each one presents unique characteristics that cannot be replicated in the same way elsewhere (Autio et al., 2014; Colombelli; Paolucci; Ughetto, 2019; Isenberg, 2010, 2011; Spigel, 2017).

Several authors (Fernandes; Ferreira, 2021; Motoyama; Knowlton, 2017; Muldoon; Bauman; Lucy, 2018; Spigel, 2017; Spigel; Harrison, 2018; Stam, 2015) highlight the importance of establishing relationships among the actors of entrepreneurial ecosystems and emphasize the roles of trust and cooperation built through strongly interconnected ties that enable the ecosystem's proper functioning and development. Moreover, the relationships that form among actors facilitate access to various resources, such as financial capital, qualified labor, cost-sharing, and access to new technologies (Martins, 2020).

Starting from the understanding that establishing connections in entrepreneurial ecosystems is essential both for business success and for the evolution of the ecosystem itself, some authors (Spigel, 2017; Acs et al., 2018) have highlighted the need for more studies that investigate the dynamic and interdependent relationships among the actors that make up an entrepreneurial ecosystem.

Silveira and Santos (2022) corroborate this view, stating that interactions among participants in an entrepreneurial ecosystem not only enhance the entrepreneurial performance of a region, but also serve as strategic instruments for universities and companies to enable technology and knowledge transfer (Cunha, 1999; Azevedo; Cário, 2018). Moreover, these collaborative relationships promote the continuous exchange of information, the sharing of experiences and knowledge among actors, thereby fostering innovation (Santos; Lima; Freire, 2020). Such interactions also play a crucial role in stimulating technological development (Acs et al., 2017; Klerkx; Rose, 2020) and in fostering



RELISE

knowledge spillover, which not only drives the creation of new innovations but also facilitates the emergence of new companies (Tonial, 2020).

Additionally, Buratti (2022) highlights that unique relationships and interactions among the various actors in a region generate an ecosystem conducive to the flourishing of entrepreneurial activities. In this sense, beyond geographic proximity, effective collaboration among ecosystem members plays an essential role in the development of innovations, especially through the formation of networks that enable the continuous exchange of knowledge and valuable information.

Felizola and Aragão (2022) conducted research focused on analyzing the actors present in the Sergipe innovation ecosystem. Although the study focused on characterizing this innovation ecosystem, the same actors also play important roles in the region's entrepreneurial ecosystem context. These actors were classified into categories such as: accelerators, business associations and federations, entrepreneurship centers, coworking spaces, incubators, support institutions for entrepreneurs, startup business movements, technology parks, and universities.

Although the diversity of actors comprising entrepreneurial ecosystems has been widely explored in previous studies, this research focused specifically on the relationships established between startups and universities. Startups, often considered the core element of an entrepreneurial ecosystem (Spigel, 2017), and universities, recognized as crucial agents in the processes of encouraging, disseminating, and energizing knowledge, innovation, and entrepreneurship (Coutinho and Silva, 2022), play indispensable roles. Furthermore, universities are seen as pillars in transformative initiatives that promote the development of a knowledge-based society, marked by entrepreneurship, modernity, and collaboration (Torlig; Resende Júnior, 2018).



In this context, establishing connections among the actors of an entrepreneurial ecosystem is essential for the ecosystem to achieve greater maturity and sustainable evolution. To achieve this objective, the actors of the entrepreneurial ecosystem must implement activities that create points of connection and interaction among them. These initiatives, called interaction mechanisms, are strategically used to provide the necessary support, facilitating the construction and strengthening of relationships among individuals (Ferraz; Dornelas, 2015).

Interaction Mechanisms among Actors in Entrepreneurial Ecosystems

Interaction mechanisms are indispensable tools for forming and strengthening bonds among the actors that make up an entrepreneurial ecosystem (Silveira; Santos, 2022). These mechanisms are recognized as the main interfaces for enabling both formal and informal communications (Lamers et al., 2017) and are also used as facilitators in the interaction among people (Ferraz; Dornelas, 2015).

Spigel and Harrison (2018) highlight the relevance of the availability of resources, whether tangible or intangible, as well as the creation of networks that allow the flow of these resources among the ecosystem's different actors. According to the authors, such connections play a fundamental role in ensuring the sustainability of entrepreneurial ecosystems. The interfaces generated using these resources in relationship networks are what constitute the so-called interaction mechanisms.

In this context, Fernandes and Ferreira (2021) emphasize that social and business relationships established among the various actors involved in entrepreneurial ecosystems represent intangible assets of great strategic value. These assets not only encourage the emergence of productive entrepreneurial activities but also drive the growth of individual ventures and, consequently, the



expansion of entrepreneurial ecosystems themselves. Furthermore, these interactions create highly favorable environments for innovation, generating positive impacts on the performance and evolution of entrepreneurial ecosystems.

Several authors (Specht; Zoll; Siebert, 2016; Lamers et al., 2017) identify as main interaction mechanisms elements such as informal communication, formal and informal events, regular meetings, training, workshops, business partnerships, collaborative activities, resource sharing, and joint projects. In this sense, communication means such as electronic messages, newspapers, posters, and telephones also play an essential role in facilitating these interactions. These mechanisms manifest in different forms, whether in-person or virtual, and may include events, meetings, training, social networks, and other digital communication tools (Specht; Zoll; Siebert, 2016; Lamers et al., 2017).

Silveira and Santos (2022) reinforce the importance of interaction mechanisms in strengthening relationships among participants in an entrepreneurial ecosystem. The authors highlight that informal communication, knowledge exchange, event organization, collaborative projects, regular meetings, and the existence of communication channels are highly relevant tools. According to them, informal communication, in particular, plays a crucial role in idea generation, as it enables faster, more dynamic, and spontaneous interactions, promoting a more fluid and efficient sharing of information.

Although interaction mechanisms are fundamental tools for fostering and consolidating relationships between startups and universities, their exploration in academic literature still presents significant gaps (Silveira; Santos, 2022). Studies such as Cunha (1999) have analyzed the interactions between universities and companies and identified a considerable distance separating these institutions. This disconnect, evident decades ago, seems to persist, as reported in more



RELISE

recent research (Specht; Zoll; Siebert, 2016; Lamers et al., 2017; Silveira; Santos, 2022).

Cunha (1999) also argues that, regardless of the type of interaction mechanism adopted, it is essential for researchers, universities, and companies to recognize and value the importance of these tools. Such appreciation is indispensable for creating effective communication channels and facilitating the flow of information among actors, contributing to more productive and integrated interactions, thereby strengthening connections and maximizing joint results.

METHODOLOGY

This study is qualitative in nature, as it seeks to understand the construction of relationships among individuals in the studied EE, namely entrepreneurs and university professionals involved in innovation and/or entrepreneurship initiatives. Qualitative methods use interpretive techniques to make sense of phenomena, prioritizing description and the attribution of meaning (Van Maanen, 1979).

Regarding its purpose, the research is exploratory, aiming to discover, understand, and develop new information, as well as to comprehend the relationships within the Entrepreneurial Ecosystem (Stake, 2011). It is also descriptive, as it reliably presents the results and interpretations obtained, describing the characteristics of these relationships (Stake, 2011). Thus, it seeks to portray contexts and events based on the experiences of the interviewees (Saunders; Lewis; Thornhill, 2009).

The strategy adopted was the basic qualitative study, in which the researcher starts with predefined critical questions to describe, interpret, and understand how they manifest in the case studied - the Entrepreneurial Ecosystem of Sergipe. Unlike the classic case study, this approach uses the case



RELISE

as an instrument to verify patterns and categories, relying on a pre-existing theoretical framework (Merriam, 1998).

Data analysis was carried out using the content analysis technique (Bardin, 2016), which allows for organizing data, systematizing ideas, analytically describing the material through coding techniques, and interpreting the collected information (Bardin, 2016).

The interviews were transcribed using the audio transcription feature of Microsoft Office 365. To ensure the accuracy of the transcription, all interviews were listened to in full simultaneously with the reading of the transcripts, to confirm and verify that the audio content was faithfully captured.

To facilitate visualization and data handling for content analysis, Microsoft Excel 365 was used. Data were grouped in separate tabs for each question, with interviewees' responses organized in rows. For each question, responses were read, categorized, and coded to provide better data organization and facilitate their presentation.

Finally, the data were interpreted using the established coding, and the results were discussed based on the literature presented in the theoretical framework of this work.

A total of 22 interviews were conducted, 15 with entrepreneurs from Sergipean startups and 7 with university professionals (Chart 1). The academic interviewees included managers, coordinators, directors, and rectors involved with entrepreneurship and innovation. All startup interviews were conducted with the founders, ensuring greater reliability and a strategic vision of the business.



RELISE

109

Chart 1 – Data from interviews conducted with university professionals

Professional	Degree	Interview Format	University
E1	Master's	In person	University 1 (UN1)
E2	Specialization	In person	University 2 (UN2)
E3	PhD	In person	University 1 (UN1)
E4	Master's	Google Meet	University 2 (UN2)
E5	PhD	In person	University 2 (UN2)
E6	PhD	In person	University 1 (UN1)
E7	PhD	Google Meet	University 1 (UN1)

Source: Prepared by the authors (2025).

The stage of startups was classified according to the ABStartups (2019) model, which defines four phases: ideation (idea validation), operation (search for market and customers, possible acceleration/incubation), traction (growth driven by investments), and scaling (20% growth for three consecutive years in revenue or team size).

The interviews were conducted either in person or virtually, depending on participant availability, and recorded with prior consent, formalized by the Free and Informed Consent Form (FICF). Two different interview scripts were used: R1, containing 16 questions for startup managers, and R2, with 8 questions for university representatives.

Table 2 – Data from interviews conducted with Startup entrepreneurs

Professional	Year of Foundation	Interview Format	Startup Segment	Stage
ES1	2000	In person	Health	Traction
ES2	2018	In person	Education	Traction
ES3	2021	In person	Education	Operation
ES4	2022	In person	Health	Operation
ES5	2019	Google Meet	Agro	Traction
ES6	2020	Google Meet	Social	Ideation
ES7	2020	In person	Social	Operation
ES8	2021	In person	Condominiuns	Operation
ES9	2021	In person	Education	Traction
ES10	2017	In person	Safety	Traction
ES11	2018	In person	Education	Traction
ES12	2021	In person	Health	Traction
ES13	2018	In person	Education	Traction
ES14	2019	In person	Logistics	Traction
ES15	2004	Google Meet	Entertainment	Scaling

Source: Prepared by the authors (2025).



RELISE

To ensure anonymity, startup interviewees were identified as ES (Startup Entrepreneur) and academic professionals as E (Interviewee), numbered sequentially. The universities were designated as UN1 and UN2.

The selection of participants followed the snowball sampling technique (Biernacki & Waldorf, 1981; Vinuto, 2014), due to the lack of updated mapping of startups in Sergipe, making chain referrals necessary to access respondents.

The academic interviewees were professors involved in academic management and initiatives related to entrepreneurship and innovation. The startup participants were exclusively founders, ensuring a strategic perspective, greater detail about the challenges faced, and in-depth knowledge of their activity within the local entrepreneurial ecosystem.

PRESENTATION AND ANALYSIS OF RESULTS

Interaction mechanisms are important tools for building relationships among actors within an entrepreneurial ecosystem (Silveira & Santos, 2022), considered the main interfaces for establishing formal and informal communications (Lamers et al., 2017), and used to facilitate communication between people (Ferraz & Dornelas, 2015).

They appear in various forms, whether in-person or virtual, and may take the shape of events, meetings, training sessions, electronic messages, social networks, and phone calls, for example (Specht, Zoll & Siebert, 2016; Lamers et al., 2017). Figure 01 presents the interaction mechanisms used by interviewees, both entrepreneurs and university professionals, to build and maintain relationships in the studied entrepreneurial ecosystem, which were mapped during the data collection process of this research.

It is important to highlight that Figure 01 was organized to emphasize the mechanisms used to build and maintain relationships in three distinct ways: I) Among startup entrepreneurs; II) Between startup entrepreneurs and universities;

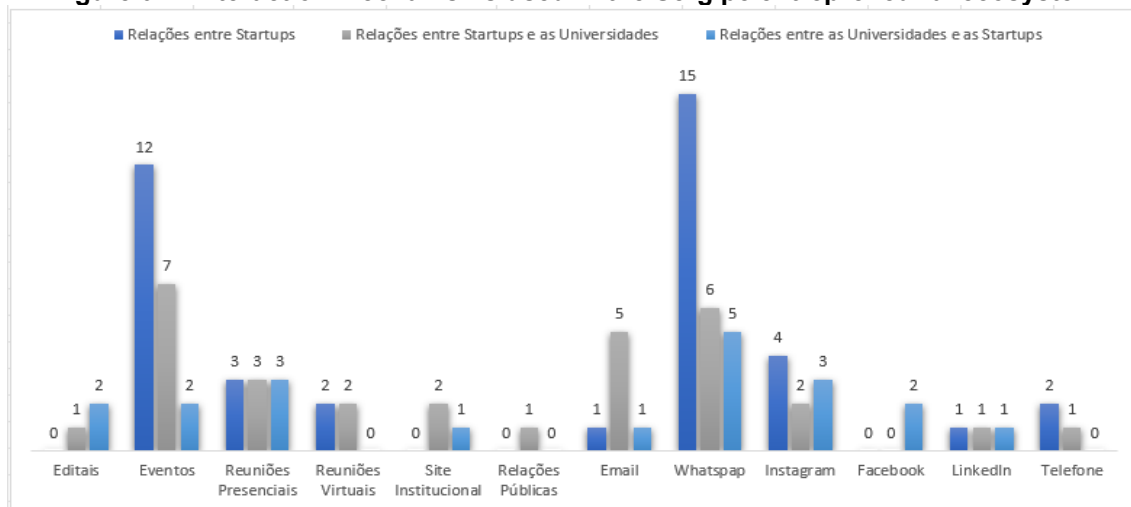


RELISE

111

and III) From universities to startup entrepreneurs. The dark blue and gray bars represent the fifteen entrepreneurs interviewed, while the lighter blue bar corresponds to the group of seven university professionals who participated in the interviews.

Figure 01 - Interaction mechanisms used in the Sergipe entrepreneurial ecosystem



Source: Prepared by the authors (2025).

Legend: Blue: Relationships between startups; Gray: Relationships between startups and universities; Light blue: Relationships between universities and startups.

Editais - Notices; Eventos - Events; Reuniões presenciais - In-person meetings; Reuniões virtuais - Virtual meetings; Site institucional - Institutional website - Public relations; Telefone - Telephone.

It can be seen from the figure that the most widely used mechanisms among all interviewees, quite evidently, are WhatsApp and events, with the former standing out as the tool most used for communication between startups by all the entrepreneurs interviewed. It was also highlighted as the main means of establishing relationships between startups and universities, and between universities and startups. This fact corroborates the observations of Silveira and Santos (2022), who emphasize informal communication as an important facilitator within entrepreneurial ecosystems. The authors suggest that fluid and fast communication between ecosystem participants, through channels such as WhatsApp, is essential to create quicker connections, promote idea exchange, and facilitate spontaneous interactions.



RELISE

112

Still regarding WhatsApp, the literature on digital communication in entrepreneurial ecosystems, as observed by Ferraz and Dornelas (2015), also suggests that this type of tool allows the integration of actors in a quick and efficient manner, without the formalities associated with other channels such as email or in-person meetings. This facilitates the dissemination of information and the resolution of operational issues in real time.

Secondly, participation in events stood out, identified by most entrepreneurs as an important means to generate connections both among startups and with universities. Lamers et al. (2017) and Specht et al. (2016) highlight events as essential spaces for network formation and for strengthening interactions between members of an entrepreneurial ecosystem.

For Spigel (2017), events, whether formal or informal, are fundamental for creating collaboration opportunities and stimulating knowledge exchange. Thus, the predominance of events in this research aligns with this theory, as they function as meeting points where entrepreneurs and universities can connect, share experiences, and collaborate in developing new ideas and solutions.

In the specific context of universities, as evidenced by entrepreneurs' statements, these events are not necessarily institutionalized but are often linked to professors who act more autonomously within the ecosystem, as mentioned by Silveira and Santos (2022). This point reflects the idea that, often, collaboration between universities and startups does not occur through organized, formal channels, but rather through the initiative of individuals within academic institutions, such as professors enthusiastic about entrepreneurship and innovation.

Other interaction mechanisms used included in-person meetings, Instagram, email, public calls published by universities, virtual meetings, university public relations channels, Facebook, LinkedIn, and telephone. The use of emails and in-person meetings reflects a trend toward more traditional forms



RELISE

of communication, which, as Lamers et al. (2017) point out, are fundamental for building more formal and structured networks within entrepreneurial ecosystems. These methods can be particularly useful for creating a space of mutual trust, necessary for establishing longer-lasting partnerships.

On the other hand, the use of Instagram, LinkedIn, and Facebook, as observed in the study, indicates an adaptation to contemporary digital means, which are widely used to promote visibility, establish more informal connections, and maintain a steady flow of information within ecosystems. Spigel and Harrison (2018) argue that social networks are important for strengthening connections within the ecosystem, and this practice reflects the growing digitalization of interactions in modern ecosystems, as seen in places like Silicon Valley.

Still on WhatsApp, all interviewed entrepreneurs stated that they use this channel not only for individual communications but also take advantage of group creation features to further encourage information exchange. In this way, the possibility of creating specific groups aligns with the suggestions of Specht et al. (2016), who indicate that creating digital interaction spaces is an effective way to connect actors within the ecosystem. This assertion is evidenced in the following statements:

There are some groups. Caju Valley is the main one. But there are others, created by Sebrae, you know? (ES1).

In WhatsApp, the Caju Valley community itself, within the WhatsApp groups and communities themselves, always creates the possibility for one startup to relate to another. (ES9).

There is a group today, a group of startups here in Sergipe, called Caju Valley [...]. The relationship between us here in our ecosystems also has its own group. These are WhatsApp groups. (ES12).

When it comes to establishing relationships between startups and universities, the main mechanism was events, followed by WhatsApp. However, these communications are not institutional. They end up being directed to professors who are enthusiasts of entrepreneurship and innovation and are



RELISE

114

somehow involved with the entrepreneurial ecosystem. This finding corroborates the study by Spigel (2017), who discusses the importance of informal relationships in the entrepreneurial ecosystem and suggests that they may occur through more informal relationship networks, often facilitated by enthusiastic individuals like professors and researchers involved in entrepreneurial initiatives. These findings are supported by the following statements:

Email, WhatsApp, and LinkedIn. But, specifically with professors. (ES6)

WhatsApp and events. But directed to certain individuals directly on WhatsApp. (ES11)

Every time I had a relationship with the university, it was through educators [...]. So maybe it wasn't their main role, they were there, trying to do this on their own. Maybe it wasn't even something institutional that the university would require. (ES13).

It is perceived that there is a view among entrepreneurs that universities do not get institutionally involved in relationships with startups in the EE. The university interviewees also highlighted WhatsApp as the most used interaction mechanism, with five out of seven interviewees stating that they use it. They corroborate the entrepreneurs' view that the relationship happens between professors and entrepreneurs, not through institutionally established means, as shown in the statements:

No. There isn't. The university's communication itself with startups ends up being through public calls. Or, in some events developed by specific coordinations. Besides that, it's through professors linked to entrepreneurship. (E1).

I think, actually, professors, those who are in charge of graduate programs, in the coordinations, professors who are connected to entrepreneurship, they end up joining these channels, which are WhatsApp groups [...]. But I don't know if there is, on the part of the university, and that's a real doubt, a channel of dialogue with these entrepreneurs that is an official channel. I honestly don't know. I see more informality. I see many professors participating in various groups. I myself participate in some. But institutionally, no. (E3).

Here it's WhatsApp, no doubt. Direct relationships, groups, but on WhatsApp. WhatsApp is the main one [...]. But these communications



RELISE

115

are not institutional from the university, they are through the [innovation] agency. (E6).

In general, the second most cited interaction mechanism was events. Twelve out of fifteen entrepreneurs relate to other startups through participation in events. Among the university interviewees, seven highlighted that there are relationships established in events. However, once again, these involve isolated actors, such as professors and coordinators. The highlight in this medium falls on the meetings and events of Caju Valley, which have been taking place monthly in the Sergipe entrepreneurial ecosystem, as shown in the statements. Spiegel (2017) and Fernandes and Ferreira (2021) highlight that, in many entrepreneurial ecosystems, informal events and meetings among key actors, such as professors and coordinators, play a crucial role in strengthening connections. In particular, Spiegel (2017) points out that these interactions, although informal, are essential for ecosystem development, as they facilitate the flow of resources and information among the parties. Additionally, Fernandes and Ferreira (2021) note that such events offer a platform for sharing experiences, promoting the strengthening of relationships both among startups and with universities. These findings are evidenced in the following statements:

The in-person meetings of Caju Valley are very important. (ES1).

We have meetings, meetups, workshops, and general community interactions, when it's open to everyone, they've been in person [...]. The goal is to have twelve annual meetings [of Caju Valley]. We've already had the first in January, the second in February, and so on. (ES2).

Now I'm joining in more and attending more Caju Valley meetings. (ES3).

There's 07Inove that [...] is coming back now. The Caju Valley meeting [...] already has a pre-scheduled calendar. (ES9).

In addition to the monthly meetings of the Caju Valley movement, it was also noted that an event called 07inove occurs regularly, as highlighted by the



RELISE

116

interviewed entrepreneur ES9, bringing up relevant topics for the Sergipe entrepreneurial ecosystem. Other mechanisms mentioned by three to five interviewees were email, Instagram, and in-person meetings, though without specific comments highlighting the operational mode of these means. Additionally, public calls disclosed by universities, virtual meetings, university institutional websites, university public relations channels, Facebook, LinkedIn, and telephone were also mentioned, but by two interviewees or fewer.

FINAL CONSIDERATIONS

This study aimed to identify the interaction mechanisms used in the relationships established between startups and universities within the Sergipe entrepreneurial ecosystem. The research revealed which mechanisms are most used to establish relationships among the actors analyzed, based on the individual perceptions of the respondents.

WhatsApp established itself as the most widely used interaction mechanism. The tool is used for communication between startups by all the entrepreneurs interviewed. It was also highlighted as a means used to establish relationships between startups and universities, and between universities and startups. The second most prominent mechanism was participation in events, identified by the majority of interviewees as an important mechanism to generate connections among the analyzed actors. In-person meetings, Instagram, and email were also mentioned by some interviewees (between three and five). In addition, public calls published by universities, virtual meetings, university public relations channels, Facebook, LinkedIn, and telephone were also mentioned, by two or fewer interviewees.

The predominant mechanisms, WhatsApp and events, had their regularity confirmed by the researchers and authors of the article. One of the researchers participated in in-person events in the Sergipe entrepreneurial



RELISE

ecosystem, including the monthly Caju Valley meetings, and remained part of the Caju Valley WhatsApp group since August 2022, in addition to having also established direct relationships with startup entrepreneurs from the ecosystem. It was found, therefore, that entrepreneurs adopt a collaborative approach and show a willingness to establish relationships with other ecosystem actors, as well as a personal commitment to stay connected and meet new people for the development of the ecosystem in question. This attitude reinforces the findings of Roundy et al. (2018), who claim that the actors and their interactions in an entrepreneurial ecosystem shape that ecosystem and drive adaptation through their actions. The Sergipe entrepreneurial ecosystem shows a moment of strong collaboration and closer relationships among startups but lacks the same characteristics when it comes to universities.

It was identified that communication via WhatsApp is more informal, whereas events can be both formal and informal. Some events are organized by universities, and their dissemination is carried out through institutional channels. Others are organized by movements led by startup managers and may take on a more formal format, involving partners and supporters, or a more informal character when they are meetings among entrepreneurs and sessions without a preset agenda to discuss various topics related to the local entrepreneurial ecosystem.

Therefore, it is concluded that the interaction mechanisms "WhatsApp" and "events" are the most evident in the perception of the interviewees in this research and are interpreted as the most efficient for establishing relationships among actors in the Sergipe entrepreneurial ecosystem.

As with any scientific study, this research has some limitations. Firstly, the study was limited to a specific entrepreneurial ecosystem - that of the state of Sergipe - with its nuances and particularities. Additionally, there was a limitation in the selected actors, which was restricted to startup entrepreneurs and



RELISE

118

universities, thus not exploring interactions with other ecosystem actors or other educational and research institutions that do not fall within the university category.

Finally, it is recommended that new studies be conducted exploring other entrepreneurial ecosystems, other actors, or even replicating this study in different ecosystems, enabling future comparative analyses.



RELISE

119

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RELISE

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RELISE

121

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122

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