A Multi-level Collaboration Process for Developing Relationships and Creating Value in an Entrepreneurship Ecosystem

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Abstract

This paper explores how collaboration in entrepreneurship ecosystems is driven by individual and collective efforts to reach both common and private goals. We investigate how the collaboration roles of a university support efforts to create value and help shape the network of relationships that scaffold the ecosystem. We propose a multi-level collaboration process that reflects how micro-level positions and practices feed into meso-level outcomes. In turn, these outcomes support the collaboration roles a university plays in developing relationships within an entrepreneurship ecosystem. Based on this framework, we discuss the integration of technology in supporting internal positions and practices, as well as collaboration roles. Our research contributes to the understanding of collaboration as a multi-level process, in which meso-level outcomes that are rooted in micro-level positions and practices ultimately support macro-level collaboration roles that establish a network of relationships and contribute to value creation across the entrepreneurship ecosystem.

Keywords: Collaboration Ecosystems, Entrepreneurial Ecosystems

1. Introduction

The importance of collaboration in entrepreneurship ecosystems is increasingly evident, as multiple actors, such as firms, universities, and research centers, collaborate to innovate [e.g., Corsaro et al., 2012; Nieto & Santamaría. 2007). In these dynamic networks, collaboration extends beyond coordination and cooperation in that it not only supports the joint effort and common goals of the group but also enables individual entities (people and organizations) to pursue their own private goals and independent outcomes. In this way, collaborative efforts lead to entrepreneurial and innovative outcomes (Miles et al., 2005), which create opportunities and value (Alvarez & Barney, 2014) for individuals, collectives, and societies at large. However, collaboration among diverse entities with varying goals and metrics of success is difficult, and the role of particular organizations in these dynamic social and economic ecosystems is often unclear (Diaconu & DUȚU, 2015). Furthermore, the challenges associated with collaboration in entrepreneurship and innovation point to fragility of relationships among individuals and organizations in rapidly changing environments (Freytag & Ritter, 2005; Freytag & Young, 2014). A deeper understanding of how the social structure of these ecosystems is shaped and sustained is needed (Randhawa et al., 2022).

Prior studies suggest that collaboration is beneficial to organizations because of access to shared resources and leveraging economies of scale (e.g.,Corsaro et al., 2012). These studies also show that the diversity of actors and network configurations of pre-existing relationships contribute to various innovative outcomes, such as making better connections between customer needs and new product development (Freeman, 1991). Research on collaborative entrepreneurship suggests that communities made up of networked firms can drive continuous innovation that has a sustained effect on economic impact (Miles et al., 2005). However, a focus on the outcomes of collaboration generally considers networks as pre-existing and suggests that collaboration always occurs with specific end goals in mind (e.g., product development or economies of scale). While this work draws attention to the importance of networks and relationships in innovation, little attention has been paid to how particular organizations engage in collaboration and their specific impact on shaping the broader ecosystem.

The exploration of roles as resources for stability and change in value-creating ecosystems (Akaka & Chandler, 2011) draws attention to importance of social practices and network positions. The study of dynamic roles sheds light on the way networks of relationships are formed and evolve, and, thereby, how ecosystems are shaped (Randhawa et al., 2022). This ecosystemic

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approach is rooted in a muti-level and co-creation approach to socioeconomic value creation in markets, and a "service ecosystem" lens (Vargo & Lusch, 2004; 2008; 2017). However, prior studies of service ecosystems have often relied on a view that there is one central organization that serves as the "shaper" and other organizations enact roles as the "supporter" in the design of a service ecosystem (Vargo et al., 2020). A third role, "collaborator," has also been identified to describe organizations that serve as a bridge between the shaper and the supporter. However, this approach does not account for situations in which there is no singular hub, such as in collaborative entrepreneurship (Miles et al., 2005), and deeper insight into how entrepreneurship emerges through a collaboration ecosystem is needed to enhance entrepreneurship and fuel social and economic development and growth.

The purpose of this paper is to explore the role of a particular type of organization, a university, that enables collaboration within and contributes to shaping an entrepreneurship ecosystem without a single dominant hub. We provide an empirical example of a particular collaboration effort within a local ecosystem to better understand the underlying mechanisms that support growth in entrepreneurship and structure the network of relationships. More specifically, we investigate how the network positions and social practices within a university support entrepreneurship and contribute to the collaboration roles required for shaping and sustaining an entrepreneurship ecosystem. To this end, our research addresses three questions:

1. How do individual actors' positions and practices contribute to the collaboration roles of a university?
2. How do the collaboration roles of a university enable development of relationships that shape the structure of an entrepreneurship ecosystem?
3. How can technology support university collaboration roles in entrepreneurship ecosystems?

The need to study collaboration ecosystems is evidenced by a lack of understanding of how different types of organizations contribute to collaboration as well as innovation and entrepreneurship in potentially unique ways. Although prior research highlights benefits of such interconnected, co-creation efforts (Randhawa et al., 2022), less is known about the process through which collaboration occurs, particularly for universities. This is problematic because universities have been recognized as knowledge creators, innovation hubs and engines for novel value creation (Heaton et al., 2019). There is growing attention to the need for universities to collaborate closely with local entrepreneurship ecosystems and play a central role in creating and disseminating resources to local entrepreneurs, students and non-students alike (Feld & Hathaway, 2020).

The context of this collaboration research is situated within an entrepreneurship ecosystem, and the case example focuses on the collaboration roles of a private university with ties to both local and national entrepreneurship ecosystems. We begin with a conceptual background on collaboration ecosystems and how they may differ from other types of ecosystems. We then discuss entrepreneurship as a collaboration ecosystem to set the stage for our exploration of a particular entrepreneurship ecosystem. We apply an ecosystemic approach to social role theory as our lens for studying how a university collaborates within an entrepreneurship ecosystem and highlight the multi-faceted nature of collaboration roles that enable the development of networks of relationships that link the university to other collaboration partners.

Our exploratory findings provide a process-based framework that shows how micro-level positions and practices feed into meso-level outcomes, such as research and programs. These university-based, meso-level outcomes then underpin the collaboration roles a university plays that enable development of relationships with actors throughout the entrepreneurship ecosystem. We identify three specific university collaboration roles: create and diffuse knowledge, educate students and community members, and provide other market-facing services. Based on these findings, we discuss the integration of technology in supporting internal positions and practices, as well as externally facing collaboration roles in entrepreneurship ecosystems. Our research contributes to the understanding of how meso-level roles are rooted in micro-level action and, thus, people and resources need to be allocated with an understanding of this multi-level collaboration process. We discuss how advancing technologies, such as Artificial Intelligence, will be integrated and/or alter this collaboration process and conclude with future research directions.

2. Conceptual Background

2.1 Collaboration Ecosystems

Considering how universities participate in and shape a collaboration ecosystem requires a review and definition of "collaboration" as well as "ecosystem." Throughout the ecosystem and broader interorganizational activities literature, coordination, cooperation, and collaboration are often used interchangeably to reflect independent organizations working together (Castañer & Oliveira, 2020). However, this mingling of terms diminishes the clarity and importance of the concept of a collaboration ecosystem. To address this ambiguity, Castañer and Oliveira (2020) analyzed each of these terms and identified two markers to distinguish between them, temporal markers and goal markers. They conclude that coordination temporally precedes cooperation and collaboration in that it focuses on the deliberation and definition of common goals, while cooperation and collaboration focus on the implementation of goals.

The second marker distinguishes two types of goals, common goals and private goals. Common goals include the jointly defined goals established in the coordination phase and cooperation consists of taking the steps necessary to achieve the common goals. Collaboration goes beyond cooperation by taking steps to help an independent partner organization achieve its private goals, even if those goals are not directly aligned with the focal actor's goals (Castañer & Oliveira, 2020). Castañer and Oliveira go on to suggest three motivations, or private goals, of the focal actor to engage in collaborative activities. The first focuses on satisfying one's own moral standards and feeling like a "good citizen" without any expectation of reciprocity (2020, p. 987). The second stems from an underlying desire to create a feeling of indebtedness on the part of the partner being helped. The third comes from a desire to create a positive reputation as a good partner with the expectation that it will bring additional partnership opportunities in the future. The distinction between common goals and private goals highlights the value of exchange in collaboration and points toward the need for an ecosystemic view on entrepreneurship that can help to inform the development of dynamic relationships that are motivated by both collective and individual goals.

The willingness to support the success of another without a clear or direct benefit aligns with what Brad Feld (Feld, 2012; Feld & Hathaway, 2020) identifies as a #givefirst mentality. However, this approach does not mean that organizations are not acting in their own self-interest – it suggests that organizations can see benefits for both themselves as well as the collective whole. Vargo and Lusch (2016, p. 24) define a service ecosystem as a "relatively self-contained, self-adjusting system of resource-integrating actors connected by shared institutional arrangements and mutual value creation through service exchange." Collaboration ecosystems are joined through relationships that actors seek out to provide benefit for themselves and for others, although that benefit may not be clearly defined.

This aligns with Castner and Oliveria's (2020, p. 986) definition of collaboration as "voluntarily helping other partners to achieve [common] goals or one or more of their private goals." Multi-level and multi-sided value outcomes provide increased motivations and potentially more benefit than traditionally considered benefits of collaboration, such as reduced costs and economies of scale (Corsaro et al., 2012). Within a dynamic exchange ecosystem, such as a collaboration ecosystem, individual actors develop relationships to access, share, and provide resources to create value for themselves and for others (Vargo et al., 2008). In other words, actors collaborate to co-create value that emerges for individuals, communities, organizations, and/or society. Value, however, is determined across the different levels by diverse actors (different people, companies, or collectives) and may not align (resources are valuable to some but not others). In the case of entrepreneurship, a collaboration ecosystem establishes a particular value outcome that has many distinct perspectives because the development of novel opportunities or solutions that spur economic growth may be beneficial to some and detrimental to others.

2.2 Entrepreneurship as a Collaboration Ecosystem

Entrepreneurial ecosystems emerged as a primary strategy for governments at all levels to promote economic development (Spigel et al., 2020). The central premise of this approach stems from the shift away from the individualist idea of the solo entrepreneur to the recognition that the environment in which the entrepreneur operates influences business success (Stam & Van de Ven, 2021). Effective entrepreneurial ecosystems achieve the desired economic development by promoting the creation, survival, and expansion of high growth startups (Spigel & Harrison, 2018). The high growth startups, in turn, drive innovation, create new jobs, and unleash economic value for the communities in which they reside. Despite the popularity of policies supporting entrepreneurial ecosystems, relatively little is known about what enables some ecosystems to be effective and others to lag behind (Stam & Van de Ven, 2021).

Entrepreneurial ecosystems are defined as "a set of independent actors and factors coordinated in such a way that they enable productive entrepreneurship" (Stam, 2015, p. 1765). Early research focused on studying well-known ecosystems and identifying the actors and resources within them that may contribute to their success (Kenney & Von Burg, 1999; Mack & Mayer, 2016; Saxenian, 1994; Spigel, 2017). Throughout early studies on these entrepreneurial ecosystems, several dominant actors emerged, including incubators, financiers, accelerators, universities, and existing companies (Ojaghi et al., 2019). These actors have diverse organizational needs and their perceptions of valuable resources can vary greatly. Although Spigel and Harrison (2018) identify investment capital, skilled workers, and entrepreneurial knowledge as the primary resources required for an effective ecosystem, they suggest that the efficiency with which those resources flow through social networks determines how effectively the ecosystem functions. This need for system efficiency and flow of resources underscores the importance of the network of relationships that scaffold the ecosystem.

To date, entrepreneurial ecosystems research remains focused at the organizational level (Wurth et al., 2022). Meanwhile, the resources essential for the effective functioning of entrepreneurial ecosystems, such as knowledge and skill, exist primarily at the individual level. Additionally, individuals within organizations may serve dramatically different social positions within the ecosystem, even though they reside within the same organization. This requires a more nuanced view of the actions taken and practices enacted by individuals across different positions within organizations to understand the collaboration roles that organizations play in entrepreneurship and value cocreation.

Among the dominant actors previously identified, universities stand out with individuals engaging in a variety of practices, contributing to the effective functioning of the ecosystem in distinct ways. Two primary contributions from universities have historically been recognized, including supplying skilled workers and driving technological advances through research, which spillover into commercial applications (Stam & Spigel, 2016). Stam and Spigel (2016) also suggest that universities should be well-connected within the entrepreneurial ecosystem and highlight that information and innovation flow through informal networks. Given the various roles within universities, including research faculty, teaching faculty, staff, administrators, and technology transfer offices, understanding the functions that university employees serve in supporting collaborative entrepreneurial ecosystems remains unknown, yet is essential to understanding how this dominant actor can support value cocreation at the individual and organizational level.

Finally, Wurth and colleagues (2022) suggest that the links (relationships) among the actors likely matter more than the number of specific actors. These links reflect the connections and applications of collaboration within the ecosystem, which places collaboration roles as the true hub of the entrepreneurial ecosystem and all collaboration ecosystems.

2.3 Roles as Resources for Shaping Ecosystems

Much of the interest surrounding roles of value co-creation centers on the changing roles of customers as increasingly active participants in value creation (Cova et al., 2011). Akaka and Chandler (2011) highlight limitations of prior research that focus on roles as enacted from positions. They integrate a "roles as resources" perspective (Baker & Faulkner, 1991) for considering roles as resources for both *stability* and *change* in networks of relationships that support value co-creation in dynamic exchange ecosystems. In this view, a role can be applied as a resource for network stability or one that influences change in positions and social structures (i.e., role as a resource for change). Akaka and Chandler (2011) conceptualize roles from a social perspective, as "sets of practices" that are reconfigured to create value, depending on context.

The consideration of roles as being grounded in practices is specific and provides a theoretical explanation for how individual actions shape collectives and underlie collaboration. According to Schatzki (1996, p. 11), "[practices are] the central social phenomenon by reference to which all other social entities such as actions, institutions, and structures are to be understood." In addition, Giddens (1984) argues that *practices* are the underlying driver of the reproduction of social systems (i.e., networks of relationships) as well as their corresponding social structures (i.e., institutions). In other words, the practice literature suggests that micro-level practices are inherently interconnected with meso and macro-level social structures and systems. Because of this interconnection, practices provide a means for studying how networks of relationships are shaped and then structure their overarching entrepreneurship ecosystems. In this way, roles are sets of practices that can be considered as resources for stability and change in networks, and roles depend upon the resources that an actor can access and apply.

Although an entrepreneurship ecosystems perspective broadens the scope of relationships in value creation beyond transactions between firms and customers, to consider a host of other actors, including investors, non-profit organizations, government agencies, and universities, little is known about *how* these dynamic, networked, and ever-changing relationships are formed and maintained. One potential challenge of the breadth of an ecosystem perspective is its high level of abstraction (Grönroos, 2011). This brief overview of roles and practices suggests that individual efforts to co-create value establish particular collaboration roles, which contribute to the reproduction of relationships in entrepreneurship ecosystems. To develop a deeper understanding of how universities contribute to collaboration and entrepreneurship and entrepreneurship ecosystems, we use an empirical case example to explore more specifically *how* individual practices and positions contribute to university collaboration roles, the development of relationships, and potentially lead to the co-creation of new opportunities and lasting solutions.

3. Case Example: Collaboration-based Entrepreneurship Ecosystem

This case example is part of a larger research project aimed at studying the structure, dynamics, and gaps of a local entrepreneurship ecosystem. The project launched through the vision of a female entrepreneur focused on elevating underrepresented and underfunded founders by offering a co-working space as well as targeted programming to support women and BIPOC (Black, Indigenous, and people of color) entrepreneurs. In partnership with a non-profit organization and government agency, she invited a research team in a private university business school to conduct a research study and map the landscape of a local entrepreneurship ecosystem to better understand the resources available and challenges faced by these specific segments. The authors of this paper are the researchers from the university and have been leveraging various forms of data to lay the foundation for this community-based action research (Baskerville, 1997) project. The project launched in January 2023, and initial data collection for the larger project has begun. The early stage of this research prevents us from reporting on specific outcomes. However, this exploration of the role of universities in entrepreneurship ecosystems provides an initial assessment of how particular organizations contribute to the shaping of the larger ecosystem.

3.1 Exploratory Data Set

The focus of this case example is to understand the collaboration roles of a university within the broader entrepreneurship ecosystem and the specific context of the study centers on the efforts of a private university in the Rocky Mountain Region of the United States and its relationship with both local and national entrepreneurship ecosystems. The current dataset includes secondary and archival data (e.g., reports, websites, blogs, videos, and articles) from local collaboration partners as well as broader national databases that provide recent trends and underscore the importance of entrepreneurship in the United States as well as the need to better understand how to develop effective entrepreneurship ecosystems at both local and national levels.

Primary data has been collected in the form of interviews and focus groups with 10 founders of organizations in a growth funding stage, interviews with 4 internal university collaborators (2 faculty, 1 administrator, 1 former staff), and interviews and a focus group with 6 local industry experts. Observations of specific university/community events or activities were included as well – one student-facing, one faculty-facing, and one community-based. The researchers engaged in participant observation, serving as the coordinator/judge for the student-facing event, collaborating author on a grant proposal for the faculty-facing event, and as speakers and participants in the community-based event, which involved a roundtable conversation among the entrepreneurs and the industry experts.

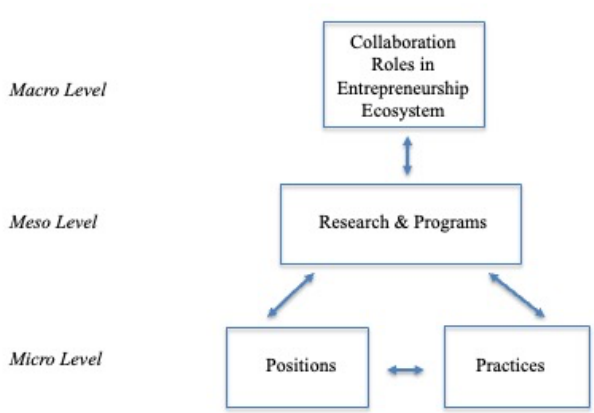
3.2 Data Collection and Analysis

The authors coordinated the data collection from entrepreneurs and industry experts with community partners through the development of a research program that is meant to also provide educational resources for entrepreneurs. This action research (Baskerville, 1997; Hult & Lennung, 1980) involves multiple methods, including extended case research (Burawoy, 1998) that centers on investigating a particular entrepreneurship ecosystem to better understand 1) the structure of the ecosystem, 2) the processes that contribute to value co-creation, and 3) the value outcomes. This case example is part of this larger effort that focuses more specifically on the collaboration process of a university and how its collaboration roles enable the development of relationships with members (both individuals and organizations) of the wider ecosystem. The qualitative archival and interview data were analyzed using the conceptual components presented above. In this process, we identified micro-level positions and their associated practices and the process through which university collaboration roles emerged. We found that the macro-level collaboration roles connecting the university to other members of the entrepreneurship ecosystem were reliant upon meso-level or disciplinary and organizational outcomes, such as research and programs. These meso-level outcomes provided tangible connections between individual competencies and the ecosystem structure, revealing specific collaboration roles that universities can leverage to collaborate and effectively allocate, exchange, and share resources with other members of the ecosystem. The findings outlined below are based on the data described above.

4. Multi-level Collaboration Process

Our exploratory findings reveal specific elements of a multi-level process through which university collaboration roles are formed. This is critical for understanding how a university (or other collaboration organization) can develop relationships with other members of the entrepreneurship ecosystem and play a role in effectively transmitting resources throughout. In general, we find that the micro-level positions (e.g., faculty, staff, student, administrator) and practices (e.g., teaching, researching, writing, coordinating, communicating) drive the formation of meso-level outcomes or resources, such as research and programs. It is clear that individual-level actions and resources lead to the development of meso-level (e.g., university or disciplinary) resources such as published research and curricular and extra-curricular programs. At the same time, the university collaboration roles require specific meso-level outcomes to establish valuable resources that aid in developing meaningful relationships with other ecosystem members. Figure 1 depicts the multi-level process of university collaboration within an entrepreneurship ecosystem.

Figure 1. University Collaboration as a Multi-level Process



It is interesting to note that our data reveal that meso-level outcomes are needed to establish collaboration roles for a university (or potentially any entity) with the broader entrepreneurship ecosystem. In other words, it is not enough to observe the micro-level positions and practices or the macro-level network of relationships, the meso-level outcomes must also be considered as a driving force of the roles that an organization plays in collaboration ecosystems. These findings align with the notion that collaboration involves both individual and collective value-creation goals and has important implications for the value outcomes of collaboration for the university itself as well as the broader entrepreneurship ecosystem.

4.1 Micro-level Actions: Positions and Practices

We began exploring the collaboration roles by addressing our first research question and investigating individual, micro-level positions and practices that aim to contribute to entrepreneurship and the shaping of the entrepreneurship ecosystem. Our exploratory case analysis reveals that positions embedded in a university infrastructure, such as faculty, staff, and administrators are relatively standard across universities and difficult to adjust. In our data, it is also clear that positions tied to particular people have overlapping practices. This is evidence of the notion that the enactment of practices can both sustain and change the ecosystem.

Table 1. Individual Positions and Practices

Positions	Practices
Faculty	Research, Teaching, Develop and Support Programs, Serve on Committees, Engage with Students, Develop Knowledge, Invent New Technology, Communicate Knowledge and Research
Staff	Develop and Communicate Programs; Support Administrators, Students, Faculty and Technology Transfer
Administrators	Develop Programs, Connect Resources and People, Build External Connections, Support Faculty and Staff, Engage with Students, Support Technology Transfer
Students	Research, Own Business, Create Content, Participate in Class, Events and Clubs
Entrepreneurs	Start Businesses, Create Campaigns, Develop Ideas, Test Products, Participate in Competitions and Events
Supporters	Donate Time, Money and Expertise.

In university settings, the most recognizable positions are faculty, staff, administrators, and students. These positions can be occupied by any number of people but are consistent across all university organizations, and the practices are often overlapping. This overlapping of practices complicates the intended roles or outcomes of the positions because, in our interviews, we found that status and power impact the ability to enact practices from certain positions. In addition, the positions of entrepreneurs and supporters identified in this study are not often seen as central contributors to collaboration in the wider ecosystem but are salient in the impact they play in enhancing entrepreneurship in our data. Thus, it seems important to consider how these positions feed into the overall collaboration process.

4.2 Meso-level Outcomes: Research and Programs

Although our focus is on exploring how individual level positions and practices contribute to shaping collaboration roles, it became clear through our data that there was a meso-level outcome that was critical to establishing a collaboration role. For universities, this outcome of individual activities broadly emerged in the form of research and programs. Research is especially critical for faculty positions but are also seen as relevant to the practices that administrators and staff enact. The type of research and outcomes vary across different meso-level disciplines – law faculty publish in Law Review journals, business faculty publish in business journals, and other faculty in the science as well as arts and humanities publish in disciplinary journals, or they publish academic books aligned with their fields. In some cases, research emerge in different forms, such as art, music, and invention. In addition, faculty and staff, as well as administrators, distribute research findings in popular press outlets in a variety of ways (e.g., blogs, podcasts).

The quality of these academic outputs are difficult to assess outside of a given field but are often seen as a central metric of success in a particular discipline. This is because they are the conduit for knowledge creation within a particular group of people. In other words, the experts in that field are the ones who determine the validity and relevance of the research and are often the gateway to publication and distribution. This "review" process leads to a specific type of rigor through which peers decide what becomes designated as knowledge. This is an essential part of the academic process in some ways but can also hinder new ideas and rapid diffusion of knowledge. Either way, this meso-level outcome provides a very distinct mechanism for universities to contribute to entrepreneurship ecosystems, through the development and dissemination of new knowledge.

In addition to faculty research, programs surfaced as a meso-level outcome of the positions held and practices enacted at the micro level. Unlike research, meso-level programs, both curricular and extra-curricular, are generally supported by a wider variety of actors, including staff, students, administrators, entrepreneurs, and other supporters. The breadth of actors that contribute to this meso-level outcome reflects the efficiency of transfer of knowledge and resources. In other words, whereas transferring knowledge through academic outlets can require indirect routes, translation and extended codification, programs are purposefully designed for direct educational opportunities and made available in forms that are most fitting for consumption by broader audiences. It was clear through our exploratory study that the connections between research and programs are, somewhat surprisingly, few and far between, revealing a chasm of disconnect between the new knowledge that is being developed in a university and the knowledge that is being disseminated by the same organization. This is one of the central tensions we find in our study that hinders the effectiveness of resource flow both within and outside the university. It creates a divide between university collaboration roles, which highlights the stability of positions internal to an organization but also limits the ability of people to support more than one role.

4.3 Macro-level Relationships: Collaboration Roles

Our case example reveals three central collaboration roles universities play in entrepreneurship ecosystems these are 1) create and diffuse knowledge, 2) educate students, community members, and entrepreneurs, and 3) provide services for collaboration partners. Because the meso-level outcomes of research and programs are often so separate, it is difficult for any single actor to contribute to both value outcomes. We find that the faculty often sit at the intersection of research and programs as many faculty taking on administrative positions for programmatic oversight. However, because research and programs are two distinct outcomes it is challenging for a person in any given position to be proficient, much less excel, at both.

Creating and diffusing knowledge is a critical role of the university, but it requires the support of multiple positions and a collection of practices. Although faculty are tasked with conducting and disseminating research in their respective outlets, this outcome is only made possible by having administrators who support particular outcomes and by staff and other faculty who take on other tasks. While the research and writing might be isolated to a particular faculty member, the dissemination and diffusion of such work involves internal and external promotion that is often driven by administrators and staff. Incentives and rewards also need to align with expectations of research productivity, which involve other types of administrative roles that help to put policies in place to measure and award success.

Education of students, community members, and entrepreneurs also requires faculty input, either in curriculum development or course design. However, this role has the potential to extend beyond university walls to provide educational programming for entrepreneurs who are not degree-seeking students but can benefit from similar educational experiences. Education can also come in different forms within the university – it can happen in or outside a classroom. This is especially true when educational opportunities are provided through experiential clinics and/or client projects in which companies seek out student work to solve real business problems. As knowledge-based content evolves, it is clear that universities are seeking alternative forms of education, beyond traditional degree programs. One of the centerpieces of the university being explored is a modular or stackable approach to course content. This approach is not unique to this university and can potentially provide additional opportunities to engage alternative types of students in the education process.

The third university collaboration role that emerged in our data emphasizes the need for universities to also be service providers, particularly when it provides opportunities for both research and programs, both curricular and extra-curricular. For example, this university has a number of clinics and centers that provide product-development, healthcare, artistic, or business-related services to the local community. These are filtered through faculty, staff, and administrators who set requirements for the projects and expectations for the students. In this way, one of the central collaboration roles is to provide members of the entrepreneurship ecosystem with access to early talent in a supervised manner, alleviating the risk to the client as well as the student. These project-based courses provide experiential opportunities for students and reduce the need for supervision from the hiring firm. Although these seem ideal, they can be tricky opportunities for engagement with the broader ecosystem because they require an assessment of the value that could potentially be received (or not) by multiple parties. Because of this, service provision is not common throughout all entities, and decisions about who will oversee this role require careful consideration. However, these service provision roles provide compelling opportunities to leverage faculty research and talent, provide enhanced experiences for students, and create strong collaboration ties with other stakeholders in the entrepreneurship ecosystem and, thus, call for further investigation. When well executed, these types of collaboration roles can lead to the development of lasting relationships, increase efficiency in transfering technology, and improve overall effectiveness of the ecosystem.

5. Discussion

The effectiveness of entrepreneurship ecosystems depends not only upon the resources available within the ecosystem, but also on the efficiency with which those resources flow through social networks to the optimal destinations (Spigel & Harrison, 2018). Universities support entrepreneurial ecosystems by educating skilled workers and providing entrepreneurial knowledge, two of the key resources required. However, the university's role in developing the relationships and social networks through which these resources flow has not been explored. This study takes a multi-level process approach to explore the university's collaboration role in improving the flow of resources, particularly knowledge and skills, through relationships that shape the ecosystem. Although we find evidence of a multi-level process, we recognize that the scope of this process is limited to the data we collected and the entrepreneurship ecosystem itself is nested within broader socioeconomic and natural ecosystems. The relationships to broader ecosystems will influence the understanding of collaboration roles as well.

We find that the univerisity's collaboration role stems from individual practices enacted by a variety of faculty, staff and students. Because collaboration goes beyond cooperating on common goals and focuses on assisting other independent actors achieve their private goals (Castañer & Oliveira, 2020), understanding the unique journeys of employees and students can provide added insight into the drivers and limitations of collaboration Looking outward, creating positions focused on bridging academia and practice, such as technology transfer offices and professors of the practice, facilitates these collaboration practices with external facing individuals, and those relationships should be explored as well. Furthermore, future research is needed to explore the many specific practices and positions that are unaccounted for in our data as well as the roles of other stakeholders in the collaboration ecosystem to identify alternative forms of collaboration and how they construct particular types of relationships.

We find that meso-level outcomes such as programs and research are rooted in individual-level positions and practices within the university. Programs injected at the meso-level without a foundation at the micro-level will likely suffer from poor engagement and prove ineffective and unsustainable. Instead, programs should emerge through connection of diverse practices and positions and align the university with the macro-level goals identified previously. Additionally, engaging practitioners in the development of research promotes the university's collaboration role and directly facilitates the dissemination and application of the knowledge discovered through research. Future research should investigate ways in which to better integrate meso-level outcomes so that people in a variety of positions can contribute more effectively to both research and programs.

Because entrepreneurial ecosystems exist to promote the creation, survival, and expansion of high-growth ventures (Spigel & Harrison, 2018), they are essential to economic and social well-being. Given this macro-level objective and the importance of social networks, universities can provide immense value by conducting research that helps to better understand these dynamic socioeconomic structures by mapping the ecosystems, understanding the archetypes of startups, and analyzing the non-linear paths that startups take in their growth journey. It is especially important to understand the needs and systemic barriers for marginalized entrepreneurs in order to infuse diversity and diffuse innovation throughout a collaboration ecosystem that is constituted by diverse perspectives and unique problems. We aim to continue our research to better understand systemic problems and solutions.

Importantly, this early-stage research highlights the opportunity for developing technology to support collaboration within an entrepreneurial ecosystem. Entrepreneurs we interviewed suggested that an enormous amount of information exists, yet the information often isn't useful because it isn't tailored to their specific situation, or they must wade through so much data before finding something relevant. Universities could collaborate with state governments and other relevant actors in platform design focused on improving the efficiency with which resources flow throughout their entrepreneurship ecosystems. Platforms designed based on ecosystem maps, startup archetypes, and non-linear paths identified could be integrated with artificial intelligence to understand startup profiles and provide customized information and connections for each startup's needs. This type of service would reduce the dependency on traditional social networks and improve equity and inclusivity in entrepreneurship.

Additionally, blockchain could track new intellectual property making it easier for technology transfer offices to provide access to new technologies and manage license and royalty arrangements through smart contracts. Doing so could enable them to disseminate information more widely and allow other market actors to explore commercialization opportunities more freely. Similarly, blockchain could be used to house and track educational content providing universities and other educators with opportunities to publish content and be compensated based on the market determined utility of the content.

The development of these platforms can contribute to future research and serve as data collection tools for researchers to monitor the ecosystem longitudinally, enabling previously impossible insight into the flow of resources and startups throughout the ecosystem.

6. Conclusion

This study develops a multi-level process model that provides new insights into value-creation processes within collaboration ecosystems. While this approach is empirical in nature, its exploratory stage limits the contextual generalizability of our findings. Readers are encouraged to focus on the applicability of the theoretical framework proposed. By focusing on a specific actor, a university, this research makes connections between the micro, meso, and macro levels of collaboration in a service ecosystem. The findings contribute to the understanding of how collaboration in entrepreneurial ecosystem occurs, particularly the role of the university, which serves to develop and disseminate knowledge through the advancement of research and curricular and extra-curricular programs. Importantly, the findings also provide insights into likely paths for the use of advanced technologies to further extend the university's collaboration role. We hope this exploration of collaboration in entrepreneurial ecosystems opens doors for further investigation of how this multi-level process can continually create value for individuals, entrepreneurs, organizations, and society at large.

7. References

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