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# Giving something back: how reciprocal motivation drives entrepreneurs to contribute to their entrepreneurial ecosystem

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**Abstract** Entrepreneurial ecosystems thrive on the contributions of diverse actors, among whom entrepreneurs play a pivotal role. Interestingly, previous research on entrepreneurial ecosystems has remained silent on how to encourage entrepreneurs to “give back” to their ecosystem. This study probes the phenomenon of downward causation, aiming to unravel the motivations and mechanisms driving entrepreneurs to actively contribute to the evolution and stability of their ecosystems. Drawing on qualitative analyses of 32 in-depth interviews with startup entrepreneurs in Germany, our findings unveil the characteristics of contribution behavior and highlight the heterogeneous nature of entrepreneurs’ motivations. Reciprocal motivation emerges as a central driver, influenced by a complex interplay of interactions.

Experiences with ecosystem actors shape diverse interpersonal relationships, impacting entrepreneurs’ gratitude and fostering a sense of affiliation. Individual characteristics, such as entrepreneurial passion and altruism, along with the situational context, can reinforce or constrain this motivation. These insights converge into a dynamic model, enhancing theoretical foundations of downward causation within entrepreneurial ecosystems.

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**Plain English Summary** Giving back: Entrepreneurs fuel the success of the ecosystem by contributing their acquired resources and skills. Entrepreneurial ecosystems, often touted but not always self-sustaining, face challenging endeavors. This study dives into the heart of entrepreneurial ecosystems and discovers why entrepreneurs actively drive their evolution. Analyzing interviews with 32 German entrepreneurs uncovers a spectrum of activities, including impactful mentoring, peering, and knowledge injection. Reciprocal motivation, influenced by experiences and ecosystem relationships, is the key driver for this contribution behavior. The findings of this study unravel the complex interplay of entrepreneurs with their environment, enhancing an understanding of why and how entrepreneurs profoundly shape ecosystem growth. This is not just academic progress in the popular research field of entrepreneurial ecosystems; it is a much-needed rationale for the constitution and coordination of ecosystem initiatives. This study opens the door for policymakers and

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ecosystem actors to sustainably foster thriving entrepreneurial ecosystems in their region and harness the power of entrepreneurial output.

**Keywords** Entrepreneurship · Entrepreneurial ecosystems (EEs) · Downward causation · Microfoundations · Evolution

**JEL Classification** A13 · L26 · L53 · M13 · M20 · O31 · R00 · R11 · R58

## 1 Introduction

Entrepreneurial ecosystems have become a central theme in entrepreneurship research (Spigel & Harrison, 2018), offering critical insights into the spatial dynamics of entrepreneurial emergence (Audretsch & Belitski, 2017; Stam et al., 2008; Wurth et al., 2021). These ecosystems play a dual role: catalyzing venture creation and regional growth by coordinating resources (Harima et al., 2024; Xu et al., 2023) while emphasizing the integral role of entrepreneurs. Once predominantly viewed as outputs that drive regional economic outcomes (Coad & Srhoj, 2023; Leendertse et al., 2021; Stam, 2015), entrepreneurs are now increasingly recognized as active co-creators within their ecosystems. They not only access and utilize resources but also reshape their environments, transforming their broader contexts (Cao & Shi, 2021; Stam, 2015; Wurth et al., 2021) and thus drive and redefine the very systems they inhabit.

This contribution behavior of entrepreneurs is a form of *downward causation*, which refers to “how outcomes and outputs of the system over time also feed back into the system conditions” (Wurth et al., 2021, p. 736). While interrelationships among ecosystem attributes are essential for the evolution of entrepreneurial ecosystems in general (Spigel, 2017), this mechanism of downward causation also extends to individual entrepreneurs and their interactions within the ecosystem. As entrepreneurs progress in their careers, they accumulate experience, skills, and networks that not only foster an entrepreneurship-supportive culture but also become valuable resources for nascent entrepreneurs and other ecosystem actors (Fotopoulos, 2022; Spigel & Vinodrai, 2021; Wurth et al., 2021). Through deliberate actions—such as mentoring, knowledge-sharing, and reinvesting expertise—entrepreneurs do not merely reinforce the attributes they once benefited from but actively shape the conditions for future entrepreneurial activity

(Auerswald & Dani, 2017; Roundy et al., 2018; Spigel, 2017; Spigel & Vinodrai, 2021). This cyclical process of resource regeneration, where previously leveraged resources are re-injected into the ecosystem, serves as a self-reinforcing mechanism of co-creation, ensuring the ecosystem’s long-term sustainability (Autio et al., 2018; Stam & van de Ven, 2021). While downward causation has recently been recognized as important to the evolution and growth of entrepreneurial ecosystems, there remains a notable gap in understanding the key factors that motivate entrepreneurs to actively engage in this process—particularly their willingness to give back to their ecosystem (Feldman et al., 2022; Roundy & Lyons, 2023). This lack of insight is significant, as entrepreneurs are not merely outputs of the ecosystem but central agents of change, actively shaping and transforming their environments (Cao & Shi, 2021; Coad & Srhoj, 2023; Mason & Harrison, 2006; Wurth et al., 2021).

Our study addresses the question of what drives entrepreneurs to contribute to their ecosystems, exploring the micro-foundational mechanisms that underpin these behaviors (Roundy & Lyons, 2023; Wurth et al., 2021). By examining how entrepreneurs initiate and sustain path-dependent processes that influence ecosystem evolution, we bridge a crucial gap in entrepreneurial ecosystems literature, linking individual actor characteristics and interactions to system-level mechanisms and changes (Roundy et al., 2018; Wurth et al., 2021).

In doing so, we also relate to broader theoretical frameworks, such as institutional theory and resource orchestration, to deepen our understanding of entrepreneurs’ transformative roles. Entrepreneurs act as key agents of change within institutional structures, actively navigating, shaping, and sometimes circumventing formal and informal frameworks to drive entrepreneurial outcomes (Aidis et al., 2008; Bika, 2012; De Clercq et al., 2013; Su et al., 2017). Through resource orchestration, they manage and align resources across ventures, not only optimizing operational synergies but also influencing the broader business landscape (Baert et al., 2016). By integrating these perspectives into the study of entrepreneurial ecosystems, we move beyond traditional analyses of individual, institutional, and sociocultural factors. Our findings demonstrate why and how entrepreneurs reshape institutional environments and structural elements through downward causation, fostering a context conducive to entrepreneurship at the regional

level (Cao & Shi, 2021; Muñoz et al., 2020; Spigel, 2017; Wurth et al., 2021). Specifically, our research seeks to answer the question: “Why and how do entrepreneurs contribute to the evolution of an entrepreneurial ecosystem and its elements?”.

To uncover the theoretical underpinnings of our research question, we conducted an inductive qualitative analysis of 32 semi-structured interviews with theoretically sampled entrepreneurs from Germany. This was complemented by extensive secondary data from digital sources, enabling a thorough and multifaceted exploration of the phenomenon. Our results suggest that entrepreneurs’ contribution behavior is determined by ongoing interactions with the ecosystem and its actors, which include personal experiences with the ecosystem, the persistence of relationships, perceived gratitude, and a consolidated affiliation towards one specific ecosystem. These interactions have a mobilizing character, either leading an entrepreneur on a trajectory of reciprocal motivation or not. Moreover, individual personality traits and the situational context can reinforce or constrain the progression of these trajectories and thus shape the targeted contribution behavior, indifferent behavior, or even no contribution.

Our paper seeks to offer three main contributions. First, it responds to the call to advance the entrepreneurial ecosystem concept beyond its metaphorical use, striving for a substantial theoretical framework that elucidates the interdependencies of elements, especially the causal mechanisms between them (Spigel, 2017; Wurth et al., 2021; Xie et al., 2021). Our approach offers the potential to widen the perspective on the evolutionary character of entrepreneurial ecosystems, their reproduction, and their self-sustaining character (Brown & Mason, 2017; Motoyama & Knowlton, 2016; Spigel, 2017).

The second contribution of our study lies in adopting a more nuanced perspective that captures the heterogeneous characteristics, attitudes, and contextual influences shaping entrepreneurs within entrepreneurial ecosystems (Wurth et al., 2021). This approach highlights the dynamic interplay between entrepreneurs and other ecosystem actors, addressing the often-overlooked micro-foundational mechanisms that drive ecosystem evolution. By emphasizing the reciprocal connections between entrepreneurs’ activities and ecosystem elements, our study sheds light on the complex processes through which entrepreneurs

navigate, influence, and are influenced by their ecosystems (Cosenz et al., 2024; Roundy & Lyons, 2023; Wurth et al., 2021). This perspective deepens our understanding of the individual-level drivers and the critical role of continuous interactions in shaping entrepreneurial ecosystems.

Third, we advance a more granular understanding of the role of social structures and exchange within entrepreneurial ecosystems by moving beyond the view of social networks as structural constituents of entrepreneurial ecosystems (Spigel & Harrison, 2018; Stam, 2015; Xu et al., 2023). Rather, we conceptualize relationships and networks as emergent micro-level outcomes of ongoing interactions among individual entrepreneurs embedded in the broader ecosystem context. This perspective allows us to highlight how relational dynamics—such as reciprocal exchanges and personal affiliations—contribute to reinforcing ecosystem elements and resources (Alaassar et al., 2022; Alvedalen & Boschma, 2017; Wurth et al., 2021). By complementing the dominant system-level lens with a micro-foundational view, we highlight the critical role of social structures. These encompass relationships and networks that influence resource flows and maintain ecosystem vitality (Scheidgen & Brattström, 2022).

In summary, our research offers a nuanced understanding of the interactions and mechanisms within entrepreneurial ecosystems underscoring the frameworks and guiding paradigms of established theories (Spigel, 2017; Stam, 2015; Stam & van de Ven, 2021; Wurth et al., 2021). These insights can guide future research and inform practical strategies for policymakers and facilitators focusing on fostering enduring entrepreneurial ecosystems.

## 2 Literature review: downward causation in entrepreneurial ecosystems

### 2.1 The evolving nature of entrepreneurial ecosystems

Entrepreneurship significantly drives innovation, economic prosperity, and social progress. Recognized as neither coincidental nor occurring in isolation, entrepreneurship flourishes within specific geographic contexts influenced by a complex interplay of various actors and factors (Acs et al., 2014; Spigel

& Harrison, 2018). These interactions form what is known as an “entrepreneurial ecosystem” (Brown & Mason, 2017; Spigel, 2017; Stam, 2015). Supported by networks of public servants, institutions, and communities, these ecosystems leverage entrepreneurial talent to spur regional economic development (Spigel et al., 2020).

Originating from diverse research domains—including industrial districts (Autio et al., 2018), clusters (Delgado et al., 2010; Rocha & Sternberg, 2005), and innovation systems (Autio et al., 2014)—the theoretical framework of entrepreneurial ecosystems incorporates insights from broader business and innovation ecosystem concepts (Adner, 2017). The body of research underscores the spatial mechanisms and relationships that are vital for boosting productivity, innovation, and growth. Beyond examining these foundational elements, entrepreneurial ecosystem research increasingly focuses on the enabling actors and contextual factors that foster entrepreneurship (Brown & Mason, 2017; Johnson et al., 2022; Wurth et al., 2021).

Recent scholarly discourse has proposed numerous definitions and theoretical models of entrepreneurial ecosystems, often drawing analogies to natural ecosystems. Such analogies suggest that economic agents, similarly to biological species, interact within their environments to access the resources necessary for growth and survival (Colombo et al., 2019). Pioneering this conceptualization, Isenberg (2010) emphasized critical ecosystem elements like human capital, infrastructure, and cultural support as being essential for venture creation. Further approaches focus on the importance of physical and formal conditions in the generation of entrepreneurial output (Ács et al., 2016; Audretsch & Lehmann, 2005; Feldman & Zoller, 2012).

The focus of contemporary research has shifted from static to dynamic interpretations, emphasizing ongoing interactions and the co-evolution of ecosystem elements (Abootorabi et al., 2021; Auerswald & Dani, 2017; Cho et al., 2022; Colombelli et al., 2019; Guerrero & Siegel, 2024; Spigel & Harrison, 2018). This evolutionary perspective considers the ability of the ecosystem and its elements to absorb and develop a heterogeneous set of competencies and resources over time (Cho et al., 2022). Entrepreneurial ecosystems are inherently dynamic, adapting, and evolving, distinguished by evolutionary processes that foster a self-sustaining state (Roundy et al., 2018). The

complexity of these ecosystems is magnified by their interdependencies, which catalyze the emergence of new ventures (Spigel, 2017).

Utilizing a social systems framework, the conceptual model of Stam and van de Ven (2021), building on Stam (2015), refines our understanding of these dynamics. Their model explores the co-evolution of ecosystem components as well as the interdependencies and causal mechanisms at play. The approach highlights intra-layer causation—both the upward influence from individual ecosystem elements to broader outputs and downward causation, where outputs feedback into the system, reshaping its structure and functionality (Wurth et al., 2021). As such, this framework, especially the aspects of interrelation and interdependence, also includes an evolutionary perspective, which we adopt in our research to scrutinize the interconnected and self-sustaining behaviors exhibited by agents within these systems. By acknowledging the interrelatedness and interactive nature of ecosystem elements (Spigel, 2017; Wurth et al., 2021), we pave the way to explore how micro-level interactions underpin the broader mechanisms of downward causation, thereby enriching the discourse on micro-level causal mechanisms in entrepreneurial ecosystems.

## 2.2 Microfoundations as a path to understanding the evolution and mechanisms of EEs

Micro-foundations offer a critical lens through which the often-overlooked interactions within entrepreneurial ecosystems can be examined. As noted by Roundy and Lyons (2023), while the ecosystem metaphor draws heavily from biology to conceptualize broad systemic dynamics, it frequently overlooks the nuanced, individual actions and interactions that occur at the micro-level. These interactions are crucial for understanding the real-time evolution and operational mechanisms that drive entrepreneurial ecosystems (Harima et al., 2024).

Focusing on micro-foundations aligns with a broader trend in organizational and strategic research that seeks to understand how individual behaviors and decisions influence larger organizational and systemic outcomes (Barney & Felin, 2013). Comprehending the micro-foundations of entrepreneurial ecosystems and the way each actor and element generate value is a crucial piece of the overall puzzle of entrepreneurial

ecosystems (Cosenz et al., 2024; Felin & Foss, 2023; Roundy & Lyons, 2023). Notably, pioneering scholars have examined the roles and capabilities of individual ecosystem actors as anchor organizations influencing the ecosystem dynamics (Goswami et al., 2018; Harima et al., 2024; Ryan et al., 2021). Yet, there remains a gap in including the entrepreneur level in this discourse and exploring their interactions and contributions to the ecosystem and its outcomes.

The underestimation and neglect of entrepreneurs' roles and agency in ecosystems (Roundy & Lyons, 2023) lead to a limited understanding of the specific causal and mediating mechanisms linking entrepreneurs and ecosystems. This calls for a more nuanced representation of these phenomena (Alvedalen & Boschma, 2017; Cosenz et al., 2024; Roundy & Lyons, 2023). Such analysis should detail how and why individual entrepreneurs, through their unique capabilities and actions, contribute to and influence the broader system (Cosenz et al., 2024; Felin & Foss, 2023; Roundy et al., 2018; Roundy & Lyons, 2023; Wurth et al., 2021). The micro-foundational perspective also addresses the bidirectional interactions between individual actors and the ecosystem (Cosenz et al., 2024). These interactions often result in spillover effects, where the benefits accrued by one entrepreneur through successful ventures or networks extend to other parts of the ecosystem, enhancing the overall ecosystem resilience (Alaassar et al., 2022; Cho et al., 2022). The resilience of entrepreneurial ecosystems is contingent upon their capacity to maintain productive functioning, to undergo transformation, to adapt to disturbances, and to retain their essential behaviors, structures, and identity (Roundy et al., 2017). However, despite the critical role of the micro-level, many existing models of entrepreneurial ecosystems focus predominantly on macro-level structures and outputs (Leendertse et al., 2021; Nicotra et al., 2018; Xie et al., 2021) or meso-level elements and actors (Fotopoulos, 2022; Kapturkiewicz, 2022), thus overlooking the individual motivations and actions that underpin ecosystem functionality. This oversight leads to a homogenized view of ecosystems, ignoring the diverse contributions of individual actors, particularly entrepreneurs (Roundy et al., 2018).

Our study seeks to address this gap by applying a micro-foundations approach to entrepreneurial ecosystems. By concentrating on individual-level actions

and interactions, we aim to provide a more nuanced understanding of how entrepreneurs both influence and are influenced by their ecosystems. This approach not only deepens our understanding of ecosystem mechanisms but also underscores the crucial role of entrepreneurs in driving downward causation. In conclusion, incorporating micro-foundations into entrepreneurial ecosystem research offers a promising path towards capturing more accurately the complex interactions that define these systems. By focusing on the entrepreneur, we can gain deeper insights into the mechanisms of evolution and enabling factors of path dependencies in entrepreneurial environments, paving the way for targeted and effective ecosystem support strategies (Cantner et al., 2021; Cosenz et al., 2024; Roundy & Lyons, 2023; Wurth et al., 2021).

### 2.3 Embracing downward causation as an entrepreneur-led mechanism

In light of the interconnectedness of entrepreneurs with their ecosystem and the potential for micro-level interactions to drive system-level evolution, downward causation represents an ideal lens through which to examine such mechanisms. The concept of downward causation, wherein entrepreneurs significantly influence and reshape the ecosystems from which they originate, emerges as a pivotal theme in contemporary entrepreneurial ecosystem research (Stam & van de Ven, 2021; Wurth et al., 2021). Downward causation is regarded as a distinctive facilitator of path dependencies, which delineate the mechanisms through which ecosystem-level transformation is propelled by nonlinear, dynamic interactions between the elements and agents of an entrepreneurial ecosystem (Cloutier & Messeghem, 2022; Roundy et al., 2018; Wurth et al., 2021). Traditionally, entrepreneurial ecosystems have been viewed as structures that support entrepreneurial activity, but a growing body of research suggests that entrepreneurs themselves can actively modify these structures, thus redefining mechanisms (Feld, 2012).

This reciprocal influence, where entrepreneurs not only benefit from but also enhance their ecosystems, highlights their role as agents of change. Entrepreneurs inject valuable resources into their ecosystems, such as new jobs, innovation, and regional economic growth, which are well-documented drivers of economic prosperity (Roundy et al., 2018).

Theoretical frameworks like institutional theory have long recognized the impact of environmental factors on entrepreneurship but increasingly focus on how entrepreneurs manipulate these conditions to foster favorable entrepreneurial climates (Aidis et al., 2008; De Clercq et al., 2013; Dorado & Ventresca, 2013; Su et al., 2017). Institutional theory, in particular, has been instrumental in illustrating how entrepreneurs engage in activities that both reflect and reshape institutional norms and regulations, thereby molding the entrepreneurial environment to their advantage (Lowe & Feldman, 2017; Stephens et al., 2019). For example, entrepreneurs in difficult regulatory or unfavorable environments engage in creative strategies, goal-oriented agency, or smart communication strategies to enhance their institutional context (Bika, 2012; Su et al., 2017). Similarly, resource orchestration theory elucidates how entrepreneurs strategically manage resources to maximize value creation, which in turn influences ecosystem characteristics (Baert et al., 2016). Ultimately, in the context of returnee entrepreneurship, social capital theory and human capital theory have been applied to examine the importance and impact of networks and ties or human capital accumulated by entrepreneurs, which affect entrepreneurial activities, venture performance, and change and growth in emerging economies (Gruenhagen et al., 2020).

Empirical examples abound where entrepreneurial actions have led to significant changes within their ecosystems. Essentially the presence of experienced entrepreneurs is associated with the availability of knowledge and social capital (Nicotra et al., 2018). This local accumulation of resources carried by entrepreneurs can diffuse in the entrepreneurial ecosystem (Garnsey & Heffernan, 2005). Experienced entrepreneurs often act as dealmakers, leveraging this social capital to connect individuals and resources, thus facilitating new business formations (Brown & Mason, 2017; Feldman & Zoller, 2012). Entrepreneurs provide connections with other entrepreneurs, mentors, and worker talents and consequently strengthen networks in the entrepreneurial ecosystem (Spigel, 2017). Moreover, the roles of entrepreneurs extend beyond business creation; they often act as mentors and investors, channeling their success into supportive activities for nascent entrepreneurs (Bosma et al., 2012; DeTienne, 2010; Garnsey & Heffernan, 2005; Mack & Mayer, 2016). With

all these activities, but also with their general presence, entrepreneurs positively influence culture for entrepreneurial activities (Feld, 2012; Spigel, 2017). Sometimes entrepreneurs themselves recycle their capacities and initiate new business projects after a successful firm exit or even after an earlier company failure (Spigel & Vinodrai, 2021). The concept of entrepreneurial recycling, where successful entrepreneurs reinvest their gains into the ecosystem, further illustrates the role entrepreneurs play in ecosystem evolution. This behavior has the potential to not only sustain but also invigorate the ecosystem, promoting a culture of entrepreneurship and facilitating continuous cycles of venture creation and growth.

In summary, downward causation represents a fundamental mechanism by which entrepreneurs not only contribute but actively shape path dependency and enhance their ecosystems and their elements. This process is crucial for understanding how ecosystems evolve and adapt over time, influenced by the very entrepreneurs they are designed to support. Our study delves deeper into these interactions, aiming to offer new insights into the underlying mechanisms of entrepreneurs' contribution to ecosystem elements and ultimately its evolution.

### 3 Methods

Given the lack of theory and evidence on why and how entrepreneurs contribute to entrepreneurial ecosystems, an interpretivist approach is considered appropriate (Gioia et al., 2013). The primary objective of this approach is to elucidate how and, crucially, why the empirical phenomenon occurs, and to develop a comprehensive conceptual understanding (Corbin & Strauss, 2014; Gioia et al., 2013). Qualitative, inductive research designs are imperative for advancing entrepreneurship research, providing in-depth insights into phenomena (Magnani & Gioia, 2022) and facilitating substantive theoretical contributions beyond exploratory endeavors (Van Burg et al., 2022).

This approach is particularly well suited to investigating micro-foundations of entrepreneurial ecosystems characterized by complex relationships among actors and elements (Goswami et al., 2018; Hubner et al., 2022; McAdam et al., 2018; Roundy & Lyons, 2023). These relationships, sustaining and reproducing

actors and elements, are often nonlinear and embedded within specific regional contexts, creating a complex web of interactions that influence the regional entrepreneurial environment (Johnson et al., 2022; Spigel, 2017). The interactions among entrepreneurs as central actors with ecosystem elements involve the exchange of resources, knowledge, and support, which are critical for fostering innovation and business growth for their ventures (Feld, 2012; Stam, 2015; van Rijnsoever, 2020). Examples of such relational interactions include universities (Cunningham et al., 2021), local support organizations (Bergman & McMullen, 2022), mentors and role models (Spigel, 2017), and other networks (Prokop & Thompson, 2022).

Our focus on downward causation requires an in-depth examination of the evolved web of relationships and experiences between entrepreneurs and these various ecosystem actors. These relationships are not easily quantifiable, necessitating a qualitative approach to capture the richness and depth of these interactions (Spigel, 2017). By employing a qualitative approach, we can uncover the underlying nonlinear mechanisms, interactions, motivations, and contextual factors that drive contribution behavior by entrepreneurs within these ecosystems (Cosenz et al., 2024; Magnani & Gioia, 2022; Roundy et al., 2018; Roundy & Lyons, 2023). Despite its limited potential for generalizability, this approach accommodates the heterogeneous configurations of different entrepreneurial ecosystems and the diverse agencies and relationships of entrepreneurs within them (Roundy et al., 2018; Roundy & Lyons, 2023).

### 3.1 Sampling

To develop an understanding of downward causation in entrepreneurial ecosystems, we adopted a theoretical sampling strategy aligned with the grounded theory method, deliberately seeking individuals and scenarios that shed light on the studied phenomenon (Glaser & Strauss, 1967). Given our theoretical framework, which links downward causation to entrepreneurs who have previously emerged from an entrepreneurial ecosystem, we focused on entrepreneurs who founded innovative startups within regional ecosystems (Wurth et al., 2021). Entrepreneurs from such ecosystems are presumed to be well positioned to provide insights into their contribution behavior to the ecosystem and its motivations (Corley & Gioia, 2004).

The German government's 1998 introduction of the EXIST program aimed to foster entrepreneurship, technology, and innovation around regional entrepreneurial ecosystems. EXIST is recognized as the most attractive early-stage startup funding program in Germany, providing comprehensive support nationwide. Unlike other regional or time-limited support programs, EXIST is a continuous initiative open to all founders from universities and research institutions. The program offers substantial financial support, infrastructure, and access to networks. The EXIST Gründerstipendium (EXIST GS) is a key component of this program, providing around €130,000 per startup team for one year (Hunke, 2023). To be eligible, entrepreneurs must collaborate with a university or research institution, signifying their spatial embeddedness in the entrepreneurial ecosystem. Up until 2023, 2942 startups had been funded by the EXIST GS with an overall funding sum of €318.9 million (Müller & Eckardt, 2023).

To align our study with entrepreneurial ecosystem theory, we analyzed how the EXIST program's elements and goals reflect the core components of entrepreneurial ecosystems, such as entrepreneurship networks, leadership, financial resources, know-how, formal institutions, entrepreneurship culture, physical infrastructure, and support services (Spigel, 2017; Stam & van de Ven, 2021; Wurth et al., 2021). Additionally, entrepreneurial ecosystems thrive on the interaction and interdependence of various elements that drive entrepreneurial success (Spigel, 2017; Stam & van de Ven, 2021). The EXIST program aims to facilitate exactly this system by providing essential resources and support, fostering successful firm establishment, and contributing positively to the ecosystem and output development. Finally, the program's support for innovative, technology-oriented, or knowledge-based products aims to drive economic impact (Hunke, 2023), mirroring the productive entrepreneurship outputs expected from entrepreneurial ecosystems (Leendertse et al., 2021; Stam, 2015).

Guided by these theoretical considerations, we employed three criteria for sampling entrepreneurs: first, they must have completed the EXIST GS and founded a company; second, their business operations should still be active; and third, they should not have exited the firm. These criteria ensure alignment with the diverse contextual nuances of different entrepreneurial ecosystems and their potential to shape

entrepreneurs' involvement and motivations. We iteratively refined our sampling strategy during data collection and analysis using theoretical sampling principles, allowing exploration from various perspectives (Corbin & Strauss, 2014).

We employed a systematic approach to address our theoretical considerations. Through online research and engagement with universities, startup centers, and incubation programs across Germany, we identified 1853 EXIST GS startups as potential candidates. Further investigation of company websites and LinkedIn profiles narrowed this pool to 457 entrepreneurs from 310 startups. Subsequent research provided essential background data, including associated universities, business ages, and industry specifics.

For each interview, coupled with ongoing theoretical sampling considerations, we contacted candidates via e-mail and LinkedIn. Our approach resulted in a diverse sample of 32 entrepreneurs, spanning various educational backgrounds, industries, company sizes, and ecosystems (see Table 1). The gender distribution, with 26 male and six female entrepreneurs, roughly mirrors the overall gender distribution of German entrepreneurs (Herold et al., 2022).

To capture the phenomenon from multiple angles, we included both individual entrepreneurs and co-founders. Specifically, our sample included eight entrepreneurs who were co-founders with another sampled entrepreneur, thereby ensuring varied perspectives within the same entrepreneurial team. These cases are indicated with paired asterisks in Table 1. Importantly, our sampling strategy ensured comprehensive coverage of potential variations and peculiarities in the phenomenon (Corbin & Strauss, 2014; Patton, 2014).

## 3.2 Collection of data

### 3.2.1 Interviews

The primary data source for our study comprised semi-structured interviews, employing a set of pre-defined questions to explore consistent topics. These interviews serve as the cornerstone of inductive studies, capturing retrospective and real-time accounts from individuals immersed in the phenomenon (Gioia et al., 2013). While the interviews followed a structured guideline, respondents were encouraged to share any additional insights they deemed relevant to

the topic (Corbin & Strauss, 2014). In line with these recommendations, we meticulously crafted the interview guideline, encompassing individual attributes, backgrounds, and activities related to the explored phenomenon. This included the entrepreneurs' connections with the entrepreneurial ecosystem, engagement with specific elements, and their current contribution behavior. To ensure guideline substantiation, we gathered comprehensive information about each interviewee beforehand, ensuring comparability across interviews while allowing for individual nuances within the sample. Given the busy schedules of entrepreneurs, we optimized the efficiency of our interviews through thorough preparation. We conducted in-depth desktop research and preliminary questionnaires to gather relevant information about each entrepreneur's career and startup, which allowed us to tailor precisely the interview guidelines. Additionally, entrepreneurs were provided with information about the research project in advance to minimize introductory explanations during the interviews.

Data collection persisted until theoretical saturation was achieved, indicating that no new themes or concepts emerged during the analysis (Corbin & Strauss, 2014; Gioia et al., 2013; Glaser & Strauss, 1967). Saturation was identified when no new themes or concepts emerged from the interviews and from triangulated data. The consistency and repetition of data indicated that we had thoroughly captured the phenomenon. The decision to conclude data collection was made collectively by the research team, ensuring that our analysis was comprehensive.

Conducted from June to October 2022, interviews took place either in person or via video calls in the entrepreneurs' native language, eliminating language barriers and enriching the depth of content. Structured into three phases—seed phase, startup phase, and current situation—the interviews aimed to guide interviewees in reflecting on specific time windows. The questions explored the entrepreneurs' career paths, interactions, and experiences with elements and actors within their entrepreneurial ecosystem, as well as their ongoing engagement and activities. Given the simultaneous nature of our theoretical sampling, where data collection and analysis occurred concurrently, we initiated interviews with broad and open-ended questions, progressively narrowing the focus as data and conceptual understanding advanced. All interviews were electronically recorded, transcribed, and prepared for analysis using MAXQDA software.

**Table 1** Sample overview and characteristics

Entrepreneur/ interviewee	Gender	Associated uni- versity/region	Education	Year of EXIST funding	Industry/product	No. of employ- ees	Startup funding
Entrepreneur #01	Male	University of Erlangen–Nuremberg	Business administration	2011	B2B SaaS, innovation consulting	125	Bootstrapped
Entrepreneur #02	Male	Nuremberg Institute of Technology	Business administration	2018	Fintech; legal tech	3	Bootstrapped
Entrepreneur #03	Male	Technical University of Munich	Business informatics	2018	Health technology	17	VC-funded (1st round)
Entrepreneur #04	Male	University of Hohenheim	Economics	2014	B2B software services and consulting	25	Bootstrapped
Entrepreneur #05*	Male	Julius Maximilian University of Würzburg	Geography	2012	Software; agriculture	6	Convertible loan
Entrepreneur #06	Male	University of Erlangen–Nuremberg	Business administration	2019	B2B SaaS; AI	20	BA-funded
Entrepreneur #07	Male	Technical University of Munich	Business engineering	2019	B2B SaaS; NLP	8	Bootstrapped
Entrepreneur #08*	Male	Julius Maximilian University of Würzburg	Information technology	2012	Software; agriculture	6	Convertible loan
Entrepreneur #09**	Male	Leibniz University Hannover	Business administration	2017	B2B hardware, B2C software	8	VC-funded (2nd round)
Entrepreneur #10**	Male	Leibniz University Hannover	Information technology	2017	B2B hardware, B2C software	8	VC-funded (2nd round)
Entrepreneur #11****	Male	University of Ulm	Product design	2019	B2B SaaS; supply chain management	7	VC-funded (2nd round)
Entrepreneur #12***	Male	Humboldt University of Berlin	Economics	2011	B2B SaaS; content intelligence	75	VC-funded (3rd round)
Entrepreneur #13	Female	Karlsruhe Institute of Technology	Industrial engineering	2019	B2C application; women's health	2	Public-funded
Entrepreneur #14****	Male	Ulm University of Applied Sciences	Business engineering	2019	B2B SaaS; supply chain management	7	VC-funded (2nd round)
Entrepreneur #15	Male	Humboldt University of Berlin	Business engineering	2019	B2B SaaS; AI sales	3	VC-funded (1st round)
Entrepreneur #16	Male	Bochum University of Applied Sciences	Architecture	2017	B2B SaaS, architecture software	0	Bootstrapped
Entrepreneur #17	Female	Ludwig Maximilian University of Munich	Ocean sciences	2019	Platform application; sailing tourism	2	VC-funded (1st round)
Entrepreneur #18	Male	Frankfurt University of Applied Sciences	Mechanical engineering	2019	B2B SaaS; sound technology	1	Bootstrapped
Entrepreneur #19	Female	University of Ulm	Information technology	2017	B2B software	8	Bootstrapped

**Table 1** (continued)

Entrepreneur/ interviewee	Gender	Associated uni- versity/region	Education	Year of EXIST funding	Industry/product	No. of employ- ees	Startup funding
Entrepreneur #20	Male	Technical Univer- sity of Munich	Technology man- agement	2020	GovTech; IoT hardware	6	VC-funded (1st round)
Entrepreneur #21	Female	University of Applied Sci- ences Landshut	Social education	2019	B2B recruiting platform	4	Public-funded
Entrepreneur #22	Male	Saarland Univer- sity	Sports science	2019	Software; fitness app	13	VC-funded (1st round)
Entrepreneur #23	Male	University of Freiburg	Electrical engi- neering	2015	B2B hardware; energy systems	60	VC-funded (1st round)
Entrepreneur #24	Male	Technical Univer- sity of Aachen	Business adminis- tration	2013	B2B IoT applica- tion	2	Bootstrapped
Entrepreneur #25	Male	Hamburg Univer- sity of Technol- ogy	Economics	2016	Hardware; heating systems	48	BA-funded
Entrepreneur #26	Male	Technical Univer- sity of Darm- stadt	Media science	2017	Technology; drones	125	VC-funded (4th round)
Entrepreneur #27	Male	University of Bremen	Business engi- neering	2012	B2B market intel- ligence	10	Bootstrapped
Entrepreneur #28***	Male	Humboldt Univer- sity of Berlin	Mathematics	2011	Software; content intelligence	75	VC-funded (3rd round)
Entrepreneur #29	Male	University of Hamburg	Business adminis- tration	2015	Tax tech; software	177	VC-funded (3rd round)
Entrepreneur #30	Female	Humboldt Univer- sity of Berlin	Business engi- neering	2018	Web App; soft- ware; e-mobility	6	Bootstrapped
Entrepreneur #31	Female	Neu-Ulm Univer- sity of Applied Sciences	Information man- agement	2018	B2B SaaS; energy systems	7	Bootstrapped
Entrepreneur #32	Male	Aschaffenburg University of Applied Sci- ences	Information tech- nology	2017	B2B hardware and software; heating	4	Corporate VC- funded

### 3.2.2 Digital artifacts

We used triangulated data collection methods to scrutinize each case longitudinally and from diverse perspectives (Yin, 2016). To enrich our understanding of sampled entrepreneurs before conducting interviews, we augmented our data collection by extracting information from various online sources. This extension of our triangulated dataset involved gathering 1257 digital artifacts published between 2021 and 2022. These artifacts encompassed the entrepreneurs' social media channels (LinkedIn, Twitter, and Instagram), including their posts, as well as published editorial interviews and podcasts featuring the entrepreneurs (for a comprehensive overview of the dataset, refer to Table 2).

### 3.3 Data analysis

#### 3.3.1 Coding the empirical data

We applied the methodological guidelines outlined by Gioia et al. (2013) for structuring our data analysis. After transcribing the interviews and assigning digital content artifacts with memos and initial reflections, we initiated a process of open coding of the interviews (Corbin & Strauss, 2014). The raw data were disaggregated and labeled with first-order codes, aiming to stay faithful to the interviewees' terms and descriptions. In vivo codes or appropriate notions closely aligned with the interpretation of the data were employed during this phase (Gioia et al., 2013;

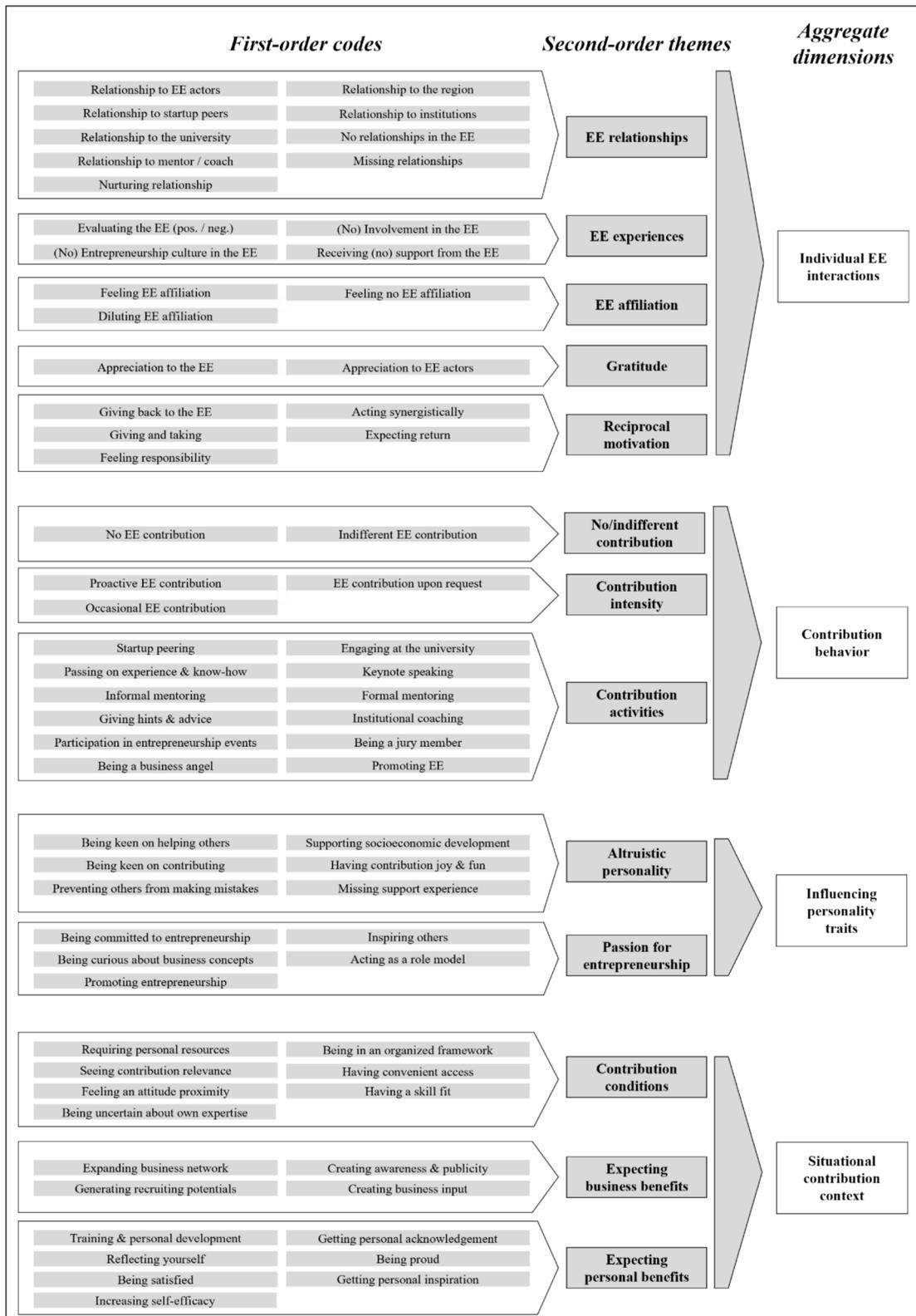
**Table 2** Dataset overview: semi-structured interviews and digital artifacts

Entrepreneur/interviewee	Duration of semi-structured interview	Digital artifacts					
		LinkedIn	Twitter	Instagram	Podcasts	Editorial interviews	Cumulation
Entrepreneur #01	39 min	30	6	0	2	1	39
Entrepreneur #02	38 min	14	0	5	1	0	20
Entrepreneur #03	53 min	263	2	0	3	0	268
Entrepreneur #04	37 min	40	0	0	2	1	43
Entrepreneur #05	44 min	3	0	0	0	1	4
Entrepreneur #06	35 min	41	0	0	2	3	46
Entrepreneur #07	41 min	17	0	0	0	0	17
Entrepreneur #08	35 min	7	0	0	0	2	9
Entrepreneur #09	29 min	30	0	4	3	0	37
Entrepreneur #10	41 min	0	0	0	0	0	0
Entrepreneur #11	41 min	3	0	0	0	0	3
Entrepreneur #12	55 min	1	5	0	0	0	6
Entrepreneur #13	34 min	10	0	0	2	1	13
Entrepreneur #14	38 min	12	0	0	2	1	15
Entrepreneur #15	27 min	105	0	0	1	1	107
Entrepreneur #16	32 min	1	0	0	0	0	1
Entrepreneur #17	33 min	6	0	1	0	0	7
Entrepreneur #18	45 min	7	0	0	1	1	9
Entrepreneur #19	37 min	9	0	0	0	0	9
Entrepreneur #20	41 min	3	0	0	0	1	4
Entrepreneur #21	39 min	17	0	0	1	0	18
Entrepreneur #22	37 min	106	52	169	2	1	330
Entrepreneur #23	37 min	42	0	19	0	0	61
Entrepreneur #24	38 min	38	0	0	0	0	38
Entrepreneur #25	34 min	13	0	0	0	0	13
Entrepreneur #26	44 min	25	0	0	3	1	29
Entrepreneur #27	28 min	30	0	0	0	0	30
Entrepreneur #28	35 min	0	0	0	0	0	0
Entrepreneur #29	43 min	20	5	0	1	0	26
Entrepreneur #30	32 min	0	0	0	1	0	1
Entrepreneur #31	40 min	36	0	3	3	0	42
Entrepreneur #32	36 min	1	11	0	0	0	12
Average	38 min	29	3	6	1	1	39
Sum	1218 min	930	81	201	30	15	1257

Locke et al., 2020). During the open coding process, we employed the technique of constant comparison to contrast data over time and across informants and sources. This ensured robustness in our analysis, aligning with the techniques described by Corbin and Strauss (2014) and Gioia et al. (2013). Initially, the coding process resulted in over 300 preliminary open codes. Refinement of the coding scheme involved

iterative discussion and consensus within the author team and constant merging of codes with equivalent meanings until the emergence of new codes dwindled significantly (Gioia et al., 2013; Magnani & Gioia, 2022).

To ensure the reliability of our coding, the main author conducted the entire open coding process, but the consistency and accuracy of this process



◀**Fig. 1** Overall empirical data structure of the foundations of downward causation in EEs

were validated through several steps. Another author independently coded several data samples, including entire interviews. Additionally, two research assistants coded the complete dataset separately. Regular feedback from independent qualitative research experts was also incorporated to test for potential misunderstandings or misleading interpretations. We also consulted influential qualitative entrepreneurship research to align our approach (Arshed et al., 2022; Goswami et al., 2018; McAdam et al., 2018). The refined first-order codes were clustered into second-order themes using visual mapping tools. These tools helped us identify conceptual overlappings and relationships among the codes. Initially, two team members worked separately on creating individual concept maps, which were later discussed and merged in team meetings.

Upon coding the interviews, a similar process was applied to analyze the content of assigned digital artifacts, initially coding them openly and integrating them into our overall coding scheme. Our overarching goal was to identify connections and commonalities in the experiences, relationships, behaviors, and motivations of each entrepreneur. Throughout this process, considerations of time- and people-related aspects, including the stakeholders' relationships with the ecosystem and its evolution over time, were consistently integrated. Figure 1 depicts the overall data structure.

### 3.4 Theorizing the process of downward causation in entrepreneurial ecosystems

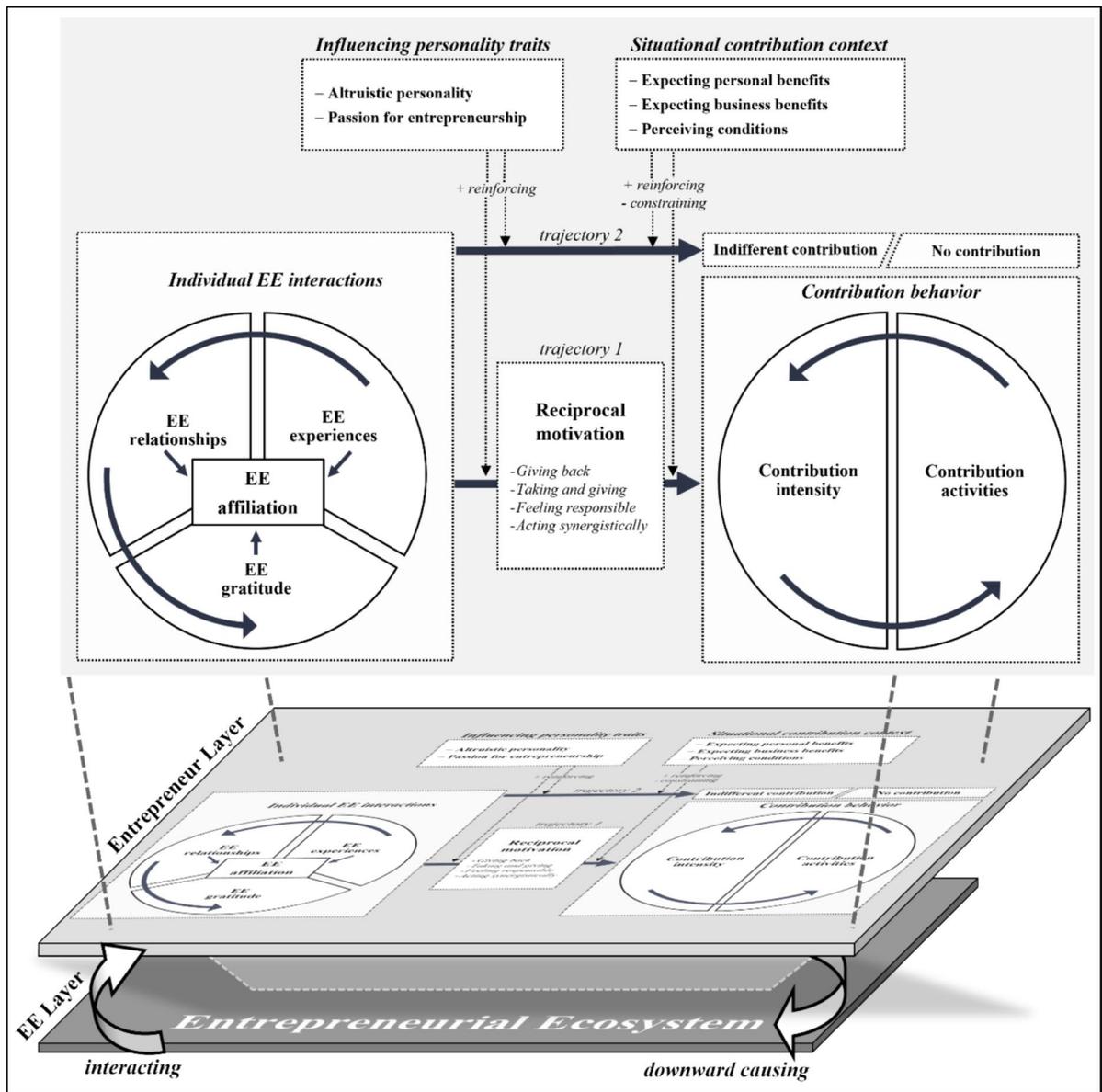
In conclusion, we further distilled our coding scheme containing first-order codes and second-order themes to aggregate dimensions and understand how those dimensions are interrelated (Gioia et al., 2013; Magrani & Gioia, 2022). Our engagement with the data entailed a thorough exploration of interrelationships between the developed constructs. Concurrently, we conducted a literature review encompassing entrepreneurial ecosystems, entrepreneurial behavior, organizational behavior, and entrepreneurial passion, seeking similarities and explanations. Subsequently, an initial model was formulated that delineates the underlying mechanisms of downward causation in

entrepreneurial ecosystems. This initial model served as a foundation that underwent continuous refinement through iterative engagement with data and extensive discussions within the core research team, involving insights from additional scientific and practical experts. This iterative and collaborative process ensured that our theoretical model was well grounded in the empirical data and provided a comprehensive understanding of the mechanisms driving contribution behavior within ecosystems.

## 4 Findings from the inductive data analysis

Our meticulous analysis of data drawn from 32 entrepreneurs within diverse entrepreneurial ecosystems in Germany yielded comprehensive theoretical constructs that elucidate the complex processes underlying the phenomenon. In light of our comprehensive findings, we propose an integrative process model that captures the relationships and interconnections among the revealed concepts and dimensions (Gioia et al., 2013). Figure 2 serves as a visual representation, illustrating both connections and coherences within the entrepreneurial context. This model posits that the genesis of downward causation converges at the level of the entrepreneur. The ultimate result—contribution behavior—is contingent on a complex process influenced by various interconnected factors.

Our model is grounded in the foundational framework of the *entrepreneurial ecosystem*. This ecosystem, represented as the EE layer, includes all incumbent actors and elements that provide resources to the entrepreneur and interact with them in various ways (Spigel, 2017; Wurth et al., 2021). These interactions are symbolized by an upward interacting arrow from the ecosystem to the entrepreneur. At the entrepreneur level—emergent and interconnected as a layer above the ecosystem—several micro-foundational interactions and mechanisms determine the subsequent trajectory of the entrepreneur. These individual entrepreneurial ecosystem interactions emphasize the interconnected and contingent relationships between four critical elements: experiences, relationships, gratitude, and affiliation. Positive experiences often stem from robust support structures, while negative experiences can diminish the overall perception of the ecosystem. These experiences feed into relationships, which are established with various ecosystem



**Fig. 2** Process model of the foundations of entrepreneurs’ contribution behavior to entrepreneurial ecosystems

actors such as other startups, universities, mentors, and supporting institutions. These relationships, in turn, influence the entrepreneur’s sense of gratitude toward the ecosystem and its actors. Together, experiences, relationships, and gratitude shape the sense of affiliation, capturing the degree of belonging that entrepreneurs feel towards the ecosystem. The interplay between these elements creates an interdependent cycle. This cyclical interaction determines the

entrepreneur’s trajectory. A robust expression of these aspects leads to trajectory 1, driven by a reciprocal motivation to contribute, fostering contribution behavior as entrepreneurs seek to “give back” to the system that supported them. Conversely, a weaker expression might result in minimal or no contribution, reflecting trajectory 2.

The *influencing personality traits* dimension of our model delves into the intrinsic characteristics

of entrepreneurs that shape their motivation to contribute to the entrepreneurial ecosystem. This dimension encompasses two primary traits: altruistic personality and passion for entrepreneurship. When these traits are strongly expressed, they act as reinforcing agents, enhancing the likelihood of reciprocal motivation. Entrepreneurs with a strong altruistic personality are driven by a desire to help others and contribute to the greater good, reinforcing the trajectory towards reciprocal motivation. Similarly, a high level of entrepreneurial passion motivates them to inspire and support others, further strengthening this trajectory. The situational contribution context, including the expectation of personal and business benefits and perceived conditions, also impacts these trajectories. Favorable conditions and perceived benefits can reinforce the trajectory toward contribution behavior, while unfavorable conditions and a lack of perceived benefits can constrain contributions.

The contribution behavior within our model is defined by two interrelated dimensions: contribution intensity and contribution activities. These dimensions exist in a reinforcing cycle, where each influences and amplifies the other. Contribution intensity refers to the frequency and regularity of contributions made by entrepreneurs to their ecosystem. A high contribution intensity is characterized by consistent, proactive involvement in ecosystem activities. Contribution activities encompass the specific activities undertaken by entrepreneurs, including mentoring, providing feedback, sharing knowledge, and participating in ecosystem events. This final section of the model captures the entrepreneur's contributions back to the ecosystem, depicted by the downward causing arrow returning to the ecosystem level. This interaction underscores the fact that the entrepreneur's contribution behaviors are not isolated actions but are part of a bidirectional relationship with the ecosystem.

#### 4.1 Individual entrepreneurial ecosystem interactions

Our analysis confirms that entrepreneurs' contribution behavior to entrepreneurial ecosystems is not random but contingent on various past and ongoing interactions of the entrepreneur within the ecosystem that gradually emerge. These cover collecting experiences and the emergence of relationships within the entrepreneurial ecosystem, as well as gratitude toward

the ecosystem and its actors, perceived affiliation, and a reciprocal motivation to contribute (see Table 3). During interviews, although lacking a concrete definition of an entrepreneurial ecosystem, entrepreneurs associated the term with their environment, aligning with prevalent definitions (Spigel, 2017; Stam, 2015).

Entrepreneurs' entrepreneurial ecosystem experiences shaped their evaluations, categorizing them as generally positive, negative, or indicative of thriving development. Positive evaluations often stemmed from robust support structures. An example of a positive evaluation is the statement of entrepreneur #06: "So we already have the feeling that there is support. We received support from the university, startup funding, and the startup center, which enabled us to get into the incubation program. And that gave us everything we needed, an office and a certain amount of funding to get started." In addition, this theme encompasses appraisals of discrete support structures and actions, including public funding, which provided "time to test out an idea and then also relatively quickly determine okay, runs or does not run" (entrepreneur #01), access to know-how or funding, available facilities, and supportive actors. Negative aspects include unqualified advisors, a lack of advice or programs, and heavy "bureaucratic burdens" (entrepreneur #29). Evaluations also considered the degree of involvement in the ecosystem, indicating that even startups in underdeveloped regions sometimes exhibited strong engagement due to fewer competing startups: "But our advantage was that there weren't so many of them and that they could really focus on us" (entrepreneur #21). The entrepreneurial culture within the ecosystem emerged as a significant experience, with diverse perceptions among entrepreneurs, for example: "there are other startups and a startup culture and a lot is going on around it" (entrepreneur #27) and "many people are then on the move in this area, pushing the whole issue of entrepreneurship forward" (entrepreneur #06).

Entrepreneurial ecosystem relationships played an important role in our findings, which aligns with the well-investigated importance of networks and relationships in ecosystems (A. Rocha et al., 2021; Spigel, 2017). Relationships with ecosystem actors, peer startups, and entrepreneurs during the EXIST GS funding period were highlighted. One entrepreneur explained that talking to other startups was extremely important to them as "there are many

**Table 3** Aggregate dimension: entrepreneurial ecosystem interactions

2nd-order themes	<i>Illustrative evidence</i> (informant; 1st-order concept; data source)
<i>Definition</i>	
Entrepreneurial ecosystem Experiences <i>Personal perception of positive and/or negative experiences of the entrepreneur with the EE and its actors</i>	<ul style="list-style-type: none"> <li>– “And I have to say that it’s one of the best environments to start something. Not only because of the reputation of the university or simply the whole network around it”</li> <li>– (Entrepreneur #03; Evaluating the EE; interview)</li> <li>– “But our advantage was that there weren’t so many of them and that the network manager could focus on us” (Entrepreneur #22; interview; EE involvement)</li> <li>– “There was an Entrepreneurial Tuesday or something like that, where external startup founders were invited once a month, always on Tuesdays, so there was already regular contact with startups and we had quite a few, quite cool startups in Berlin at that time”</li> <li>– (Entrepreneur #12; Entrepreneurship culture in the EE; interview)</li> <li>– “And we continued to receive comprehensive support from the whole team at university” (Entrepreneur #25; Receiving (no) support from the EE; podcast)</li> <li>– “It’s just that added value. At this early stage, I don’t think any of us would have entered the risk to carry ourselves voluntarily” (Entrepreneur #12; Receiving support from the EE; interview)</li> </ul>
Entrepreneurial ecosystem Relationships <i>Quality and expression of relationships of the entrepreneur with the EE and specific actors</i>	<ul style="list-style-type: none"> <li>– “That was the next level, and these relationships got us ready, so to speak. I’d say they were extremely important for the next class of investors and also for the next stage of development in the market, and they’re all still around today. They basically work with us in a kind of advisory board”</li> <li>– (Entrepreneur 24; Relationship to EE actors; interview)</li> <li>– “We shared an office with other founders and other teams and so on, that was also definitely helpful, that you could have a bit of an exchange with them, that was a huge room and there were then five teams or so accommodated, with whom you naturally had the exchange about various topics” (Entrepreneur #28; Relationship to startup peers; interview)</li> <li>– “...our EXIST mentor, the one from the university, ultimately the head of the faculty, he still sits on our advisory board today, so he has been since day one because he is also one of the few business angels here in Hannover, who has been involved in our path from the very beginning and has pushed us in the right direction...” (Entrepreneur #09; Relationship to mentor/coach; interview)</li> </ul>
Gratitude <i>Feeling of gratitude to the overall EE or its actors for their support and help</i>	<ul style="list-style-type: none"> <li>– “Of course, I have also experienced a lot of promotion myself, I must say that quite clearly. And of course, that’s more likely to happen here in the region, that’s quite clear”</li> <li>– (Entrepreneur #01; Appreciation to the EE; interview)</li> <li>– “Thanks to our ecosystem for the enduring great support”</li> <li>– (Entrepreneur #29; Appreciation to the EE; LinkedIn post)</li> <li>– “So, when N. N. calls, I call him back if I can help him, and I do. Because he has played a major role in ensuring that we exist as a company” (Entrepreneur #29; Appreciation to EE actors; interview)</li> </ul>

**Table 3** (continued)

2nd-order themes Definition	Illustrative evidence (informant; 1st-order concept; data source)
EE Affiliation <i>Degree of feeling of affiliation of the entrepreneur to the EE</i>	<ul style="list-style-type: none"> <li>– “You feel, you feel affiliated...” (Entrepreneur #28; Feeling EE affiliation; interview)</li> <li>– “It’s just a small family that you get to know step by step. And we’ve just been there for two years now” (Entrepreneur #13; Feeling EE affiliation; interview)</li> <li>– “I don’t feel like I belong to the Hamburg startup ecosystem” (Entrepreneur #29; Feeling no EE affiliation; interview)</li> <li>– “At some point, however, you grow out of this local ecosystem, depending on what kind of target group you have” (Entrepreneur #11; Diluting EE affiliation; interview)</li> </ul>
Reciprocal Motivation <i>Entrepreneurs’ motivation to repay what they received from the EE</i>	<ul style="list-style-type: none"> <li>– “We are always very happy to support our ecosystem and the entrepreneurs in it. So we are very, very happy to give that back because we have received a lot and we hope to keep that principle going” (Entrepreneur #24; Giving back to the EE; interview)</li> <li>– “I think everyone would give that back because you’ve experienced it yourself somehow” (Entrepreneur #07; Giving back to the EE; interview)</li> <li>– “Give and take. And if you start with a lot of giving, then you know it will somehow come back to you” (Entrepreneur #07; interview; Giving and taking)</li> <li>– “So, I think you also owe it to pass on ideas when you have gained experience yourself” (Entrepreneur #27; Feeling responsible; interview)</li> </ul>

startups that have similar problems [...]. So we talk super often about how to approach that a little bit better. It’s also easier to get pilot projects, at least, through networks” (entrepreneur #20). This relationship with other entrepreneurs and the approach to creating synergies with them stood out in various statements. Relationships extended to the university, mentors, and supporting institutions, acting as essential reference points. Entrepreneur #08 even sees the associate from the transfer office as “our mom for everything, because she was practically sitting one floor below us. If we had any questions, we could go directly to her.” Another frequently named key person is the mentor or coach of the entrepreneur. In many cases, this role is taken by a university professor, such as for entrepreneur #11, who supported the team with his institute and who “was on his toes and was very committed to the topic and was also keen on giving technical tips and so on.” Others referred to relationships with supporting institutions, such as public startup and technology centers or incubators, in which they spent some time or are still located. Some entrepreneurs expressed a strong connection to their region, which influenced their decision to

stay despite potential benefits elsewhere. Statements mostly include personal or private topics, such as “We feel at home here” (entrepreneur #04) or “We are four people, we are already rooted here with women, child, etc.” (entrepreneur #23). Interestingly, a lot of entrepreneurs actively continued or nurtured their relationships with specific persons or institutions: “He has remained connected with us to this day, has also become an investor with us and we still do every month our mentor meeting since 2015” (entrepreneur #03). In contrast, some entrepreneurs mention that they have had no relationships with specific persons, e.g., “but I can’t really say that we were really shaped by anyone (entrepreneur #27),” or with institutions in the ecosystem, e.g., “apart from EXIST funding, however, we did not have any relationship with them, nor did we follow up on them in any way, nor did they develop any further” (entrepreneur #14).

Building on those relationships, many entrepreneurs—especially those with close relationships—feel *gratitude* toward the entrepreneurial ecosystem and/or to individual actors for the support and help that they received in their early startup phase: “We just found it extremely great that people just

voluntarily said, ‘yes, of course! I’ll take my time and we’ll chat and you can ask anything you want’” (entrepreneur #17). This deep appreciation for support and devotion is also echoed by entrepreneur #06: “We were happy for any support because we just jumped in at the deep end, we didn’t have much of a clue and so we were super happy that we got some form of support. I’m still extremely grateful for that today.” However, it became obvious that this feeling of *gratitude* to the overall entrepreneurial ecosystem and its actors for their support and help is conditional on the relationships mentioned earlier.

This dependence on experiences, relationships, and gratitude particularly applies to what we interpret as *affiliation to the entrepreneurial ecosystem*. The expression of belonging, attachment, or affiliation was frequently stated by the entrepreneurs. Such constructs also draw from organizational identification literature (Ashforth et al., 2008; Wiesenfeld et al., 2001). Two categories were identified: feeling affiliated or not. Affiliated entrepreneurs, for example, commented: “So I think, in any case, we are part of the ecosystem” (entrepreneur #07) and “I will always feel part of the ecosystem” (entrepreneur #30). Some of the more experienced entrepreneurs even consider themselves to be “the old hand” (entrepreneurs #18 and #29) in the ecosystem. On the other hand, a nonaffiliated entrepreneur remarked: “So regionally not at all. So, I don’t feel like I belong to the startup ecosystem, you can’t say that” (entrepreneur #29). This mostly goes along with a weak or no presence of the earlier mentioned dimensions: “That is, there are some things that are missing. So, I was missing, above all, a bit of a mentor person, who is the old hand, figuratively speaking, who already has years of professional experience and can simply save you a bit of work in some situations. And some kind of mentoring or something like a pool of experts that you can call on at that point...” (entrepreneur #32).

As a consequence of the previously mentioned dimensions, *reciprocal motivation* is a central dependency in the emerging theoretical construct. Several interviewed entrepreneurs explained that they “have also received a lot there, and you can definitely give that back sometimes” (entrepreneur #01) and that “everyone gives back again because you have experienced that somehow” (entrepreneur #04). Entrepreneur #26 even believed that “that’s the only way it works in the ecosystem. We have benefited massively

from the fact that people have taken the time to help us out free of charge. Yes, and so ultimately there is also the self-image of giving back exactly that.” Others also considered it to be “give and take” (entrepreneur #13) or expected a future return: “On the other hand, you always think to yourself, or I always think to myself, you always see each other twice in life, so who knows, maybe he can help us some time” (entrepreneur #07). Some entrepreneurs even had a “sense of responsibility, I’ll say now, that I, that when someone asks me, that I also do it very gladly” (entrepreneur #17). In conclusion, individual entrepreneurial ecosystem interactions play a crucial role in shaping entrepreneurs’ reciprocal motivation and ultimately their contribution behavior.

#### 4.2 Contribution behavior

This section examines contribution behavior, classified according to the evidence presented in Table 4. Different manifestations and characteristics of such behaviors can be identified. Entrepreneurs who specify *contribution activities* also indicate that these are accompanied by a distinct regularity or contribution intensity, which can be divided into two categories: proactive contribution and occasional contribution. Proactive contribution includes entrepreneurs who usually have “various projects, where I am involved” (entrepreneur #03), who “help, whenever you can help” (entrepreneur #09), or who are “always open at events if someone wants something from me, then he can just chat me up, write, I’m open” (entrepreneur #22). This category involves high frequency and proactiveness in their contributions. Occasional contribution is characterized rather through “now and then” behavior (entrepreneur #29), in most cases “upon request” (entrepreneur #05) from an ecosystem actor.

Contribution activity encompasses specific actions undertaken by entrepreneurs to the entrepreneurial ecosystem. One frequently mentioned topic is startup peering, which means to “talk to other startups in any case” (entrepreneur #20) or to be “good friends with some founders with whom I exchange very closely” (entrepreneur #15). Additionally, more experienced entrepreneurs assume mentorship roles. We distinguish between formal mentoring, which refers to “organized mentoring programs” (entrepreneur #03), and informal mentoring, which implies “regularly two, three hours, meet them for a coffee and just

**Table 4** Aggregate dimension: contribution behavior

2nd-order themes Definition	Illustrative evidence (informant; 1st-order concept; data source)
Contribution intensity The regularity, occasions, and intensity of contribution activities	<ul style="list-style-type: none"> <li>– “We have also always been the ones who have gladly helped the incubator. When evening events are held and the startups, i.e. the companies, also want to see the startups and so on that are in the building, we were always there and introduced ourselves, we are always present” (Entrepreneur #21; interview; Proactive EE contribution)</li> <li>– “Yes, I do that from time to time when I’m asked. So a large part of the, yes, I have a quasi constant flow of these requests from Humboldt University, so from my alma mater. And I have another flow from my network of ex-employees, other founders, who say, talk to them, maybe you can help” (Entrepreneur #12; interview; Occasional EE contribution)</li> </ul>
Contribution activities The concrete expression or manner of contribution behavior	<ul style="list-style-type: none"> <li>– “I also have intensive exchanges with other founders here”</li> <li>– (Entrepreneur #18; interview; Startup peering)</li> <li>– “For me, part of being a founder is sharing your experiences, passing things on”</li> <li>– (Entrepreneur #20; Passing on experience &amp; know-how; interview)</li> <li>– It usually helps if you meet them for a coffee for two or three hours and just listen to the idea, give tips, and answer questions” (Entrepreneur #10; Giving hints &amp; advice; interview)</li> <li>– “I’m part of a lot of different mentoring programs here”</li> <li>– (Entrepreneur #03; interview; Formal mentoring)</li> <li>– “I’m also a business angel myself, so that’s where I provide support”</li> <li>– (Entrepreneur #29; Being a business angel; interview)</li> </ul>
No/indifferent contribution No or indifferent contribution behavior	<ul style="list-style-type: none"> <li>– “I’m not doing that” (Entrepreneur #15; No EE contribution; interview)</li> <li>– “I don’t have a contribution area in my environment now” (Entrepreneur #11; No EE contribution; interview)</li> <li>– “Sporadically. If we go somewhere, to put it bluntly, if we are driven somewhere and there is an event, I don’t know, a month ago there was a lunch, we were invited here, then we met with others” (Entrepreneur #29; Indifferent EE contribution; interview)</li> </ul>

listen to the idea, give tips, answer questions” (entrepreneur #10). Many entrepreneurs just give “hints and advice” (entrepreneur #08) to younger entrepreneurs and startups or “just try to pass on experience” (entrepreneur #01). Regular attendance at entrepreneurship events within the entrepreneurial ecosystem is also an activity, e.g., entrepreneur #24 states that “there was no conference where we canceled that comes maybe once a quarter in this form.” This sometimes also includes holding a keynote speech or being a jury member for business plan competitions. Engaging with universities comprises activities such as “lectureships” (entrepreneur #18) and “guest lectures” (entrepreneur #01). Some entrepreneurs actively take on the role of a business angel (entrepreneur #29). To further evaluate these insights, consulting digital artifacts was immensely perceptive. Most entrepreneurs were very active in communicating their contribution activities on social media and we could reconstruct their activities and frequency of activities over the last few years. Nevertheless, our analysis also revealed instances of *no* or *indifferent contribution*. No contribution refers to entrepreneurs who do

not contribute or who contribute very little. We also identified what we considered an indifferent contribution. This is related to very erratic, unsystematic, and especially ecosystem-unspecific activity.

#### 4.3 Contingencies: personality traits and situational contribution context

In our analysis of personality traits such as *altruism* and *passion for entrepreneurship*, we observed that these traits predominantly exert a reinforcing influence on the reciprocal motivation of entrepreneurs to contribute to their ecosystems. The extent of this reinforcement varies based on the individual intensity of these traits, as shown in our data (evidence can be found in Table 5). A low expression or absence of these traits does not necessarily inhibit contribution behaviors but does not enhance them to the same extent as their presence.

Altruism, characterized by the desire to help others or society without expecting a return, plays a significant role in the motivation of entrepreneurs to contribute. This is evident in statements such as

**Table 5** Aggregate dimension: influencing personality traits

2nd-order themes	<i>Illustrative evidence</i> (informant; 1st-order concept; data source)
<i>Definition</i>	
Altruistic personality <i>Personality trait with the ultimate goal of increasing another entrepreneur's success</i>	<ul style="list-style-type: none"> <li>– “I mean, that’s why I’m making this contribution, too, because I figure, hey, if it helps someone” (Entrepreneur #05; Being keen on helping others; interview)</li> <li>– “So yes, I would say that I am always ready for that” (Entrepreneur #13; Being keen on contributing; interview)</li> <li>– “I think you can avoid mistakes if you know there’s one lurking. And then you can just save everybody time that it affects. I’m not a fan of knowingly letting people run in somewhere for the learning effect” (Entrepreneur #22; Preventing others from making mistakes; interview)</li> <li>– “So that this spirit of entrepreneurship is simply passed on a little. The things that characterize entrepreneurship are somehow also part of education” (Entrepreneur #18; Supporting socioeconomic development; interview)</li> </ul>
Passion for entrepreneurship <i>Consciously accessible, intense positive feelings experienced by engagement in entrepreneurial activities associated with roles that are meaningful and salient to the self-identity of the entrepreneur</i> (Cardon et al., 2009)	<ul style="list-style-type: none"> <li>– “It’s important to me personally. It worked out well for us. I’m convinced that it’s great to be able to build something yourself with a startup and, in case of doubt, even be successful with it” (Entrepreneur #27; Being committed to entrepreneurship; interview)</li> <li>– “It’s just my thing, I’m interested in technology and new ideas” (Entrepreneur #05; Being curious about business concepts; interview)</li> <li>– “So, I want to be in a role at some point where I’m not doing anything other than enabling people” (Entrepreneur #04; Inspiring others; interview)</li> <li>– “Yes, definitely. So surprising. That always surprises me when we are the old hands, so to speak, and pass on knowledge” (Entrepreneur #27; Acting as a role model; interview)</li> <li>– “So that you simply pass on this spirit of entrepreneurship a little bit. That which also characterizes entrepreneurship is somehow part of education” (Entrepreneur #01; Promoting entrepreneurship; interview)</li> </ul>

that by entrepreneur #11 expressing a desire “to help people,” and the one by entrepreneur #06 deriving “personal enjoyment” from assisting others. Additionally, preventing other entrepreneurs from making mistakes is a frequently mentioned factor: “That is in the very, very early phase one of the most important things from my point of view to take away fears, to take away ambiguities, to say where you might have to pay attention” (entrepreneur #10). Notably, experiences of lacking support in the early stages of entrepreneurship drive some entrepreneurs to contribute: “I didn’t have any support in my early days, at least not that, in the areas where I would have liked to have that in addition, and accordingly, I’m doing that” (entrepreneur #02). The other identified personality

trait is what we have interpreted as passion for entrepreneurship. Entrepreneurial passion is a widely studied theme in entrepreneurship research, influencing entrepreneurial cognition, entrepreneurial behavior, and venture growth (Cardon et al., 2009). Nearly all of the interviewed entrepreneurs expressed a strong connection to entrepreneurship, viewing it as part of their self-identity. This was reflected by being committed to their startup but also to entrepreneurship in general; entrepreneur #10 thought it is “always truly cool when people just have ideas and implement them and not go the classic way.” Similarly, several entrepreneurs wanted to promote entrepreneurship and motivate others to become entrepreneurs themselves: “So I think that overall, we need more founders in

this country, and in my view, there are too few female founders in particular” (entrepreneur #27).

In addition to personality traits, contingencies surrounding contribution behavior contain a situational context, including *conditions* and *expectations of personal or business benefits* (see Table 6). Entrepreneurs navigate these contingencies as they decide whether, and if so how, to contribute, considering both the potential advantages and challenges they face. The nuanced interplay between these reinforcing and potentially constraining factors illustrates the complex decision-making process entrepreneurs undergo.

First, entrepreneurs require specific personal resources, such as time and capacity, for contribution behavior: “So the first criterion is at least I have time and if I don’t have time, someone else [from our company] has time who can do it” (entrepreneur #27). Most entrepreneurs consider their job as a company leader to be highly intensive and time-consuming as well as “very, very busy” (entrepreneur #19). Therefore, it must not be “extremely time-consuming now” (entrepreneur #13). Following this, the entrepreneurs mentioned a fitting skill set on their part for the contribution activity, mainly asking “how it is in terms of content, so does that fit in my skill set? Can I contribute something or not?” (entrepreneur #20) or “how much expertise do we have in this area?” (entrepreneur #27). These considerations highlight the reinforcing nature of skill alignment but also the constraining effect when there is a mismatch, as entrepreneur #27 points out the deterrent effect of lacking relevant expertise.

Requests from the entrepreneurial ecosystem or specific actors prompt contribution, emphasizing the role of external initiatives in mobilizing entrepreneurs: “So only on demand. So, if someone comes and says, hey, can we exchange ideas? I’m always open, I’m happy to help where I can” (entrepreneur #05). However, we also see entrepreneurs considering the relevance of their contribution. This means that entrepreneurs ponder the outcome and effect of their contribution and “if that feels like it’s something that makes sense for the startup scene, and is kind of something that has substance, I’d go with that” (entrepreneur #09). For some, it is also a question of convenient accessibility, such as a short distance to the event or activity.

Entrepreneurs also consider the strategic fit of the contribution opportunity with their business goals and personal development. They are motivated by the potential for personal and professional benefits but are cautious of engagements that may not yield tangible outcomes. Personally, several entrepreneurs perceived their contribution activities as a chance through which they “somehow got to know new, exciting things again” (entrepreneur #24) or to “go back into the subject matter a little bit yourself” (entrepreneur #17). Additionally, the contribution forces the entrepreneur to “think about it again and again. Therefore, it helps enormously to keep questioning and reflecting, and to recalibrate” (entrepreneur #01). Sometimes it appears “inspiring” (entrepreneur #19) and increases the entrepreneur’s “self-efficacy” (entrepreneur #05). Contributing to the ecosystem also serves as a form of “personal acknowledgment” (entrepreneur #24) and it confirms “that you have made progress in some way. That’s success feedback, I’d say” (entrepreneur #23).

Potential benefits for the business include expanding the business network: “So I think in the first moment in any case network expansion because you get to know people (entrepreneur #19). Furthermore, the recruiting potential of “former founders or others, who may also be potential team members at some point in the future” (entrepreneur #17), or the “awareness, publicity, and so on” (entrepreneur #04) for the startup can play a role through being present in the ecosystem and contributing. “If I don’t see this adding value, I think twice about getting involved,” says entrepreneur #27, pointing out the need for contributions to have clear benefits.

In conclusion, the interplay between personality traits and situational context shapes the trajectories of entrepreneurs, demonstrating the ongoing complex interdependencies between the multifaceted motivations and contemplations that entrepreneurs navigate as they engage in, or abstain from, contribution behavior.

#### 4.4 Trajectories of downward causing contribution behavior

We next address the second core element of our research question: why entrepreneurs contribute to the evolution of an entrepreneurial ecosystem and its

**Table 6** Aggregate dimension: situational contribution context

2nd-order themes <i>Definition</i>	<i>Illustrative evidence</i> (informant; 1st-order concept; data source)
Contribution conditions <i>Perceived framework, prerequisites, and conditions for a contribution activity</i>	<ul style="list-style-type: none"> <li>– “I always have to say, if we have time and capacity or resources” (Entrepreneur #06; Requiring personal resources; interview)</li> <li>– “If I had more time. Well, then I would do it more. But I just don’t have enough time at the moment” (Entrepreneur #30; Requiring personal resources; interview)</li> <li>– “Another question is to what extent it adds value for the audience because otherwise, it’s just a waste of time for both of them” (Entrepreneur #31; Seeing contribution relevance; interview)</li> <li>– “Yes, that for one thing or I find with a founder that he has a similar spirit to what I had at the time” (Entrepreneur #16; Feeling an attitude proximity; interview)</li> <li>– “But if you realize that the mindset of the person making the request doesn’t match and somehow what you want to get across doesn’t come across and you hit a wall, then I would let it come to an end” (Entrepreneur #13; Feeling an attitude proximity; interview)</li> <li>– “It’s really this proximity. So because it is of course much easier to drive up to our university on its entrepreneurship day than to say now, we are going to Düsseldorf” (Entrepreneur #06; Having a convenient access; interview)</li> <li>– “The second is how much expertise I really have” (Entrepreneur #27; Having a skill fit; interview)</li> </ul>
Expecting business benefits <i>The degree of expected benefits for the startup of the entrepreneur</i>	<ul style="list-style-type: none"> <li>– “That’s why I like doing it and it’s always good for my business because I get to know someone again” (Entrepreneur #21; Expanding business network; interview)</li> <li>– “The third is, of course, recruiting. You give a guest lecture, you give a presentation, talk to people and think: hey, honestly, if it doesn’t work out, you can come to us” (Entrepreneur #01; Generating recruiting potentials; interview)</li> <li>– “Of course, with us, there’s always a bit of an ulterior motive. Well, we can get our name out there again somehow” (Entrepreneur #07; Creating awareness &amp; publicity; interview)</li> <li>– “I also receive input into business, where I can say, dear colleagues here, look, I’ve talked to a startup and they’ve chosen the following approach” (Entrepreneur #12; Creating business input; interview)</li> <li>– “No, if the startup isn’t benefiting from it, I’m quite critical of it. We currently have to use every resource for our business. Such sideshows can also be a hindrance” (Entrepreneur #14; No business benefit recognizable; interview)</li> </ul>
Expecting personal benefits <i>The degree of expected benefits for the entrepreneur themselves</i>	<ul style="list-style-type: none"> <li>– “And because I also have a learning experience through it” (Entrepreneur #15; Training &amp; personal development; interview)</li> <li>– “So that helps enormously to question our own business, our approach, again and again, to reflect and then to recalibrate” (Entrepreneur #01; Reflecting yourself; interview)</li> <li>– “It satisfies to help entrepreneurs or the ecosystem” (Entrepreneur #21; Being satisfied; interview)</li> <li>– “So it feels like so to speak, an acknowledgment at the end of the day” (Entrepreneur #03; Getting personal acknowledgment; interview)</li> <li>– “It shows that you’ve somehow already made it as far as we have, which is of course also very cool and not an everyday occurrence” (Entrepreneur #24; Being proud; interview)</li> <li>– “The feeling of being needed is not bad” (Entrepreneur #22; Increasing self-efficacy; interview)</li> <li>– “If I personally don’t get anything out of it, I don’t have to invest any time” (Entrepreneur #16; No personal benefit recognizable)</li> </ul>

elements. Our findings reveal two principal trajectories entrepreneurs follow based on their interactions within the ecosystem. These trajectories either result in the observed contribution behavior or, alternatively, in an indifferent behavior or even no contribution. Importantly, the direction of these trajectories is not dictated solely by the presence or absence of specific factors; rather, it emerges from the interplay between individual interactions with the ecosystem and its elements.

Entrepreneurs who exhibit a strong sense of reciprocal motivation—characterized by a desire to “give back” (entrepreneurs #07, #24, #28) or feeling “responsible to support the ecosystem” (entrepreneurs #17, #22)—often have a history of meaningful and prolonged engagement with the ecosystem. These interactions, spanning both past and present, cultivate a sense of affiliation, driven by accumulated personal experiences, positive and negative, sustained relationships with key actors, and even a sense of gratitude. This affiliation is not tied to the productivity or state of the ecosystem but to the entrepreneur’s personal perceptions, such as appreciation for ecosystem efforts or lasting connections. For instance, entrepreneur #06 captures this sentiment: “In the end, I feel rooted in the regional startup scene and we have benefited greatly from the help of many institutions and other founders who are still friends today. Of course, not everything was always perfect. But nonetheless, I see such [contribution] activities as a personal obligation.” Such reciprocal motivation serves as a critical driver of contribution behavior, facilitating the emergence of downward causation.

However, this path-dependent trajectory is not uniform; its outcomes are further shaped by individual personality traits and situational contexts. While reciprocal motivation frequently drives consistent contribution behaviors, it may occasionally lead to irregular patterns due to these personal and contextual factors.

Conversely, we identified a second trajectory among entrepreneurs with low or no affiliation to the ecosystem. These individuals often lack meaningful experiences or sustained relationships within the ecosystem and may even question its existence or relevance. Their limited interactions and weaker connections are often tied to a lack of personal resonance with the ecosystem. While this trajectory typically results in little to no contribution behavior, certain intrinsic traits, such as altruism, or situational

incentives, like the expectation of tangible benefits, can temporarily prompt contributions. However, these behaviors are not sustained by long-term motivation and tend to be transient and situational.

Overall, our findings suggest that contribution behavior emerges from a complex interplay of relational dynamics and individual perceptions of the entrepreneurial ecosystem. Entrepreneurs with a sense of affiliation and gratitude are more likely to engage in sustained contributions, while those with weaker connections may remain indifferent unless motivated by specific traits or situational factors. These themes underscore the critical role of both personal and contextual elements in shaping the trajectories of entrepreneurial engagement within ecosystems.

## 5 Discussion

The causal mechanisms within entrepreneurial ecosystems—particularly those related to downward causation—remain inadequately explored, despite their critical role in explaining how ecosystems evolve and sustain entrepreneurial activity (Wurth et al., 2021). Previous studies recognize the critical influence of entrepreneurs within these ecosystems (DeTienne, 2010; Garnsey & Heffernan, 2005; Mason & Harrison, 2006; Spigel, 2017) yet often overlook the nuanced and reciprocal nature of their motivations to contribute. This study extends this dialogue. Our findings illuminate the intra-layer processes and micro-foundational interactions that underpin entrepreneurial ecosystems (Stam, 2015; Stam & van de Ven, 2021; Wurth et al., 2021). The objective of this discussion is to delineate the theoretical implications of our model.

### 5.1 Theorizing the entrepreneurial perspective on downward causation

Entrepreneurial ecosystems are defined not only by the entities they comprise but also by the interactions between these entities that foster conditions conducive to innovation and entrepreneurship (Brown & Mason, 2017; Roundy et al., 2017; Wurth et al., 2021). In these ecosystems, entrepreneurs play a dual role as both outputs and catalysts, initiating a process of downward causation in which they recycle

their benefits back into the system, thereby modifying its structural framework (Stam & van de Ven, 2021; Wurth et al., 2021). This feedback mechanism is important for sustaining and enhancing ecosystem capabilities, suggesting that entrepreneurial actions contribute cyclically to the health and resilience of the ecosystem (Auerswald & Dani, 2017; Cavallo et al., 2019). This resilience is closely linked to the interplay between micro- and macro-level processes, and is contingent upon the dynamic interactions between entrepreneurs and other actors and institutions within the ecosystem (Cho et al., 2022; Roundy et al., 2017). Our findings elucidate the myriad ways in which entrepreneurs engage with ecosystem actors. This engagement can reinforce the ecosystem's capacity to support future entrepreneurial activities, highlighting the regenerative nature of these systems, akin to biological feedback loops where success fosters further success, enhancing the ecosystem's overall capabilities and resilience (Brown & Mason, 2017; Cavallo et al., 2019; Kuckertz, 2019; Sussan & Ács, 2017).

Central to our findings is the interaction between entrepreneurs and the resources of the entrepreneurial ecosystem. This is remarkable, as it aligns with theoretical insights suggesting that an entrepreneurial ecosystem is not a collection of isolated attributes but a network of synergistic interactions (Autio et al., 2018; Spigel, 2017; Theodoraki et al., 2018). Such interdependencies catalyze changes at the systemic level while also influencing individual outcomes, reinforcing the ecosystem's co-evolutionary nature. Entrepreneurs navigating these ecosystems engage in continuous interactions over time, which are instrumental in shaping their experiences (Thompson et al., 2018). These interactions, often contingent upon the entrepreneur's initial and evolving relationships with other ecosystem actors, underscore the significance of relational aspects. Far from being static, these relationships are dynamic entities that evolve, enhancing the ecosystem's structural complexity and its capacity for innovation (Mack & Mayer, 2016). Furthermore, the application of a social network perspective illuminates how robust ties among ecosystem actors not only expand the ecosystem's reach but also enhance its resilience (Clarysse et al., 2014; Scheidgen & Brattström, 2022; Theodoraki et al., 2018). Our model emphasizes the transformative role of these relationships, which serve as foundational antecedents to entrepreneurs' sense of gratitude and affiliation.

Affiliation is a defining characteristic of human behavior. In psychology, the term is used to describe a sense of involvement, closeness, and belonging within social groups or relationships (Baumeister & Leary, 1995; Wiesenfeld et al., 2001). The motivation behind such affiliations can be attributed to a number of factors, including social comparison, emotional support, and the desire for social contact (Hill, 1987; Veroff & Veroff, 1980). Our findings introduce the concept of entrepreneurial ecosystem affiliation, which emerges through an interplay of EE experiences, EE relationships, and gratitude. Examples of these themes can be observed in relationships with ecosystem actors, the experience of a positive regional culture, or the feeling of involvement in the ecosystem. Consequently, the degree of affiliation is contingent upon the specific interactions of the entrepreneur with the various elements of the ecosystem. The stronger and more positively these interactions are expressed, the greater the likelihood of a high degree of affiliation. In light of the aforementioned evidence, it can be concluded that entrepreneurial ecosystems are not merely theoretical constructs employed to examine regional entrepreneurship. Rather, they are perceived by entrepreneurs as vital and dynamic environments that exert a significant influence on their sentiments and actions. This highlights the importance of the sociocultural dimension of entrepreneurial ecosystems (Alvedalen & Boschma, 2017; Roundy et al., 2018; Wurth et al., 2021). Further conceptual depth is gained by drawing on the notion of local embeddedness—the extent to which entrepreneurs are situated within local social networks, cultural norms, and communities (Jack & Anderson, 2002; Korsgaard et al., 2015; McKeever et al., 2015). Like ecosystem affiliation, embeddedness reflects an emotional and relational connection with place, expressed through a sense of belonging and rootedness in its physical and social structures. Research on embedded entrepreneurship suggests that this rootedness can foster reciprocal behavior toward communities and the reconstruction or revitalization of place (McKeever et al., 2015; Redhead & Bika, 2022). This view supports our argument that reciprocal motivation is not merely transactional or rational, but also deeply emotional—anchored in social experiences, relationships and institutional ties. In sum, the role of affiliation in motivating and directing entrepreneurs on specific trajectories within the ecosystem indicates the existence of a profound and reciprocal

relationship between individual entrepreneurs and the broader ecosystem.

Traditionally, trajectories have only been associated with broad, system-level evolutionary dynamics, focusing on how entire ecosystems evolve and mature over time (Auerswald & Dani, 2017; Mack & Mayer, 2016). Our study challenges such views by demonstrating how individual interactions of entrepreneurs lead to co-evolutionary processes, emphasizing the role of path dependencies linked to downward causation in entrepreneurial ecosystems (Roundy et al., 2018; Wurth et al., 2021). Only a few studies have empirically explored how such path dependencies evolve and function. Cloutier and Messeghem (2022) examine the trajectories of sub-ecosystems and establish a link between these and path-dependent influences on ecosystem evolution. Our research extends this theoretical perspective further by offering empirical insights into the role of entrepreneurs and their interactions with the ecosystem. We can infer that the trajectory enabling downward causation and path dependence is not solely provoked by the state or capability of the ecosystem. Entrepreneurs from our sample were recruited from a variety of ecosystems, including the vibrant and large ecosystem of Berlin, but also nascent ecosystems in rural areas of Germany. However, our findings suggest that it is the entrepreneur's personal interactions with individual ecosystem elements (Stam & van de Ven, 2021) or attributes (Spigel, 2017), such as social (EE relationships) or cultural aspects (EE experiences), that exert influence and ultimately determine the trajectory of the entrepreneur towards contribution behavior. In this regard, our findings are both distinctive and comprehensive with respect to theory. We can assert that all ecosystems, irrespective of potential resource constraints or their developmental stage, have the capacity to facilitate the trajectory towards downward causing behavior enabling path dependency at the ecosystem level. In light of these considerations, we introduce a novel perspective to the field of evolutionary entrepreneurial ecosystems, elucidating how entrepreneurs are reciprocally motivated to engage in contribution behavior and facilitate path dependence (Cloutier & Messeghem, 2022; Roundy et al., 2018; Wurth et al., 2021).

As we propose that entrepreneurs themselves are directed along specific paths by their interactions with the ecosystem (Cosenz et al., 2024; Roundy &

Lyons, 2023; Wurth et al., 2021), a crucial trajectory within our model is characterized by reciprocal motivation. The idea of reciprocity draws heavily from social exchange theory, which posits that relationships and experiences shape an entrepreneur's motivation to contribute positively to their ecosystem (Cropanzano & Mitchell, 2005; Cropanzano et al., 2017). The central role of relationships (Spigel, 2017; Wurth et al., 2021) and interactions (Roundy et al., 2018) in the evolution of entrepreneurial ecosystems underscores the identified relevance of the norms of reciprocity and mutual benefit. Building on these insights, our findings contribute to advancing our theoretical understanding of entrepreneurial ecosystems as systems rooted in social structures (Rocha et al., 2021; Spigel, 2017; Stam & van de Ven, 2021; Wurth et al., 2021). This allows for a more profound use of social sciences, specifically including social exchange theory.

Our model further theorizes that the evolving interactions within entrepreneurial ecosystems shape the trajectories toward contribution behavior, influenced by individual-level traits and contextual perceptions. The findings of our research indicate that the presence of altruistic motivation has the potential to reinforce the trajectory of reciprocal motivation. The absence of dedicated social entrepreneurs in our sample highlights this persistence of altruism as a reinforcing personality trait. The role of altruism and other prosocial motives has been a topic of considerable debate in social entrepreneurship. Prevailing research suggests that social entrepreneurs are primarily driven by a desire to improve the well-being of others, simultaneously seeking personal fulfillment through the generation of well-being for others (Battson & Shaw, 1991; Douglas & Prentice, 2019; Miller et al., 2012). However, the extant evidence on the motivations of profit-oriented entrepreneurs indicates that these are primarily driven by the intention to accumulate financial wealth, pursue a political vision, or advance a community (Fauchart & Gruber, 2011; Sieger et al., 2016). While the communitarian identity may account for some of our observed evidence, such as a proactive role in supporting the activities of individuals recognized by entrepreneurs, these findings cannot be fully applied to our context. In this, entrepreneurs report that "helping gives pleasure" (entrepreneur #12), similarly to contributing because it just "helps someone" (entrepreneur #05). Considering

these findings, we are able to gain a novel insight into the field of entrepreneurial ecosystem research. Our work has led us to the conclusion that the presence of altruistic or prosocial motives influences trajectories toward supporting groups or individual actors, such as other entrepreneurs within the ecosystem.

Another remarkable insight from our findings is the prevalence of entrepreneurial passion in our sample. While there is a substantially growing body of research, including empirical insights that entrepreneurial passion influences various attitudes and behaviors of entrepreneurs (Newman et al., 2021), the notion of passion in the context of entrepreneurial ecosystems has not yet been raised. This is presumably related to the general neglect of micro-level mechanisms, including individual personality traits and characteristics of ecosystem actors (Roundy & Lyons, 2023). Although there are numerous approaches to measuring and analyzing entrepreneurial passion (Zhao & Liu, 2022), the role-based model specifically modeled for entrepreneurs (Cardon et al., 2009, 2013) shows the most salient relevance to the interpretation of our findings. This model incorporates the dimensions of identity centrality and intense positive affect, encompassing three core domains of entrepreneurship: inventing, founding, and developing. A closer look at our subordinate codes and evidence of our findings reveals the many parallels to this model. For example, “being a role model,” “promoting entrepreneurship,” and “inspiring others” include various aspects of identity centrality in all domains, especially founding and developing. In addition, “being curious about new business concepts” or products, as well as “being committed to entrepreneurship,” include several indications of the prevalence of intense positive feelings in the context of gaining motivation to contribute to a broader perspective of entrepreneurship than just one’s own business. In conclusion, while our study could not explore the very nuanced facets of entrepreneurial passion, we demonstrate that its dimensions can act as a catalyst, driving motivation to contribute to the ecosystem and thereby extending this construct to a new context.

The incorporation of the situational contribution context in our model reflects the strategic thinking of entrepreneurs, emphasizing their ability to assess and act upon opportunities that not only benefit

their immediate business interests but also contribute positively to the ecosystem. Ultimately, our findings demonstrate that the most salient forms of contribution activities are consistent with established behaviors noted within the broader literature. These contributions include facilitating connections and strengthening networks (Spigel, 2017), disseminating knowledge (Nicotra et al., 2018), acting as mentors or providing supportive activities to other entrepreneurs (Bosma et al., 2012; DeTienne & Robb, 2016; Mack & Mayer, 2016), and investing in new ventures as business angels (Mason & Harrison, 2006). Significantly, while these activities primarily target individual actors within the ecosystem, they are underpinned by a broader intention to enrich and fortify the ecosystem as a whole. This aspect of our model illustrates how entrepreneurial actions, rooted in a reciprocal motivation trajectory, form a framework of contributions that bolster the entrepreneurial ecosystem’s structure and function.

In summary, our model challenges the traditional view of entrepreneurs as benefiting players, underscoring their centrality in both shaping and being shaped by the ecosystem. The interactions, multilevel networks, and connectivity that entrepreneurs engage in are crucial, facilitating a rich exchange of knowledge and resources that propel entrepreneurial activities (Johnson et al., 2022; Scheidgen & Brattström, 2022). This approach not only enhances our comprehension of individual entrepreneurial actions within these ecosystems but also expands our understanding of how these ecosystems function as evolutionary social systems.

## 5.2 Contributions to entrepreneurial ecosystem theory

Our study makes several contributions to the dynamically evolving literature on entrepreneurial ecosystems. First, it enriches this literature by advocating a perspective that integrates evolutionary processes. Second, our research underscores the multilateral interplay between entrepreneurs and other ecosystem actors, contributing significantly to our understanding of ecosystem mechanisms, particularly downward causation. Third, by integrating micro-level interactions of ecosystem-embedded elements, we further

promote a micro-foundational approach in entrepreneurial ecosystem research.

Existing literature has often spotlighted the structural aspects of entrepreneurial ecosystems without fully delving into the underpinning interactions (Alaassar et al., 2022; Alvedalen & Boschma, 2017; Brown & Mason, 2017). By examining the nuanced exchanges between entrepreneurs and ecosystem actors, our study extends the discourse beyond static relationships to encompass the evolving interdependencies that drive ecosystem evolution (Autio et al., 2018). This approach not only highlights the complexity of entrepreneurial ecosystems but also aligns with theories that view ecosystems as interactive systems, where changes at any level can precipitate adjustments throughout the system (Roundy et al., 2018; Wurth et al., 2021).

A central contribution of our work is the elaboration of downward causation as a vital mechanism within entrepreneurial ecosystems enabling path dependencies. Traditionally, the focus has been on how ecosystem elements support entrepreneurial activities—upward causation. Our findings illuminate how and why entrepreneurs reciprocate this support, influencing and reshaping these ecosystems through their successes and interactions (Stam, 2015; Stam & van de Ven, 2021; Wurth et al., 2021). This perspective challenges conventional views that portray ecosystems as merely supportive backdrops for entrepreneurial activity, instead presenting them as dynamic entities shaped by the continuous input and feedback of their constituents. This study offers a novel theoretical perspective on the enabling role of individual entrepreneur interactions in relation to trajectories that facilitate path dependencies and influence ecosystem evolution (Cho et al., 2022; Roundy et al., 2018; Wurth et al., 2021).

Aligning with recent scholarly calls to deepen the micro-foundational understanding of entrepreneurial ecosystems, our study provides insights into why and how individual characteristics, interactions, and behaviors at the entrepreneur level can significantly influence broader ecosystem constitutions (Cosenz et al., 2024; Roundy & Lyons, 2023; Wurth et al., 2021). By focusing on the active roles of entrepreneurs, we detail how their strategic decisions,

resource allocations, and network interactions contribute to the evolutionary capacities of ecosystems. This micro-level analysis enhances the granularity of our understanding of entrepreneurial ecosystems and offers a more robust framework for examining how individual actions influence systemic outcomes.

In sum, this study contributes significantly to the entrepreneurial ecosystem literature by providing a detailed examination of the roles of entrepreneurs within these systems. It extends current theories by incorporating a reciprocal view of ecosystem interactions and sets the stage for future research to explore these interactions in even greater depth.

### 5.3 Implications for entrepreneurial ecosystem practitioners and policymakers

Our study not only advances theoretical discussions around entrepreneurial ecosystems but also has significant practical implications. By pointing out the resource-providing roles of entrepreneurs in entrepreneurial ecosystems, this research helps policymakers and ecosystem facilitators better understand where interventions can be most effective. Moreover, the emphasis on entrepreneur-driven feedback mechanisms offers strategies for enhancing ecosystem resilience through targeted support and resource allocation.

Practitioners can use these insights to develop programs that specifically support entrepreneurial efforts known to contribute positively to ecosystem dynamics. This may involve providing more accessible knowledge exchange channels, mentorship programs, and networking opportunities. The study also illuminates potential intervention points to actively engage entrepreneurs and sustain their contributions. Motivating entrepreneurs to support regional ecosystems through initiatives and specific measures can foster a thriving entrepreneurial environment. In this regard, acknowledging the heterogeneity among entrepreneurs is crucial. Customized approaches that consider the unique backgrounds, industries, and personality traits of each entrepreneur can lead to more effective ecosystem support. This tailored approach should extend beyond generic programs to include personalized interactions and support that address individual entrepreneurs' specific attitudes and goals.

Strong networks and relationships are foundational to a robust entrepreneurial ecosystem. Our research suggests that fostering these relationships among new and established entrepreneurs and ecosystem actors and institutions can significantly enhance the ecosystem's vibrancy. Programs that encourage networking and community building can be particularly effective, not just for business development but also for creating a sense of belonging and commitment among ecosystem participants.

We also reveal that the effectiveness of ecosystem support does not depend solely on the size or maturity of the ecosystem but rather on how well interventions are customized to meet local entrepreneurs' needs. Ecosystem governance should focus on creating flexible and responsive support mechanisms that can adapt to diverse entrepreneur requirements. This involves understanding the specific challenges and opportunities within local contexts.

Finally, understanding and facilitating the conditions that encourage entrepreneurs to feed back to their ecosystems can be a game changer. This involves not just providing resources but also creating an environment where contributions are recognized and valued. Establishing feedback loops where entrepreneurs see the tangible impacts of their contributions can reinforce their commitment to the ecosystem and inspire continuous engagement.

#### 5.4 Limitations and future research potential

Despite the study's insights, the research carries limitations that suggest directions for future inquiries. First, our findings are derived from a sample of German entrepreneurs, which raises questions about the generalizability of our conclusions across different cultural and economic contexts. In particular, extending this line of inquiry to emerging and developing economies may offer valuable theoretical insights. For instance, reciprocal ecosystem contributions—especially those driven by emotional and prosocial motivations—may be even more pronounced in resource-constrained environments. In such settings, entrepreneurial ecosystems often operate within institutional voids and structural gaps (Cao & Shi, 2021), making socially embedded mechanisms

and individual agency especially critical. Moreover, downward causation could be extended to diaspora entrepreneurs, who may engage with and contribute to multiple ecosystems simultaneously (Appel & Oreg, 2020; Elo et al., 2022). Future research could investigate how transnational reciprocal motivations—shaped by migration experiences, cultural affiliations, and global mobility—manifest in multi-local ecosystem engagement and contribution behavior. Relatedly, research by Hans and Vissa (2023) shows that entrepreneurs' engagement in social change efforts varies across cultural contexts and is shaped by social origin, status, and international experience. Taken together, these insights call for a geographically sensitive understanding of why and how entrepreneurs “give back” across diverse regional ecosystems.

Second, while our analysis provides insights how downward causing behavior is enabled at the level of the entrepreneur, there remain open questions about how such behavior translates into enduring, path-dependent transformations at the system level (Cloutier & Messeghem, 2022; Wurth et al., 2021). While path dependency is typically observed in regional institutions, it is worth examining empirical evidence on how downward causation gives rise to path-dependent alterations in social or cultural elements, or how such influences are addressed by governance strategies. Future research could explore this micro–macro link more systematically by employing ecosystem-wide data collection methods, such as network analysis or regional ecosystem surveys (Cosenz et al., 2024; Scheidgen & Brattström, 2022). Such approaches would enable researchers to trace how individual entrepreneurial actions contribute to broader structural shifts and feedback mechanisms within the ecosystem over time.

Third, given our study introduces several novel micro-level concepts into entrepreneurial ecosystem research—some adapted from broader entrepreneurship scholarship and others newly conceptualized—there remains significant opportunity to deepen and expand their theoretical development. Two areas stand out in particular: entrepreneurial passion and entrepreneurial ecosystem affiliation. While we integrate entrepreneurial passion into ecosystem theory, our analysis only scratches the surface of its diverse

manifestations and systemic implications. Passion has long been recognized as a powerful driver of opportunity recognition, venture persistence, and entrepreneurial outcomes (Newman et al., 2021). It is plausible to assume that this affective driver influences how ecosystem actors engage with ecosystems and influence diverse mechanisms. Future research could explore more granular measures of passion (Zhao & Liu, 2022), its ecosystem-level implications, and how contextual conditions—such as resource munificence or institutional support—moderate the effect of passion on upward and downward causation. Equally promising are inquiries into how passion diffuses through ecosystems: for instance, how it is shared via mentoring, peer support, or role modeling, and how such contagion shapes ecosystem-wide behavior and identity.

Fourth, building on our concept of entrepreneurial ecosystem affiliation, we also identify parallels with research on entrepreneurial embeddedness. Embeddedness scholarship shows that entrepreneurs are not only shaped by their communities but also act as agents who reshape local institutions, cultures, and relationships (McKeever et al., 2015). This perspective aligns with our finding that emotional bonds with the ecosystem can inspire reciprocal contribution behaviors. Future work could explore how such affiliation emerges from interactions with ecosystem elements and actors and how it influences outcomes.

In a parallel vein, the concept of entrepreneurial bricolage offers another fruitful path for extending our findings—especially in contexts of resource scarcity (Busch & Barkema, 2021). Related to our findings, Ciambotti et al. (2023) show that entrepreneurs in such contexts draw on strong community ties and emotional motivators like passion to creatively leverage resources at hand. These socialized forms of bricolage could be used and interpreted as a contextualized form of downward causation and offer important insights into how ecosystems evolve in the absence of strong formal institutions. Future research could examine how community-rooted bricolage functions as a mechanism of ecosystem contribution—particularly in under-resourced, informal, or emergent entrepreneurial ecosystems.

Finally, the information from semi-structured interviews used for gathering data, albeit rich in detail, is limited to the subjective interpretations and recollections of the participants. To counterbalance these limitations, subsequent research might incorporate comparative case studies or employ a mixed-method approach to triangulate findings and deepen the understanding of entrepreneurial dynamics across various settings (Eisenhardt & Graebner, 2007). A longitudinal research design could further illuminate how relationships, behaviors, and roles evolve over time, offering a clearer view of the ecosystem's developmental processes (Bergman & McMullen, 2022). In addition, although our study identifies key mechanisms and interactions within ecosystems, the causal relationships remain to be fully established. Experimental methods may help clarify the directionality and strength of these relationships, thereby reinforcing the validity of the proposed theoretical model (Grégoire et al., 2019; Hsu et al., 2017; Wurth et al., 2021).

## 6 Conclusion

By adopting a process-oriented approach to downward causation in entrepreneurial ecosystems, this research articulates how contribution behavior by entrepreneurs and its motivations are not serendipitous but are the product of an interplay of various factors. Our nuanced findings extend beyond merely adding to the existing theoretical framework of entrepreneurial ecosystems; they provide a granular understanding of the mechanisms at play, which fosters a robust platform for both academic inquiry and practical application. Moreover, our exploration highlights the integral role entrepreneurs play in not only reacting to but actively shaping their ecosystems. This reciprocal relationship enhances our comprehension of entrepreneurial ecosystems as evolutionary entities rather than static structures.

In conclusion, this research not only augments the theoretical landscape of entrepreneurial ecosystems but also catalyzes future scholarly endeavors. It invites researchers to further examine the causal pathways and implications of entrepreneur-driven

ecosystem dynamics, potentially guiding targeted interventions that enhance ecosystem capabilities and resilience. As such, it lays the groundwork for a transformative shift in how ecosystems are perceived, studied, and influenced, offering a new lens through which to consider the symbiotic relationships between entrepreneurs and the environments that sustain them.

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**Data availability** The datasets (anonymized interview transcripts, digital artifacts, coding schemes) generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

#### Declarations

**Conflict of interest** The authors declare no competing interests.

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