



## Takers and givers: Exploring the drivers of peer support in intra-incubator networks

Joris Ebbers<sup>a,\*</sup>, Wouter Stam<sup>b</sup>, Tom Elfring<sup>c</sup>

<sup>a</sup> Luiss Business School, Via Nomentana 216, 00162, Rome, Italy

<sup>b</sup> Vrije Universiteit Amsterdam, De Boelelaan, 1105, Amsterdam, the Netherlands

<sup>c</sup> EM Lyon Business School, 144 Avenue Jean Jaurès, 69007, Lyon, France

### 1. Introduction

Social networks provide entrepreneurs with valuable access to information and resources (Elfring and Hulsink, 2007), which is especially critical at the founding and early growth stages of a venture (Hite and Hesterly, 2001). One way entrepreneurs can quickly connect to such networks is by joining an entrepreneurial support organization (ESO). ESOS—such as incubators, accelerators, science parks, maker spaces, and co-working spaces—are defined as “an organization whose primary purpose is to support individuals and collectives, through (in)direct and (im)material assistance, as they seek to initiate and progress through the stages of the entrepreneurial process” (Bergman and McMullen, 2022, p. 690). Research has traditionally emphasized the resources, advice, and connections provided directly or indirectly by ESO managers (Hansen et al., 2000; Busch and Barkema, 2022; Del Sarto et al., 2022). More recently, attention has shifted toward the peer networks that form among entrepreneurs within ESOS (Becker et al., 2024), which can generate a range of benefits including joint projects (Ebbers, 2014; Moritz et al., 2022) and knowledge exchange (Schwartz and Hornych, 2010; Caccamo and Beckman, 2022; Del Sarto et al., 2022).

Despite these promises, findings on the performance outcomes of ESOS remain mixed and inconclusive (Bergman and McMullen, 2022; Eveleens, Rijnsoever, and Niesten, 2017). Two gaps in the literature may help explain this. First, many studies implicitly assume that ESO managers know what support entrepreneurs need, thereby overlooking the roles of uncertainty and unexpected peer encounters. This neglect underestimates the importance of serendipity in resource exchanges (Busch and Barkema, 2022; Ferretti et al., 2022). Although interest in peer networks is growing, we still know little about how co-located entrepreneurs influence, support, and learn from each other, or about which ties create the most value and for whom (Bergman and McMullen, 2022). Second, prior work has focused predominantly on the value entrepreneurs receive from peers, while paying limited attention to those who provide resources. This gap is critical, since ESOS depend on the

presence of entrepreneurs who are willing and able to support others (Schnell and Berger, 2025). Current exit policies typically hinge on incubatee tenure (Moritz et al., 2022), assuming that entrepreneurs eventually outgrow the ESO. Yet when experienced entrepreneurs leave, newcomers lose access to their expertise. Managing this trade-off between individual and collective benefits is a central challenge for ESO managers, highlighting the importance of understanding what drives entrepreneurs to “give” rather than only “take” (Van Rijnsoever, 2020).

In this study, we therefore address the following research question: *How do entrepreneurs in ESOS capture and create value through different types of peer ties, and what explains why some act as givers while others act as takers?* We investigate this question in the context of an incubator. Specifically, we examine three types of direct ties related to knowledge exchange (ideas for product development, information about market trends, and management advice) and four types of referral ties through which incubatees gain potential new contacts (customers, suppliers, personnel, and investors). Our research not only explores how incubatees capture value by being the receivers (or “takers”) of knowledge and referrals but also identifies which incubatees create value for their peers by acting as providers (or “givers”) of these resources. To analyze this bidirectionality (Bergman and McMullen, 2022), we use social network analysis and identify takers and givers through incubatees’ out-degree and in-degree network centrality. To explain heterogeneity in network positions, we build on the idea that networking actions represent effectual responses to uncertainty (Engel et al., 2017). In particular, we examine how founder-, venture-, and market-level sources of uncertainty drive incubatees’ network structures and outcomes.

Our study breaks new ground in research on entrepreneurial support organizations by advancing three innovative contributions. First, we move beyond prior work that has primarily examined the benefits of peer support from the recipient’s side (Caccamo and Beckman, 2022; Bøllingtoft, 2012), by disentangling multiple types of peer networks, which act as conduits of resource exchanges among co-located entrepreneurs (Ferretti et al., 2022; Roche et al., 2024). By studying these

\* Corresponding author.

E-mail addresses: [joris.ebbers@luissbusinessschool.nl](mailto:joris.ebbers@luissbusinessschool.nl) (J. Ebbers), [w.stam@vu.nl](mailto:w.stam@vu.nl) (W. Stam), [elfring@em-lyon.com](mailto:elfring@em-lyon.com) (T. Elfring).

network ties from the perspectives of both the receivers and providers of resources, we complement extant studies on the receivers of peer support. We thereby advance knowledge about which kinds of peer networks add the most value and how this depends on the kinds of uncertainties faced by entrepreneurs, an underexplored yet critical aspect of incubation dynamics (Bergman and McMullen, 2022). Second, by examining how different sources of uncertainty may push incubatees to assume central positions in peer networks, we respond to recent calls for deeper insights into the emergence of resource sharing and brokering in ESOs (Caccamo and Beckman, 2022; Schnell and Berger, 2025). By illuminating the processes that transform incubatees into key brokers, we advance understanding of how peer-based intermediation processes—such as “meeting, mating, and intermediating” (Van Rijnsoever, 2020, p. 1)—create a vibrant and supportive culture in incubators. Third, our study challenges prevailing assumptions underlying incubator exit policies. Rather than viewing incubatees as gradually exhausting the value of incubation, we reveal how, over time and depending on their unique uncertainties, some entrepreneurs evolve into providers of knowledge and referrals (McAdam and McAdam, 2008). In doing so, they complement or even substitute for the external mentors often arranged by incubator management (Bibeau et al., 2024; Cohen et al., 2019). This not only advances theoretical debates on value creation in ESOs but also offers practical insights for designing more adaptive incubation models that recognize incubatees as evolving contributors, not merely transient beneficiaries.

## 2. Theoretical background

### 2.1. Intra-incubator peer networks

Incubators add value to their members by facilitating the formation of network ties, which may be external or internal (Bibeau et al., 2024; Kim et al., 2025). External ties are those with actors outside the incubators, such as expert advisors (e.g., legal, tax, accounting), experienced business people who act as mentors, financial service providers such as banks and venture capital firms, government sources of grants, and potential new employees, suppliers, and customers (Hansen et al., 2000; Tötterman and Sten, 2005; Clarysse et al., 2005). In practice, however, the introductions that incubator managers provide to such entities can be limited (Honig and Karlsson, 2010) and often fail to lead to tangible results. Internal ties are those between the co-located entrepreneurs, which incubators may facilitate by organizing events for the entrepreneurs (Kim et al., 2025). Events may be relatively formal, such as workshops on business, innovation, or technology related topics (Sá and Lee, 2012), or informal, such as after-work drinks, barbecues, and other types of parties (Nijssen and van der Borgh, 2017).

As well as these top-down network ties facilitated by incubator management, incubated entrepreneurs also establish bottom-up connections with each other. While an incubator’s affordable, flexible office space and access to shared services is a clear attraction for entrepreneurs, their key motivation for entering an incubator is often to become part of a community of peers for both social and professional interactions (Schnell and Berger, 2025). Incubated entrepreneurs are inclined to value these informal networks more highly than their formal contractual exchange relationships (Tötterman and Sten, 2005). Peer networks enable entrepreneurs to exchange ideas, advice, information, and other valuable resources, while also providing emotional and strategic support (Bøllingtoft and Ulhøi, 2005; Van Erkelens et al., 2024). Incubatees may also share their external contacts with their peers, referring them to potential customers, investors, recruits, and other resource providers (Bøllingtoft, 2012). In fact, prior research suggests that co-located peers are a more valuable source of referral than the incubator’s management (Tötterman and Sten, 2005), and that peer-provided referrals play a crucial role in fostering a supportive incubator culture (Van Rijnsoever, 2020). By helping entrepreneurs connect with broader networks, these referrals facilitate access to

essential resources; recipients are then motivated to reciprocate, strengthening the overall culture of collaboration and knowledge sharing (Nai et al., 2022).

### 2.2. The role of uncertainty in explaining peer networks and outcomes

Recent studies indicate that peer networking in incubators is largely driven by an effectuation logic (Nicholls-Nixon and Valliere, 2021; Xu et al., 2024), through which incubatees leverage the means they have at their disposal to develop opportunities (Sarasvathy, 2001). As incubatees often have ill-defined business models, interactions with co-located peers can be a powerful vehicle for the cross-fertilization of ideas and even for the co-creation of new opportunities (Nicholls-Nixon and Valliere, 2021; Xu et al., 2024). Entrepreneurial networks and networking behavior are crucial elements that underpin these effectuation processes. Entrepreneurs evaluate and use the network ties they have at their disposal to form, develop, and adjust their business ideas (Engel et al., 2017). Furthermore, the action-orientation of effectual processes emphasizes the importance of flexibility when available resources are being combined through networking. In the incubator environment, peers are physically proximate (Roche et al., 2024) and can therefore be easily contacted to share knowledge and obtain referrals to relevant resource providers.

The effectual nature of incubatees’ networking points to the crucial role that uncertainty plays in understanding peer networks and outcomes. Uncertainty is manifested in situations where the future is unknowable due to incomplete knowledge (Milliken, 1987), as is often the case in the entrepreneurial context (Townsend et al., 2018). Entrepreneurship scholars have argued that networking is crucial for navigating and mitigating the many uncertainties that can arise during the entrepreneurial process (Engel et al., 2017; Hite and Hesterly, 2001). Through their social embeddedness, entrepreneurs can gain access to relevant information and create legitimacy for their ventures (Elfring and Hulsink, 2007), thereby reducing their own experienced uncertainty as well as the uncertainty perceived by external resource providers (Podolny, 2001). It follows that how incubated entrepreneurs capture value from, and contribute value to, co-located peers through networks is likely to depend on the nature and extent of the uncertainty they face.

Prior research suggests that uncertainty is not an objective phenomenon but rather a socially constructed experience that varies depending on the characteristics of the focal actor and the situational context (McMullen and Shepherd, 2006). Incubatees are thus unlikely to encounter the same types or levels of uncertainty. Moreover, incubatees often develop in very different ways (Pauwels et al., 2016), further contributing to variations in the uncertainties they face. These differences influence how entrepreneurs navigate challenges, potentially leading to distinct networks. As such, the nature and degree of uncertainty experienced by incubated entrepreneurs likely varies as a function of their own personal characteristics as well as the characteristics of the ventures they lead and the market environments in which they operate (Kerr and Coviello, 2019). To better understand this heterogeneity in peer networks, we propose an organizing framework that incorporates founder-, venture-, and market-level factors, from which we can examine how these contribute to uncertainty and, in turn, shape entrepreneurs’ networks.

### 2.3. Founding team composition

An important determinant of the uncertainty experienced by entrepreneurs is the extent to which they have already accumulated relevant resources. This depends on their level of experience as well as the presence of co-founders (Dew et al., 2009). Research suggests that entrepreneurial experience plays a crucial role in shaping networks, with novice and experienced entrepreneurs differing in both their resource needs and their abilities to form network ties (Zheng et al., 2020). In particular, startups founded by experienced entrepreneurs and

multiple co-founders are likely to face less uncertainty around the resources they require. Moreover, their larger knowledge base makes them more valuable exchange partners, as there is less uncertainty about the resources they can share with their peers. However, it is unclear to what extent entrepreneurial experience and founding team size influence incubatees' networks.

Incubators often use selective screening practices (Aerts et al., 2007) to “pick-the-winners” (Bergek and Norrman, 2008) because successful alumni enhance the incubator's status, which, in turn, helps attract other firms (Mian, 1997). Consequently, incubators might be tempted to select experienced entrepreneurs (Hsu, 2007) and startups with multiple co-founders (Ensley et al., 2006) because their ventures are more likely to be successful. However, since experienced entrepreneurs and co-founder teams typically have less need for basic startup support services and have already built a strong and relevant network (Mosey and Wright, 2007), it is arguable that incubators offer them limited value. That being said, the experience and extensive connections of such ventures might enable them to identify valuable contacts within the incubator more quickly. Moreover, their visibility and credibility could make them more attractive as resource providers for their peers (Dew et al., 2009).

#### 2.4. Venture development stage

The uncertainty faced by incubated entrepreneurs not only depends on their prior experience but is also contingent on the development stage of their ventures. Early-stage ventures are characterized by much greater levels of uncertainty about their prospects due to their strong liabilities of newness (Stinchcombe, 1965) and smallness (Aldrich and Auster, 1986). Unlike later-stage ventures, which have accumulated resources and established operating routines to execute a validated business model, early-stage ventures face high uncertainty around their business models and the resources they might need. While these differences in uncertainty likely shape incubatees' peer networks, the precise nature of the relationship remains unclear.

Most incubators focus on early-stage ventures (Bergek and Norrman, 2008). The rationale is that once firms reach a certain stage of growth, incubators have less to contribute to their further development. In the early stages, when the business model is still evolving and resources are scarce, incubatees often engage in “a frantic search for people” (Elfring and Hulsink, 2007, p. 1857) to access resources, making peer networks especially beneficial (McAdam and McAdam, 2008). As ventures grow, they require increasingly diverse resources (Hite and Hesterly, 2001), many of which are located outside the incubator. Incubatees who successfully scale their ventures could become valuable network contacts for their incubated peers by providing knowledge and resources. However, it remains an open question whether such incubatees would have the time and willingness to support their peers, given the external focus of their own ventures.

#### 2.5. Venture incubation period

Once ventures enter an incubator, the mere passage of time can affect the uncertainty incubatees experience in terms of understanding what the incubator offers and identifying which peer entrepreneurs to approach for specific support and resources. We conceptualize a venture's incubation period as two-dimensional, comprising incubation tenure (which captures how long a venture has been incubated) and incubation intensity (which captures the amount of time individuals typically spend at their incubator office on a daily basis). Both factors likely impact incubatees' networks, though the exact nature of these relationships remains unclear.

Ventures with longer incubation tenure or greater incubation intensity have had more opportunities to establish strong peer connections and identify the most valuable contacts, potentially enhancing the value they capture from networks and the value they create for others.

Research suggests that ties characterized by a longer shared history and frequent interactions are often more willing and able to provide useful resources (Jack, 2005). Moreover, geographical proximity can foster social and cognitive proximity, facilitating more effective knowledge exchange (Caccamo and Beckman, 2022; Ferretti et al., 2022). Conversely, it is also possible that incubatees who recently joined the incubator or who spend less time there derive the most value from peer networks because new and infrequent encounters may provide the highest novelty value (Gilsing and Nootboom, 2005). The value of peer networks could therefore diminish over time as incubatees exhaust the available network resources and shift their focus to networks outside the incubator.

#### 2.6. Market dynamism

The uncertainty experienced by incubatees is likely not only rooted in founder or venture characteristics but also in market conditions. In particular, market dynamism—the degree of unpredictable change in an organization's task environment (Dess and Beard, 1984)—can be a major source of uncertainty that shapes incubatees' peer networking. A more dynamic environment (Volberda et al., 2012) increases uncertainty, which could render networks, especially effectual peer networks, more valuable. Engaging with incubated peers to acquire knowledge and referrals may help incubatees better understand critical contingencies and adapt to shifting market conditions. Incubatees operating in dynamic markets may also be more attractive as resource providers because peers seeking to enhance their own adaptability may wish to draw on their expertise and insights. However, it is arguable that market dynamism could discourage incubatees from supporting their peers more actively because coping with rapid change often demands significant time and energy, diverting entrepreneurs' attention away from assisting others.

#### 2.7. Intermezzo

Our review of past research reveals that most studies on incubator networks focus on the relationships between firms and the incubator's management (Bibeau et al., 2024; Van Erkelens et al., 2024). While some studies do explore peer networks, they tend to be qualitative and descriptive (Bøllingtoft, 2012; Moritz et al., 2022; Caccamo and Beckman, 2022; Kim et al., 2025). Other studies focus on external peers such as mentors rather than on intra-incubator relationships (Del Sarto et al., 2022) or they employ quantitative approaches without distinguishing between the different types of peer support network and the roles of givers versus takers (Schwartz and Hornych, 2010; Becker et al., 2024). Hence, theoretical understanding of what drives incubatees' peer networking—and in particular, why some incubatees capture value through peer networks while others create it—remains underdeveloped (Schnell and Berger, 2025). Furthermore, our analysis of founder-, venture-, and market-level sources of uncertainty suggests that how these connect with incubatees' peer networks and the value incubatees derive from such networks remains ambiguous. To address this gap, we conduct fine-grained quantitative exploratory analyses offering deeper insights into the profiles of takers and givers in intra-incubator peer support networks.

### 3. Empirical setting, data and research design

We conducted our study of intra-incubator peer networks in collaboration with one of Europe's largest incubators, based in Amsterdam, the Netherlands. To respect its preference for anonymity, we refer to it simply as “the incubator.” Its mission is to “bring entrepreneurship within everyone's reach by providing our spaces, the right toolset, and a supportive social environment.” To achieve this, the incubator offers standard services such as office and event space, meeting rooms, IT infrastructure, and a shared reception desk. In addition, it provides a

wide range of amenities—including a gym, cinema, three restaurants, and a rich program of social and professional networking events. The incubator’s management team was an active partner in the design and execution of the research project.

Creswell and Creswell (2022) emphasize the importance of selecting research approaches that align with the focal research problem. Guided by this principle, we employed an exploratory, survey-based research design. In exploratory studies, surveys are particularly useful “for answering ‘what,’ ‘who,’ ‘where,’ ‘how much,’ and ‘how many’ questions” (Saunders et al., 2023: p. 194). This design was well suited to our objective of systematically mapping and analyzing the structure of peer networks within an incubator, and of testing how founder-, venture-, and market-level sources of uncertainty shape incubatees’ roles as givers or takers. It also enabled us to examine multiple dimensions of peer networks in a consistent manner, thereby allowing meaningful comparisons across different types of relationships. While qualitative approaches can yield rich insights into individual experiences (Creswell and Creswell, 2022), they are less effective in capturing broader structural patterns across networks. A survey-based design, by contrast, provided a coherent and rigorous means of linking entrepreneurs’ characteristics and contexts to their roles within intra-incubator peer networks.

The project was implemented in three interrelated phases. In the design phase, we collaborated with the incubator’s management to co-develop the survey instrument and pre-tested it with three founders. In the data collection phase, we adopted a multi-pronged strategy that combined internal communication (newsletter announcements), direct outreach (using contact details provided by management), and on-site administration (with two research assistants supporting one-on-one survey completion). Data were collected between December 2016 and June 2017. We obtained 141 responses, of which 12 were excluded because the respondents were neither founders nor CEOs, and one was excluded due to insufficient information. This resulted in 128 valid surveys, 23 of which contained missing data. Accordingly, we retained 105 completed questionnaires, representing 49 % of the 215 firms in the incubator. In the analysis phase, we transformed the raw survey responses into relational data, constructed firm-level networks, and prepared the dataset for statistical modeling.

To capture network ties, we adapted an item originally developed for studying intra-organizational networks (Tsai and Ghoshal, 1998): “With which persons inside [name of the incubator]—but outside your own organization—do you exchange (informal) business information (such as ideas for product development or market trends)?” We limited the reporting period to the past 12 months. Respondents were asked to indicate three types of direct ties: 1) information about market trends, 2) ideas for product development, and 3) advice about how to manage one’s firm. They were also asked to report four types of referral ties through which information was exchanged about potential new contacts: a) customers, b) suppliers, c) personnel, and d) investors. To reduce respondent fatigue, we limited the number of names that could be listed to a maximum of ten.<sup>1</sup> The resulting network comprised 169 nodes. Figs. 1 and 2 depict network visualizations of the direct information exchange networks and referral networks, respectively.

### 3.1. Dependent variables

*Intra-incubator network value (INV).* To measure the value of the

<sup>1</sup> Although we collected the names of individuals and their affiliated firms, the firm was our unit of analysis. When respondents listed multiple contacts from the same firm, we coded only the one with the highest exchange frequency. If respondents mentioned a contact not in our sample, we cross-checked the name via web search to verify that the person was indeed (still) based in the incubator. Since our focus was on ties between firms, we also excluded ties to incubator management.

seven types of intra-incubator network ties described in section 3, we asked founders the following question: “How important are the following types of business information that you (informally) exchange with persons working at other firms located in [name of the incubator] for the performance of your firm?” We categorized “business information” in accordance with our information exchange ties and referral ties. Three items related to information exchange ties: 1) information about market trends, 2) ideas for product development, and 3) advice about how to manage one’s firm. Four items related to referral ties: a) personnel, b) customers, c) suppliers, and d) investors. Respondents were asked to rate each of these seven items on a 7-point Likert scale ranging from “not at all important” to “extremely important.”

*In-degree centrality.* We anticipated that founders who did not derive much value from intra-incubator peer networks could still play a critical role by serving as a valuable resource for others. We therefore measured founders’ incoming ties (Freeman, 1979) from other founders within the incubator. From this measure of *in-degree centrality*, we could identify *givers*, who were individuals who *provided* information and acted as brokers by providing referrals to other firms’ founders. We assessed *in-degree centrality* for the seven types of ties described in section 3.1.

### 3.2. Independent variables

*Out-degree centrality.* Out-degree centrality measures the number of outgoing ties (Freeman, 1979) to other founders within the incubator. As such, this variable enabled us to identify *takers*, who were individuals who *received* information and referrals from other founders in the incubator. We assessed out-degree centrality for the seven types of ties described in section 3.1.

*Founding team composition.* Prior work has shown that founder characteristics have important implications for resource needs. We examined two characteristics of founders. First, *founder entrepreneurial experience* refers to the founder’s prior engagement in venture creation efforts. To measure this, we used the following item: “Of how many firms have you been a (co-) founder?” Second, some incubatees might be solo founders while others form part of a co-founder team. To measure the *number of founders*, we used the following item: “How many founders does the firm have (including you)?”

*Venture development stage.* Prior work has associated venture development stage with liabilities of newness and smallness. Accordingly, we measured venture development stage through firm age and firm size. For *firm age*, we used the following item: “In what year was the firm founded?” We recoded this into firm age by deducting the reported year from the year the data were collected. For measure *firm size*, we used the following item: “What is the current size of your firm in number of employees (in FTE)?”

*Venture incubation period.* With respect to venture incubation period, we measured two distinct time-related dimensions. For measure *incubation tenure*, we used the following item: “For how many months has the firm been located in [name of the incubator]?” For *incubation intensity*, we used the following item: “How many hours per week do you spend in the [name of the incubator] building (on average)?”

*Market dynamism.* For this we used a scale developed by Volberda et al. (2012) consisting of the following items: “Changes in our market are very intense,” “in our market, customers frequently demand completely new products and/or services,” “in the market we operate in, changes happen continuously,” “our offering of products/services to our customers changes constantly,” “in our market, the amount of products and/or services to be supplied changes often and quickly,” and “in the market we operate in, each day something changes.” The Cronbach’s alpha of this 6-item scale was 0.88.

### 3.3. Control variables

*In-degree centrality.* Besides including *in-degree centrality* as a dependent variable, we included it as a control variable in the models

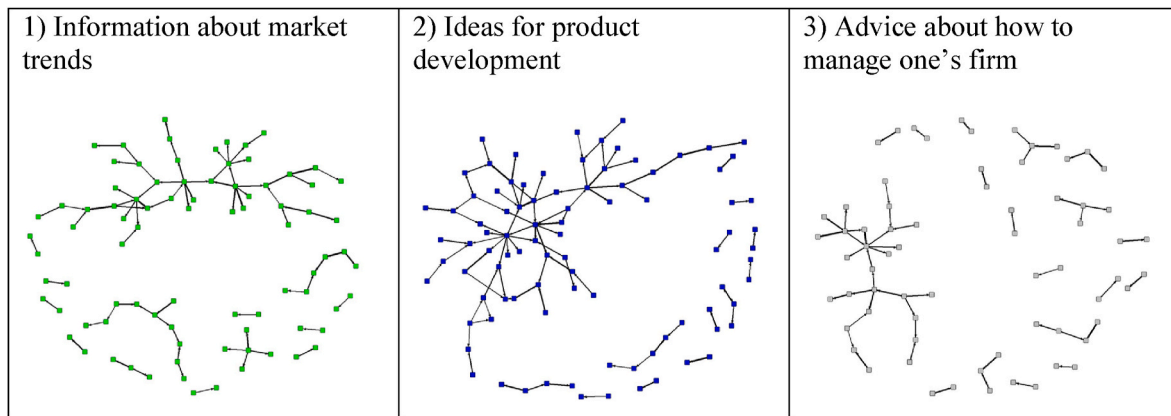


Fig. 1. Direct information exchange networks.

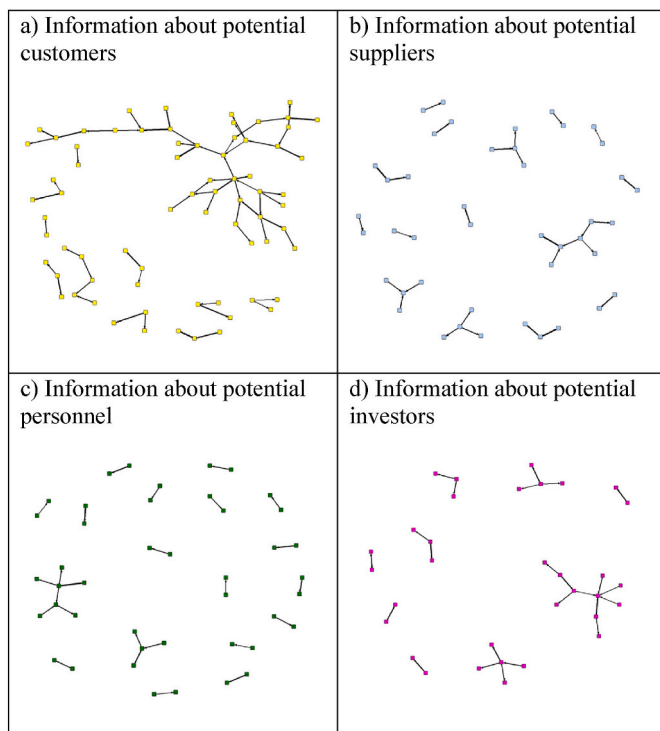


Fig. 2. Referral networks.

predicting *intra-incubator network value*. Founders who are important sources of information may derive less value from intra-incubator networks because the time they dedicate to assisting their less experienced peers could be better spent focusing on their own businesses (Tötterman and Sten, 2005). That said, by providing assistance, these founders cultivate social capital that can be reciprocated in various ways (Coleman, 1988).

*Extra-incubator network value (ENV)*. We expected that founders with valuable networks outside the incubator—in contrast to inside it—would be more important sources of information and advice for their peers inside the incubator. We therefore asked founders the following question: “How important are the following types of business information that you (informally) exchange with persons in your professional network *outside* [name of the incubator] for the performance of your firm?” As in section 3.1, we distinguished between three types of information exchange ties and four types of referral ties in a seven item 7-point Likert scale, ranging from “not at all important” to “extremely important.”

#### 4. Methods and findings

The descriptive statistics are presented in Table 1. To analyze our data, we used OLS regressions in STATA. Since the variables *incubation tenure*, *firm age*, and *firm size* were positively skewed, we performed robust regressions using Stata command `vce (robust)` to correct for potential heteroskedasticity. We then checked for potential multicollinearity problems in each of the models. For the models with the dependent variable *internal network value*, the mean VIF ranged from 1.14 to 2.38 (for *potential personnel*), while the maximum VIF ranged from 1.23 to 7.49 (for *potential personnel*).

These scores were all below the suggested threshold of 10. In addition, we checked for potential multicollinearity problems in models with the dependent variable *in-degree centrality*. The mean VIF for these set of models ranged from 1.11 to 1.16, while the maximum VIF ranged from 1.16 to 1.29. These scores were also well below 10.

Below, we present the results in two stages. First, we focus on the perspective of the takers—founders who extract value from intra-incubator peer networks (Table 2). Second, we examine the perspective of the givers—founders who provide value to these networks (Table 3). For readability, Tables 2 and 3 report a condensed summary of the main findings. The full model results are available in Appendix 1A, 1B, 2A, and 2B. As our analyses are exploratory and based on cross-sectional data, the reported relationships should be interpreted as associations rather than causal or directional effects. Consistent with this approach, we did not formulate hypotheses regarding the directionality of these relationships but instead sought to identify empirical patterns that can inform future theory building. Any directional language used in the presentation of results is intended to aid interpretation rather than to imply causality.

##### 4.1. Takers: value of direct ties

Table 2 shows the results of the regression analyses for *value of direct ties*, in which we estimated the value of informal intra-incubator networks for firm performance with respect to information about *market trends* (model 1a), ideas for *product development* (model 1b), and advice about *managing one's firm* (model 1c).

For *out-degree centrality*, we observed a positive and significant association with *market trends* (Model 1a;  $\beta = 0.283$ ;  $p < 0.05$ ) and *managing one's firm* (Model 1c;  $\beta = 0.472$ ;  $p < 0.05$ ). This suggests that firms with more outgoing network ties to peers within the incubator derived greater value from the intra-incubator peer network, particularly in terms of receiving information about market trends and advice on managing their firm.

We observed no significant associations for founding team composition, whether in terms of *founder entrepreneurial experience* or *number of founders*.

**Table 1**  
Descriptive statistics.

Variable	Obs.	Mean	S.D.	Min.	Max.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1 INV: market trends	107	4.39	1.59	1	7	1.00																
2 INV: product development	107	5.09	1.47	1	7	0.55***	1.00															
3 INV: managing firm	107	3.97	1.70	1	7	0.33***	0.28**	1.00														
4 INV: potential personnel	107	4.49	1.83	1	7	0.32***	0.21*	0.39***	1.00													
5 INV: potential customers	107	5.50	1.57	1	7	0.31**	0.21*	0.26**	0.35***	1.00												
6 INV: potential suppliers	107	4.28	1.91	1	7	0.29**	0.18+	0.25**	0.39***	0.53***	1.00											
7 INV: potential investors	107	3.88	2.03	1	7	0.21*	0.22*	0.21*	0.22*	0.17+	0.31***	1.00										
8 In-degree: market trends	107	0.39	0.67	0	3	0.05	0.03	-0.04	-0.08	0.13	0.12	0.04	1.00									
9 In-degree: product develop.	107	0.50	0.83	0	4	0.02	0.07	0.10	0.01	0.04	0.15	0.21*	0.52***	1.00								
10 In-degree: managing firm	107	0.24	0.60	0	3	0.04	0.04	0.11	0.05	0.18+	0.10	0.32***	0.49***	0.51***	1.00							
11 In-degree: pot. Personnel	107	0.12	0.38	0	2	0.06	-0.07	-0.01	0.13	0.15	0.13	0.13	0.25**	0.34***	0.57***	1.00						
12 In-degree: pot. Customers	107	0.35	0.58	0	2	0.06	0.09	-0.02	0.02	0.11	0.11	0.06	0.57***	0.65***	0.46***	0.15	1.00					
13 In-degree: pot. Suppliers	107	0.14	0.37	0	2	0.11	0.08	0.15	0.10	0.09	0.04	0.03	0.53***	0.47***	0.39***	0.28**	0.38***	1.00				
14 In-degree: pot. Investors	107	0.11	0.32	0	1	0.08	-0.00	0.00	-0.01	0.17+	0.21*	0.24*	0.28**	0.43***	0.50***	0.43***	0.45***	0.18+	1.00			
15 Out-degree: market trends	107	0.68	1.19	0	6	0.28**	0.19*	0.12	0.07	0.17+	0.13	0.24*	0.04	0.30**	0.19+	0.02	0.24*	0.18+	0.17+	1.00		
16 Out-degree: product develop.	107	0.86	1.35	0	9	0.20*	0.15	-0.08	-0.03	0.13	0.16	0.21*	0.11	0.24*	0.12	0.09	0.21*	0.15	0.26**	0.70***	1.00	
17 Out-degree: managing firm	107	0.46	0.91	0	5	0.04	-0.01	0.32***	0.12	0.07	0.04	0.13	0.04	0.23*	0.09	-0.13	0.18+	0.20*	-0.08	0.51***	0.36***	
18 Out-degree: pot. Personnel	107	0.22	0.54	0	4	-0.07	-0.09	0.21*	0.27**	-0.03	0.08	0.04	0.12	0.29**	0.15	0.05	0.14	0.36***	-0.09	0.30**	0.12	
19 Out-degree: pot. Customers	107	0.58	1.01	0	4	0.24*	0.05	0.11	0.06	0.23*	0.16	0.13	-0.09	0.15	0.14	0.11	0.12	0.06	0.09	0.65***	0.48***	
20 Out-degree: pot. Suppliers	107	0.26	0.59	0	3	0.11	0.12	0.19*	0.14	0.10	0.26**	-0.10	-0.05	0.15	0.01	0.03	0.23*	0.09	-0.01	0.32***	0.14	
21 Out-degree: pot. Investors	107	0.23	0.62	0	3	-0.03	-0.01	0.08	-0.01	-0.13	0.01	0.38***	0.05	0.30**	0.35***	0.20*	0.14	0.18+	0.20*	0.48***	0.35***	
22 Founder experience	114	2.11	1.92	0	15	0.04	0.00	-0.12	0.15	0.01	0.02	0.15	0.11	0.06	0.17+	0.18+	-0.03	0.00	0.06	-0.07	0.02	
23 Number of founders	113	2.12	1.18	0	6	-0.04	-0.07	0.04	0.04	-0.16	0.08	0.11	0.07	0.08	-0.02	0.18+	-0.04	-0.00	0.09	-0.15	-0.04	
24 Firm age (years)	114	4.76	4.94	0	28	-0.01	0.02	-0.17+	-0.17+	-0.09	-0.14	-0.18+	0.04	0.00	0.04	0.05	-0.06	0.06	-0.02	0.03	0.11	
25 Firm size (FTE)	113	7.54	11.40	0	80	0.07	-0.01	0.04	0.32***	0.12	0.19+	0.02	0.00	0.10	0.17+	0.14	0.07	-0.01	0.05	-0.07	-0.02	

(continued on next page)

Table 1 (continued)

Variable	Obs.	Mean	S.D.	Min.	Max.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
26 Incubation tenure (months)	114	11.35	11.21	1	40	0.19+	0.17+	0.23*	0.01	0.07	0.01	0.10	0.28**	0.37***	0.37***	0.24*	0.27**	0.32***	0.34***	0.29**	0.27**
27 Incubation intensity (hours)	128	28.70	14.62	4	70	0.15	0.04	0.23*	0.32***	0.13	0.12	0.02	0.20*	0.29**	0.19+	0.33***	0.18+	0.26**	0.23*	-0.04	-0.02
28 Market dynamism	110	4.52	1.25	1.67	7	0.25**	0.20*	0.12	0.29**	0.13	0.29**	0.16+	0.09	0.06	0.24*	0.18+	0.11	0.09	0.04	0.04	0.08
29 ENV: market trends	108	5.48	1.21	1	7	0.55***	0.27**	0.18+	0.07	0.11	0.20*	0.10	0.18+	0.05	0.11	0.04	0.07	0.16	0.11	0.11	0.08
30 ENV: product development	108	5.59	1.14	1	7	0.39***	0.37***	0.33***	0.16	0.16	0.18+	0.02	0.09	0.10	0.10	0.01	0.07	0.13	0.05	0.07	0.17+
31 ENV: managing firm	108	4.73	1.64	1	7	0.16	0.13	0.56***	0.41***	0.13	0.24*	0.13	0.02	0.08	0.09	-0.01	0.08	0.04	0.06	0.11	0.09
32 ENV: potential personnel	107	4.91	1.73	1	7	0.18+	0.10	0.37***	0.69***	0.19*	0.35***	0.26**	0.00	0.03	0.09	0.05	0.15	0.06	0.06	0.07	0.10
33 ENV: potential customers	108	6.05	1.17	1	7	0.26**	0.15	0.26**	0.27**	0.39***	0.33***	0.10	-0.01	0.01	0.05	-0.07	0.04	0.10	-0.06	0.22*	0.13
34 ENV: potential suppliers	108	4.71	1.82	1	7	0.09	0.18+	0.22*	0.31**	0.26**	0.66***	0.32***	0.08	0.06	0.09	0.03	0.07	-0.03	0.10	0.06	0.04
35 ENV: potential investors	108	4.33	2.11	1	7	0.05	0.04	0.08	0.22*	-0.04	0.23*	0.69***	0.02	0.10	0.18+	-0.00	0.05	0.04	0.18+	0.15	0.14
Variable	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35		
17 Out-degree: managing firm	1.00																				
18 Out-degree: pot. Personnel	0.54***	1.00																			
19 Out-degree: pot. Customers	0.58***	0.26**	1.00																		
20 Out-degree: pot. Suppliers	0.34***	0.23*	0.38***	1.00																	
21 Out-degree: pot. Investors	0.41***	0.21*	0.49***	0.09	1.00																
22 Founder experience	-0.07	-0.07	-0.10	-0.09	-0.03	1.00															
23 Number of founders	0.11	-0.08	-0.09	-0.10	0.15	0.06	1.00														
24 Firm age (years)	0.02	-0.03	0.05	0.03	-0.09	-0.04	-0.20*	1.00													
25 Firm size (FTE)	-0.07	-0.02	-0.06	-0.01	-0.01	0.03	0.04	0.18+	1.00												
26 Incubation	0.34***	0.14	0.23*	0.22*	0.20*	-0.03	-0.03	0.12	0.02	1.00											

(continued on next page)

Table 1 (continued)

Variable	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
tenure (months)																			
27 Incubation intensity (hours)	0.10	0.24*	-0.05	0.14	-0.06	0.12	0.09	-0.04	0.14	0.22*	1.00								
28 Market dynamism	0.04	0.04	0.05	0.08	0.10	0.07	0.11	0.12	0.22*	0.08	0.16	1.00							
29 ENV: market trends	0.02	0.02	0.04	0.01	0.05	0.02	-0.03	0.11	0.15	0.16	-0.05	0.24*	1.00						
30 ENV: product development	0.04	0.10	0.03	0.15	-0.02	0.02	-0.19*	0.17+	0.14	0.15	0.05	0.13	0.64***	1.00					
31 ENV: managing firm	0.19*	0.09	0.06	0.20*	0.05	-0.06	-0.02	0.03	0.21*	0.13	0.15	0.07	0.24*	0.46***	1.00				
32 ENV: potential personnel	0.13	0.19+	-0.01	0.18+	0.01	0.14	0.03	-0.17+	0.34***	0.08	0.23*	0.19+	0.13	0.23*	0.64***	1.00			
33 ENV: potential customers	0.20*	0.12	0.17+	0.19+	0.04	0.05	-0.20*	0.01	0.15	-0.00	-0.04	0.03	0.33***	0.39***	0.28**	0.30**	1.00		
34 ENV: potential suppliers	0.13	0.11	0.08	0.29**	0.16+	0.22*	0.08	-0.21*	0.24*	-0.05	0.17+	0.10	0.11	0.19+	0.26**	0.35***	0.47***	1.00	
35 ENV: potential investors	0.12	-0.03	0.03	-0.06	0.33***	0.17+	0.22*	-0.18+	0.13	-0.02	-0.07	0.07	0.08	0.02	0.31***	0.38***	0.15	0.42***	1.00

Notes.  
 Two tailed test: + p < 0.10, \*p < 0.05, \*\*p < 0.01, \*\*\*p < 0.001.  
 INV = Intra-incubator network value.  
 ENV = Extra-incubator network value.

**Table 2**  
Takers (DV = intra-incubator network value).

	Model 1a Market trends	Model 1b Product development	Model 1c Managing one's firm	Model 2a Referrals personnel	Model 2b Referrals customers	Model 2c Referrals suppliers	Model 2d Referrals investors
<b>Main variables:</b>							
Out-degree: market trends	0.283*						
Out-degree: product development							
Out-degree: managing firm			0.472*				
Out-degree: potential personnel				0.761*			
Out-degree: potential customers					0.336*		
Out-degree: potential suppliers						0.818**	
Out-degree: potential investors							1.026**
Founder experience			-0.202 <sup>+</sup>				0.212 <sup>+</sup>
Number of founders					-0.258 <sup>+</sup>		
Firm age	0.151 <sup>+</sup>		-0.073*	-0.104**	-0.058 <sup>+</sup>	-0.245*	-0.090*
Firm age squared	-0.009*					0.008 <sup>+</sup>	
Firm size				0.109**			
Firm size squared				-0.001 <sup>+</sup>			
Incubation tenure							
Incubation intensity			0.021 <sup>+</sup>				
Market dynamism	0.335**	0.281*		0.315*		0.423**	0.291 <sup>+</sup>
R-squared adjusted	0.140	0.013	0.151	0.293	0.062	0.152	0.195
F	2.690**	1.154 <sup>+</sup>	3.048**	5.302***	1.769 <sup>+</sup>	2.864**	3.807***

Notes.

Two tailed tests: +p < 0.10, \*p < 0.05, \*\*p < 0.01, \*\*\*p < 0.001.

Cells are left blank when the corresponding coefficients were not statistically significant.

*In-degree centrality* was included as a control variable but omitted from the reported results for brevity (see appendix for full models).

**Table 3**  
Givers (DV = indegree centrality).

	Model 3a Market trends	Model 3b Product development	Model 3c Managing one's firm	Model 4a Referrals personnel	Model 4b Referrals customers	Model 4c Referrals suppliers	Model 4d Referrals investors
<b>Main variables:</b>							
Founder experience							
Number of founders							
Firm age							
Firm size							
Incubation tenure	0.013*	0.024**	0.018***		0.014**	0.010**	0.009**
Incubation intensity		0.011*		0.006*		0.006*	0.004 <sup>+</sup>
Market dynamism			0.084				
R-squared adjusted	0.056	0.129	0.151	0.127	0.058	0.109	0.117
F	1.767 <sup>+</sup>	2.923**	3.306**	2.880**	1.799 <sup>+</sup>	2.584*	2.728**

Notes.

Two tailed tests: +p < 0.10, \*p < 0.05, \*\*p < 0.01, \*\*\*p < 0.001.

Cells are left blank when the corresponding coefficients were not statistically significant.

*Extra-incubator network value* was included as a control variable but omitted from the reported results for brevity (see appendix for full models).

For venture development stage, we observed a positive and marginally significant association between *firm age* and *market trends* (Model 1a;  $\beta = 0.151$ ;  $p < 0.1$ ), and a negative and significant association for *firm age squared* (Model 1a;  $\beta = -0.009$ ;  $p < 0.05$ ). This suggests an inverted U-shaped relationship, in that the value firms derived from the market trend information they received from the intra-incubator peer network appeared to increase with firm age but only to a certain point, after which it declined.<sup>2</sup> Additionally, we observed a negative and

significant association between *firm age* (Model 1c;  $\beta = -0.073$ ;  $p < 0.05$ ) and *managing one's firm*, indicating that older firms derived less value from the firm-management advice they received from the intra-incubator peer network.

We observed no significant associations for the venture incubation period, whether in terms of *incubation tenure* or *incubation intensity*.

However, for *market dynamism*, we observed a positive and significant association with *market trends* (Model 1a;  $\beta = 0.335$ ;  $p < 0.01$ ) and *product development* (Model 1b;  $\beta = 0.281$ ;  $p < 0.05$ ). This suggests that firms operating in more dynamic markets tended to derive more value from the intra-incubator peer network, particularly in relation to information about market trends and ideas for product development.

<sup>2</sup> To further test this inverted U-shaped finding (Haans et al., 2016), we used the approach by Lind and Mehlum (2010) and Stata command “utest” (Lind and Mehlum, 2007). The Sasabuchi (1980) test for the inverted-U shape relation was significant ( $p < 0.05$ ), with the estimated extreme point of 8.04 being within the 95 % Fieller confidence interval [-2.60, 11.73].

#### 4.2. Takers: value of referrals

Table 2 also shows the results of the regression analyses for the value of peer ties that provide referrals. We estimated the value of informal intra-incubator networks on firm performance, distinguishing between referrals to potential personnel (Model 2a), potential customers (Model 2b), potential suppliers (Model 2c), and potential investors (Model 2d).

For out-degree centrality, we observed positive and significant associations with referrals to potential personnel (Model 2a;  $\beta = 0.761$ ;  $p < 0.05$ ), customers (Model 2b;  $\beta = 0.336$ ;  $p < 0.05$ ), suppliers (Model 2c;  $\beta = 0.818$ ;  $p < 0.01$ ), and investors (Model 2d;  $\beta = 1.026$ ;  $p < 0.01$ ). This suggests that firms with more outgoing network ties to peers within the incubator tended to derive more value from the intra-incubator peer network in terms of receiving referrals to potential personnel, customers, suppliers, and investors.

We observed no significant associations for founding team composition, whether in terms of founder entrepreneurial experience or number of founders.

For venture development stage, we observed a negative and significant association between firm age and referrals to potential personnel (Model 2a;  $\beta = -0.104$ ;  $p < 0.01$ ), suppliers (Model 2c;  $\beta = -0.245$ ;  $p < 0.05$ ),<sup>3</sup> and investors (Model 2d;  $\beta = -0.090$ ;  $p < 0.05$ ). This suggests that older firms tended to derive less value from the intra-incubator peer network in terms of receiving referrals to potential personnel, suppliers, and investors. Additionally, for firm size, we observed a positive and significant association with referrals to potential personnel (Model 2a;  $\beta = 0.109$ ;  $p < 0.01$ ).<sup>4</sup> This suggests that larger firms tended to derive greater value from the intra-incubator peer network in terms of receiving referrals to potential personnel.

We observed no significant associations for the venture incubation period, whether in terms of incubation tenure or incubation intensity.

However, for market dynamism, we observed a positive and significant association with referrals to potential personnel (Model 2a;  $\beta = 0.315$ ;  $p < 0.05$ ) and suppliers (Model 2c;  $\beta = 0.423$ ;  $p < 0.01$ ). This suggests that firms operating in more dynamic markets tended to derive greater value from the intra-incubator peer network in terms of receiving referrals to potential personnel and suppliers.

#### 4.3. Givers: direct ties

Table 3 shows the results of the regression analyses for in-degree centrality in relation to direct ties. We distinguish between being a source of information about market trends (Model 3a), ideas for product development (Model 3b), and managing one's firm (Model 3c).

For venture incubation period, we observed a positive and significant association between incubation tenure and being a source of information for peers regarding market trends (Model 3a;  $\beta = 0.013$ ;  $p < 0.05$ ), product development (Model 3b;  $\beta = 0.024$ ;  $p < 0.01$ ), and managing one's firm (Model 3c;  $\beta = 0.018$ ;  $p < 0.001$ ). This suggests that founders of firms with longer incubation tenure (i.e., those who joined the incubator earlier) were more valuable sources of information about market trends, product development, and firm management for their co-located peers. Additionally, for incubation intensity, we observed a positive and significant association with product development (Model 3b;  $\beta = 0.011$ ;  $p < 0.05$ ). This indicates that founders of firms with higher incubation intensity (i.e., those who spend more time in the incubator on a daily

<sup>3</sup> We found a positive and (marginally) significant effect for firm age squared (Model 6;  $\beta = 0.008$ ;  $p < 0.1$ ). However, the Sasabuchi (1980) test was not significant and therefore did not provide statistical support for this U-shape relationship.

<sup>4</sup> We found a negative and (marginally) significant coefficient for firm size squared (Model 4;  $\beta = -0.001$ ;  $p < 0.1$ ). However, the Sasabuchi (1980) test was not significant and therefore did not provide statistical support for this inverted U-shape relationship.

basis) were seen as more valuable sources of ideas for product development.

#### 4.4. Givers: referrals

Table 3 also shows the results of the regression analyses for in-degree centrality in relation to providing referrals, where we distinguish between being a source of referrals to potential personnel (Model 4a), potential customers (Model 4b), potential suppliers (Model 4c), and potential investors (Model 4d).

For venture incubation period, we observed a positive and significant association between incubation tenure and providing referrals to potential customers (Model 4b;  $\beta = 0.014$ ;  $p < 0.01$ ), suppliers (Model 4c;  $\beta = 0.010$ ;  $p < 0.01$ ), and investors (Model 4d;  $\beta = 0.009$ ;  $p < 0.01$ ). This suggests that founders of firms with longer incubation tenure were more valuable sources of customer, supplier, and investor referrals for their co-located peers. For incubation intensity, we observed positive and significant associations with providing referrals to potential personnel (Model 4a;  $\beta = 0.006$ ;  $p < 0.05$ ) and suppliers (Model 4c;  $\beta = 0.006$ ;  $p < 0.05$ ). This indicates that founders of firms with higher incubation intensity were more important sources of referrals to potential personnel and suppliers.

#### 4.5. Robustness tests

To assess the robustness of our findings, we conducted two supplementary analyses (full results available upon request). First, although our main regression analyses already accounted for non-normal distributions and outliers, we re-estimated the models after removing potentially influential cases. Outliers were identified using studentized residuals and Cook's distance in the model with internal network value as the dependent variable. We excluded three observations with residuals outside the  $-2.5$  to  $+2.5$  range and/or a Cook's distance greater than  $4/106 = 0.038$ . This led to a few changes in the models for takers (i.e. those capturing value). In Model 1c (managing one's firm), incubation intensity became significant ( $\beta = 0.022$ ,  $p < 0.05$ ) and company age became marginally significant ( $\beta = -0.057$ ,  $p < 0.1$ ). In Model 2a (referrals to personnel), founder experience became significant ( $\beta = 0.242$ ,  $p < 0.05$ ), and in Model 2d (referrals to investors), founder experience also became significant ( $\beta = 0.271$ ,  $p < 0.05$ ). For givers (i.e., those creating value), one change emerged: in Model 1c (referrals to personnel), incubation intensity became significant ( $\beta = 0.007$ ,  $p < 0.05$ ).

Second, we estimated models using average tie strength instead of out-degree centrality. Weak ties are typically more valuable for accessing novel information and opportunities (Granovetter, 1973), whereas strong ties are more important for fostering interaction and building trust (Coleman, 1988). We measured average tie strength based on the frequency of information exchange between founders and peers over the past 12 months, coded as: once or twice, once every three months, monthly, weekly, or daily. For the models concerning the value of direct ties, the effects of tie strength related to market trends, product development, and managing one's firm were all insignificant. This contrasts with our main results, where we found a positive and significant effect for market trends (see model 1a) and managing one's firm (see model 1c). In addition, in the models concerning the value of referral ties, we found significant and positive associations for potential investors ( $\beta = 0.632$ ;  $p < 0.001$ ) and potential personnel ( $\beta = 0.359$ ;  $p < 0.01$ ). This result is noteworthy, as referrals to investors and personnel involve core factors of production that are also relatively high-risk for entrepreneurs. Founders may therefore attach particular value to referrals from peers with whom they maintain strong, trust-based relationships (Tötterman and Sten, 2005).

## 5. Discussion

Our study revealed distinct patterns of takers and givers in informal

intra-incubator peer networks. Specifically, we theorized peer networking as an effectual response to uncertainty, leading us to examine key founder-, venture-, and market-level sources of uncertainty that were found to have distinct impacts on incubatees' network behaviors. Thus, a key insight emerging from our research is that whether co-located entrepreneurs primarily capture value from peer networking versus also create value for peers is rooted in the presence or absence of particular types of uncertainties.

At the founder level, we found no significant associations between founding team composition—whether in terms of entrepreneurial experience or number of founders—and the perceived value of peer networking. Likewise, despite expectations that more experienced founders would act more as givers, they did not exhibit higher in-degree centrality. These findings are noteworthy because they challenge the assumption that experienced entrepreneurs or larger founding teams contribute more actively to intra-incubator peer exchange (Hsu, 2007; Ensley et al., 2006). A plausible explanation is that experienced founders rely more heavily on network ties external to the incubator, which may substitute for intra-incubator relationships. By the logic of reciprocity (Cropanzano and Mitchell, 2005), this reduced dependence on peers could lessen their motivation to share advice or referrals. Another possibility is that experienced founders perceive the knowledge and referrals available from less-experienced peers as redundant or of limited value, which may constrain their willingness to seek or offer assistance (Burt, 1992). Finally, for ventures with larger founding teams, intra-team collaboration and knowledge exchange may substitute for inter-firm peer interaction, thereby reducing the need to engage with other founders and potentially lowering the overall density and reciprocity of peer exchanges within the incubator (Kamm and Nurick, 1993).

At the venture level, we found that a venture's development stage—measured by firm size and firm age—shaped incubatees' networks in distinct ways. Regarding firm size, we found a positive link only with the extent to which founders derived value from receiving referrals to potential new personnel. This finding is noteworthy because it runs counter to prior research. Entrepreneurs are generally thought to rely on trusted strong ties when hiring, in order to reduce the risk of bringing in unreliable or ill-fitting employees (Aldrich and Langton, 1997). As ventures mature and transition from the startup to the growth phase, they typically gain legitimacy and face reduced uncertainty, which shifts recruitment practices away from network-based hiring and toward market-based approaches (Leung et al., 2006). A possible explanation for our contrasting finding is that entrepreneurs' easy access to many peers within the incubator sustains their reliance on network-based hiring, while physical proximity simultaneously acts as a reputation mechanism. If a referred candidate proves unfit, the peer making the referral may bear reputational costs within the community (Raub and Weesie, 1990).

In contrast, firm age was generally negatively associated with the value founders derived from peer networks. However, we identified two exceptions. First, we found no association for ideas about product development or referrals to potential customers. Second, we found an inverted U-shape relationship between firm age and the value of market trend information received from co-located peers. This suggests that mid-stage ventures benefit the most from peer insights about market trends, whereas younger and older firms derive comparatively less value. Regarding givers, contrary to expectations, we found no significant associations between firm age and being a provider of information, advice, or referrals for incubated peers. Combined, these findings provide empirical support for the common practice among incubators to focus on younger firms (Bergek and Norrman, 2008), particularly from a peer support perspective.

Regarding venture incubation period, we found no significant associations between incubation tenure or incubation intensity and the value takers derive from peer networks. In contrast, incubatees with longer incubation tenure tended to serve as key sources—rather than

beneficiaries—of various forms of information and referrals, with the exception of referrals to potential personnel. This is a particularly intriguing finding, given that many incubators implement graduation or exit policies requiring ventures to leave after 2–5 years, based on the assumption that incubators no longer provide substantial value beyond a certain stage (Mian, 1997; Bergek and Norrman, 2008). Moreover, incubation intensity—i.e. greater daily presence in the incubator—was positively associated with being a key source of information for product development ideas and referrals to potential personnel and suppliers. While physical visibility may partially explain this effect, it may also reflect the notion that spending more time together fosters trust (Gulati, 1995). Trust is particularly important in high-risk decisions, such as selecting key resource providers (e.g. personnel, suppliers, and investors). Strong relationships help mitigate opportunistic behavior (Granovetter, 1985), thereby making referrals more reliable (Uzzi, 1997).

At the market level, we found a positive association between market dynamism and the value incubatees derive from intra-incubator networks, particularly in relation to information about market trends and ideas for product development. In addition, ventures operating in more dynamic markets derive greater value from peer referrals to potential personnel and suppliers. These findings are consistent with highly dynamic markets, which are characterized by rapidly shifting buyer demands for new products and services (Volberda et al., 2012). While prior research has emphasized that firms must proactively form network ties to enhance their adaptability in such environments (Sarkar et al., 2001), our study offers new insight into how market dynamism specifically increases the value of peer networks among incubatees.

### 5.1. Theoretical contributions

Our study makes several contributions to the literature on ESOs, particularly research on intra-incubator peer networks (Bøllingtoft and Ulhoi, 2005; Ebberts, 2014). First, while prior studies have emphasized the value of intra-incubator peer networks for entrepreneurs (Moritz et al., 2022; Caccamo and Beckman, 2022; Del Sarto et al., 2022), there is limited theoretical understanding about when and for whom peer networks create more or less value (Bergman and McMullen, 2022). Our study addresses this gap by offering fine-grained insights into the differential value of various types of knowledge and referral networks crucial to new venture development. We find that not all network ties are equally valuable for all incubatees, highlighting the need for future research to explore not only how incubatees can construct an optimal portfolio of peer network ties, but also how that portfolio evolves over time. By demonstrating that the value of peer networks depends on the specific uncertainties faced by incubatees, we contribute to a deeper understanding of the contextual factors shaping peer networks. Furthermore, our analysis of founder-, venture- and market-level sources of uncertainty reveals that each has distinct implications for the value incubatees derive from peer networks. By highlighting these differences, we extend recent research that recognizes uncertainty as a key driver of entrepreneurial networking efforts (Engel et al., 2017). Specifically, we emphasize the need for future studies to explore how incubatees navigate different types of uncertainties, each of which may uniquely influence the value and effectiveness of their peer networking behaviors.

Second, our study also identified that intra-incubator peer networks have givers—incubatees that actively share knowledge and referrals with others. By comparing the distinct profiles of givers and takers, we have been able to illuminate how they jointly affect the value of peer networks, thereby addressing the call to study the bi-directionality of peer networks in incubators (Bergman and McMullen, 2022). We find that givers have a unique profile of founder-, firm- and market level attributes compared to takers and that they are critical sources of value for their peers. These findings have important implications. The network brokerage in which givers engage catalyzes the ESO's network

expansion across different fields and fosters a culture of trust and cooperation among peers. Without entrepreneurs who are willing to support their peers, incubators and other ESOs risk encountering free-rider problems, which may limit their ability to add value. Our study thus enriches the existing literature in which incubatees are generally portrayed as the receivers of resources (Schwartz and Hornych, 2010; Becker et al., 2024). While some recent qualitative studies distinguish between givers and takers (Caccamo and Beckman, 2022; Moritz et al., 2022), these works are largely descriptive. Our quantitative and network analytical approach complements these prior studies by offering a systematic examination of the factors influencing the emergence of givers. By disentangling the role played by different sources of uncertainty, our study paves the way for further research to systematically examine what motivates entrepreneurs to support their peers. It is worth noting here that in uncertain environments, rational self-interest does not fully explain networking behavior. Indeed, a particularly intriguing aspect of our findings is that the extent to which incubatees support their peers is unrelated to the value they themselves capture from peer networks. Why these incubatees would still help their peers is therefore an important question to address. Insights from the effectual networking literature suggest several possible explanations, one of which relates to altruism. Sharing resources with peers without expecting an immediate return aligns with the notion of altruistic networking, which has been suggested as an important aspect of effectual networking, as has the addressing of collective needs (Engel et al., 2017).

Third, scholars have emphasized the need to examine the nodal characteristics of ties as key drivers of effectual networking in uncertain contexts (Kerr and Coviello, 2019). In particular, a passion for entrepreneurship has been identified as a key driver of networking actions because it creates common ground and motivates founders to become active networkers (Becker et al., 2023; Hoang and Yi, 2015; Kerr and Coviello, 2019). For instance, in a case study on Chez Panisse, a pioneering restaurant in Berkeley, the founders' passion for organic food drove initial networking actions, such as meeting new people who shared the passion and the establishing of new relationships (Elfring and Hulsink, 2019). Passionate entrepreneurs have often been observed to take up a brokerage role. For example, a study (Boari and Riboldazzi, 2014) in the context of the manga industry—a distinctive Japanese comic genre—found that a deep passion for manga motivated certain entrepreneurs to take on various brokerage roles, facilitating essential industry connections. Likewise, givers in incubators serve as brokers, connecting peers to key resource providers such as personnel, suppliers, and investors. This finding is important because it highlights that givers—possibly driven by their passion for entrepreneurship or a specific field—play a key role in initiating a potentially virtuous cycle of support (van Rijnsvoever, 2020). In the words of Caccamo and Beckman (2022), they make the incubator space come “alive.” This reinforces the idea that givers act as crucial network builders, actively forming new connections and leveraging them effectively—an essential feature of effectual networking. Effectual networking can be understood as a response to uncertainty, yet future research should explore additional motivators of incubatees' willingness to support their peers, particularly the roles of altruism and passion.

### 5.2. Limitations and avenues for future research

Our study has several limitations, each of which also suggests avenues for future research. First, we relied on cross-sectional rather than longitudinal data. Longitudinal designs could provide stronger causal inferences and deeper insights into how the value of different peer network ties evolves over time (Newbert et al., 2013). Second, we examined a single incubator. While this allowed for detailed, context-sensitive analysis, future studies could adopt a comparative design to explore how incubator characteristics—such as size, specialization, geographic location, and cultural context—shape peer dynamics

and giver–taker patterns. For instance, smaller incubators may facilitate closer interpersonal ties and repeated interactions that strengthen cohesion, whereas larger incubators may dilute relational density, leading to more fragmented networks in which advice and support circulate less effectively (Klofsten et al., 2020). The degree of specialization may also matter: in highly specialized incubators, ventures with similar profiles may compete for comparable resources, heightening competitive dynamics, while in more generalist incubators ventures may be too heterogeneous to derive reciprocal value from one another (Kim et al., 2025; Schwartz and Hornych, 2008). Moreover, incubators situated in different regions or cultural contexts might vary in the norms and expectations surrounding reciprocity and knowledge sharing, influencing the balance between giving and taking within peer networks. Comparative analyses across incubators located in diverse geographic and cultural environments (Rubin et al., 2015) would thus offer valuable insights into the contextual contingencies underlying peer exchange. Third, we focused on the perceived value of peer networks rather than on objective performance outcomes. While this approach aligns with much of the entrepreneurial networking literature, perceived value may not always translate into measurable performance. Future research could therefore combine subjective and objective outcomes to assess whether entrepreneurs accurately evaluate the benefits of their networks. Fourth, we considered only a limited set of variables linked to incubatees' uncertainty and networking behavior. Future work could extend this by examining additional dimensions, including more direct measures of uncertainty. Fifth, the firms in our sample had relatively short incubation tenures (average 11 months, maximum 40 months), which may restrict the generalizability of our findings. Studies of incubators with longer tenures could test whether extended incubation periods influence peer networking. Finally, our analysis focused exclusively on founders' networks. Although this focus is appropriate given the small size of incubated firms, future research could also explore employee networks and how they complement or substitute for founders' networking activities.

## 6. Conclusion

In this study, we identified distinct patterns of givers and takers in informal intra-incubator peer networks and conceptualized peer networking as an effectual response to uncertainty. Building on this perspective, we examined founder-, venture-, and market-level sources of uncertainty that shape incubatees' networking behaviors. Our findings show that entrepreneurs in younger ventures and those operating in dynamic markets benefit most from intra-incubator peer ties, whereas entrepreneurs with longer incubation tenures and greater daily presence are more likely to act as givers, sharing knowledge, advice, and referrals. In doing so, our study advances research on ESOs by moving beyond the traditional focus on resource receipt to also highlight the characteristics of those who contribute to peer networks. Theoretically, we offer a more nuanced account of how entrepreneurial uncertainty interacts with peer dynamics to shape these giver–taker patterns. Practically, our findings suggest that ESO exit policies should balance individual benefits with the collective value generated when long-tenured entrepreneurs continue to contribute. Taken together, these insights deepen our understanding of when, how, and for whom peer networks in ESOs create value.

### CRediT authorship contribution statement

**Joris Ebberts:** Writing – review & editing, Writing – original draft, Visualization, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Wouter Stam:** Writing – review & editing, Writing – original draft, Methodology, Conceptualization. **Tom Elfring:** Writing – review & editing, Writing – original draft.

**Declaration of competing interest**

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Joris Ebbers reports financial support was provided by the Netherlands Organisation for Scientific Research (NWO). If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

**Acknowledgements**

This research was supported by the Netherlands Organisation for

Scientific Research (NWO) under grant number 314-98-067. The authors are grateful to the editors, Wim Vanhaverbeke and Magnus Klofsten, and to the anonymous reviewers of Technovation for their constructive feedback and guidance. We also thank the partnering business incubator and its tenants for their time and collaboration, as well as Olivier Lieshout and Maartje Siemelink for their valuable assistance with data collection. In addition, we are indebted to participants at the Academy of Management (AOM) and EGOS conferences, and to colleagues at research seminars hosted by Utrecht University, ESCP Berlin, Wageningen University, Católica Porto Business School, and Vrije Universiteit Amsterdam for their insightful comments on earlier versions of this paper.

**Appendices**

**Appendix 1A**

Takers: Value of direct ties

	Model 1		Model 2		Model 3	
	Market trends		Product development		Managing one's firm	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
<b>Main variables:</b>						
Out-degree: market trends	0.283	0.132*				
Out-degree: product development			0.096	0.114		
Out-degree: managing firm					0.472	0.180*
Founder experience	0.041	0.101	-0.013	0.100	-0.202	0.107+
Number of founders	-0.079	0.131	-0.136	0.129	-0.061	0.137
Firm age	0.151	0.082+	-0.022	0.032	-0.073	0.034*
Firm age squared	-0.009	0.004*				
Firm size	-0.009	0.014	-0.013	0.014	0.009	0.015
Incubation tenure	0.006	0.015	0.021	0.015	0.019	0.016
Incubation intensity	0.014	0.011	0.001	0.011	0.021	0.011+
Market dynamism	0.335	0.124**	0.281	0.123*	0.151	0.133
<b>Controls:</b>						
In-degree: market trends	-0.078	0.229				
In-degree: product development			-0.020	0.196		
In-degree: managing firm					0.011	0.288
Constant	2.095	0.665**	4.004	0.636***	3.077	0.685***
N	105		105		105	
R-squared	0.223		0.099		0.224	
R-squared adjusted	0.140		0.013		0.151	
F	2.690**		1.154+		3.048**	
VIF (mean, max)	2.35	7.25	1.16	1.28	1.17	1.36

Note: Two tailed test: + p < 0.10, \*p < 0.05, \*\*p < 0.01, \*\*\*p < 0.001.

**Appendix 1B**

Takers: Value of referrals

	Model 4 Referrals to potential personnel		Model 5 Referrals to potential customers		Model 6 Referrals to potential suppliers		Model 7 Referrals to potential investors	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
	<b>Main variables:</b>							
Out-degree: potential personnel	0.761	0.296*						
Out-degree: potential customers			0.336	0.152*				
Out-degree: potential suppliers					0.818	0.309**		
Out-degree: potential investors							1.026	0.303**
Founder experience	0.107	0.108	0.015	0.102	0.001	0.121	0.212	0.123+
Number of founders	-0.128	0.141	-0.258	0.132+	0.055	0.154	-0.014	0.160
Firm age	-0.104	0.034**	-0.058	0.033+	-0.245	0.097*	-0.090	0.040*
Firm age squared					0.008	0.005+		
Firm size	0.109	0.038**	0.015	0.014	0.026	0.017	-0.010	0.017
Firm size squared	-0.001	0.001+						
Incubation tenure	-0.013	0.015	0.001	0.015	0.002	0.018	0.001	0.018

(continued on next page)

**Appendix 1B (continued)**

	Model 4 Referrals to potential personnel		Model 5 Referrals to potential customers		Model 6 Referrals to potential suppliers		Model 7 Referrals to potential investors	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Incubation intensity	0.019	0.012	0.011	0.011	0.000	0.013	-0.007	0.013
Market dynamism	0.315	0.132*	0.157	0.127	0.423	0.148**	0.291	0.153+
<b>Controls:</b>								
In-degree: potential personnel	-0.077	0.440						
In-degree: potential customers			0.052	0.270				
In-degree: potential suppliers					0.003	0.515		
In-degree: potential investors							1.135	0.613
Constant	2.405	0.704***	4.959	0.652***	2.601	0.789**	2.476	0.788**
N	105		105		105		105	
R-squared	0.361		0.144		0.233		0.265	
R-squared adjusted	0.293		0.062		0.152		0.195	
F	5.302***		1.769 +		2.864**		3.807***	
VIF (mean, max)	2.38	7.49	1.14	1.23	2.35	7.20	1.14	1.24

Note: Two tailed test: + p < 0.10, \*p < 0.05, \*\*p < 0.01, \*\*\*p < 0.001.

**Appendix 2A**

Givers: In-degree centrality direct ties

	Model 8		Model 9		Model 10	
	Market trends		Product development		Managing one's firm	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
<b>Main variables:</b>						
Founder experience	0.025	0.044	0.005	0.053	0.054	0.038
Number of founders	0.035	0.057	0.041	0.069	-0.040	0.048
Firm age	0.007	0.014	-0.007	0.017	-0.005	0.012
Firm size	-0.003	0.006	0.002	0.007	0.006	0.005
Incubation tenure	0.013	0.006*	0.024	0.007**	0.018	0.005***
Incubation intensity	0.006	0.005	0.011	0.005*	0.002	0.004
Market dynamism	0.005	0.056	-0.003	0.065	0.084	0.046+
<b>Controls:</b>						
ENV: market trends	0.084	0.055				
ENV: product development			0.038	0.070		
ENV: managing firm					0.008	0.034
Constant	-0.552	0.378	-0.387	0.497	-0.460	0.280
N	105		105		105	
R-squared	0.128		0.196		0.216	
R-squared adjusted	0.056		0.129		0.151	
F	1.767+		2.923**		3.306**	
VIF (mean, max)	1.12	1.20	1.11	1.16	1.11	1.16

Note: Two tailed test: + p < 0.10, \*p < 0.05, \*\*p < 0.01, \*\*\*p < 0.001.

**Appendix 2B**

Givers: In-degree centrality referrals

	Model 11 Referrals to potential personnel		Model 12 Referrals to potential customers		Model 13 Referrals to potential suppliers		Model 14 Referrals to potential investors	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
<b>Main variables:</b>								
Founder experience	0.030	0.025	-0.023	0.039	-0.024	0.024	-0.008	0.021
Number of founders	0.044	0.032	-0.047	0.051	-0.002	0.030	0.006	0.027
Firm age	0.002	0.008	-0.018	0.012	-0.002	0.008	0.000	0.007
Firm size	0.004	0.004	-0.001	0.005	-0.003	0.003	0.000	0.003
Incubation tenure	0.005	0.003	0.014	0.005**	0.010	0.003**	0.009	0.003**
Incubation intensity	0.006	0.003*	0.005	0.004	0.006	0.002*	0.004	0.002+
Market dynamism	0.028	0.030	0.060	0.047	0.028	0.029	-0.006	0.025
<b>Controls:</b>								
ENV: potential personnel	-0.019	0.023						
ENV: potential customers			0.014	0.049				
ENV: potential suppliers					-0.009	0.021		
ENV: potential investors							0.032	0.015*
Constant	-0.348	0.177+	-0.078	0.398	-0.147	0.169	-0.208	0.140
N	104		105		105		105	
R-squared	0.195		0.130		0.177		0.185	

(continued on next page)

Appendix 2B (continued)

	Model 11 Referrals to potential personnel		Model 12 Referrals to potential customers		Model 13 Referrals to potential suppliers		Model 14 Referrals to potential investors	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
R-squared adjusted	0.127		0.058		0.109		0.117	
F	2.880**		1.799+		2.584*		2.728**	
VIF (mean, max)	1.16	1.29	1.11	1.16	1.14	1.22	1.13	1.19

Note: Two tailed test: + p < 0.10, \*p < 0.05, \*\*p < 0.01, \*\*\*p < 0.001.

Data availability

Data will be made available on request.

References

Aerts, K., Matthyssens, P., Vandenbempt, K., 2007. Critical role and screening practices of European business incubators. *Technovation* 27 (5), 254–267.

Aldrich, H., Auster, E.R., 1986. Even dwarfs started small: liabilities of age and size and their strategic implications. *Res. Organ. Behav.* 8 (2), 165–198.

Aldrich, H.A.N.L., Langton, N., 1997. Human resource management practices and organizational life cycles. In: *Frontiers of Entrepreneurship Research*. Babson College Center for Entrepreneurship, Wellesley, MA, pp. 349–357.

Becker, K., Ebberts, J.J., Engel, Y., 2023. Network to passion or passion to network? Disentangling entrepreneurial passion selection and contagion effects among peers and teams in a startup accelerator. *J. Bus. Ventur.* 38 (4), 106299.

Becker, K., Ebberts, J.J., Engel, Y., 2024. Going online: peer entrepreneur networks in a startup accelerator before and during the COVID-19 pandemic. *Technovation* 130, 102917.

Bergek, A., Norrman, C., 2008. Incubator best practice: a framework. *Technovation* 28 (1–2), 20–28.

Bergman, B.J., McMullen, J.S., 2022. Helping entrepreneurs help themselves: a review and relational research agenda on entrepreneurial support organizations. *Entrep. Theory Pract.* 46 (3), 688–728.

Bibeau, J., Meilleur, R., St-Jean, É., 2024. To formalize, or not to formalize, business incubators' networks: that is not the question. *Technovation* 130, 102904.

Boari, C., Riboldazzi, F., 2014. How knowledge brokers emerge and evolve: the role of actors' behaviour. *Res. Pol.* 43 (4), 683–695.

Bøllingtoft, A., 2012. The bottom-up business incubator: leverage to networking and cooperation practices in a self-generated, entrepreneurial-enabled environment. *Technovation* 32 (5), 304–315.

Bøllingtoft, A., Ulhøi, J.P., 2005. The networked business incubator: leveraging entrepreneurial agency. *J. Bus. Ventur.* 20 (2), 265–290.

Burt, R.S., 1992. *Structural Holes: The Social Structure of Competition*. Harvard University Press, Cambridge, MA.

Busch, C., Barkema, H., 2022. Planned luck: how incubators can facilitate serendipity for nascent entrepreneurs through fostering network embeddedness. *Entrep. Theory Pract.* 46 (4), 884–919.

Caccamo, M., Beckman, S., 2022. Leveraging accelerator spaces to foster knowledge communities. *Technovation* 113, 102421.

Clarysse, B., Wright, M., Lockett, A., Velde, E.V.D., Vohora, A., 2005. Spinning out new ventures: a typology of incubation strategies from European research institutions. *J. Bus. Ventur.* 20 (2), 183–216.

Cohen, S.L., Bingham, C.B., Hallen, B.L., 2019. The role of accelerator designs in mitigating bounded rationality in new ventures. *Adm. Sci. Q.* 64 (4), 810–854.

Coleman, J., 1988. Social capital in the creation of human capital. *Am. J. Sociol.* 94, S95–S120.

Creswell, J.W., Creswell, J.D., 2022. In: *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, sixth ed. Sage publications Press, India.

Cropanzano, R., Mitchell, M.S., 2005. Social exchange theory: an interdisciplinary review. *J. Manag.* 31 (6), 874–900.

Del Sarto, N., Cazares, C.C., Di Minin, A., 2022. Startup accelerators as an open environment: the impact on startups' innovative performance. *Technovation* 113, 102425.

Dess, G.G., Beard, D.W., 1984. Dimensions of organizational task environments. *Adm. Sci. Q.* 52–73.

Dew, N., Read, S., Sarasvathy, S.D., Wiltbank, R., 2009. Effectual versus predictive logics in entrepreneurial decision-making: differences between experts and novices. *J. Bus. Ventur.* 24 (4), 287–309.

Ebberts, J.J., 2014. Networking behavior and contracting relationships among entrepreneurs in business incubators. *Entrepren. Theor. Pract.* 38 (5), 1159–1181.

Elfring, T., Hulsink, W., 2007. Networking by entrepreneurs: patterns of tie formation in emerging organizations. *Organ. Stud.* 28 (12), 1849–1872.

Elfring, T., Hulsink, W., 2019. Dynamic networking by entrepreneurs: Collaborative efforts in developing opportunities and mobilising resources. In: Reuer, J., Matusik, S., Jones, J. (Eds.), *The Oxford Handbook of Entrepreneurship and Collaboration*. Oxford University Press.

Engel, Y., Kaandorp, M., Elfring, T., 2017. Toward a dynamic process model of entrepreneurial networking under uncertainty. *J. Bus. Ventur.* 32 (1), 35–51.

Enslay, M.D., Hmieleski, K.M., Pearce, C.L., 2006. The importance of vertical and shared leadership within new venture top management teams: implications for the performance of startups. *Leadersh. Q.* 17 (3), 217–231.

Ferretti, M., Guerini, M., Panetti, E., Parmentola, A., 2022. The partner next door? The effect of micro-geographical proximity on intra-cluster inter-organizational relationships. *Technovation* 111, 102390.

Freeman, L.C., 1979. Centrality in networks: conceptual clarification. *Soc. Netw.* 1, 215–239.

Gilsing, V., Nootboom, B., 2005. Density and strength of ties in innovation networks: an analysis of multimedia and biotechnology. *Eur. Manag. Rev.* 2 (3), 179–197.

Granovetter, M.S., 1973. The strength of weak ties. *Am. J. Sociol.* 78 (6), 1360–1380.

Granovetter, M.S., 1985. Economic action and social structure: the problem of embeddedness. *Am. J. Sociol.* 91 (3), 481–510.

Gulati, R., 1995. Does familiarity breed trust? The implications of repeated ties for contractual choice in alliances. *Acad. Manag. J.* 38 (1), 85–112.

Haans, R.F.J., Pieters, C., He, Z.-L., 2016. Thinking about U: theorizing and testing U- and inverted U-shaped relationships in strategy research. *Strateg. Manag. J.* 37 (7), 1177–1195.

Hansen, M.T., Chesbrough, H.W., Nohria, N., Sull, D.N., 2000. Networked incubators: hothouses of the new economy. *Harv. Bus. Rev.* 74–84. September.

Hite, J.M., Hesterly, W.S., 2001. The evolution of firm networks: from emergence to early growth of the firm. *Strateg. Manag. J.* 22 (3), 275–286.

Hoang, H., Yi, A., 2015. Network-based research in entrepreneurship: A decade in review. *Found. Trends® Entrepreneursh.* 11 (1), 1–54.

Honig, B., Karlsson, T., 2010. Social capital and the modern incubator: a comparison of in-group and out-group social networks. *J. Small Bus. Enterpren.* 23 (Suppl. 1), 719–731.

Hsu, D.H., 2007. Experienced entrepreneurial founders, organizational capital, and venture capital funding. *Res. Pol.* 36 (5), 722–741.

Jack, S.L., 2005. The role, use and activation of strong and weak network ties: a qualitative analysis. *J. Manag. Stud.* 42 (6), 1233–1259.

Kamm, J.B., Nurick, A.J., 1993. The stages of team venture formation: a decision-making model. *Entrep. Theory Pract.* 17 (2), 17–27.

Kerr, J., Coviello, N., 2019. Formation and constitution of effectual networks: A systematic review and synthesis. *Int. J. Manag. Rev.* 21 (3), 370–397.

Kim, G.Y., Lee, W.J., Choi, B., Lew, Y.K., 2025. Fostering collaborative opportunities for AI start-ups: the case of a hybrid business incubator in Seoul. *J. Technol. Tran.* 50 (2), 552–581.

Klofsten, M., Lundmark, E., Wennberg, K., Bank, N., 2020. Incubator specialization and size: divergent paths towards operational scale. *Technol. Forecast. Soc. Change* 151, 119821.

Leung, A., Zhang, J., Wong, P.K., Der Foo, M., 2006. The use of networks in human resource acquisition for entrepreneurial firms: multiple “fit” considerations. *J. Bus. Ventur.* 21 (5), 664–686.

Lind, J.T., Mehlum, H., 2007. UTEST: Stata Module to Test for a U-shaped relationship. *Statistical Software Components S456874*. Boston College Department of Economics revised 23 Feb 2016.

Lind, J.T., Mehlum, H., 2010. With or without U? The appropriate test for a u-shaped relationship. *Oxf. Bull. Econ. Stat.* 72 (1), 109–118.

McAdam, M., McAdam, R., 2008. High tech start-ups in university science park incubators: the relationship between the start-up's lifecycle progression and use of the incubator's resources. *Technovation* 28 (5), 277–290.

McMullen, J.S., Shepherd, D.A., 2006. Entrepreneurial action and the role of uncertainty in the theory of the entrepreneur. *Acad. Manag. Rev.* 31 (1), 132–152.

Mian, S., 1997. Assessing and managing the university technology business incubator: an integrative framework. *J. Bus. Ventur.* 12 (4), 251–284.

Milliken, F.J., 1987. Three types of perceived uncertainty about the environment: State, effect, and response uncertainty. *Acad. Manag. Rev.* 12 (1), 133–143.

Moritz, A., Naulin, T., Lutz, E., 2022. Accelerators as drivers of cooption among early-stage startups. *Technovation* 111, 102378.

Mosey, S., Wright, M., 2007. From human capital to social capital: a longitudinal study of technology-based academic entrepreneurs. *Entrep. Theory Pract.* 31 (6), 909–935.

Nai, J., Lin, Y., Kotha, R., Vissa, B., 2022. A foot in the door: field experiments on entrepreneurs' network activation strategies for investor referrals. *Strateg. Manag. J.* 43 (2), 323–339.

Newbert, S.L., Tornikoski, E.T., Quigley, N.R., 2013. Exploring the evolution of supporter networks in the creation of new organizations. *J. Bus. Ventur.* 28 (2), 281–298.

Nicholls-Nixon, C.L., Valliere, D., 2021. Entrepreneurial logic and fit: a cross-level model of incubator performance. *Int. J. Entrepreneurial Behav. Res.* 27 (7), 1696–1723.

Nijssen, E.J., van der Borgh, M., 2017. Beyond the water cooler: using socialization to understand use and impact of networking services on collaboration in a business incubator. *R D Manag.* 47 (3), 443–457.

- Pauwels, C., Clarysse, B., Wright, M., Van Hove, J., 2016. Understanding a new generation incubation model: the accelerator. *Technovation* 50, 13–24.
- Podolny, J.M., 2001. Networks as the pipes and prisms of the market. *Am. J. Sociol.* 107 (1), 33–60.
- Raub, W., Weesie, J., 1990. Reputation and efficiency in social interactions: an example of network effects. *Am. J. Sociol.* 96 (3), 626–654.
- Roche, M.P., Oettl, A., Catalini, C., 2024. Proximate (co-)working: knowledge spillovers and social interactions. *Manag. Sci.* 70 (12), 8245–8264.
- Rubin, T.H., Aas, T.H., Stead, A., 2015. Knowledge flow in technological business incubators: evidence from Australia and Israel. *Technovation* 41–42, 11–24.
- Sá, C., Lee, H., 2012. Science, business, and innovation: understanding networks in technology-based incubators. *R D Manag.* 42 (3), 243–253.
- Sarasvathy, S.D., 2001. Causation and effectuation: toward a theoretical shift from economic inevitability to entrepreneurial contingency. *Acad. Manag. Rev.* 26 (2), 243–263.
- Sarkar, M.B., Echambadi, R.A.J., Harrison, J.S., 2001. Alliance entrepreneurship and firm market performance. *Strateg. Manag. J.* 22 (6/7), 701–711.
- Sasabuchi, S., 1980. A test of a multivariate normal mean with composite hypotheses determined by linear inequalities. *Biometrika* 67, 429–439.
- Saunders, M., Lewis, P., Thornhill, A., 2023. *Research Methods for Business Students*, ninth ed. Pearson Education.
- Schnell, L., Berger, E.S., 2025. Sharing and exchange dynamics in entrepreneurial spaces: a systematic literature review and conceptualization. *Technol. Forecast. Soc. Change* 218 (C).
- Schwartz, M., Hornych, C., 2010. Cooperation patterns of incubator firms and the impact of incubator specialization: empirical evidence from Germany. *Technovation* 30 (9–10), 485–495.
- Stinchcombe, A.L., 1965. Social structure and organizations. In: March, J. (Ed.), *Handbook of Organizations*. Rand McNally, Chicago, IL, pp. 142–193.
- Tötterman, H., Sten, J., 2005. Start-ups: business incubation and social capital. *Int. Small Bus. J.* 23 (5), 487–511.
- Townsend, D.M., Hunt, R.A., McMullen, J.S., Sarasvathy, S.D., 2018. Uncertainty, knowledge problems, and entrepreneurial action. *Acad. Manag. Ann.* 12 (2), 659–687.
- Tsai, W., Ghoshal, S., 1998. Social capital and value creation: the role of intrafirm networks. *Acad. Manag. J.* 41 (4), 464–476.
- Uzzi, B., 1997. Social structure and competition in interfirm networks: the paradox of embeddedness. *Adm. Sci. Q.* 42 (1), 35–67.
- Van Erkelens, A.M., Thompson, N.A., Chalmers, D., 2024. The dynamic construction of an incubation context: a practice theory perspective. *Small Bus. Econ.* 62 (2), 583–605.
- Van Rijnsouwer, F.J., 2020. Meeting, mating, and intermediating: how incubators can overcome weak network problems in entrepreneurial ecosystems. *Res. Pol.* 49 (1), 103884.
- Volberda, H.W., van der Weerdt, N., Verwaal, E., Stienstra, M., Verdu, A.J., 2012. Contingency fit, institutional fit, and firm performance: a metafit approach to organization–environment relationships. *Organ. Sci.* 23 (4), 1040–1054.
- Xu, S., Wu, X., He, J., Zhu, R., Morrison, A.M., Xie, C., 2024. Turning entrepreneurial networks into business model innovation for start-ups. *Manag. Decis.* 62 (4), 1395–1423.
- Zheng, C., Ahsan, M., DeNoble, A.F., 2020. Entrepreneurial networking during early stages of opportunity exploitation: Agency of novice and experienced new venture leaders. *Entrepren. Theor. Pract.* 44 (4), 671–699.