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THE ROLE OF MATURE FIRMS IN AN ENTREPRENEURIAL ECOSYSTEM

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The Role of Mature Firms in an Entrepreneurial Ecosystem

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Abstract

Entrepreneurial ecosystems are geographically situated collections of organisations that support the cultivation of entrepreneurial talent. Entrepreneurial ecosystems include several major homogeneous constituent groups. One of these constituent groups are mature firms (i.e. technology companies, large corporations, enterprise, big business). Little has been written about mature firms' interactions with the ecosystem, and start-ups in particular. Mature firms (non-innovating or non-growth oriented firms) benefit the entrepreneurial ecosystem in three ways. Their presence lures talent, develops deep expertise in functional and process areas, provides employees for potential spinoffs, and talent for hire for high-growth young firms. Mature companies also act as investors and acquirers for start-ups. Lastly, mature firms benefit entrepreneurial ecosystems by engaging with start-ups and growth-oriented firms in myriad other ways which is the focus of this research. The goal of the study is to investigate the amount of engagement by mature firms and start-ups as well as what they do, and how they do it. A mixed-method approach using quantitative network theory finds less-than-optimum mature firm-start-up interaction in a sample population. A qualitative investigation presents some data and highlights 18 different ways for mature firms to engage with start-ups. The author begins to develop theory about the role of mature firms in an entrepreneurial ecosystem from an inductive standpoint. This work responds to mature firm practitioners who question how they can participate in an entrepreneurial ecosystem, and to policy makers who want to learn how to improve entrepreneurial activity in a jurisdiction.

Keywords: Mature firm, Entrepreneurial ecosystem, Cluster of innovation, Entrepreneur, Start-up, Social network, Network theory, Enterprise, Corporation, Big business

1 Introduction

Social networks are important to entrepreneurial accomplishment and firm performance. Extant research indicates that firm networks are positive indicators of entrepreneurial firm performance (Lechner and Dowling, 2003). Entrepreneurs who use their network to access resources facilitate their ability to acquire finance (Fornoni, Arribas et al. 2012) and taking advantage of strong ties (where interpersonal ties are more similar in various ways and therefore more likely to be friends (Granovetter, 1973)) is linked to

sales performance (Collins and Clark, 2003). Entrepreneurs capitalize on confidence, experience, and their relation to others in social networks facilitating access to information and knowledge. Thus, entrepreneurs with greater networks and social capital influence the financial performance of their firms (Semrau and Sigmund 2012) through sales and the acquisition of finance.

Entrepreneurs compensate for their lack of resources for finance, markets and information by drawing on their social networks which provide them with access to information without having to pay for it. Indeed, start-ups often begin with little more than the social networks of their founders. In locales where many entrepreneurs are situated, the notion of entrepreneurial ecosystems (EE) describes the network of ties and support systems that connect entrepreneurs to finance, information, support and technology in the ecosystem. Born out of the concept of clusters, EE and clusters of innovation (COI) describe relations established amongst various constituents in an entrepreneurial environment where many young firms are situated, entrepreneurial processes are applied, and the specific requirements of start-ups are cultivated (Saxenian 1994, p 287). EE importance is magnified because they have become recognized as highly viable economic development opportunities and sources of regional advantage (Audretsch, Belitski et al. 2015).

An EE or COI starts as a geographic cluster of start-ups attempting to survive and succeed. A collection of other constituents with which start-ups engage include venture capital, professional support, universities and research institutions, and mature technology firms in the case of Silicon Valley (Ferrary and Granovetter, 2009), and government interactions as in Israel (2014). Recent empirical work indicates that accelerators and incubators often play a major role in EE as well (Farrell and Dennison, 2015). Ecosystems expands in the current environment of instant personal communications where an email address or a cell phone permits information and interaction acquisition from around the world. By so doing, actors from distant geographic locations are brought into the orbit of a local EE.

Much has been written about various constituents within EE or COI. The importance of universities, and venture capital dominate this literature. The objective of this paper is to assess the contribution of the mature firm constituents to the EE or COI. This work is novel in its theoretical and practical contributions. Though the roles played by mature firms within the domain of an EE or COI have been described in ethnographic and historical accounts (Saxenian, 1994), and summarized in accounts of EE (Mason and Brown, 2014), their actions have not been previously isolated for research (except Freeman and Engel, 2007). The actions of mature firms, enterprise and anchor firms are known to be important for

the development of employees who sometimes leave as spinoffs, and as acquirers of start-up firms. The roles that mature firms perform over and above these characteristics is not so well known.
The research question asks how mature firms engage with start-ups in an EE. The study therefore seeks to identify the quantity of interactions amongst start-ups and mature firms, and it also attempts to clarify what the engagements exist between the large and small players and illustrate how those engagements are executed.

2. Structure of the paper

The research objective of this study is to investigate the amount of mature firm (MF) interaction in an EE, what they do to interact with the entrepreneurial firms and start-ups (SU), and how MF engage with SU. The remaining structure of this paper begins by tracking the contributions of mature firms in an EE in Section 3. This is conducted by using the main constructs that identify a COI as outlined by Engel and del-Palacio (2009; Engel and del-Palacio, 2011). Section 4 outlines the mixed methods, sequential methodology employing network theory to assess the amount of MF-SU interaction, and a qualitative investigation to explore what MF are contributing to SU and how they are doing it. Section 5 presents the results of the quantitative network theory and qualitative investigation to scrutinize a conceptual framework for the types of specific actions mature firms may adopt in interacting within an EE or COI and the possible motivations for each. A conceptual framework and theory development for the contribution of MF to an EE are presented in Section 6. The conclusion notes both the work's limitations and future research opportunities for the Academy.

The terms of COI and EE are used interchangeably in this research to describe EE and COI. Mature firms (MF) may be small, medium or large firms, but they are corporations that are no longer growing rapidly, nor innovating. Entrepreneurial firms and start-ups (SU) are variously referred to also as young firms, founders' firms, and growth companies.

3. Extant research regarding MF role in EE

In this section, extant research is used to examine what is currently known about the role of mature firms as they interact amongst EE constituents. Knowingly, or unknowingly, do mature firms contribute to network ties and how. How they catalyse the mobility of resources and hasten testing and developing commercialising processes? Do they promote start-up know-how and business practices and what do they

offer by way of capital and finance; how do they support the innovation process and do their larger ranks promote the frequent flow of people; and lastly how collaboration is enhanced by the presence of the mature firms.

High mobility of people and talent between and among ventures

Successful COI tolerate -- indeed encourage -- the rapid recycling of talent, and the movement of people between and amongst firms, large and small. This mobility of human capital facilitates the transfer of tacit knowledge, intellectual collaboration and rapid validation and success or rapid failure.

Mature firms participate in seeding this cycle with an abundance of deep talent who may harbour pre-entrepreneurial intentions. Rapidly growing entrepreneurs often turn to mature firms for talent when completing the management team. As the firm grows, the likelihood of the founder being replaced is also exacerbated. And the more successful and faster the firm grows, the sooner the entrepreneurs will be called upon to look to mature firms for openings in their own management teams, and replacements for themselves (Freeman and Engel, 2007).

Age, attitude and income are influencers in entrepreneurial populations. Entrepreneurial attitude and age have an inverted U shape, albeit more pronounced in aggregate over a population, that implies an optimum entrepreneurial activity in mid-career (Lévesque and Minniti, 2011). Similarly, populations who are more advanced in age, start firms that have greater longevity. Entrepreneurs with higher previous incomes and who have greater access to resources, are motivated by income targets, and start-firms that grow faster (Cressy, 1996). Pre-entrepreneurs migrating out of MF have apparent prosperity and maturity to be more successful and resourceful during mid-life.

Employers have the ability to encourage such activity out of their firms. They might support their employees who harbour entrepreneurial intentions and who plan to leave the traditional employer workforce. This notion might even be extended to high-performing employees who are valuable to the MF, but who have a disposition to leave to pursue entrepreneurial intentions which may be competitive to their employer. Similarly, while the mature firm may not go as far as to encourage the defection of a valuable employee, they may not act to impede the intended defector either. Such was the case of Hoffman LaRoche in Switzerland when it watched four of its key cardiac researchers leave the giant pharmaceutical firm, following the disillusionment and defection of their team leader, Thomas Widdmann. Hoffman LaRoche did not impede the group either, by not enforcing the non-compete clauses for any of the individuals involved. Using licensed IP they had developed while at Hoffman

LaRoche, Widdman and his party went on to create Actilion which grew to hundreds of employees and sold in, 2017 to Johnson and Johnson for $36 billion.

Downsizing firms also contribute to recycling of talent in an ecosystem. A mature firm down-sizing strategy may seek to support the subsequent entrepreneurial intentions of downsized employees when mature firms reduce workforce numbers. Entrepreneurs founding a firm under the circumstances of adverse events occurring to the parent firm will have previous organisational experience (Curran, O'Gorman et al., 2016). Similarly, but earlier in the downsizing process, a mature firm engaged in an adverse event may look to identify personnel willing to leave for entrepreneurial motives (Mishra, Spreitzer et al., 1998). Supporting downsized employees with entrepreneurial education, means, contacts and counselling prepares previously unsuspecting founders for potentially unforeseen opportunities.

Start-up know-how and business practices

MF develop skills in employees that enhance start-up skills and business practices for currently employed pre-founders with an innovation to launch. Likewise, MF cultivate deep knowledge in specific areas that founders acquire during their careers of which they can take advantage. However, Klepper's (2001) summary of the literature on spinoff founders found that the nature of a spinoffs' products and services derives primarily from their founders' backgrounds and contributions rather than from the parent firms' principle products or technologies.

Moreover, speculations indicate the more previous-parent-experience that founders have with their co-founders improves ventures' performances as a result of their shared experiences, knowledge and familiarity (Cooper and Gimeno-Gascon, 1992) of each other and business practices. Dyck (1997) also used the parental dynamic to suggest that employers that were supportive of the defecting spinoffs, helped give greater lift to the start-ups' performance than those start-up founders who leave the mature firm without "parental" backing and encouragement.

There are other skills and business practices that start-ups learn *in situ* rather than from the MF from which they departed. Founders need to be fluid and adaptive to the evolving needs of the firm (Freeman and Engel, 2007), and new founders' abilities to validate, sell, finance, create control systems, market, design, code, hire and build are facilitated by having few organisational charts, or job roles. This may be unfamiliar territory for the talent departing from MF. Being able to respond opportunistically to customer feedback or unexpected developments, and having the personal nature and know-how to reorient their

plans in mid-start-up is a characteristic of successful entrepreneurs (Bhide, 2000) which may also be unlikely for employees from MF.

Deployment and acquisition of capital and finance

Founders whose creations have the potential to grow quickly have to secure a sufficient and ongoing source of cash flow to secure a growth trajectory where revenues lag behind spending. The search for capital is vital and the amount of time spent conducting such activities is not disproportionate to its importance. The ongoing discussions, board meetings, control systems, reporting and network development will predominantly occupy the activities of at least one of the team members. This is a perverse event since much finance is accompanied with issuing equity and is thus dilutive to the founders. The paradox of spending inordinate amounts of time for outcomes that will dilute ownership is not lost on founders who often struggle to avoid dilutive finance wherever possible. Mature firms' roles relative to the deployment of capital in an EE or COI includes acquiring young firms outright, investing in these firms to gain an insight or an edge on a developing technology or innovation of interest to the mature firm, gain an eye to the start-ups' intellectual property. This is discussed further in Section 6.

Rapid experimentation, testing and innovation

During early-stages entrepreneurial development, many new venture teams focus on the product instead of the business and the business model. Rapid testing and validation foster the develop-pivot-redevelop learning process (Engel and Forster, 2014) that accelerates entrepreneurs' understanding of success or failure and movement to commercialisation. In Saxenian's (1994) seminal ethnographic examination of Silicon Valley, Jeffrey Kalb of MasPar mused that "… time is everything. Time-to-market is right behind cash in your priorities as a start-up" (p. x). Established firms and enterprise accelerate SU validation process by testing prototypes, providing access to resources, hiring (or firing) talent, prescribing the necessary logistics of selling into specific markets, cultivating an understanding of document control procedures in larger firms, evaluation and insights.

Validating the business case in advance prevents wasting resources on unnecessary product development (Mitra and Euchner, 2016). Mature firms contribute to creation of the business case and the value proposition without every writing a line of code particularly in B2B situations. MF facilitate the creation and testing of minimum viable products by giving rapid feedback to start-ups. Developing and testing a prototype by a willing MF accelerates rapid re-testing because customer feedback is incorporated. Concepts of iteration, stimulating the imagination, and consulting with customers is a staple of both

design thinking and lean methods of entrepreneurship. Alternatively, selling the prototype to the MF provides the SU with its first revenues.

Collaboration enhanced by mobility

The prevalence of an abundance of skills diffused throughout an ecosystem is influenced by the presence of MF and the potential spinoffs they represent. It is speculated that the greater stock of industry-informed employees in a specific locale enhances the stock of management available for start-up opportunities (Garvin, 1983). Likewise, earlier theories noted that locales or regions that housed considerable specific industrial or commercial interests (i.e. many suppliers, vendors, and employees with specific industry acumen) were inclined to have more spinoffs of employees leaving parent firms to create start-ups. The easy movement of employees from MF to SU intensifies the relationships amongst individuals and companies creating heightened affinity for alliances, cooperation and partnerships.

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3. Research Methodology

A mixed-methods, sequential study using quantitative and qualitative methods was adopted for this work. In attempting to address the research question, the needs if the study to quantity the amount of MF-SU activity was best addressed by a survey-based quantitative approach. But finding out what activities MF engage in and how they were being executed required a qualitative approach. The data relative the frequency and importance of MF interactions would not prescribe specific actions taken, nor would the quantitative approach alone have been enriched by context and examples helping to inform theory development. Both research types were equivalent in importance (Molina-Azorín, López-Gamero et al., 2012).

3.1 Quantitative - network theory

Studying EEs with more quantitative approaches has been encouraged in order to contribute a different lens (Engel, 2015; Overholm, 2015) to the highly insightful and significant qualitative observations already conducted and reported earlier. A mixed methods approach was adopted to take advantage of the features of both paradigms using equal emphasis on each (Molina-Azorín, López-Gamero et al., 2012). A sequential two-phase design used quantitative network theory to identify how much mature firm activity was in the ecosystem, followed by a qualitative assessment of the different types of interactions and how mature firms were engaging with entrepreneurial types.

The construct measured in the study were knowledge seeking behaviours used by members of the ecosystem to search for information to enhance their entrepreneurial-decision making. To effectively analyse the ecosystem's knowledge-seeking behaviours quantitatively, network theory was employed which permits viewing connectivity, density and diversity of the network. Information about the knowledge-seeking activities included the importance and frequency of the ecosystem's participants' activities. For more information about the population sampling, measure, data collection and descriptives, visit (Farrell, 2017 at http://www.smu.ca/academics/sobey/working-papers-series.html).

3.2 Qualitative Analysis

To explore the nature and manner of entrepreneurial-mature firm interactions, case analysis was employed to learn situations and examples using: literature searches, regional media searches, and situations known to the authors. Situations where MF and SU engaged with one another were documented. General examples were sought initially, however, specific attention was devoted to finding examples of MF-SU in the Atlantic Region of Canada. The data collection methods included interviews, observations, and reviewing literature and news stories

Table 1 - Mature Firms' Interactions with Entrepreneurs

Mature Firm	Location	Description of Action	Entrepreneurs Engaged	Details	Source
Beckman Instruments	Silicon Valley	Provided finance to establish new firm	New firm Shockley Semiconductor spawned with finance	Deep resources of mature firms are insignificant to large firms, but are vital and instrumental to entrepreneurial firms	(Engel and Forster 2014)
Fairchild Camera and Instruments	Silicon Valley	Mature firm in non-financial industry provided finance for establishment of new firm	Ent – Fairchild Semiconductor created and later Intel and Kleiner Perkins Caufield & Byers created, Philips , AMD	Many other companies were spawned from the original eight who left the firm Typifies rapid reemployment and movement between firms	(Engel and Forster 2014)
F. Hoffmann - La Roche Ltd	Switzerland	Waived non-competition clauses Later closed cardiovascular research division and put IP up for licensing.	Former employees, now entrepreneurs – Co-founders Jean_Paul Clozel, Martine Clozel, Walter Fischli, led by Thomas Widmann	1997, Large pharmaceutical firm chose not to support further testing for a new hear drug innovation; Former employees raised US46 million in two rounds of VC; Spawned Actilion; Then to highly successful IPO $146 million US.; Billion dollar market valuation now; sold to Johnson & Johnson $36 billion; One founder went on to lead Vinci Fund & Herperion	(Jones 2015) https://medium.com/lsf-magazine/team-actelion-5716eb965a28#.b3i1y0jco
McCain Foods	Atlantic Canada	Mature firm collaborated with ent'l firm when requested; Provided data to ent'l firm in order to identify an important problem to solve for the mature firm	"The only thing Baxter and Shawn Carver knew was that they wanted to work with McCain on a project involving advanced analytics. The exact nature of the project would be determined by interviewing McCain employees and discovering what component of the international food business would benefit from advanced analytics."	FiddleHead went on to achieve seed round of $1.8 million from Build Ventures and NBIF "co-creation — the partnering of a start-up and a large company to attack a corporate problem. "	(Build Ventures 2016) http://business.financialpost.com/entrepreneur/fp-startups/how-to-reverse-engineer-a-startup? lsa=3899-4e34 (Casey 2016) Financial Post
Verifin robotics and financial security firm	Atlantic Canada	Created a work space	Incubator and Entrepreneurs benefitted Startups associated with an accelerator, Genesis, received all the old furniture from Verafin;s new 200-person office move; Metrics Flow, Mysa Smart Home Thermostats, and Vish Salon Tech, along with exciting graduates Agile Sensors, HeyOrca, Solace Power, and Whitecap Scientific all accepted some furniture	Recycling furniture and equipment to growth start-ups in the locale	https://medium.com/genesiscentre/giving-back-genesis-grad-verafin-supports-local-start-up-community-b516a763774d#.7009xkgc7
SAP	MNC	Created HANA, a platform	Entrepreneurs to build their businesses & products, a bit of a recruiting tool for SAP	Cultivate relationships by holding contests and offering scholarships to entrepreneurs	(Mitra and Euchner 2016)

DMGT Group	UK	Worked with One Million by One Million	Britain's largest media group wanted entrepreneurs to participate in developing their innovation agenda	Used commercial acceleration and incubation group One Million by One Million to get entrepreneurs to help with their businesses	(Mitra and Euchner 2016)
NSPower	Atlantic Canada	Wanted to identify ways to contribute to economic prosperity via interactions with entrepreneurs	Ultimately entrepreneurs via University	Could be used to sponsor prizes and funding for emerging start-ups, but may likely go into the construction of a building on campus and the entrepreneurs may see little obvious comingling with the MF	Personal knowledge of author
Elmsdale Lumber & Ecan Lumber	Atlantic Canada	Entrepreneurs needed help in understand dynamics of timber industry in Canada & US	Entrepreneurs used the contacts of a University professor to gain access to long-term significant players in the Canada/US cross border lumber industry. Four hours with two different participants in the industry benefitted entrepreneurs	Traditional Timber was launched with early success.	Traditional Timber Personal knowledge of author
Louisbourg Seafoods	Atlantic Canada	Created an open innovation competition Sea++; Rapid Business Competition with Dragon Den style Sunday night session	Innovators, entrepreneurs, existing small businesses were asked to solve seafood and fishing business problems; $5k and $1k prizes; designed to tap into local tech community to solve local fishery problems	Competition open to anyone to help solve one of five problems: contest entrants were asked to look at improving ore or more problems -- mobile and fixed fishing gear, to solve an issue in aquaculture, to improve sales and marketing, or to solve an issue in the management of a fishing enterprise; Adam Mudgridge	(Moreira 2016) http://entrevestor.com/ac/blog/louisbourg-seafoods-launches-sea http://www.cbc.ca/news/canada/nova-scotia/cape-breton-louisbourg-seasfood-tech-sector-sea-plus-plus-1.3530797
Cisco	Atlantic Canada	Cisco Innovation Grand Challenge, a global competition that helps Cisco	Fredericton entrepreneurial firm, Eigen Innovations, won third place spot with Cisco	Eigen Innovations of Fredericton placed third; build relationships with innovators; "Many are "too young to have real-world experience to completely understand problems that businesses encounter, so they never get the ideas that lead to killer applications. For that reason, some early-stage companies are based on weak ideas."	(Moreira 2015) http://entrevestor.com/ac/blog/closing-the-startup-corporate-gap
Mariner Partners	Atlantic Canada	Established a division, East Valley Ventures, to invest in specialized IT applications	Created a division for making investments into innovating entrepreneurs with synergistic properties for Mariner and the Region	Providing mentorship, advice, entrepreneurial financing, and vision to mover young firms further along their growth trajectory	http://marinerpartners.com/

4. Results

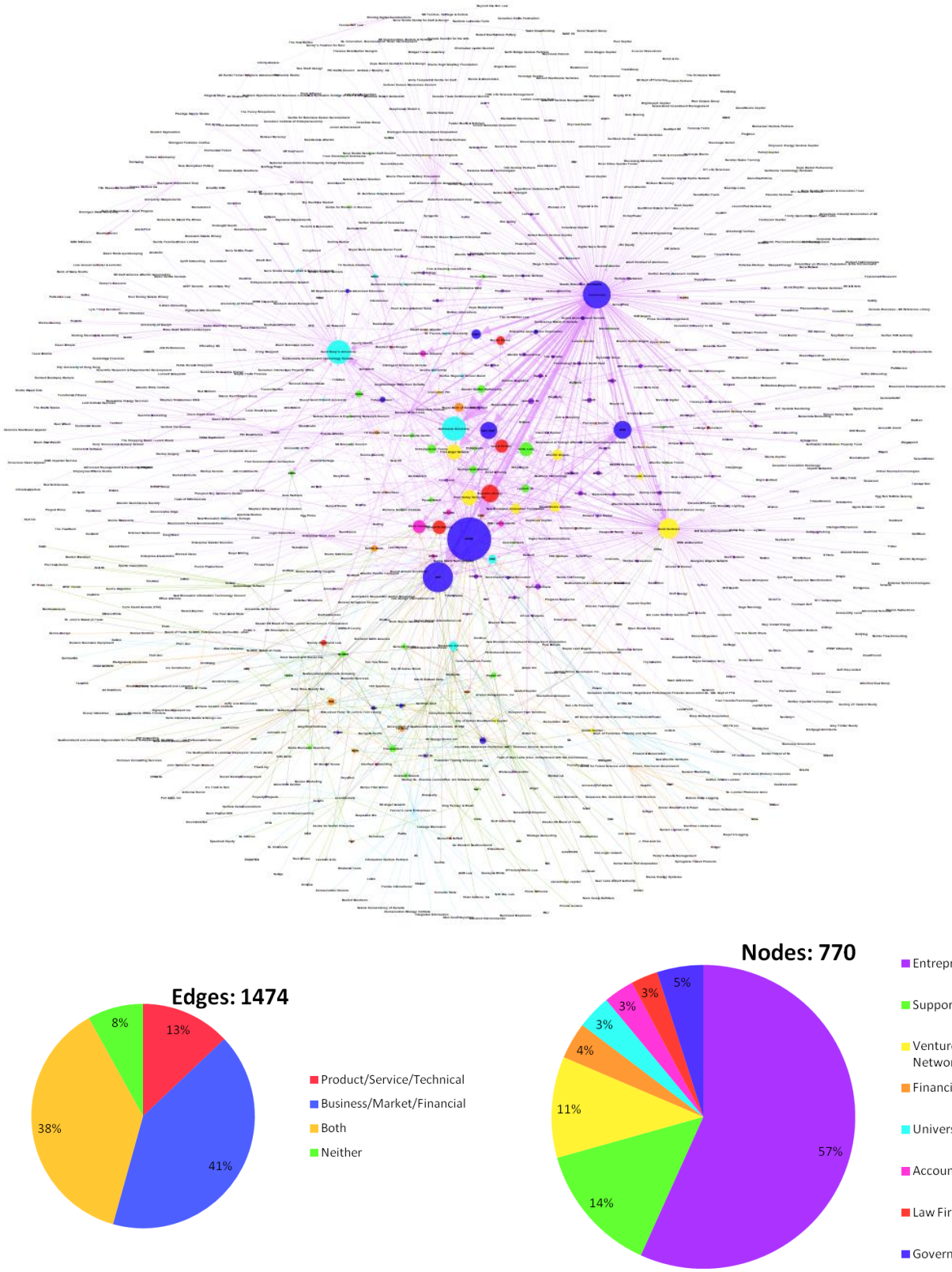
The results of the quantitative and qualitative approaches are discussed below. The quantitative analysis of egos in the entire ecosystem measures inbound and outbound requests of knowledge are presented first. The findings of the qualitative exploration of how MF engage with the entrepreneurial ecosystem and what they do follows.

Quantitative analysis

The targeted sample for the AEE began with a base list of 148 qualified potential respondents and grew as other entrepreneurial locales were noted by respondents. This quantitative analysis employed the egocentric method of network theory (as opposed to whole network method) because the total population of entrepreneurial firms is unknown. Rather than trying to capture the whole network, we seek detail information about the personal networks of each of a sample of individuals (nodes or egos) relieving the requirement for strict onerous response rates onerous (Grosser and Borgatti, 2013) which are impossible to accurately achieve know when populations are not known.

The composition and nature of the related nodes and the type of information sought and indicates the respondents' networks when actively searching for information about their entrepreneurial endeavours are shown in Figure 1. The knowledge-seeking activities of the entire AEE are very complex. There are 781 different organisations represented in the reported Atlantic EE and 1474 separate knowledge-seeking relationships defined. For information about how to read interpret these network graphs, please visit (Farrell, 2016 http://www.smu.ca/academics/sobey/working-papers-series.html)

Figure 1 - Atlantic Entrepreneurial Ecosystem



Using the same data but stripping out all knowledge-search behaviours that are not related to MF produces the chart shown in Figure 2. This chart has the same properties as that of Figure 1, but shows the inbound and outbound requests only as they related to MF.

Figure 2 - Ecosystem Interactions Involving Mature Firms

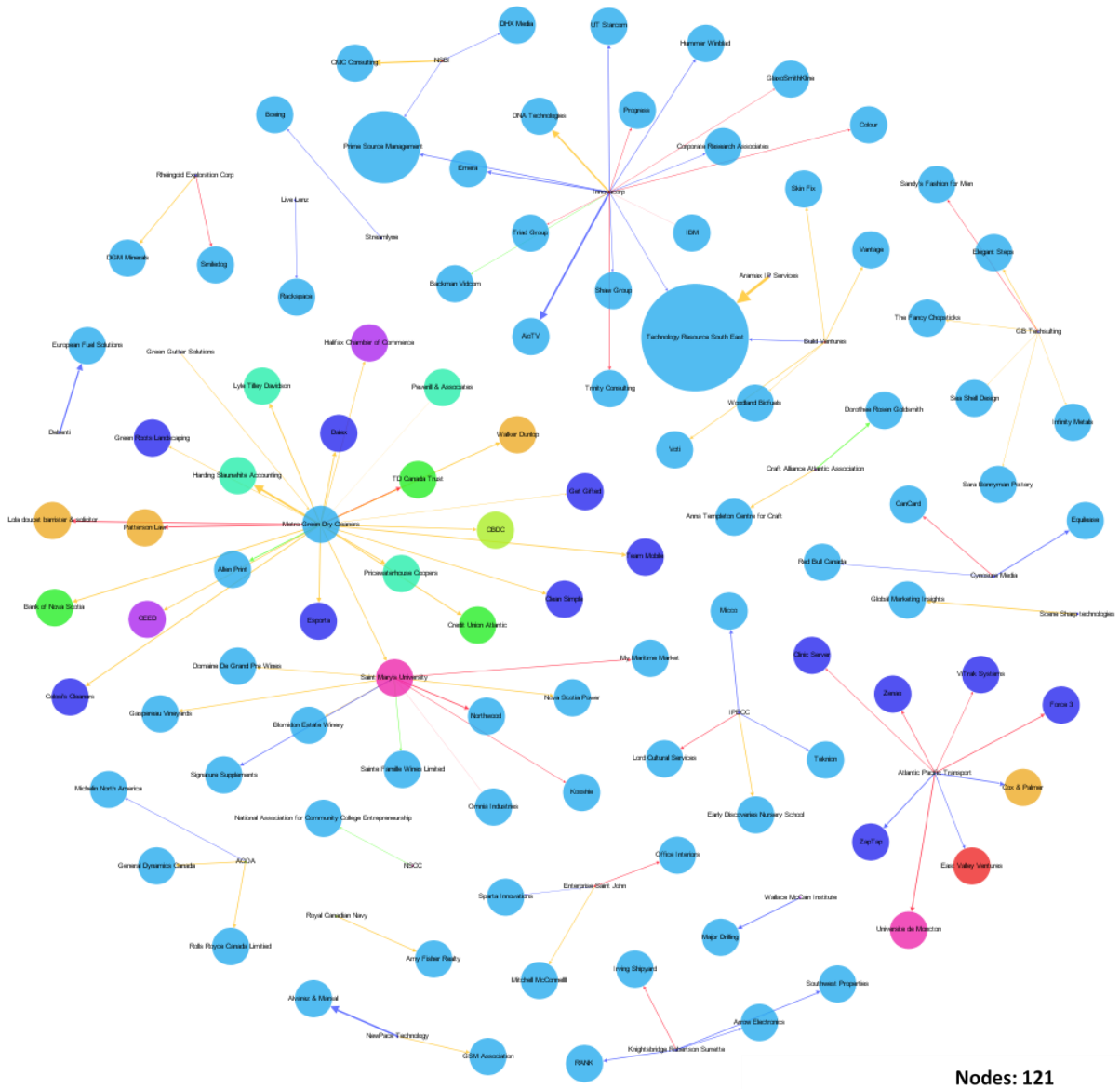


Table 2 simplifies the constituent and direction of the requests in a table format. When MF are the target of ecosystem participants, entrepreneurial firms and venture capitalists equally dominate the requests for information. When the MF are instigating the information-search behaviours, they are principally searching for information from entrepreneurial firms. The EE respondents have a total of 1474 interactions amongst all the participants (Figure 1), but includes only 39 communications amongst entrepreneurial firms and MF (27+12). There is no extant research to compare this to, however, it appears that the proportion of MF-SU firm interaction is very light as a proportion of all interactions in the ecosystem (2.6% = 39/1474).

Table 2- Mature Firms as Target and Instigator of Ecosystem Information

Type	Mature Firm as a Target: search for information from a Mature firm by:		Mature Firm as Instigator: search for information by a Mature Firm from:	
	#	%	#	%
Venture Capital/Angel Network	27	37%	1	3%
Entrepreneurial Firm	27	37%	12	40%
Government Agency	4	5%	1	3%
Support Organisation	3	4%	2	7%
University/College/Research	11	15%	2	7%
Law Firm	0	0%	4	13%
Financial Institution	0	0%	3	10%
Accounting Firm	0	0%	4	13%
Mature Firm/Late stage	1	1%	1	3%
Total	73	100%	30	100%

Qualitative Analysis

The qualitative approach to investigating mature firms manners of supporting entrepreneurial endeavours uses a more inductive approach -- investigating actions actually executed and developing a framework to classify them (McEnany and Strutton, 2015). In some cases it was difficult to identify whether the founder or the MF initiated the engagement. A short table of those interactions appeared in the

Qualitative Analysis sub-section of the Methodology, Section 3. Collecting all the various different situations produced the following table, Table 3, which enumerates various combinations of connections. For the sake of shining a spotlight on the collaborations, efforts were to elaborate as many different items rather than trying to consolidate them. Hopefully, this list will be useful to entrepreneurs, as well as executives and managers in MF.

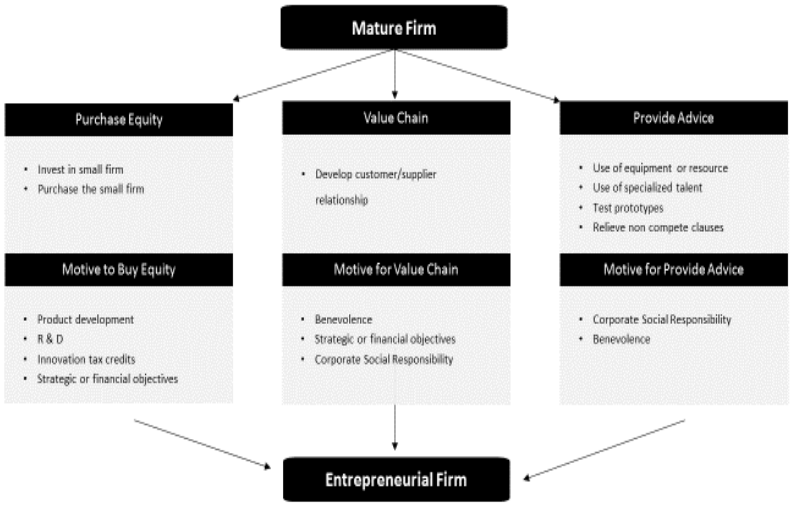
Table 3 - Nature and Types of Interactions Between Mature Firms and Entrepreneurial Firms

1.	Conduct R&D by posing problems for solution by entrepreneurial firms such as open innovation invitations, competitions, or hackathons
2.	Test prototypes developed by entrepreneurial firms
3.	Lend engineering talent and other operational and process capabilities
4.	Lend administrative or logistic support such as boardrooms, offices, equipment, photocopiers
5.	Government policy to provide in-kind support of contributions by mature firms
6..	Lend equipment and resources that are difficult or expensive to acquire or purchase
7.	Donate materials, furniture old equipment to accelerators or start-ups
8	MNC provide high paying jobs and stability and potential new entrepreneurs (Samsung, McCains, Emera, Louisburg Seafood)
9.	Accelerate commercialisation
10.	Introduce entrepreneurs to network of suppliers and customers
11.	Provide introductions to network of industry associates
12.	Government spending/support into privately held firms contains a proviso to find ways to support the venture and entrepreneurial community
13.	Assist in rapid testing to accelerate validation leading to product market fit
14.	Customer trials
15.	Assist with field trials
16.	Help in the identification and development of key qualities start-ups need for mission critical situations (i.e, document control procedures, pretests, site visits)
17.	Investing alongside start-ups
18.	Outright purchases of start-up firms (for products, services, knowledge, or acqui-hires)

5 MF interactions with SU: Discussion and theory development

Both the first and second approaches of MF contributions to SU in entrepreneurial ecosystems further MF strategic or financial objectives – first by incorporating entrepreneurial firms into MF value chain by selling to, or buying from them, or second by investing in, or acquiring, entrepreneurial firms. The third alternative manner of supporting EE or COI start-ups are not necessarily centred on the needs of the MF, but rather with the needs of the EE. The third major category are those tactics adopted by MF that are neither investment-, nor acquisition-, nor value chain- or channel of distribution-based. These MF contributions are expressed as contributions of advice, services, equipment, logistics, contacts, intellectual property, open innovation opportunities, or talent for the founders. The remaining discussion relates to the latter option, alternative engagements.

Figure 3 - Types of Support and Related Motivations by Mature Firms for Entrepreneurs



Alternative contributions by mature firms

These alternative involvements make use of capabilities and resources that are resident in MF, yet needed by small firms and very expensive them to acquire. MF efforts to reach out to growing entrepreneurs are virtually costless to a large firm, but priceless to a start-up. By representing small costs to MF, with little

ostensible benefit, they could be said to be responding to social responsibility norms or objectives, or altruism. Altruism is recognized as a promising approach for entrepreneurial environments as outward-looking mature firms attempt to develop ties with non-competing (and sometimes even competing firms) to cooperate and collaborate in open innovation contexts (Formica, 2017).

The third manner of supporting EE or COI start-ups have a more altruistic nature. The third major category are those strategies adopted by mature firms that are neither investment-, nor acquisition-, nor value chain- or channel of distribution-based. These MF contributions are expressed as contributions of advice, services, equipment, logistics, contacts, intellectual property, and talent for the founders. These involvements are capabilities and resources that are resident in MF, yet needed by the small firm. MF efforts to reach out to growing entrepreneurs are virtually costless to the large firm, but priceless to the start-up. By representing small costs to MF, with little ostensible benefit, they could be said to be responding to social responsibility norms or objectives.

MF may experience difficulties in implementing actions to integrate themselves into the start-up EE because long hierarchical organisational relationships do not lend themselves to engaging a MF embedded employee with a SU. An engineer in a mission critical area of a large organisations may a) not have the authorisation to act outside of her role, or b) does not see participation in the EE as part of her job description, or c) perceives that this is not an action that will result in an improved performance evaluation.

Mature firm social networks are created over long periods of time with internal nodes (employees interacting amongst one another) and external nodes (suppliers, customers, stakeholders, other members of the value chain) participating with one another through various levels of the organisation (Mizruchi and Stearns, 2001). Mature firm networks are composed of strong and weak ties which individuals search for advice and knowledge from peers and colleagues about transactions and deals. They deploy their networks to acquire approvals (a natural part of the hierarchy of large firms) uses resources to enhance "personal expected returns" (Lin, 2000). However, in some very hierarchical, very well-established firms, conditions of uncertainty incline employees to cling to networks that are built of strong (close and familiar) ties, rather than weak (broader less friendly, but more informative) ties. This situation creates a paradox because weak ties are more closely linked with success (than strong ties) by gathering diverse and wider range of information (Granovetter, 1973). "Not only does this illustrate the simultaneous weakness of strong ties and strength of weak ties, but it also shows how our social instincts can run counter to our best interests" (Mizruchi and Stearns, 2001, p. 667). From the mature firm perspective,

building networks that develop relationships with entrepreneurs, start-ups, co-founders, or new venture teams may not seem like the most successful strategy for enhancing one's own career.

Entrepreneurial firms, on the other hand, may be busy building networks that do not complement the types of relationships required for successful early stage venture development. Entrepreneurs build their networks starting with principally the original co-founders' networks and build them out over time and with ensuing addition of colleagues and their networks. When start-ups' many interconnections include linkages with MF ('leaders'), the benefits reinforce one another. Founders and start-ups gain the experience and support of MF, while at the same time, the combination can urge entrepreneurs to situate in these locales providing the essential elements for the genesis of innovation ecosystems (Dedehayir, Mäkinen et al., 2016).

The types of ecosystem development activities that MF are engaging with SU are rich, and resourceful. The engagements occur in both directions though there does not appear to be enough of them. Also, it is yet unknown, for example, whether the relative paucity of MF-SU activity outlined in the quantitative results is a result of SU failing to reach out to MF, or whether MF are unresponsive when approached. There are clearly very divergent power and resources at play in such requests which can hamper future relations (Mayoux, 2001; Woolcock, 2001). In one instance, an offer of an open innovation collaboration made at a community meeting seemed to fall on deaf ears, thought the MF executive who made the offer. Others perceived the audience's silence to be deference, awaiting more information and instruction.

6. Conclusion

This study investigated the interactions between entrepreneurial start-ups and mature firms in an EE. Specifically, it explored what MF do to support SU, how they do it, and how much activity exists between the two. The results from the quantitative analysis indicate that the network connections between MF and SU need development. The linkages within the study population showed fewer interactions than would be expected given the importance of MF in the extant literature. The qualitative analysis produced a rich tapestry of alternative mechanisms for MF to collaborate with SU (Section 4). In addition to the more well-known MF contributions of investing, acquiring or incorporating SU into their value chain, the results inventory surprising opportunities for SU and MF.

This work has important theoretical and practical implications. The roles played by MF within the domain of an EE or COI have been rarely isolated for research and contributions to theory. Extant

research shows the potential importance of roles played by MF (or enterprise, or anchor firms) as they consider community and social responsibility objectives and commitments to the locales in which they work. Practically, regions implementing growth strategies for economic development purposes (Ivany, d'Entremont et al., 2014; Saillant, 2014) look to entrepreneurship and the creation of EE to influence regional prosperity (Audretsch, 2015). This work outlines features that policy makers may consider to enhance regional prosperity. Lastly, there are specific practical actions that MF can contribute to a COI are listed and discussed for the executive, or senior management group, of large or mature companies. SU are advised to develop their networks and to extend that reach to (weak tie) associations with MF.

The qualitative study identified dozens of cases of successful MF-SU interactions; a crude typology of possible interactions was created. The direction of the initiative is central. On the one hand, SU cannot wait to be invited to collaborate or supported; MF need to be approached (appropriately) for most SU to have even a remote probability of successful interaction. Yet, on the other hand, the incidents noted here span a variety of different ecosystems and countries including US, UK, Switzerland, and our specific area of interest, Atlantic Canada. In Atlantic Canada two MF were recorded as having made overtures to open innovation collaborations at a community level. Future work could usefully identify the genesis of the open innovation invitation initiative within the MF, as well as the manner of its disseminations and reception by the local EE. These are practical issues about which more should be known.

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