IT IS WHAT YOU KNOW:
CHANGES IN THE STRUCTURE AND ROLE OF ENTREPRENEUR NETWORKS IN AN INDUSTRY OVER TIME

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The undersigned, appointed by the dean of the Graduate School, have examined the dissertation entitled

IT IS WHAT YOU KNOW: CHANGES IN THE STRUCTURE AND ROLE OF ENTREPRENEUR NETWORKS IN AN INDUSTRY OVER TIME

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a candidate for the degree of doctor of philosophy,

and hereby certify that, in their opinion, it is worthy of acceptance.

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Statement of Academic Integrity

I declare that this research report is entirely my own work. When the ideas, quotations, data and diagrams of others have been used in the report, the work has been properly cited in the text.

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Signature Date

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Abstract

Previous research investigating the relationship between social capital and entrepreneurship has generally focused on the entrepreneur's own capacity to work their way into existing networks. There still remains a gap in terms of understanding how networks are created in the first place. This study aims to gain insight into how industry pioneers create and utilize entrepreneurial-supportive social networks. Building on existing work on network theory and industry evolution I explore three questions. First, are there structural differences in the networks of industry pioneers compared to later entrants? Second what role do diverse social networks play for industry entrants and does this role change over time? Third, does the way in which industry pioneers construct and utilize social networks influence the establishment of legitimacy for a new product category?

In this mixed-methods study, I find that in the early stages of the U.S. artisan cheese industry, entrepreneurs created and utilized networks mainly for the development of human capital. Diverse networks provided a greater volume of information than tight-knit networks, and were instrumental in the creation of legitimacy for a new product category. As knowledge has become codified later entrants are more likely to create networks that enable growing market share. Gender differences were identified in that women are more likely to influence others through maintaining a high number of quality connections in which information is transferred one-to-one, and men are more likely to monitor and control the flow of information by acting as a connector between groups. Further research is needed to explore the role of gender differences in mentorship relationships in terms of network structure and role as an industry evolves.

Preface

Why is it that some small towns thrive and others don't? It was with this question in the back of my mind that I set out to investigate the artisanal cheese industry in the U.S. Anecdotally I had learned that in some parts of the U.S., artisan cheesemakers were working together to create cheese trails in their local regions. Inspired by the success of local wine trails, the cheesemakers involved believed cheese trails would be a great way to market their products to locals and tourists. I wanted to find out how, in practice, these people were working together in an attempt to increase their own individual sales by bringing people to their area. After all they were essentially all competing for the same dollar. And there are plenty of examples of failed collaboration between firms on similar projects (Barkema & Drabenstott, 2000; Hall, 2004).

During visits with the owners and cheesemakers of creameries listed on the Finger Lakes and Vermont cheese trails, I came to learn that cheese trails were not actually 'a thing'. Many of the people involved in the set-up of these trails perceived their industry to be similar to the wine industry, however they came to realize the cheese trail concept just doesn't work in the same way as a wine trail. For one, you can't collect cheese. It doesn't (generally) keep as long as wine does. Especially when you've been schlepping it round in your purse all day while the sun's out, which is when people tend to embark on such outings. Second, unlike wine, there's only so much cheese you can consume in one day. Or at least, the amount of cheese one can consume in a day before feeling terribly uncomfortable is a lot less than the amount of wine needed to create the same effect. Third, and most importantly, most of the cheesemakers didn't have a) the

money, or b) the time, to set themselves up as a venue for visitors. Cheesemakers are busy people.

While the cheese trail exploration turned out to be a bust, I did find something much more interesting after analyzing the initial interviews. In the Vermont interviews the word 'we' was consistently used. Owners and cheesemakers in this State consistently used the word 'we', not only when they were talking about the local artisan cheese scene, but also in relation to the entire industry of cheesemakers across the U.S: "*This whole industry is relationship-based. That's how we sell our cheese. It's a personal exchange*." (Cheesemaker 18); "…*we don't have to do the same thing, it is not all one size fits all.*" (Cheesemaker 19); "*We're all concerned about sanitation, food safety practices.*" (Cheesemaker 20). In addition, two phrases were repeated in the interviews: 1) "A rising tide lifts all boats", and 2) "An open-door approach, that's who we are", (or variations on that theme). Most remarked that yes, they recognized they were competitors, but they didn't feel competitive toward each other: "*It's not like oh that guy or this guy or like we're competing against them. It's like oh, I want to go talk to them. Oh, I want to go talk to them and see what they're doing. Oh, I want to go see what they're doing. Which is really neat and I don't exactly know why it is that way. Maybe it's just the kind of people that get into it*" (Cheesemaker 17); "*We're not competitors with each other. We're all in the same boat, and the enemy is standardization*" (Cheesemaker 22). Consequent interviews with cheesemakers from other States expressed the same sentiments in pockets: some used the same 'we' terminology as the Vermonters, some used 'they'. Some used 'them and us' when talking about the Vermont cheese community, describing

'them' as being unique and not indicative of the entire industry. What was it about Vermont? Was it something in the water?

I was getting ready to embark on an in-depth study of the water in Vermont when another story began to emerge. On top of the 'we' language and willingness to share information and resources with each other that I was beginning to recognize not just in Vermont, but also elsewhere in the U.S., it became apparent that many perceived the entire re-energizing of the artisan cheese industry in the U.S. as being due to the efforts of seven or so pioneers in the late 1970's/early 1980's. The same names continued to be repeated, and they were mostly all women: "…*some of the early, early, pioneers in cheesemaking in America, like Sue Conley and Peggy Smith at Cowgirl Creameries, are such generous spirits, that they set a tone. And you have Jennifer Bice at Redwood Hill, and these are just such wonderful people. Just generous and inclusive in their whole philosophy. They're not about getting ahead of their competition, they're about raising everybody together*" (Cheesemaker 1). 'The goat ladies' as they have come to be known (Abrams, 2018; Donnelly, 2016; Kubick, 2017), began experimenting with cheesemaking as a hobby for different reasons. Laura Chenel, Paula Lambert, and Allison Hooper had all travelled overseas in their early 20's and on returning home to the U.S., began to experiment with making cheese with goat milk after finding they couldn't buy the European cheeses here. Judy Schad, Mary Keehn, and Jennifer Bice brought goats for various other reasons and after realizing how quickly goats reproduce, began to experiment with making cheese from the goat milk they were soon inundated with. Each of these women report they never set out to create businesses of the size they grew to be. And they certainly never thought they were pioneering an industry. Vermont's

Allison Hooper admits, "*When we started in 1984 we didn't believe people would eat goat cheese in the numbers they do today; it wasn't even on our minds. I just wanted to make cheese*" (Fratini, n.d.). Sue Conley and Peggy Smith didn't even start their business because they expressly wanted to make cheese. Conley had gotten to know Albert Straus, a pioneer in organic farming, and was wanting to find a way to call attention to the high-quality milk he had. She was familiar with goat cheese, having worked with Laura Chenel's chevre there and called up her college friend Peggy Smith to see if she was interested in making cheese as a way to not only highlight this organic milk but also as "*something for the wives of the Hispanic ranch workers to give them jobs where they would have health care. It was very community minded*" (Cheesemaker 1).

An interesting aspect of the legend of these women, is that while they all started at more or less the same time, they all essentially started out on their own. The cheesemakers of the 70s and 80s didn't have the virtual library of resources that modern cheesemakers have to draw from. As Allison Hooper comments, "*There wasn't anyone to help us on the cheese side; I was really on my own…*" (Fratini, n.d.). Those who travelled overseas learned to make cheese while there and had these experiences to draw from. For the others, there was just one small book to refer to: "*Originally, the Bible of goat cheesemaking was a small book only in French, which I translated word for word. In those days, there weren't any classes*" – Jennifer Lynn Bice (Peterson, 2016). What eventually brought the goat ladies together was that they all joined the American Dairy Goat Association. Established in 1904, the association acted as a vehicle through which like-minded people could find each other, and the goat ladies quickly did just that. They soon became friends, swapping stories, offering support and advice to this day.

What is perhaps most interesting about this period is that there were other women making goat cheese throughout the U.S. Some had been making cheese as a hobby for many years before the goat ladies began their endeavors, selling to friends and family or at local farmers markets. Yet none of their small businesses came close to the size of those of the goat ladies. It could be that none of these other women aspired to having bigger businesses: growth isn't a goal for every business owner. But then neither did Allison Hooper, Peggy Smith, or Sue Conley, or any of the other 'goat ladies'. And people who don't pursue wealth for its own sake don't necessarily choose to live a life of subsistence. One possible explanation lies in the popular saying, "It's not what you know, it's who you know". In a recent study of knitters, Kim (2018) finds that individuals who have received encouragement from others are more likely to transition a hobby into a growth-oriented business. Provided the person has the necessary technical skills and know-how, feedback and encouragement are provided to the entrepreneur from diverse social networks (i.e. the people you are connected to aren't connected to each other). Kim suggests this feedback and encouragement is the x-factor that motivates effort into turning an idea into a business. If this is true, in order to move from an idea to a business, you not only need to know what you're doing, you need to know people who believe that you know what you're doing.

The following chapters tell the story of how entrepreneurs created and utilized social networks as they transitioned from the business idea stage to the implementation stage. This is not the story of why some rural towns thrive while some die that I set up at the beginning. While I do pay attention to previous studies investigating variation in economic growth rates of rural towns in the following chapters, this is more specifically

an investigation into how entrepreneurs learn, and connect. I have come to believe that in order to understand why some rural towns thrive, and others don't, we first need to increase our understanding of why some rural entrepreneurs thrive and some don't. This study is also the story of how, between 1975 and 2010, the U.S. artisanal and specialty cheese industry grew and evolved from "*a passing fad*", the domain of "*hippies*" (Levitt, 2015), faced with establishing a market in a society that perceived Kraft singles to be fancy cheese and goat cheese as 'yuck' (Fulton, 2011), into one in which artisan cheese is now a mainstream product (Bernard, 2015). U.S. produced artisan and specialty cheese has won multiple awards on the world stage and is now officially right up there with French cheese (Bratskeir, 2016; Fletcher, 2019).

Chapter 1 - Introduction

Mary Kay Ash, founder of Mary Kay Cosmetics, Inc, once said "Ideas are a dime a dozen. People who implement them are priceless" (Anderson, 2013). The world is full of people and companies with incredible ideas who never do anything with them. The obvious question is, "Why not?"

While considerable case study evidence supports the view that there is nothing distinct about the individuals themselves who turn their incredible ideas into businesses (Abell, Mills, & Crouchley, 2001; Chiasson & Saunders, 2005), the jury is still out and the argument continues (Germak & Robinson, 2014; Kerr, Kerr, & Xu, 2017). In this study I begin with the approach that individuals who transition their idea into a business have structurally distinct networks (Abell et al., 2001). In other words, the difference is what most people believe it to be: it's not what you know, it's who you know. People who transition through the process of turning an idea into a business tend to have diverse social networks, i.e., they tend to be connected to people who aren't connected to each other. Figure 1 is an example of a relatively diverse network. Some of the connections of the focal node in the middle (represented by a star) are connected to each other, however there is no node that is connected to everyone else. Tight-knit social networks on the other hand are networks in which every member is connected to each other. Figure 2 is an example of a tight-knit network in which the nodes that the focal node is connected to are also highly connected to each other (except for one).

Diverse networks are said to advantage an entrepreneur through: the provision of more varied resources (Adler & Kwon, 2002); protection against negative social capital (Ronning, Ljunggren, & Wiklund, 2010); and greater exposure to new ideas (Powell,

White, Koput, & Owen-Smith, 2005), information (Burt, 2000), and opportunities (Anderson & Miller, 2003). More recent research argues that exposure to greater knowledge diversity triggers the specialized prior knowledge and experiences of the entrepreneur, enabling them to identify and exploit entrepreneurial opportunities (Wang & Hwang, 2018). In the same vein, another study compares individuals with the same amount of skill and knowledge, and finds that those who transition their hobby into a business venture receive feedback and encouragement from a diverse set of people significantly more often than those who stay at the hobby stage (Kim, 2018). Taken together, this research suggests diverse social networks aren't in themselves the differentiating factor between the people who implement their ideas and those that don't. The differentiating factor is the idiosyncratic function they perform depending on the entrepreneur's need.

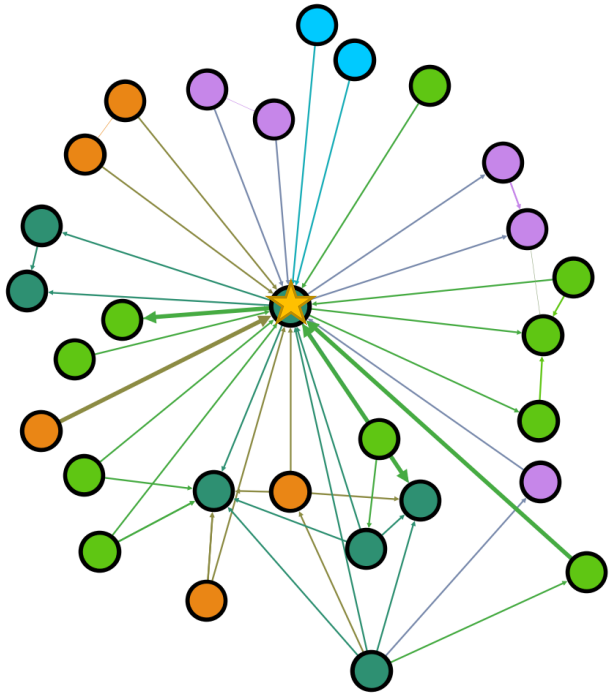

Figure 1 Example of a relatively diverse network

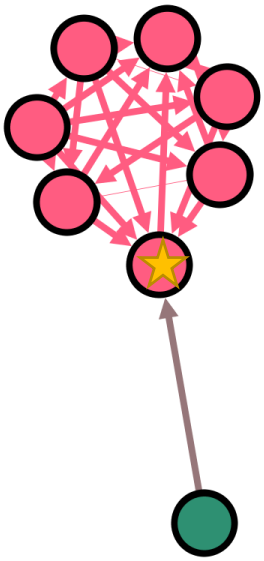

Figure 2 Example of a tight-knit network

According to much of the economic development literature, developing diverse networks may be challenging if you live in a rural community. Many studies explore the problem of a lack of economic growth in rural towns, and the problem is typically framed as being a lack of people with the skills required to identify, evaluate, and exploit business opportunities that will create real personal wealth (Laukkanen & Niittykangas, 2003; Ronning et al., 2010). Rural business owners prefer to seek the advice of a tight-knit network of local friends and relatives rather than seek resources from an outsider, even when the outside resources are provided at little or no cost (Meccheri & Pelloni, 2006; Shields, 2005). This reliance on local family and friends for advice, many of whom have not established their own entrepreneurial venture, means it is likely that a would-be entrepreneur seeks feedback from an individual who is unable to see or understand the identified opportunity and therefore fails to see it as a viable business venture (Hayek, 1945). Tight-knit networks can thus be detrimental to producers with innovative ideas

because of their tendency to induce conformity and constrain individuals' autonomy, creativity, and innovation (Borgatti, 1997; Gargiulo & Benassi, 2000; Hansen, 1999; Putnam, 2000). Within these networks, it isn't uncommon for would-be entrepreneurs to not go through with their idea for fear of going against the advice of the group and facing social exclusion (Portes, 1998). Farmers with innovative ideas for diversification are reluctant to share their ideas within their local networks and express a fear of being thought of as too 'radical', and again, facing social exclusion (Kendall, 2013; Macken-Walsh, 2011; Ronning, 2009). Consequently, would-be entrepreneurs perceive they are an anomaly in the community, that no-one else thinks as they do, and tend not to seek assistance in evaluating future ideas, let alone attempt to implement them (Kendall, 2013).

This suggests then that a lack of economic growth in rural communities may not be due to a lack of individuals with the skills required to identify opportunities, but a lack of individuals with diverse social networks that fulfil whatever idiosyncratic need (varied resources, protection against negative social capital, new ideas, information, knowledge, feedback, encouragement) they have. An important question is whether they recognize they have a need in the first place. Individuals in rural communities may choose to rely on local tight-knit networks because they're simply unaware of what value outside advice could provide (Kendall, 2013). Rural communities are strongly risk averse (Sherman, Lamb, & Aspegren, 2009), and new businesses and change in general are sometimes viewed with skepticism (Macken-Walsh, 2011; Sampson, Goodrich, & McManus, 2011). People who move to a rural community and set up a new business can find it difficult to gain local acceptance and tend to have fewer sales to locals than other long-established

businesses (Shields, 2005). There is nothing to suggest that people with ideas for businesses who live in these communities aren't any different from the general culture, i.e., risk averse, skeptical of change, distrusting of outsiders. A preference for tight-knit networks is intuitively understandable when that is the culture you live and conduct business in. Yet some small rural towns are thriving centers of innovation and entrepreneurship (Fallows & Fallows, 2018), and many small to medium sized producers, motivated by sustained low profit margins and ongoing concern for the future viability of their lifestyle, have successfully implemented innovative ventures as a way of diversifying their income streams.

Why do entrepreneurship rates vary across space? One stream of research adopts a resource-based approach to answering this question, measuring stocks of different resources and finding relationships between regional entrepreneurship rates and variation in stocks of: human capital (Glaeser, 2007; Laukkanen & Niittykangas, 2003; Ronning, 2009); natural resources; input supplier competition (Chinitz, 1961); and consumer base (Glaeser, 2007). A second stream focuses on spatial concepts such as localization of clusters (Glaeser, Kerr, & Ponzetto, 2010), networks (Johannisson, 2000), and regions (Low, Henderson, & Weiler, 2005) as having significance in the emergence and diffusion of entrepreneurial ventures.

A third stream explores community-level social norms and values towards entrepreneurship, finding a positive relationship between regional growth and an entrepreneurial-supportive culture (Roberts, 1991). An entrepreneurial-supportive culture is one in which existing and potential entrepreneurs are willing to share information and resources, and offer feedback and encouragement to each other, whereas an

entrepreneurial-inhibitive culture is exclusionary both in terms of people and types of businesses. In other words, if you want to start something new, where you live might be more important than what you know, who you know, and what they provide you with. Regions with an entrepreneurial-supportive culture tend to have a tradition of entrepreneurship and risk-taking (Goldstein, 2009), a communal past, and good quality institutions (Percoco, 2012). History therefore seems to be an important measure for identifying differences in entrepreneurship rates across geographical space. Cultural geographers have long argued that the specific characteristics of the first group of settlers to an area have a lasting impact on the social and cultural geography of that space (Woodard, 2011; Zelinsky, 1973). Subsequent immigrants and internal migrants assimilate into the dominant cultural identity (rather than replace it), no matter whether they embrace or reject it (Woodard, 2011). Creating entrepreneurial-supportive social capital in a community that excludes certain types of people and businesses may be more difficult than economic development agencies realize.

Rural communities are said to typically lack the human capital to undertake entrepreneurial activity in the numbers required to achieve real growth (Laukkanen & Niittykangas, 2003; Ronning et al., 2010), however rates of entrepreneurship are most widespread in rural America (Low, 2004). It is not a quantity problem that explains a lack of economic growth in some rural communities, it's a quality problem: rural businesses tend to provide lower average incomes for owners and employees (Frederick & Monsen, 2011; Low, 2004; McDaniel, 2002). The purpose of this study then is to gain insight into how entrepreneurs in rural areas, including existing producers with innovative ideas for

diversification, create and utilize entrepreneurial-supportive social networks as they transition their idea into a sustainable and profitable business.

If entrepreneurship is lonely, innovation is lonelier

Previous research investigating the relationship between social capital and an individual's entry into entrepreneurship has generally focused on the entrepreneur's own capacity to work their way into existing networks in order to access the resources held within them (Hernandez-Carrion, Camarero-Izquierdo, & Gutierrez-Cillan, 2019; Van de Ven, 2005). A different approach is to conceptualize entrepreneurial social capital as consisting of: the resources that exist within the network of relationships possessed by the entrepreneur; the relationships themselves; and the norms and values held within the networks (Ronning et al., 2010). While some studies seek to increase our understanding of how social capital works in practice by analyzing the social contexts within which entrepreneurs are embedded, e.g., McKeever, Anderson, & Jack (2014), there still remains a gap in terms of understanding how networks are created, particularly by producers of new products and product categories for which formal and informal networks don't yet exist for the entrepreneur to 'work their way into'. For an idea to be innovative, it presumes the entrepreneur is the first, if not one of the first, to have the idea. In this case, there may not be a ready population of people to consult for advice. Advisors located in business incubators and small business development centers in rural regions often possess knowledge more suited to lifestyle businesses and may lack experience in developing markets for new product categories that consumers don't yet understand (Drabenstott, 2003; Sherman et al., 2009). Therefore, where an individual is

seeking to implement an idea in a new market, creating diverse networks that can provide idiosyncratic resources may be even more challenging.

Studies of nascent markets explore various mechanisms in the establishment of new market segments, such as: social movements for the establishment of grass-fed products (Weber, Heinze, & DeSoucey, 2008), media coverage for workstation computers (Kennedy, 2008), strategic alliances between firms for wireless gaming (Ozcan & Eisenhardt, 2009), creation of a collective identity for satellite radio manufacturers (Navis & Glynn, 2010), and agreement between consumers and enthusiasts as to what Scotch whiskey is (McKendrick & Hannan, 2014). These studies investigate the post-implementation phase of market establishment and assume firms are known to each other. What is less understood is how these networks are created in the first place.

Establishing a market for a new product requires motivated, committed, and innovative producers. Individuals value advice from people they perceive as being like-minded (Sillence, 2010), in that they share similar attitudes. Entrepreneurs with innovative ideas always face the challenge of finding such individuals and this would have been even more challenging in the days before the internet. Yet despite being geographically dispersed and existing in small numbers, industry pioneers have succeeded in establishing markets for their products, as well as norms and standards, and as a consequence, legitimation, not only for their own products, but for an entire industry. Nascent entrepreneurs who wish to increase the diversity of their social networks actively participate in associations and aggressively seek out new contacts at meetings (Davis, Renzulli, & Aldrich, 2006). It could be that despite the transaction costs involved, the

newness of their products, the need for legitimacy for their products, and an absence of codified knowledge means industry pioneers have a higher degree of idiosyncratic needs that aren't able to be fulfilled within their existing networks. These pioneers may be more likely to conduct a wider search for the resources they require. Once a market has been established and knowledge has become codified, subsequent entrants may be less likely to search outside of their existing networks due to a reduction in idiosyncratic needs.

Importance of this study

Combining cultural geography, network theory, and industry evolution is still a relatively novel approach for analyzing social networks. To the best of my knowledge, no empirical studies exist that combine cultural geography, network theory, and industry evolution together. Some theoretical frameworks exist, e.g., Martin & Sunley (2011) and Ter Wal & Boschma (2011), and studies have explored network differences between firms located in economically advantaged and disadvantaged regions, e.g., Huggins, Izushi, & Prokop (2019) and Laursen, Masciarelli, & Prencipe (2012), and changes in geographical networks over the evolution of an industry, e.g., Ter Wal (2013). Network analysis techniques have been used to show that clusters of firms within a region are not necessarily drivers of innovation and economic development in that they are not by default linked to each other (Giuliani & Bell, 2005), and have key linkages outside the cluster (Morrison, 2008). Much of the sociology literature focuses on the role of homophily as being highly influential in how individuals create network ties (Ruef, Aldrich, & Carter, 2003). In other words, individuals are more likely to create connections with those they perceive as similar in some way, however geographical proximity may also be a key driver in these decisions. One simulation model finds that in

the early stages of an industry when knowledge has yet to be codified and there is high technological uncertainty, localized tight-knit networks have higher knowledge growth than networks that are geographically diverse (Cowan, Jonard, & Ozman, 2003).

From an applied standpoint, an increased understanding of the processes described so far are important for small to medium sized producers in rural areas looking to create sustainable livelihoods through diversification. In that the U.S. economy is the sum of its individual geographic parts, the ability of rural communities to provide economic opportunities and jobs for the people that live there is not only important for rural regions, but for the country as a whole. It is vitally important that an effective and low-cost model for facilitating the development of human and social capital for entrepreneurs be developed and implemented in order for rural communities to support would-be entrepreneurs and existing producers looking to diversify. Focusing on facilitating the creation of structural relationships between relevant actors is a more promising focus for national and regional governments than the implementation of programs designed to incentivize specific entrepreneurial activity (Davidsson & Honig, 2003). The proposed outcome of this study is therefore to provide specific insight, not only for producers, but also economic development agencies and policy developers, as to how entrepreneurs in rural areas, including small to medium sized producers with innovative ideas for diversification, create and utilize entrepreneurial-supportive social networks in order to transition their idea into implementation of a sustainable and profitable business.

Research questions & setting

In the following chapters, I explore three general questions. First, are there structural differences in the networks of industry pioneers compared to later entrants, and if so, what might explain these differences? Second, in nascent industries, what role do diverse social networks play for entrepreneurs and does this role change over time? Third, does the way in which industry pioneers construct and utilize social networks influence the establishment of legitimacy for a new product category?

Following Zavyalova, Pfarrer, Reger, & Shapiro (2012), I focus on one industry in order to examine these questions. Examining the connections between individuals within a clearly defined boundary assists in the development of how individuals affect, and are affected by, each other's actions through the creation of network ties (Butts, 2008). The context for this study is the U.S. artisan cheese industry. Throughout history sustained low profit margins and ongoing concern for the future viability of their lifestyle has motivated farmers to continuously explore ways of diversifying their income streams. To a large extent, the U.S. artisanal and specialty cheese industry owes its existence to these continued efforts, the outcome of which is now "a very tenuous, delicate, and incredibly important web of people, land, and animals" (Thorpe, 2009, p. 24). When producers first began offering artisanal cheese to mainstream audiences in the 1970's and '80's, they couldn't get U.S. consumers, who had grown up with Kraft singles and "an uneducated palate" (Albala, 2015, p. 1269), to even try their products. Over the last three decades, artisanal cheese has transitioned from "yuck" (Fulton, 2011), to "an elite consumer treat" (Paxson, 2013), to "mainstream" (Bernard, 2015). Larger and more established brands are losing market share and shelf space to smaller, more artisanal

brands (Green E. , 2018). Not only do more consumers want to know where their food is coming from, artisan cheese is also highly "Instagram-worthy" among younger generations (Rossi, 2016). The industry as it stands today consists of nearly 1,000 cheese producers (Roach, Kendall, & Moreland, 2019). In many cases artisan cheese has acted as a vehicle for sustaining the livelihoods of rural producers and in some cases, rural communities (Hewitt, 2009). Paxson (2013) quotes Robert (Bob) Wills, a key figure in the Wisconsin artisan cheesemaking community since 1989, "*The artisan cheese business has come about by necessity, not merely because of opportunity. Innovating to find new markets was not optional*" (p. 89).

Explanations for the successful resurgence of the industry general focus on the also burgeoning farm-to-table movement (Eldridge, 2014), a growing trend towards farmers markets and indie food shops (McGuigan, 2016), changing consumer concerns, and nostalgia (Kiesel, 2016). However ongoing networking, information relationships, and a culture of informal collaboration is well recognized within the artisanal cheese industry, both anecdotally and within empirical research (Light, 2014; Muro & Katz, 2011; Paxson, 2013). The influence of these characteristics on the growth in the number of individuals deciding to become cheesemakers have yet to be explored in their own right. Insight as to how U.S. artisanal cheesemakers created and utilized social networks in order to not only establish their own businesses, but also to establish a market for their products is critical, not only for producers, but also for rural communities dependent on agriculture.

My data spans over 40 years, from 1975 to 2018, and include quantitative and qualitative data from: (1) narratives of founding conditions and growth of the U.S.

artisanal cheese industry sourced from industry commentators and researchers within books, media, and previous empirical research; 2) narratives about cheesemakers presented in books and media articles; 3) narratives by cheesemakers sourced primarily from in-person interviews conducted by myself, and publicly available media interviews, podcasts, and their business websites; and 4) primary survey data. With the exception of the survey data, I treat these accounts as stories (Kennedy, 2008; Lounsbury & Glynn, 2001; Navis & Glynn, 2010; Rosa, Porac, Runser-Spanjol, & Saxon, 1999) that provide detail on how cheesemakers created and utilized networks as they transitioned from idea to implementation. While the U.S. artisanal cheese industry may seem idiosyncratic, there are at least two important reasons to believe it has broad implications. First, the setting resembles many other cases of entrepreneurial transition in diversification efforts of producers such as agri-tourism, organic farming, and grass-fed beef. This study provides more general insight on the structural and relational characteristics of the social networks of producers who implement diversification ideas. Second, the setting also resembles other hobbyist industries such as beer, board-games, and knitting. According to a study of U.S. business founders, 27% of individuals started their businesses as leisure activities or hobbies (Kim, Longest, & Lippmann, 2015). Understanding hobbyists' entrepreneurial transition is therefore also important in developing an understanding of the structural and relational networks of those who become entrepreneurs.

Contribution to Literature

This study contributes to the existing literature in four main areas. First, to the best of my knowledge, this is the first empirical study that examines changes in network structure and role over time and space, in conjunction with industry evolution and

community culture. Second, the different roles of diverse and tight-knit networks in relation to industry stage are delineated, providing insight as to the potential value of each for entrepreneurs. Third, the use of a geographic layout to understand network structure is still a fairly new method, and this study highlights the benefits that can be gained from being able to visualize networks across geographic space. Finally, it provides a better understanding of the social process through which legitimacy is achieved for a new product category.

Structure of this dissertation

This chapter began by outlining the purpose, research questions and importance of the study. This chapter also provided some background for the study and an overview of the types of data to be gathered was given.

Chapter 2 discusses previous literature in regards to the role of social capital within the entrepreneurial process and the three distinct dimensions of social capital being structural, relational, and cognitive. The structural dimension considers the characteristics such as number of connections and relative position, while the relational dimension focuses on the quality of the relationships between people, i.e., the value of the specific resources that are provided to the individual by those they are connected to, the structural dimension considers the characteristics of the network. The cognitive dimension of social capital takes the social capital concept wider than the individual and their immediate networks and refers to the internalized cultural norms and values within the local community. This dimension is discussed via the literature on regional variation in entrepreneurship rates. In this chapter I also discuss literature that explores the relationships between the different dimensions. Finally, I outline the appropriateness of

network analysis as a methodology for exploring these relationships. In Chapter 3 I present my conceptual model based on this literature and outline the hypotheses for answering the research questions outlined earlier.

The following chapter, Chapter 4, outlines the data collection procedures and how the data were analyzed. Chapter 5 provides context for the study and data collected through a discussion of the resurgence and growth of U.S. produced artisanal cheese over the last forty years, as well as the key players involved in the U.S. artisanal cheese industry between 1975 and 2018. This chapter also provides context in the form of a summary of the cheesemakers that were interviewed by myself and a brief account of how the first formal semi-local network of cheesemakers was created and why.

Chapter 6 contains an objective presentation of the empirical results in relation to the hypotheses set out in Chapter 2. A discussion of these results is contained within Chapter 7. Implications for economic development strategies and future research are presented here, as are the limitations of this study.

Chapter 8 concludes the study by explaining the importance of the findings and this study's contribution to literature.

Chapter 2 – Literature review

This review of the literature contains three distinct topics. Beginning with a presentation of Ronning et al's (2010) entrepreneurial process model and the critical resources for transitioning through this process, the focus is narrowed towards the role of social capital in this process, and its different dimensions. Second, the relationship between the different dimensions of social capital is explored, specifically as they relate to entrepreneurs entering an industry at different stages, i.e., early on when no market exists and has to be established, compared to later when participants compete for market share. The final section outlines the use of social network analysis as a tool for understanding the relationship between the different dimensions of social capital and the way in which they change depending on industry stage.

Before continuing, it is important to define entrepreneurship and social capital. Within this study entrepreneurship is defined as "the discovery and exploitation of profitable business opportunities for the creation of personal wealth and, as a consequence, for the creation of societal value" (Venkataraman, 1997). Entrepreneurs possess the experience, skills, and ability required to not only recognize opportunities that others do not see or find attractive but also to exploit them as profitable business enterprises (Acs, 2009; Acs, Audretsch, Braunerhjelm, & Carlsson, 2004; Audretsch, Obschonka, Gosling, & Potter, 2017). This ability is referred to as entrepreneurial human capital. Human capital is the knowledge, capabilities, skills and experience developed by an individual through formal training and education as well as work and life experience. Entrepreneurial human capital is that which enables an individual to identify and exploit new opportunity (Ronning et al., 2010). For social capital, I use the definition proposed in

the seminal paper by Nahapiet and Ghoshal (1998), as "the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit", comprising "both the network and the assets that may be mobilized through that network" (p. 243). In other words, an actor's social capital is made up of the resources they have access to through both direct and indirect relationships.

The entrepreneurial process

Adopting a resource-based approach, Ronning et al., (2010) put forward four critical elements in mobilizing the entrepreneurial process as depicted in Figure 3. This model is not widely used but has informed empirical studies of: social intentions of entrepreneurs (Sundin, 2011), barriers and opportunities for entrepreneurship in older industrial regions (Austrian & Piazza, 2014), resource mobilization in rural communities (Vestrum, 2014), and entrepreneurs and resources in the Nordic countries (Arethun, Nesse, & Oklevik, 2017; Ljunggren, et al., 2010). The four key elements of the model are entrepreneurial human capital, entrepreneurial social capital, specific business resources and an individual working alone, group working collaboratively, or individual within an organization who drives the entrepreneurial process of opportunity discovery, evaluation and exploitation resulting in a profitable new business venture. According to Ronning et al., (2010), transitioning through the entrepreneurial process of idea generation, evaluation, and exploitation requires these four critical elements. Resources required in the entrepreneurial process are depicted at the top and bottom of the model. At the top are the generic entrepreneurial resources which drive the process and at the bottom are the specific business resources required to deliver the product or service. Human capital is

the knowledge, capabilities, skills and experience developed by an individual through formal training and education as well as work and life experience. Entrepreneurial human capital involves the ability to identify and exploit opportunities that others don't see or find attractive, an ability gained through entrepreneurial and industry-specific experience as well as formal learning. Entrepreneurial social capital consists of networks, the relationships within those networks, and the norms and values held within those networks. It is the provider of information, knowledge, emotional support and co-operation. Differentiating as to the importance of each element, Ronning et al. conclude that in terms of success, generic entrepreneurial resources (human and social capital) are of more importance than access to, or the development of, specific business resources such as facilities, equipment or finance.

The role of entrepreneurial social capital

Entrepreneurial-supportive social capital is valuable to an entrepreneur as a source of information and knowledge, reducing the negative consequences of possible failure (Ronning et al., 2010). The idea that social capital: 1) provides access to information and resources held by other people (Burton, Sorensen, & Beckman, 2002), and 2) is necessary for making the transition from an idea to implementation (Aldrich & Zimmer, 1986; Johannisson, 1989), is dominant in the entrepreneurship literature. However, with the introduction of the internet, it is now possible to develop specific product and technology skills, and skills required for management, marketing, distribution, and financial management, without being part of a social network. In other words, social networks aren't exclusive in the role of being sources of information and knowledge.

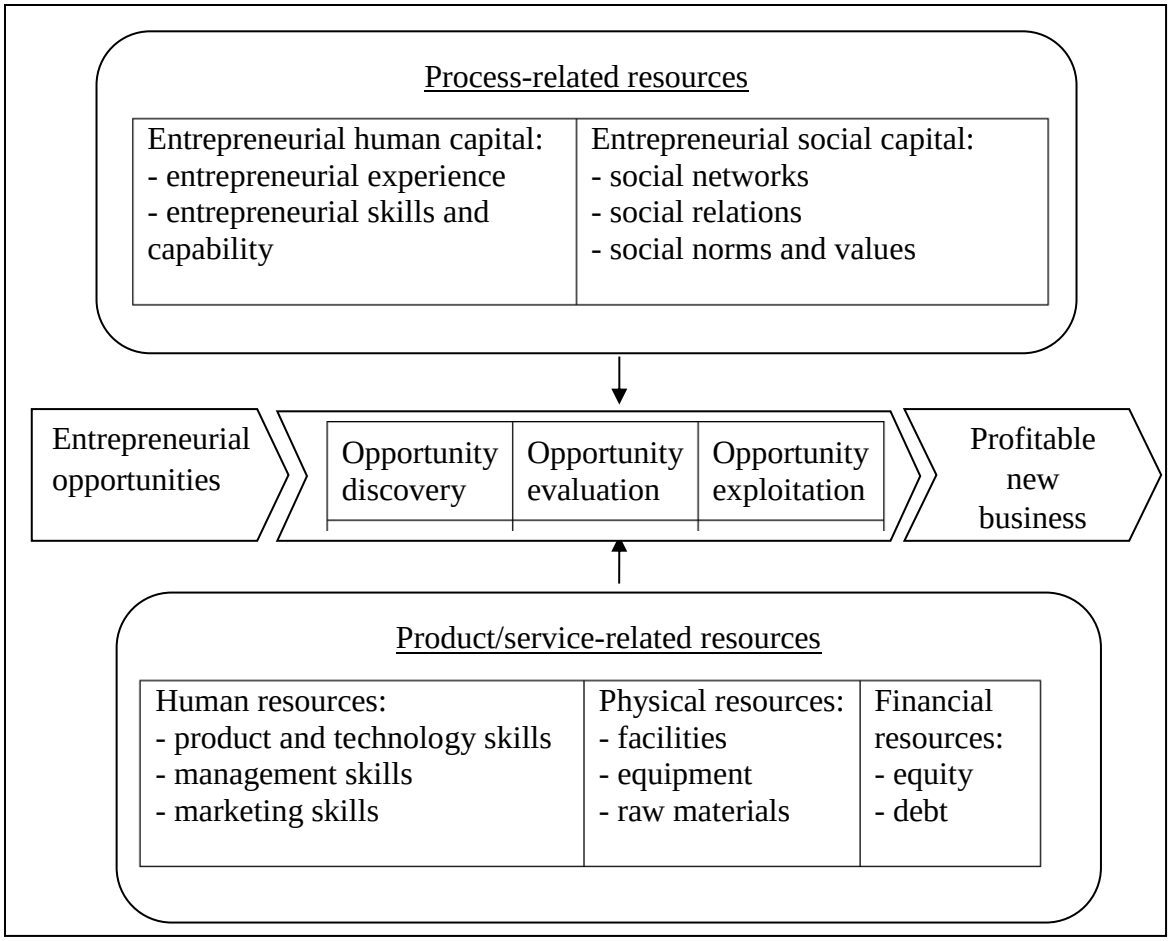

Figure 3 The use of resources in the entrepreneurial process (Ronning et al., 2010)

People who transition through the process of turning an idea into a business are associated with diverse social networks, i.e., connections to people who aren't connected to each other. Diverse networks are said to advantage an entrepreneur through: the provision of more varied resources (Adler & Kwon, 2002); protection against negative social capital (Ronning et al., 2010); and greater exposure to new ideas (Powell et al., 2005), information (Burt, 2000), and opportunities (Anderson & Miller, 2003). More recent research argues that exposure to greater knowledge diversity triggers the specialized prior knowledge and experiences of the entrepreneur, enabling them to identify and exploit entrepreneurial opportunities (Wang & Hwang, 2018). In the same

vein, another study compares individuals with the same amount of skill and knowledge, finding that those who transition their hobby into a business venture receive feedback and encouragement from a diverse set of people significantly more often than those who stay at the hobby stage (Kim, 2018). Kim's research finds that when individuals lack the human capital necessary to implement their idea, the main role of diverse social capital is to provide information and resources. However for those individuals who already possess the necessary human capital, the main role is to provide encouragement and feedback. Taken together, this research suggests diverse social networks aren't in themselves the differentiating factor between the people who implement their ideas and those that don't. The differentiating factor is the idiosyncratic function they perform depending on the entrepreneur's need.

While access to knowledge may not be the primary role of diverse social networks, the creation of new knowledge is perceived by individuals to be a benefit of group membership and participation (Burt, 2000; Ronning et al., 2010). In an effort to reduce the amount of redundant information they must process, actors tend to seek knowledge from specific others within their network, rather than engaging all members (Piezunka & Dahlander, 2015). Group generalized exchange (Yamagishi & Cook, 1993), and indirect reciprocity (Alexander, 1987) both state that at the group-level expected benefits need not be received directly for members to share information and expertise: the benefit that one participant receives is not directly contingent on the resources he or she gives to another participant. Rather, group members provide resources at some time with the expectation that they will receive some future benefit in turn from a fellow group member. In this sense, these theories align with the work of evolutionary theorists:

certain behaviors arise because referent individuals, groups, or organizations use them and thus legitimize them (Smith, Carroll, & Ashford, 1995), eventually becoming part of the collective identity of the group (Lockett, Currie, Finn, Martin, & Waring, 2014).

Dimensions of social capital

Entrepreneurial social capital consists of networks, the relationships within those networks and the norms and values held by those networks, and consists of three dimensions (Nahapiet & Ghoshal, 1998). The structural dimension considers the network that provides an individual with access to other people, whereas the relational dimension focuses on the quality of the relationships between those people. Strong social capital can be both supportive and inhibitive of entrepreneurship (Portes, 1998; Westlund & Bolton, 2003): trusted relationships are valuable for idea generation, validation, and support (Ronning et al., 2010), but can also work to exclude certain individuals (Shields, 2005) and limit the range of ideas deemed as acceptable (Macken-Walsh, 2011). The third dimension, the cognitive dimension takes the concept wider than the individual and their immediate networks and refers to the internalized cultural norms and values within the community. Entrepreneurial-supportive social capital (Ronning et al., 2010) is that which assists the entrepreneur in the transition process from idea to exploitation by providing access to required information and resources through the structural and relational dimensions (Cook & Pandit, 2010; Lee, Florida, & Acs, 2004), and through the cognitive dimension by contributing to the perceived attractiveness of the local community for individuals with ideas to establish entrepreneurial ventures (Florida, 2012; Koschatzky & Hemer, 2009).

One branch of entrepreneurship literature, largely belonging to the psychology literature, focuses on specific individual-level traits as motivating and enabling the entry decision. While considerable case study evidence supports the view that there is nothing distinct about the individuals themselves who turn their incredible ideas into businesses (Abell et al., 2001; Chiasson & Saunders, 2005), the jury is still out and the argument continues on (Germak & Robinson, 2014; Kerr et al., 2017). Here I focus on the literature that follows from Abell et al.'s (2001) argument that the entry decision is most significantly impacted by links to friends in self-employment. More recent studies have developed this idea suggesting that while the human capital an individual possesses is certainly an important and necessary resource required for the implementation of entrepreneurial ideas (Ronning et al., 2010), it is not sufficient on its own. Rather, the distinction is suggested as being structural: implementers have diverse social networks. Over the last 20 years, an increase in studies adopting a resource-based approach to entrepreneurship have enabled a deeper understanding of what the social networks of implementers look like and how they function. While some studies focus on the characteristics of the individual, i.e. entrepreneurs with strong entrepreneurial human capital possess diverse networks enabling them to be less susceptible to negative social capital (Ronning et al., 2010); other research has focused on the structure of the links between individuals (Freeman, 2004). For example, we know that the more central an actor is within a network, the greater their advantage in terms of information gathering (Cui, Yang, & Vertinsky, 2017). Other research explores individual behaviors in conjunction with network structure: people with similar positions within a network tend to communicate with one another due to similarity in experienced issues (Burt, 1992);

high-performing actors have an holistic understanding of possible interdependencies between all actors within a network while low-performing actors focus on maintaining existing dyadic relationships (Ozcan & Eisenhardt, 2009); and nodes that occupy more central positions in a network undertake more competitive actions than nodes with less central positions (Gnyawali, He, & Madhavan, 2006). These studies have increased our understanding of how network structure creates value for the entrepreneur.

An exploration into the role of diverse social capital also requires a focus on the relational dimension, i.e., the quality of relationships that an actor has with other network actors. Diverse social networks provide access to novel information because there are less mutual connections between actors (Burt, 2000). However, because these ties tend to be weak through intermittent contact and thus produce less trust between partners, there is a decreased likelihood that valuable information will flow across these ties (Burt, 1992; Granovetter, 1973). Strong ties found in tight-knit networks are more likely to produce trusted relationships, and these relationships can be particularly valuable during the entrepreneurial process of idea generation, validation, and support (Ronning et al., 2010). The downside of strong ties within tight-knit social networks is that they can dull individual judgement (Robinson, 2009), make excess claims on group members, restrict individual freedoms, exclude outsiders, and have downward levelling norms (Portes, 1998). People located in rural communities tend to depend primarily upon the advice of friends and relatives within a tight-knit network instead of making use of professional expertise, even when that expertise is provided at little or no cost (Meccheri & Pelloni, 2006; Shields, 2005). This can be due to a desire for confidentiality and/or distrust of professionals/academics (Macken-Walsh, 2011), a lack of understanding of the

importance of professional advice (Meccheri & Pelloni, 2006; Sherman et al., 2009), or simply an unawareness of the existence of such expertise (Macken-Walsh, 2011). However, tight-knit networks can be inhibitive of entrepreneurship and individuals can be reluctant to go against the advice of the group and risk social exclusion as a consequence (Macken-Walsh, 2011; Ronning, 2009).

Finally, the third dimension of social capital, the cognitive dimension, takes the social capital concept wider than the individual and their immediate networks and refers to the internalized cultural norms and values within the local community. Economists generally tend to conceive of cognitive social capital as "a collective manifestation of behaviors, attitudes, and values of individual members of a community" (Rupasingha, Goetz, & Freshwater, 2006). Rural communities tend to be strongly risk averse (Sherman et al., 2009), and new businesses and change in general are sometimes viewed with skepticism (Macken-Walsh, 2011; Sampson et al, 2011). People who move to a rural community and set up a new business can find it difficult to gain local acceptance and have fewer sales to locals than other long-established businesses (Shields, 2005). Offering some insight into the influence of the cognitive dimension of social capital, studies explore the relationship between economic growth and cognitive social capital arguing that in communities where people are supportive of entrepreneurship, a would-be entrepreneur is more likely to gain access to required information and resources through the structural and relational dimensions (Cook & Pandit, 2010; Lee et al., 2004; Ronning et al., 2010; Roberts, 1991). An entrepreneurial-supportive culture is one in which existing and potential entrepreneurs are more willing to share information and resources, and offer feedback and encouragement to each other, whereas an entrepreneurial-

inhibitive culture is exclusionary both in terms of people and types of businesses. In an effort to measure cognitive-level social capital, some studies associate volunteer activity and association membership with the propensity of community members to engage in collective action, suggesting that such cooperative behavior will flow over into behaviors toward start-up entrepreneurs (Putnam, 1993). Rupasingha et al. (2006) extend this work and the work of others, e.g. Glaeser, Laibson, & Sacerdote, (2002) and Putnam, (1995), to include income and income inequality, education, the changing role of women, family status, age, employment type, and home ownership. The authors have continued to refine the variables resulting in a database of the stock of U.S. county-level social capital based on voter turnout and the number of associations, organizations, and non-profits (Rupasingha, Goetz, & Freshwater, 2014).

The institutional entrepreneurship literature takes a different approach to assessing the relationship between cognitive social capital and entrepreneurship and proposes that incentives determined by the quality of economic, political, and legal institutions, significantly affect entry decisions (Baumol, 1990; Sobel, 2008). Baumol (1990) argues that in any location, "…entrepreneurs are always with us and always play some substantial role…" (p. 894), however whether the entrepreneur invests effort into productive, unproductive, or destructive money-making ventures, is dependent on the reward structure determined by the quality of local economic, political, and legal institutions at the time. From Baumol's standpoint, criminals are also entrepreneurs. Sobel (2008) tests this hypothesis and finds a positive relationship between institutional structure and economic growth: "good institutions channel effort into productive entrepreneurship, sustaining higher rates of economic growth" (p. 641). Rural regions

with strong economies think regionally; create institutions that forge regional partnerships; make steady investments in knowledge and training; and leverage educational institutions (Drabenstott, 2003).

In examining regional differences, Lengyel (2009) puts forward three types of region: neo-Fordist, knowledge transfer, and knowledge creation. Neo-Fordist regions typically lack the human capital necessary to facilitate entrepreneurship (Laukkanen & Niittykangas, 2003). These communities often suffer from a distinct lack of education (Barkema & Drabenstott, 2000; Laukkanen & Niittykangas, 2003), and are typically characterized by a low GDP per habitant, firms that are not internationally competitive, and a tendency of talented young people to leave the region after graduating high-school. There is insufficient infrastructure and attracting branches of global companies form the basis of regional growth strategies (Lengyel, 2009). Local authorities may provide resources and incentives for existing or emerging entrepreneurs, however Laukkanen & Niittykangas (2003) argue that in depleted communities these growth strategies are becoming more and more ineffective and even irrelevant. The main reason for this is that the supply of individuals and businesses with the levels of human and/or social capital required to take advantage of these resources is simply nowhere near the capacity required to achieve regional growth. Criticism has also been made of business incubators and small business development centers designed to assist rural entrepreneurs, stating that advisors often possess knowledge more suited to lifestyle businesses and lack experience at growing businesses and preparing them to attract venture capital (Drabenstott, 2003; Sherman et al., 2009).

In ‘knowledge transfer regions’ economic strategy is concerned with retaining existing companies and creating value-added workplaces. Transportation infrastructure is developed and frequent training programs correspond to the needs of the local economy as well as improving managerial skills. In ‘knowledge creation regions’ output is high and the focus is on developing the capacity for innovation through scientific parks, universities, knowledge spillovers, incubator programs, and venture capital schemes.

Grounded in the entrepreneurial culture literature, recent studies combine these two approaches and focus on historical social, cultural, and institutional imprinting as explanations of variation in entrepreneurship rates across geographic space, e.g., Audretsch et al., (2017), Percoco, (2012), Sobel, (2008), and Stuetzer, et al., (2016). While an entrepreneurial-inhibitive culture is a significant factor in rural communities with no economic growth (Macken-Walsh, 2011; Ronning et al, 2010), a positive relationship has been found between regional growth and: an entrepreneurial-supportive culture (Roberts, 1991); a tradition of entrepreneurship and risk-taking (Goldstein, 2009); and a communal past and good quality institutions (Percoco, 2012). History therefore seems to be an important measure for identifying differences in entrepreneurship rates across geographic space. If regions with an entrepreneurial-supportive culture tend to have a tradition of entrepreneurship, and strong institutions channel effort into productive entrepreneurship (Sobel, 2008), historical and institutional factors may be relevant in explaining the formation of diverse social networks that fulfill the idiosyncratic needs of entrepreneurs in order to mobilize the entrepreneurial process.

The relationship between social capital dimensions

While many studies have explored the structural, relational, and cognitive dimensions of social capital, what is less understood is the relationship between the different dimensions. For example, if rural communities characteristically lack entrepreneurial human capital (Laukkanen & Niittykangas, 2003; Ronning et al., 2010) and have an entrepreneurial-inhibitive culture (Macken-Walsh, 2011; Ronning, 2009), do farmers and other individuals with innovative ideas located in these communities establish networks that not only provide access to human capital, but also support? In rural communities in which there is a lack of entrepreneurial-supportive social capital, are individuals with innovative ideas more likely to create connections with actors located outside of their own geographic area? Also, are pioneers more highly motivated to create diverse social networks than future entrants, simply because of the absence of existing networks that work to both: 1) assist in the development of human capital; and 2) provide feedback and encouragement?

The focus in this section is on exploring the potential implications of the different dimensions together. Firstly, I discuss how different network structures enable different types of relationships. The next section looks at the potential relationship between the structure of an individual's social network and cognitive social capital. Next, I theorize about the relational dimension of an entrepreneur's social capital in relation to entrepreneurial-inhibitive social capital at the cognitive level. In other words, the quality of a person's relationships and how they may potentially affect, or are affected by, the internalized cultural norms and values within their local community. The final section considers all of these relationships as they might apply to producers of new products.

Relationship between structural and relational dimensions

In order for parties to enter an exchange relationship, they each must perceive some degree of similarity between them, whether it be based on demographics, background, interests, level of competitiveness, beliefs about each other's future behavior, or valuations of payoffs (Deutsch, 1973; Frank, 2009; Jackson, Rodriguez-Barraquer, & Tan, 2010; Sugden, 2009). Empirical research suggests that where there is a perception of similarity between actors, the diffusion of ideas occurs more readily (Strang & Meyer, 1993), however knowledge diversity is important for innovation (Feldman & Audretsch, 1999), and innovation is strongly tied to entrepreneurship (Steyaert & Katz, 2004). In a tight-knit network, it is more likely that the knowledge held within that network will not be diverse because the same information and potential contacts are likely to be widely shared and thus common to all members (Glanville, 2004). In the face of technological uncertainty, innovative firms are more likely to engage in exchange when they are fixed firmly and deeply within a network in which members hold heterogeneous expertise and production facilities (Hage & Alter, 1997). This implies that for innovation, structurally diverse networks are not necessary. Whether the connections an actor has are connected to each other or not is irrelevant; it is the diversity of expertise and the production activities of each firm inside the network that is important. In this sense, where an individual has an innovative idea for which the knowledge within their existing network is insufficient, diverse social connections offer the advantage of providing specific information or expertise. However, in order to create such connections, the individual must: 1) recognize a need that is not being fulfilled by their existing networks; and 2) perceive potential value in creating new connections outside of these

networks. In other words, the perceived marginal benefits associated with creating each new connection must outweigh the opportunity cost of the time and resources required to do so. Therefore the structure of an individual's network will depend on their need for idiosyncratic resources not held within their existing networks, and any new connections made are more likely to be of higher quality in that the actor requires relatively high marginal benefits in order to create them. For producers of innovative products for which a market has yet to be established and few resources exist for the development of specific human capital, the motivation to interact with others in the product category is likely to be high, no matter where they are located. Due to small numbers at the beginning of an industry lifecycle, pioneers will be more likely to create geographically diverse networks out of necessity. Increased uncertainty means they will value heterogeneous expertise over and above the cost of engaging in an exchange relationship with someone who is located geographically far away. As the industry develops and uncertainty decreases, later entrants will be more likely to avoid this cost and prefer to create geographically close connections. It is expected that in order to fulfil some idiosyncratic need such as a need for specific rather than generalized information, and in the absence of local people able to offer these resources, pioneers are more likely to form linkages with people located in other areas. As the number of industry participants increases and specific knowledge is codified, it is likely that the networks of later entrants will become less geographically widespread.

Relationship between structural and cognitive dimensions

As discussed in the previous chapter, rural communities characteristically lack entrepreneurial human capital (Laukkanen & Niittykangas, 2003; Ronning et al., 2010)

and have an entrepreneurial-inhibitive culture (Macken-Walsh, 2011; Ronning et al., 2010), yet individuals tend to prefer consulting local friends and family for advice rather than outside expertise (Meccheri & Pelloni, 2006; Shields, 2005). In rural communities with low social capital, meaning there is a low tendency towards collective and cooperative behaviors, (i.e., existing and potential entrepreneurs are unwilling to share information resources, or offer feedback and encouragement), individuals with business ideas may be more motivated to incur the transaction costs associated with establishing geographically diverse networks. Conversely, where there is a critical mass of entrepreneurs in a geographic location, strong local networks may develop through frequent interaction (Westlund & Bolton, 2003). An entrepreneurial-supportive culture within these networks can actually spill over into the wider community, normalizing cooperation and knowledge transfer at the regional level (Doloreux & Parto, 2005).

Relationship between relational and cognitive dimensions

In a community with low cognitive social capital there may be strong resistance to potential changes that challenge the status quo (Lavoie, 2015). It makes sense then that as people with ideas identify nearby others with similar ideas, they will form a tight-knit network. One of the functions of this network will be to offer protection against an entrepreneurial-inhibitive culture (Ronning et al., 2010). The question here is, is there a hierarchy between the social capital dimensions in which cognitive social capital trumps all else? As in, if you have an innovative idea, it's not what you know, who you know, or what they provide you with; it's where you live that matters most.

Establishing legitimacy

For a new product to be accepted by the market, it must comply with social norms and standards of legitimacy (Deephouse, 1999; Kennedy, 2008; Navis & Glynn, 2010; Suddaby, Bitektine, & Haack, 2017). The survival of firms is dependent on consumer understanding of these new products (Rao, 1994). In many instances, the market has few, if any, benchmarks against which to measure a new product. Prior research argues that homogeneity matters: when an audience sees similar behavior between firms producing similar offerings, it is easier for them to understand and associate meanings with new product labels (McKendrick & Hannan, 2014). The social movement literature suggests that a need for short-term economic survival increases the likelihood that effort will be invested in creating and maintaining exchange relationships (Gillham & Edwards, 2011). Producers invest in establishing relationships with each other in order to construct a common identity that makes their products understandable by audiences (Suddaby et al., 2017). In the case of a new product category, because audiences must perceive producers in a new category to be both similar to each other and different from existing producers, a collective identity of producer firms that is separate from the identity of mainstream producers is required (Hsu, Hannan, & Polos, 2011). The literature is unclear on how the construction of this collective identity happens in practice, especially for a nascent industry in which start-up entrepreneurs experimenting with new products may lack an awareness of others operating in the same product category, let alone interact or cooperate with each other. Geographical distance may account for a lack of awareness of each other, and if they are known to each other, the fact that these firms produce similar offerings, require similar resources, and adopt similar routines, can mean rivalry is

stronger amongst them (McKendrick & Hannan, 2014). As Khaire and Wadhwani (2010) write, "…it is difficult to imagine how a fragmented and heterogeneous set of producers and consumers would engage in a meaningful discourse that would lead to a consolidated understanding of a category and the value of products within it" (p. 1298).

The legitimacy-as-process literature assumes firms are known to each other and proposes legitimacy as the product of interaction between organizations, i.e. firms work together to construct a shared meaning (Suddaby et al., 2017). Firms operating within a new product category work together to construct a common identity by emphasizing similarities of the firms claiming membership. By constructing a shared meaning, it becomes easier for audiences to understand their products as a cluster in the beginning stages of establishing a market (Navis & Glynn, 2010). Only after legitimacy has been established for the product category will they begin to emphasize the idiosyncrasies of their own products in attempts to gain market share (Barnett, 2006). This view suggests firms are not simply passive recipients in the process of obtaining social approval (Barnett, 2006) and are able to manipulate category meaning and boundaries according to their own interests and where they perceive audience preferences might be (Durand & Paolella, 2013; Suchman, 1995).

The sociological perspective maintains that a collective identity is ascribed to a set of producers or products by external audiences and is established solely through their own interpretations (Khaire & Wadhwani, 2010). For instance, consumers, critics, regulators, and financial analysts typically classify firms based on what they make or offer, whereas enthusiasts might classify firms based on technology, location, ownership structure, or business practices (McKendrick & Hannan, 2014). These classifications then

shape the views of broader audiences (Negro, Hannan, & Rao, 2011). One such study finds that in the beginning, producers of Scotch whisky lacked a collective approach to identity formation, and classification of this new product was in fact created by audiences (McKendrick & Hannan, 2014).

Other literature combines the two theories and proposes that "some degree of agreement about standards of performance in an industry" (Rindova & Fombrun, 1999, p. 695) is constructed through the interaction and exchange of information between firms and audiences. Producers interpret the responses of consumers to the new products and subsequently adapt their behavior, to which a new round of consumer response takes place (Rosa et al., 1999). The grass-fed meat and dairy product movement is an example of producer interests resonating with the interests of audience members using cultural codes hinged to authenticity, sustainability and naturalness to categorize emergent products (Weber et al., 2008). In this view, the understanding of how firms in an industry create value is developed not only through agreement between firms but also through agreement between audience members (Rindova & Fombrun, 1999).

Of the few studies that focus on how new category meanings are agreed upon by firms and consumers, even fewer have addressed the role of other relevant actors, e.g., Khaire & Wadhwani, (2010). Institutional intermediaries have been found to play a role in the development of shared understandings of new products and industries (Rindova, Reger, & Dalpiaz, 2012). For example, product evaluations by consumer organizations or 'experts' highlight key attributes that aim to reduce consumer uncertainty about how to evaluate and compare producer offerings. The media acts as an intermediary in the establishment of legitimacy through its ability to influence the social approval of firm

actions (Pollock & Rindova, 2003; Zavyalova et al., 2012). In the case of new firms (or products), a high volume of media coverage increases consumer familiarity and acceptance and reduces perceptions of risk (Pollock & Rindova, 2003). For instance, Rao (1994) found that in its nascent stage, legitimacy for the U.S. auto industry was obtained by firms through media coverage. For a firm, product, or industry, to be considered newsworthy, some level of legitimation may be required in the first place (Pollock & Rindova, 2003), however prior research has found media attention is strongest when focused on nascent products and industries (Kennedy, 2008). Some studies find firms take a reciprocal adaptation approach by interpreting and responding to narratives of different actors featured in the media, e.g., Pollock & Rindova, (2003) and Rosa et al., (1999). Others find that firms exercise power to influence media coverage e.g., Lounsbury & Rao, (2004) and Zavyalova et al., (2012). A third perspective argues that because judgment rests with stakeholders, industry commentators and consumer audiences are more influential than producers in driving the legitimization process (Grodal, Gotsopoulos, & Suarez, 2015).

Shared cognition is thought to be developed through individuals articulating information to a group (Stigliani & Ravasi, 2012). This approach suggests that behavioral requirements for the establishment of legitimacy for a new product category are suggested by key discursive actors and adopted by others in a somewhat linear fashion (Green, 2004). Evidence of acceptance is a decrease in the need to linguistically define or justify these requirements (Green, 2004). Yet Kennedy (2008) proposes that cognitive categorizations are an outcome of the motives of all parties (i.e. producers and audiences), as well as of the communication that has taken place. Simon (1987) similarly

proposes that at the firm-level, actions and decisions aren't the result of one individual or group but instead evolve through the interaction of multiple parties. In the early stages of an industry when early entrants may be unknown to each other, a collective identity may in fact come to be constructed through symbolic communication rather than face-to-face interaction. Coordination is achieved through actors observing one another and building on the interpretative work of others as opportunities arise (Khaire & Wadhwani, 2010). Research has shown that the discourse of both market and nonmarket enthusiasts can influence the view of broader audiences (Negro et al., 2011), and actor status has been found to be of critical importance in this respect (Khaire & Wadhwani, 2010). However while actors located in central social positions may have high influence, they have been found to be less likely to be drivers of change. Conversely, peripheral actors are more likely to initiate change but lack the power required to drive that change (Lockett et al., 2014). Two competing theories therefore exist as explanations of how legitimacy for a new product category is established: 1) certain actors in key discursive positions use normative language that is adopted by others in a somewhat linear fashion (Green, 2004), or, 2) firms cooperate together to produce a joint understanding and collective identity (Suddaby et al., 2017) by observing and building on the work of each other (Khaire & Wadhwani, 2010).

Network analysis as a research method for exploring the relationships between social capital dimensions

In this section, I justify the use of social network analysis (SNA) techniques to explore the relationships between the different dimensions of social capital. Social network research conceptualizes a social system as a structure of social relationships among individuals (Robins, 2015), and allows analysis of social groups through the

examination of individual-level behaviors within the context of not only their own direct relationships with others, but also in terms of their indirect relationships. As mathematical algorithms have continued to be refined, allowing the formation of new measures that describe different characteristics of networks, it is now possible to not only empirically assess the structure of networks but also the interactions within them and their evolution over time in a more quantitative manner (Ter Wal & Boschma, 2011). While SNA has been closely linked with social capital theory (Putnam, 2000), it isn't attached to any one particular theory of social structure, nor is it a theory in itself. Rather, it is a set of methodological techniques and vocabulary for exploring and describing patterns within the structure (Scott, 2017).

Combining geography with network theory has improved our understanding of how networks are formed. For instance, network analysis techniques have been used to show that clusters of firms within a region are not necessarily drivers of innovation and economic development in that they are not by default linked to each other (Giuliani & Bell, 2005), and have key linkages outside the cluster (Morrison, 2008). Much of the sociology literature focuses on the role of homophily as being highly influential in how individuals create network ties (Ruef, Aldrich, & Carter, 2003), in other words, individuals are more likely to create connections with those they perceive as similar in some way. Geographical proximity may also be a key driver in these decisions. One simulation model finds that in the early stages of an industry when knowledge has yet to be codified and there is high technological uncertainty, localized tight-knit networks have higher knowledge growth than networks that are geographically diverse (Cowan, Jonard, & Ozman, 2003).

Structural social capital

For exploring the exchange of valued resources between actors, social structure theories emphasize the role of structural factors such as the positions of individuals, groups, and organizations within the networks they belong to, e.g. Blau (1964). Studies such as Markovsky, Willer, & Patton, (1988) and Uzzi, (1997) have enabled a deeper understanding of how macro-properties of network structures can be used to analyze how the structure of an actor's social network provides certain advantages (Tsai & Ghoshal, 1998), such as access to information (Jackson, 2008). Variables for structural analysis include:

1. Degree – Degree represents a count of how many connections a node has. An actor with a large degree is in direct contact with many other actors. This actor is likely to be recognized by others as a major channel of relational information, i.e., a crucial node in the network. In contrast, actors with a low degree are on the periphery of a network and not active in the process of relating information to others (Wasserman & Faust, 2009). Degree centrality is calculated as:

$$C_D(n_i) = d(n_i)$$

   where $d(n_i)$ is the degree of node n_i (Umadevi, 2013).

2. Closeness – Closeness is a measure of the relative speed at which information is spread from a given node to all others in a network (Umadevi, 2013). The measure calculates the shortest path between all nodes, and assigns each node a score based on its sum of shortest paths (Disney, 2014). Actors with a large closeness value can interact with all the other actors in a network quicker than an actor with a low closeness value. These actors can be very productive in communicating information

to others and will be especially relevant when actors are engaged in problem solving (Beauchamp, 1965). Closeness centrality is calculated as:

$$C_c(n_i) = \sum_{i=n}^{N} \frac{1}{d(n_i, n_j)}$$

where $d(n_i, n_j)$ is the distance between two nodes in the network (Umadevi, 2013).

3. Clustering – If every actor that an actor is connected to is also connected to each other, the actor will have a clustering value of 1, i.e, the actors connections are clustered together (see Figure 2, page 9). If very few of the actors that an actor is connected to are connected to each other (see Figure 1, page 8), the clustering value will be closer to 0. In terms of gaining access to new information, clustering measures the extent to which a person's contacts are redundant. If all actors are connected to each other, all actors will share the same information. In contrast, diversity of an actor's contacts means the actor has access to a higher volume of information (Burt, 2000). In addition, as the proportion of actors in a network with clustering values of 1 increases, it creates a 'small-world' effect, and the likelihood of cooperation taking place between each of these 'small worlds' decreases (Watts & Strogatz, 1998). Clustering is calculated as:

$$C_T = \frac{\lambda_G(v)}{\tau_G(v)}$$

where $\lambda_G(v)$ is the proportion of links between the nodes that a node i is connected to, and $\tau_G(v)$ is the number of links that could possibly exist between them (Watts & Strogatz, 1998).

4. Eigenvector – Eigenvector centrality represents the amount of influence a node has on other nodes in the network by paying attention not only to direct contacts, but also indirect connections (Bonacich, 2007). The concept is based on the idea that "a person is prestigious if he is endorsed by prestigious people" (Franceschet, 2010). A high eigenvector value indicates that a high-scoring node is connected to other high-scoring nodes. A high-scoring node that is connected to low-scoring nodes will have a low eigenvector value. Thus, an actor is considered important if they are connected to other important actors. Eigenvector centrality is calculated as:

$$x_i = \frac{1}{\lambda}\sum_{j=1}^{n} A_{ij}x_j$$

where λ is a constant (Umadevi, 2013).

5. Structural holes - Weak connections between groups in a network represent 'holes' in the social structure of the network (Burt, 2017). The groups may be aware of each other but don't necessarily pay attention to the activities of the people in each group. Structural holes represent an opportunity to broker the flow of information between people. Individuals with connections structured in such a way that mean they essentially span structural holes act as authorities and connecters in that they not only gain early access to information but also monitor and move information between people. Additionally, they act as interpersonal bridges between parties. People who are not greatly interested in, say, current events, but are interested in staying informed about important developments, can save search costs by consulting an actor who spans a structural hole.

Relational social capital

The relational dimension of social capital focuses on the quality of the relationships between the actor and the actors they are connected to. The weighted degree measure captures the recognition that not all connections are equal (Opsahl, Agneessens, & Skvoretz, 2010). While the degree variable is a simple count of how many connections a node has, weighted degree reflects the value of each connection according to the concept of interest to the researcher. For this study, connections to other actors that represent the development of human capital through mentorship or training are weighted higher than connections that record family relationships. In this sense, degree is a structural social capital measurement, while weighted degree is a measurement of relational social capital, i.e., the quality of the relationship rather than the number of relationships.

It is suggested that the creation of new knowledge occurs in diverse networks in which participants aren't linked to each other (reducing the likelihood of redundant information), or in networks in which the expertise of participants is heterogeneous (Feldman & Audretsch, 1999). Innovation and creativity continue to be highly present in the artisan cheese industry in the U.S. and this can be evidenced by the fact that ACS has continuously added new categories for new types and styles of cheese to their annual competition[1]. This suggests that industry participants continue to maintain diverse networks, and clustering values will be low over time as high clustering values suggest a reduction in innovation due to the increased likelihood of redundant knowledge. However, in this context, if clustering values are high over time, this suggests diverse

[1] Since its inception in 1986, the American Cheese Society competition has grown from 13 categories, to 20 main categories and 123 sub-categories (American Cheese Society, 2019).

networks aren't required for innovation. In addition, as a nascent industry develops over time, knowledge will become codified and more easily accessible, not only due to the fact that later entrants have the benefit of learning from earlier entrants, but also because, in the case of the U.S. artisan cheese industry, advances in technology such as the development of the internet, mean large amounts of information are able to be accessed easily and quickly. If diverse networks aren't necessary for innovation, and the human capital necessary for establishing an entrepreneurial venture can be developed via books or online sources, the marginal benefit of establishing these sorts of connections may be very low. Later entrants to an industry are therefore less incentivized to incur the transaction costs associated with developing relationships for the purpose of developing human capital. This will be reflected in a decrease in the average weighted degree of entrants as time progresses.

Cognitive social capital

The concept of cognitive social capital suggests the norms and values of the wider community impact upon the ability of an individual to transition from idea to implementation of their idea. Rural communities can be inhibitive of entrepreneurship in that they dislike change and would-be entrepreneurs are discouraged from pursuing ideas that are outside the norm (Macken-Walsh, 2011; Portes, 1998; Ronning, 2009). Tight-knit social networks in which all members are connected to each other form part of the fabric of a rural community (Sampson et al., 2011), meaning knowledge held within these networks is more likely to be redundant (Glanville, 2004), reducing the likelihood that these networks will be of value to a would-be entrepreneur wanting to establish a business in a nascent industry. Therefore individuals who establish their businesses in

locations with low social capital are likely to create geographically diverse networks that both reduce the likelihood of redundant information and protect them from local entrepreneurial-inhibitive cognitive social capital.

Given that an entrepreneur establishes a business in a nascent industry, in a location with a low level of cognitive social capital, these early entrants may be more likely to be highly influential in their community and thus less susceptible to entrepreneurial-inhibitive social capital. Therefore entrepreneurs located in low social capital areas are more likely to have higher influence, especially early entrants.

Establishing legitimacy

In terms of the establishment of legitimacy for a new product category, if it is the case that cooperation between producers is required, after which time producers adopt competitive strategies (Barnett, 2006; Suddaby et al., 2017), early entrants will have a high number of connections represented by a high average degree value, while later entrants will have a lower average degree. Early entrants will also have a high average weighted degree representing the fact that information is being exchanged between actors. Later entrants will have a lower average weighted degree. This is because early entrants will have more connections and higher quality connections because of the need to exchange information and knowledge. A higher average degree could be a function of time in the industry; those who entered in the beginning have made more connections over time, however this is an unlikely relationship because connections aren't made simply as a function of being in business. In addition, there will be a high closeness value among those who entered the industry early depicting the speed at which information spreads throughout the network.

On the other hand, if key actors in key discursive positions set standards that are consequently adopted by others in a somewhat linear fashion (Green, 2004), there will be distinctive early entrants who span structural holes between sub-groups depicting the responsibility they have for the spread of new ideas and behaviors. Because they are positioned between different groups, actors with high structural hole values control the information flow between groups and thus have more influence on other nodes than those who are on the edge of the network (Wasserman & Faust, 2009). These actors will also have high eigenvector values, representing the idea that people with a high degree of influence are generally endorsed by others with high influence and are therefore more likely to have the standards they communicate adopted by others.

Chapter 3 – Conceptual model

Here I present my conceptual model based on the literature reviewed in the previous chapter (see Figure 4). My primary focus is on the changing structure and role of social networks over time represented by the arrows from *entrance stage* as a *driver of network structure and role* to variables representing *structural*, *relational*, and *cognitive* social capital.

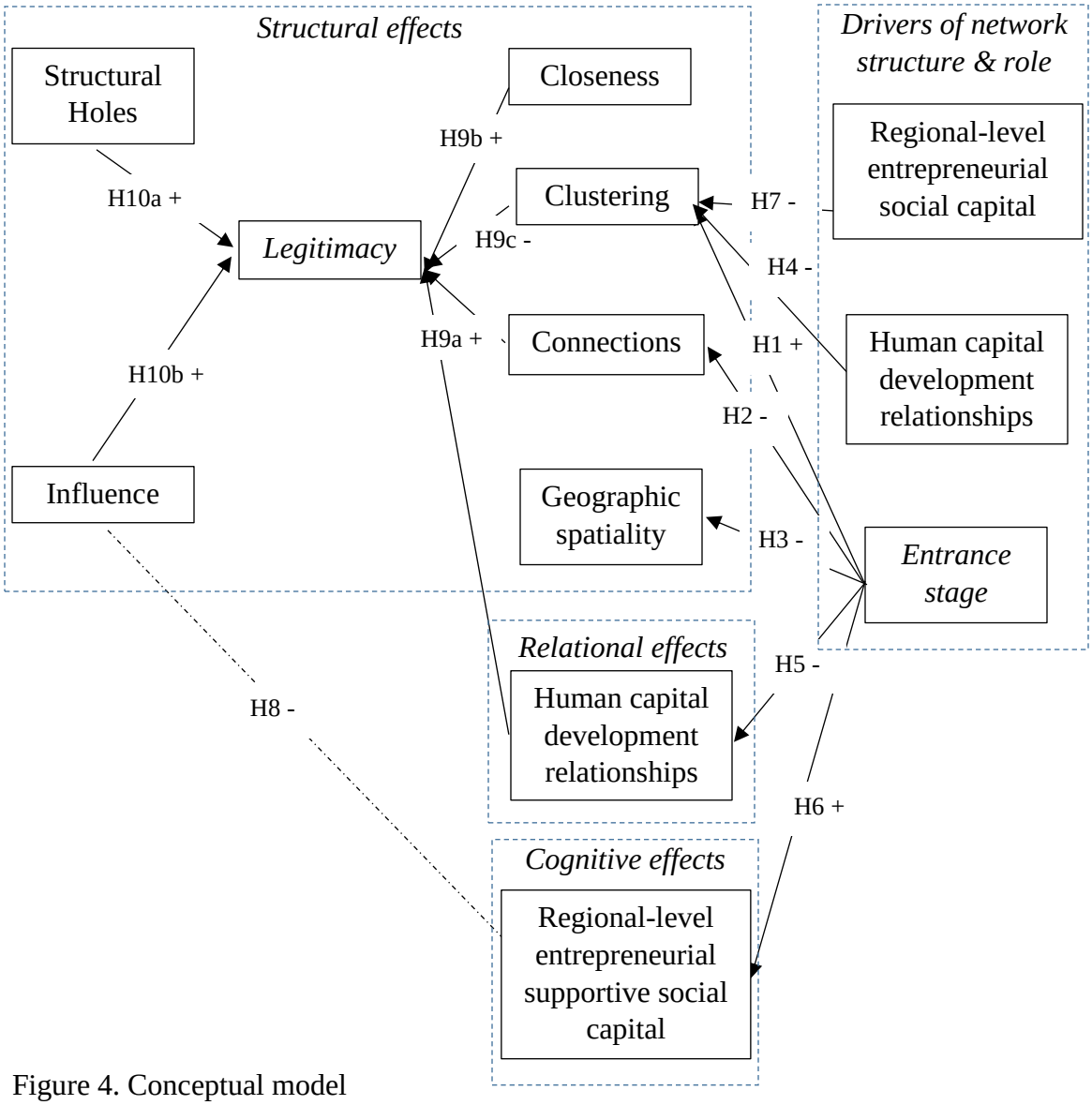

Figure 4. Conceptual model

The secondary focus is on the other two *drivers of network structure and role* being cognitive social capital at the regional level, and utilization of networks for the development of human capital. Finally, I use variables representing structural and relational social capital to test competing hypotheses regarding industry-level legitimacy as an outcome of network structure at both the level of the industry and the actor.

Structural social capital effects

Ronning et al.'s (2010) entrepreneurial process model suggests that in order for individuals to begin entrepreneurial ventures, they require human capital. In the event that actors utilize social networks for the development of human capital, it is expected that actors will have lower clustering values (i.e., more diverse networks) in order to gather a higher volume of information. Early entrants in a nascent industry may be more incentivized to incur transactions costs associated with developing diverse networks because small numbers and no codification of knowledge means that the marginal benefit of knowledge gained from each new connection outweighs the opportunity cost of the time and resources required to create the connection. As knowledge becomes codified, actors will have less incentive to invest time and resources into creating new connections and thus clustering values of later entrants should move towards 1 rather than 0. Therefore, it is expected that there is a positive relationship between the year that an actor first took action towards entering an industry and their clustering value.

> *Hypothesis 1*: Later industry entrants will have less diverse networks (i.e., higher clustering values) than earlier entrants.

As knowledge becomes codified, and advances in technology increase the volume and speed of information that a given actor has access to, later entrants who utilize social networks primarily for the development of human capital will also be less likely to maintain a large number of connections with actors who aren't connected with each other because the volume of information they can get from, say the internet alone, is arguably more than any number of connections could provide.

Hypothesis 2: Later entrants will have a smaller number of connections than earlier entrants.

In the early stages of an industry small numbers means that participants who want to form connections with other participants may be required to form connections across space. Geographically spatial connections carry high transaction costs and so as an industry develops and more participants enter, later entrants will form connections with closer nodes as this lessens the transaction costs of interaction. Geographical closeness enables a higher incidence of communication between participants, as well as freer interactions (Porter, 1998). Therefore in the early stages, communities will be geographically spread out. In the later waves, networks will be more localized and tight-knit.

Hypothesis 3a: Later industry entrants will have more localized networks than earlier entrants.

Hypothesis 3b: Tight-knit networks are more likely to be localized.

Relational social capital effects

For early entrants in nascent industries, there may be a shortage of actors for an entrepreneur to access in order to develop the required human capital. In this instance, early entrants may be forced to teach themselves via experimentation in order to develop the relevant know-how they need. In the event that actors utilize social networks for the development of human capital, this will be represented by a higher weighted degree value. Actors who utilize social capital networks for the development of human capital are expected to have a lower clustering value due to the theory that diverse networks deliver a greater volume of information to the actor.

Hypothesis 4: Actors who utilize social networks for the development of human capital will have more diverse networks than actors who don't.

Due to the fact that the internet contains a larger volume of information than any number of individuals that an actor could possibly maintain connections with, it is expected that the networks of later entrants will become more tight-knit as time progresses rather than diverse if social networks primarily exist to provide actors with resources for the development of human capital.

Hypothesis 5: Later entrants have less incentive to create relationships for the development of human capital than early entrants.

Cognitive social capital effects

Individuals who make the transition decision early in a nascent industry will be more likely to be located in areas with high social capital. As the industry evolves and

legitimacy is achieved, entrepreneurial-inhibitive cognitive social capital is less likely to affect entrepreneurial efforts.

Hypothesis 6: Industry pioneers are more likely to be located in areas with a community-level entrepreneurial-supportive culture.

Individuals who establish their businesses in locations with low social capital are likely to create geographically diverse networks that both reduce the likelihood of redundant information and protect them from local entrepreneurial-inhibitive cognitive social capital.

Hypothesis 7: Individuals located in communities with a lack of entrepreneurial-supportive culture will be more likely to create geographically diverse networks.

Early entrants may be more likely to be highly influential in their community and thus less susceptible to entrepreneurial-inhibitive social capital. Therefore entrepreneurs located in low social capital areas are more likely to have higher influence, especially early entrants.

Hypothesis 8: Industry pioneers located in communities with a lack of entrepreneurial-supportive culture will be more likely to have high influence over others and be connected to others with a high degree of influence.

Legitimacy as an outcome of network structure and role

If legitimacy requires cooperation between all industry players, the average clustering value of actors in a network will be low, increasing the likelihood of cooperation (Watts & Strogatz, 1998). In addition, degree, weighted degree, and

closeness centrality will all be lower for later entrants due to the fact that legitimacy is achieved and firms are now acting competitively for market share (Barnett, 2006).

> *Hypothesis 9a*: If cooperation between producers is required for legitimacy of a new product category after which time participants engage in competition for market share, early entrants will have a higher number of connections, and will be more likely to exchange information and resources with each of their connections than later entrants.

> *Hypothesis 9b*: If cooperation between producers is required for legitimacy of a new product category after which time participants engage in competition for market share, early entrants will be more able to spread information throughout the entire network than later entrants.

> *Hypothesis 9c*: If cooperation between producers is required for legitimacy of a new product category after which time participants engage in competition for market share, cooperation will be higher among early entrants than later entrants, represented by a low average clustering value of later entrants.

On the other hand, if key actors in key discursive positions set standards that are consequently adopted by others in a somewhat linear fashion (Green S. E., 2004), there will be distinctive early entrants who span structural holes between sub-groups depicting the responsibility they have for the spread of new ideas and behaviors. Because they are positioned between different groups, actors with high structural hole values control the information flow between groups and thus have more influence on other nodes than those who are on the edge of the network (Wasserman & Faust, 2009). These actors will also

have high eigenvector values, representing the idea that people with a high degree of influence are generally endorsed by others with high influence and are therefore more likely to have the standards they communicate adopted by others.

Hypothesis 10a: If key actors set the standards for legitimacy of a new product category, key actors among early entrants will spread new ideas and behaviors through their connections to different groups.

Hypothesis 10b: If key actors set the standards for legitimacy of a new product category, key actors will be highly influential and connected to other influential individuals.

Chapter 4 - Research design

The purpose of this study is to provide specific insight, not only for rural entrepreneurs and producers, but also economic development agencies and policy developers, as to how entrepreneurs with innovative products create and utilize entrepreneurially supportive social networks as they transition their idea to implementation of a sustainable and profitable business. In order to develop this insight, this study aims to answer three specific questions. First, are there structural differences in the networks of industry pioneers compared to later entrants, and if so, what might explain these differences? Second, in nascent industries, what role do diverse social networks play for entrepreneurs and does this role change over time? And third, does the way in which industry pioneers construct and utilize social networks influence the establishment of legitimacy for a new product category?

This chapter now explains the methodology used to answer these questions. It also outlines how the data were selected and the data collection procedures. The analysis technique is explained and the data is analyzed with the results of the analysis provided in Chapter 5.

Research Method

In order to answer my research questions, I focus on the interactions between a core sample of U.S. artisanal cheese industry participants. A collective case-study methodology was used in order to gain an in-depth understanding and comprehensive description of the underlying structures and generative mechanisms that cause the processes and events that are observed while also adding to the literature. The objective of using a collective case-study methodology that focuses on the effect of the different

dimensions of social capital on the efforts of multiple actors engaged in entrepreneurial activity, is that it allows an analysis of the relevant data using different approaches. This method avoids placing too great a reliance on findings from one categorization of the data, thereby enhancing the researcher's ability to theorize about a larger collection of cases (Hancock & Algozzine, 2011).

Four distinct approaches were chosen. First, in-person and phone interviews were conducted with cheesemakers and other industry professionals located throughout the U.S. These interviews were designed to gather preliminary information about the cheesemakers entry into the artisan cheese industry from a social context in order to identify relevant themes for further exploration. The interviews with the industry professionals were designed to gain a deeper understanding of the social aspect of the industry than could be sourced from existing publicly available information. Second, narratives of industry participants, commentators, and researchers regarding founding conditions and growth of the US artisanal cheese industry were sourced from empirical research and publicly available books, media stories, interviews, and podcasts. The third approach involved collecting narratives from a core set of actors involved in the production of artisan cheese in the U.S. about their pre- and post-entry activities including how they developed the human capital necessary to make cheese and the type of interactions they had with other industry participants, e.g., mentoring, formal classes and workshops, employment, and other types of connections including collaborations and work on committees. These data were sourced from publicly available books, media stores, interviews, webcasts, and the actors' own websites and blogs. The final approach involved survey analysis of creameries. The survey contained questions regarding the

roles that informal and formal networks within the industry play in terms of both social and human capital development, as well as attitudes regarding the perceived benefits (or lack thereof) of these networks. With the exception of the survey data, I treat these accounts as stories (Kennedy, 2008; Lounsbury & Glynn, 2001; Navis & Glynn, 2010; Rosa et al., 1999) that provide detail on how cheesemakers created and utilized networks in their transition from idea to implementation. In addition to the collective case study approach, observation methods were also used.

Sample Choices

Quantitative

For the quantitative network data collection, I engaged a multi-wave snowball sample design (Goodman, 1961; Robins, 2015). Snowball sampling is a form of link-trace design in which a 'seed' sample of actors is collected, from which chains of ties are built in 'waves' (Butts, 2008). The first wave of data collection involved starting from the set of actors (individuals, firms, and institutions), or 'seed sample', featured in four books on the artisan cheese industry. These books were: *The All American Cheese and Wine Book: Pairings, profiles, and recipes*, by Laura Werlin (2003), *The Atlas of American Artisan Cheese*, by Jeff Roberts (2007), *The Cheese Chronicles*, by Liz Thorpe (2009), and *The Life of Cheese* by Heather Paxson (2013). From these books, data on the actors' network ties was able to be sourced. The second wave of data collection involved collecting data on ties from the nodes created in the first wave. This wave identified additional ties among the core set of actors and also ties to new nodes not included in the core set. This data was collected by conducting internet searches for each actor, identifying other industry participants they had interacted with and adding them to the

list. In the third wave, the new actors added in the second wave were searched in order to identify further potential core actors that they had interacted with. This snowball approach continued until no further actors could be identified that weren't already on the list. By design, the snowball sample method removes the possibility of having actors in the sample that aren't related to at least one other actor. The boundary of this network is relationally defined in that it does not contain connections to actors outside of the artisanal cheese industry and is limited to connections between actors within the sample (Butts, 2008). The point of collecting a snowball sample is to be able to make inferences applicable to the whole network using just the snowball data (Hoon Lee, Kim, & Jeong, 2009), and studies suggest these inferences are highly accurate despite the fact that not all connections are recorded (Frank & Thompson, 2000). For this study, I have collected additional qualitative data for each of my hypotheses in order to strengthen the suggestion that inferences from my sample can be applied to the general population.

The snowball method is particularly useful for identifying diverse networks (Hoon Lee et al., 2009), however one weakness of snowball sampling is that hubs (nodes with many links) are more likely to be selected by this method. Due to the fact that books written about the industry are highly likely to feature key people, the entire core sample is likely to be hubs, with nodes connected to the hubs more likely to be selected in the next step (Hoon Lee et al., 2009). Observing changes over time mitigates this over-representation of hubs in that changes in the characteristics of the network are the unit of interest rather than the characteristics of a network at a given point of time. In total, the snowball-sampling procedure took approximately 720 hours over the course of 20 months. Data collection began June 8, 2017, and ended February 2, 2019. Each wave

of data collection resulted in a set of nodes that were subsequently assembled into a network, approximating the U.S. artisanal cheese industry ecosystem. The final sample consisted of 536 nodes made up of 504 individuals and 32 institutions, and 1,326 connections between the nodes. Each participant generated between 1 and 46 connections with other stakeholders of the entrepreneurial ecosystem.

For the survey data, the American Cheese Society engaged myself and Alice Roach, another researcher at the University of Missouri to conduct a survey in 2018. An attempt was made to create an exhaustive list of all artisan, farmstead, and specialty cheesemakers within the U.S. who were in business in 2017. Google searches were conducted to identify artisan, farmstead, and specialty cheesemakers within the U.S. and resulted in 993 U.S. artisan, farmstead, and specialty cheesemakers who were invited to participate in the survey. Responses from 209 participants were received. Responses from five participants were excluded from the analysis as those five producers exclusively made commodity cheese. Thus, the final sample included 204 participants. An approximate response rate of 21% was achieved, however it is difficult to calculate an accurate response rate in that it is not known how many of the 993 cheesemakers that were sent invites are still in business. A number of individuals replied stating that they were no longer making cheese however it is expected that there are more we didn't hear from.

Qualitative

For the qualitative data, interview participants were purposefully sampled in that I chose cheesemakers who appeared interesting, informative, and capable of articulating their experiences (McKeever et al., 2014). The original sample population was members

of cheese trails as an analog to research investigating cooperation amongst wine trail members (Hofherr & Westgren, 2014). Two cheese trails were identified in Vermont and Finger Lakes, New York. A list of members of each trail was obtained from the websites of the Vermont Cheese Council and the Finger Lakes Cheese Alliance. In the summer of 2016, there were 48 members listed on the Vermont Cheese Trail, of which I contacted 15 and nine replied. All nine agreed to be interviewed. I contacted seven of the 12 farms listed as being on the Finger Lakes Cheese Trail and three agreed to be interviewed. In addition, two individuals identified as having a long history of involvement with organizations in the artisanal cheese industry in the states of Wisconsin and Vermont and a second individual with a long history of involvement in the wider US industry were interviewed. Interviews were also conducted with cheesemakers in Colorado and Missouri. Cheesemakers in these states were identified as a matter of convenience in terms of travel as Missouri is my home state, and I made a visit to the American Cheese Society in Colorado. Six cheesemakers were identified in the state of Missouri, and six in Colorado. All cheesemakers were contacted and three in Missouri and four in Colorado agreed to be interviewed. Finally, two cheesemakers, one from California, and one from North Carolina, who had heard about my research contacted me offering to participate in the study. In total, 23 cheesemakers and three industry participants were interviewed by myself.

Data Collection

Data were gathered through the following methods. Firstly, interviews were conducted with 26 cheesemakers, creamery owners, and other industry participants across the U.S. between June 2016 and July 2018. 15 cheese producers were visited at their farm

or creamery, three interviews were conducted by phone, three were interviewed at the American Cheese Society conference held in Des Moines in July 2016, two were interviewed at the 2018 conference in Pittsburgh, and three interviews took place in cafes. Interviews were between 24 and 65 minutes long and 45 minutes on average. Consistent with the theoretical model developed from Ronning et al.'s entrepreneurial process model (2010), interviews were focused on topics that could reveal how the individual came to be in the industry, how they had developed the human capital specific to cheesemaking, the social networks they had developed (and how), and their cognitive perceptions of social interactions within the industry. The interview questions are included in Appendix I. In the process of gathering empirical data, reliability was enhanced by several means. Researcher influence was reduced by conducting semi-structured interviews. This allowed respondents the freedom to tell their story in their own terms (Ronning et al., 2010). To ensure that all the relevant themes were covered, an interview guide was used pointing at relevant themes for the enquiry (Hancock & Algozzine, 2011). There were two main parts to the qualitative interviews: open-ended questions were asked in order to stimulate discussion and gain an in-depth understanding of the respondents' perceptions of their own experiences, and additional questions were asked in order to clarify or quantify any issues that arose out of the narrative. This part of the process probed more deeply into the respondents' attitudes and beliefs and clarified ambiguous statements that may have led to misinterpretation. Finally, the interviews were recorded, transcribed by a professional transcription service, and then coded by the author. This procedure improves the accuracy of empirical data (Ronning et al., 2010). Transcripts are not provided within this document and are available on request.

Secondly, narratives of industry participants, commentators, and researchers regarding founding conditions and growth of the U.S. artisanal cheese industry were sourced from empirical research and publicly available books, media stories, interviews, and podcasts. My main source of data was podcast interviews from *Cutting the Curd*, a Radio Heritage Network show interviewing "notable cheesemakers, cheesemongers, and cheese-lovers" (Radio Heritage Network, 2018) since 2009, and the interview sections of *Culture* magazine, a magazine founded in 2008 and specifically designed to cater to the cheesemaking industry and enthusiasts. The third approach involved collecting narratives from a core set of actors involved in the production of artisan cheese in the U.S. about their pre- and post-entry activities including how they developed the human capital necessary to make cheese and the type of interactions they had with other industry participants, e.g., mentored by, attended classes taught by, employed by, connected with. These data were sourced from publicly available books, online articles featured in regional and national newspapers, community newsletters and blogs. To supplement the interviews, I used information found on the websites and personal blogs of the actors. In order to identify ties between actors using a multi-wave snowball sampling approach, 720 hours was spent gathering data from the data sources used for the second and third approaches towards data collection. Data collection began June 8, 2017, and ended February 2, 2019. Each actor's name was used as search criteria in Google searches performed over this period and every result was analyzed as to its relevance. Data regarding ties was entered into a spreadsheet and subsequently transferred to Gephi and Ucinet, both network analysis programs that fulfil different analytic purposes as discussed later in this chapter.

The final approach involved survey analysis of creameries which took place from July to September 2018. Nearly 1,000 U.S. artisan, farmstead and specialty cheesemakers were invited by mail to participate in the survey. The survey questions are included in Appendix II. Three reminders were sent by email. Responses from 209 participants were received. Responses from five participants were excluded from the analysis as those five producers exclusively made commodity cheese. Thus, the final sample included 204 participants. Participation in the survey was voluntary and those who participated were entered into a draw for one of three $50 Amazon giftcards. Participation requests were made by me; the American Cheese Society; state and local cheese guilds; and during the ACS Annual Conference in July 2018, where I and representatives of the American Cheese Society promoted the survey.

Observation methods were also used. Observational analysis was conducted at the 2016 Vermont Cheesemakers Festival, the 2016 American Cheese Society conference, and the 2018 American Cheese Society conference. Over 40 cheesemakers were in attendance at the Vermont Cheesemakers Festival, the majority of them from Vermont and a few from neighboring states New York and Massachusetts. The event runs for one day and offers industry participants and the general public a chance to interact with many cheesemakers under the same roof as well as attend workshops and demonstrations. The festival is also an opportunity for Vermont cheesemakers to get together as a group. The American Cheese Society Conference titled 'Cheese in the Heartland' was held in Des Moines, Iowa, with over 1,100 attendees (American Cheese Society, 2016). The four-day conference included formal and informal networking opportunities, workshops, demonstrations, an awards ceremony for the annual competition featuring over

1,700 cheeses, and the “Festival of Cheese”, an event open to the public in which they could interact with the cheesemakers and taste the competition cheeses. The 2018 American Cheese Society Conference, “Forged in Cheese” was held in Pittsburgh, Pennsylvania, with over 1,400 attendees, and consisted of the same format as the 2016 conference including the annual competition which featured over 2,000 cheeses (Greco, 2018). Attendance at these events enabled me to participate in a number of informal conversations with individuals involved in the industry as well as those outside of it such as ‘cheese enthusiasts’.

Ethical and Cultural Issues

Procedures set forth by the University of Missouri Human Ethics Committee revealed this research to be of low risk and a low risk notification was made to the Committee. Those individuals who could be identified by name within publicly available online media articles or podcasts have been named within this report in relation to the publicly available information only. Individuals who took part in in-person and phone interviews with myself have not been named and in the event that they are included in the sample of core actors established through publicly available information, their comments or information provided within the interview conducted by myself have not been attached to them.

Analysis Technique

My research design permits inference at two levels. First, a focus on the individual attributes of actors, such as their gender, location, and the characteristics of their own local network, allows personal inference within a relationally defined boundary (i.e. connections to other artisan cheese industry participants included in the sample). The

second level of inference is an estimation of cognitive social structures (i.e. the view of the complete social structure as understood by each member of the network) (Butts, 2008). Qualitative data permits this second level of inference within this study.

Quantitative

Standard statistical packages such as SPSS and Stata are not suited for testing hypotheses as part of social network analysis. The main reason for this is that significance tests in standard packages assume statistical independence between the observations, and this is not the case in social networks. If an actor has a special quality or attribute, it affects all of their relations with other actors, introducing a lack of independence among the observations (Borgatti, Everett, & Johnson, 2013). Traditional statistical techniques describe distributions of attributes of actors, while statistical techniques developed for social network analysis describe the distributions of relations among actors. Ucinet (Borgatti, Everett, & Freeman, 2002) is a social network statistical analysis program widely used in academic circles, e.g. Luo & Zhong, (2015), Neumeyer, Santos, Caetano, & Kalbfleisch, (2018), and Zheng, Padman, Krackhardt, & Johnson, (2010), that provides a number of randomization (or permutation) tests that modify standard regression methods. The permutation test essentially calculates a large number of random connections between actors in a network and counts the proportion of random assignments yielding a correlation as large as the one actually observed. This is the '*p*-value' or significance of the test. At a most general level, the question to be answered is: how much confidence can I have that the pattern I see in the data I've collected is actually typical of some larger population, or that the apparent pattern is not really just a random occurrence?

Visual network graphs were produced in Gephi. Gephi is an interactive visualization and exploration platform used for many different kinds of networks and complex systems including dynamic and hierarchical graphs, and is designed as a complementary tool to traditional statistical analysis (Gephi, 2018). The GeoLayout plugin algorithm within Gephi was used to examine differences in the geographical diversity of actor's networks over time (hypothesis 3). This layout uses latitude and longitude coordinates to set each nodes position on a geographical map.

In order to identify tightly interlinked groups within the network, a *k-core* algorithm (Seidman, 1983) was applied in Ucinet. A *k-core* is a subgraph in which every actor has degree *k* or more with the other actors in the subgraph. For example, in a 2-core graph every actor is connected to at least two other actors. On a structural level, the *k-core* algorithm identifies whether there is a "core-periphery" structure (Borgatti & Everett, 2000) within the network, with a tightly connected core of active members at the heart of the social network. The *k-core* algorithm is also useful for identifying structural holes that are spanned by key actors within the network who tend to be instrumental in the diffusion of knowledge by virtue of their structural position (Hu & Racherla, 2008). On a relational level, the *k-core* definition has an intuitive appeal in that if an actor has ties to a sufficient number of members of a group, they may feel a stronger identity with the group, even if they don't know many, or even most members (Hanneman & Riddle, 2005).

To compare differences in structural social capital across time I created four different networks to represent the different 'waves' of entrants to the cheese industry as described by industry insiders (Thorpe, 2009). These waves were 1) 1975-89,

2) 1990-99, 3) 2000-09, and 4) 2010-18. Because I am interested in the transition stage of the entrepreneur, I use the year that they first took action towards entering the industry to dictate which wave they belong to. For some, it is the year they purchased their first goat, for others, it is the year they took a class, or the year they tasted a specific cheese and had the idea to diversify their existing dairy operation. This year is also used for the variable *began* (discussed below). These sub-networks examine the connections between entrants in those waves, and omit connections with actors who entered the industry in a different wave. The quadratic assignment procedure (QAP) method in Ucinet was used to measure the correlation and differences in coefficients between the four networks. QAP is a permutation-based, non-parametric method for which computational details can be found in Krackhardt (1988). QAP correlation generates 5,000 random networks in order to determine whether the correlations between networks could be achieved by chance and generates an 'observed' correlation, such as Pearson's *r,* and a *p*-value, typically considered to be significant if less than 5%. Permutation-based OLS regression is used to measure differences between sub-networks. For the global network level variable I used *clustering* to measure the degree to which the networks of each wave are tight-knit or diverse (hypothesis 1). To analyze individual-level variables, node-level regression tests were performed using permutation techniques to construct the *p*-values. As a further test of hypothesis 1, I used regression tests to examine the presence of a linear relationship between *clustering* and *began* - the year the actor first took action towards entering the U.S. artisanal cheese industry. To test hypothesis 2, I used *degree* - the number of connections held by actors and *began*.

To compare differences in relational social capital, (hypotheses 4 and 5), I computed *weighted degree* to analyze the degree to which actors utilize relationships for the development of human capital. Permutation OLS-regression was performed to examine the differences between the networks in regards to the presence of linear relationships between *clustering* and *weighted-degree* (hypothesis 4), and *weighted degree* and *began* (hypothesis 5).

To compare differences in cognitive social capital, I used Rupasingha et al.'s (2014) social capital index (*sci*) value for the county in which the actor was located as a measure of how entrepreneurial-supportive the culture within the local area is. Permutation-based OLS regression was performed to test hypotheses 6 and 7 being the likelihood that industry pioneers are more likely to be located in counties with high *sci*, and that individuals located in low *sci* will be more likely to create diverse networks. Geographical diversity was analyzed through visual network graphs in Gephi. To test hypothesis 8, that pioneers located in low *sci* counties will be more likely to be highly influential, the individual-level variable *eigenvector* was used. *Eigenvector* serves as a measure of popularity in the sense that an actor who is connected to other actors who are in themselves well-connected will have a high eigenvector centrality value (Borgatti et al., 2013).

Finally, to test the competing hypotheses regarding the establishment of legitimacy for a new product category, i.e., that 1) certain actors in key discursive positions use normative language that is adopted by others in a somewhat linear fashion (Green, 2004), or, 2) firms cooperate together to produce a joint understanding and collective identity (Suddaby et al, 2017) by observing and building on the work of each

other (Khaire & Wadhwani, 2010), permutation-based OLS regressions were run using the individual-level variables *wave*, *clustering*, *degree*, and *weighted degree*, to compare differences between waves of entrants in the degree of cooperation between industry participants through the exchange of information and resources (hypothesis 9a and c). *Closeness* centrality is calculated as a measure of how able industry participants who entered in different waves are at spreading information throughout the entire network (hypothesis 9b). These measures are suggested by previous literature, e.g., Watts & Strogatz, (1998) as suitable proxies for cooperation between network members.

In order to test the second theory regarding key actors as standard setters, the variable *structural holes* (Burt, 2017) is used. Weak connections between groups in a network represent 'holes' in the social structure of the network. The groups may be aware of each other but don't necessarily pay attention to the activities of the people in each group. Structural holes represent an opportunity to broker the flow of information between people. Individuals with connections structured in such a way that mean they essentially span structural holes act as authorities and connecters in that they not only gain early access to information but also monitor and move information between people. Additionally, they act as interpersonal bridges between parties. People who are not greatly interested in, say, current events, but are interested in staying informed about important developments, can save search costs by consulting such an actor (Burt, 2017). Key actors were identified using the *structural holes* algorithm in Ucinet and analyzed as to the year in which they took their first action towards entering the U.S. artisanal cheese industry using the variable *began* (hypothesis 10a). Permutation-based OLS regression

was run to test the relationship between *structural holes* and *eigenvector* (influence) of actors (hypothesis 10b).

Given the context of this study, I have controlled for gender. As is discussed in the next chapter, there is strong anecdotal evidence to suggest that women lead the revival of the artisan cheese industry in the U.S. The uniqueness of an agricultural industry being led by women has made for a great story in the media and within the industry, however within the sample of actors that I collected for this study, the number of entrants in each wave is generally split equally between male and female (see Table 3, page 104). The period from 2010 to 2018 is heavily weighted towards more women entrants however this wave contains only 33 actors which is too small a number to suggest there are currently more women entering the industry than men. To test the story of the industry being led by women, I use *gender* as a control variable in order to identify any differences in structural, relational, and cognitive social capital. I make no hypotheses about gender differences in this study and leave that study to a follow-up paper to be written after differences have been determined (or not) in this study.

Table 1 summarizes the variables used in the quantitative analysis. It is expected that some of these variables will be highly correlated and so principal components factor analysis was performed in order to reduce these down to a set of core components that explained the maximum amount of variability in the data.

Table 1 Network measures to estimate and compare structural and relational social capital Qualitative

Network Measure	**Function**	**Related studies**
Closeness	Measure of how fast an actor can interact with every other network member	Message delivery in sparse mobile networks (Daly & Haahr, 2007)
Clustering	Measure of connectedness between an actor's connections	Influence of connected groups on smoking cessation (Christakis & Fowler, 2008)
Degree	Measure of an actor's direct contact with others	Dynamic spread of happiness (Fowler & Christakis, 2008)
Eigenvector	Measure of how much a highly connected actor is connected other highly connected actors	Influence of social interactions on technology adoption by doctors (Zheng et al., 2010)
Structural holes	Measure of the comparative value of opportunities an actor has to act as a broker of information and connections between people	Structural hole theory applied to network formation and industry growth (Walker, Kogut, & Shan, 1997)
Weighted degree	Relations that involve mentorship or training are weighted higher than family relations	Founders influence on key behaviors in family businesses (Athanassiou, Crittenden, Kelly, & Marquez, 2002)

A qualitative approach was also appropriate because my objective was to develop an understanding of the social environment in which the entrepreneurial entry decisions of cheesemakers were made, and to answer questions of 'how' rather than 'how many' (McKeever et al., 2014). My primary source of qualitative data was interviews that I conducted with cheese producers either in-person or over the phone. Interviews were conducted with 26 cheesemakers, creamery owners, and other industry participants in six states across the U.S. For this purpose, conscious effort was made to omit the use of theoretical language from conversations. For my cheesemaker respondents, the research was about how they came to be in the artisanal cheese industry, how they perceived their

business as being similar and/or different to other cheesemakers in their neighborhood, what benefits they perceived from industry body membership, and the perceived importance of their professional network to their business. A key aim was to discover how cheesemakers described the transition experience from idea to implementation including how they developed the necessary technical skills and know-how for cheesemaking and who they reached out to and why. Interviews were then analyzed using a thematic approach based on replication of a theoretical pre-understanding of the entrepreneurial process as proposed by Ronning et al. (2010). A theoretical pre-understanding provides a frame of reference that guides the analytical process (Yin, 2009). Consistent with the research model, analysis was focused on identifying the presence (or absence) of entrepreneurial human and social capital as well as the role of social capital. Analysis of these interviews helped to organize the case study design.

NVivo software was used to further analyze each case study and identify additional themes in a second wave of coding. The aim of the secondary thematic coding approach was to explain the presence or otherwise of each of the resources through an in-depth understanding of underlying structures and generative mechanisms. These themes are presented at the end of the Results chapter.

Twenty-three interviews have been analyzed using the same theoretical concepts. Publicly available interviews have also been analyzed however because these interviews were not conducted by myself using the interview protocol, they are used to provide a more generalized context for the development of general theoretical constructs. Much of this wider context regarding the U.S. artisanal cheese industry is provided in the next chapter. Context regarding each of the interviewed cheesemakers is also presented.

Chapter 5 – Artisan cheese in the U.S.

In this chapter I present a brief history of the U.S. artisan cheese industry in order to provide context for the study. This history has been compiled from narratives of industry participants, commentators, and researchers regarding founding conditions and growth of the US artisanal cheese industry sourced from empirical research and publicly available books, media stories, interviews, and podcasts. The second part of the chapter is dedicated to providing specific context gathered from the interviews I conducted.

What is artisanal cheese? According to the American Cheese Society, artisan cheese is cheese "produced primarily by hand, in small batches, with particular attention paid to the tradition of the cheesemaker's art, and thus using as little mechanization as possible in the production of the cheese" (American Cheese Society, 2019). An explanation of the difference between artisan and commodity cheese is provided by Liz Thorpe in her book *The Cheese Chronicles* (2009): "Artisanal cheesemakers change their recipe, and their cheesemaking technique, to accommodate the shifting fluid medium that is milk. Commodity cheesemakers take all possible steps to forcibly create a consistent fluid medium that can be made into a consistent final product, without modifying their approach" (p. 135).

A brief history of handmade cheese in the U.S.

Cheese made by hand is not new. It did not suddenly appear in the U.S. when Laura Chanel made her first goat cheese in 1975. In fact, it was a household staple in pre-industrial America. For many generations, farm wives and daughters made cheese for both domestic use and commercial trade. The first cheese dairy in the U.S. was reportedly established by English settlors in Otsego County, upstate New York, in the late 1790's.

By about 1820, cheesemaking had begun to attract attention from many English dairy farmers and "All who adopted it flourished at once…" (Gilbert, 1896, p. 8). By the mid-1870s cheesemaking activities in the home had virtually all been replaced by cheese factories with a third of all of the dairy products produced in the U.S. being produced in the state of New York. This is largely due to the fact that the factory system originated in the state of New York and was therefore implemented sooner by the dairy farmers there. Prior to the advent of the factories, cheese had been produced on a small scale and was of inconsistent quality as each household produced their own. Safety was also an issue as hygiene standards differed between households. Innovation and new knowledge created through scientific discovery incentivized the establishment of artisan cheesemaking factories. The early factories were not the result of automation but were an attempt to improve the quality and scale of production and increase the safety of the product. While it did take dairy farmers more than ten years to decide that the factory system was a legitimate way of making cheese, by the 1890's artisan cheesemaking factories were thriving (Gilbert, 1896).

The early formation of artisan cheesemaking factories in New York was assisted by the fact that the early settlors to this area were the ones who introduced the cooperative system to the U.S. The cooperative system was popular among these settlors as the general belief was that they would either all succeed or all fail together, and thus the salvation of the entire community depended on every individual doing their part. These settlers placed great emphasis on education, local political control, and the pursuit of the "greater good" of the community (Woodard, 2011), and thus actively shared resources in response to conditions within rural areas. The cooperative system was

designed to reduce transaction costs and risk in smallholder agricultural communities by pooling products from individual farmers to create scale economies. Dealers preferred the uniformity of standardized cheese and by pooling milk and appointing the most skilled (or willing) among them to carry out the cheesemaking, small dairy farmers were able to access cheese markets previously not open to them. In addition, the cooperative provided an institutional entity through which the dairy farmers were able to make binding and enforceable contracts with other parties (Holloway, Nicholson, Delgado, Staal, & Ehui, 2000).

As the practice of cheesemaking transferred from the home to the factory, the cheesemaker role also transferred from women to men. This gender transition, combined with factories as the new domain of cheesemaking rather than households, meant that the activity transformed from being positioned as a farm-based craft, to a modern and efficient science (Valenze, 1991). Much of the cheese produced in the state of New York was English-style hard cheese and this style of cheese eventually shouldered the blame for giving American cheese a bad name. With advances in science, the process of turning milk into cheese was scaled up and cheese soon became a "safe, predictable, commodity food" (Paxson, 2013, p. 9). However the production of standardized, widely marketable, commodity cheese came to be focused on consistency and efficiency at the expense of quality (Gilbert, 1896; Paxson, 2013). Wisconsin eventually took over from New York as the predominant cheese-producing state, focusing more on European styles of cheese as Dutch, Swiss, and German settlors began to arrive there (Gilbert, 1896).

Not all of the early cheese factories became manufacturers of commodity cheese however. While many artisan cheesemakers were replaced by automated assembly plants,

a few artisan factories continued to make cheese using traditional, centuries old methods. The oldest continuously operating artisan cheese factory in the United States, Marin French Cheese, located in San Francisco, was started in 1865 by a dairy farmer who spied an opportunity to supply cheese to European immigrant dockyard workers who were used to eating cheese with every meal (Paxson, 2013). As Paxson (2013) writes, "Artisan cheesemaking never died in the United States" (p. 98).

While it is therefore incorrect to refer to the U.S. artisan cheese industry as beginning in the 1970's, it is accurate to say the industry was dominated by men prior to this time. In the early 1980s a resurgence of artisan cheesemaking began as individuals, mainly women, located in different parts of the country and motivated by different reasons, began to experiment with making cheese in their kitchens. These cheesemakers were faced with the challenge of getting American consumers of the time, who had grown up with processed cheese as a staple part of their diets, to try a product that was not only different, but also largely unknown. When producers first began offering artisan cheese to mainstream audiences in the 1970's and '80's, they couldn't get U.S. consumers, who had grown up with Kraft singles and "an uneducated palate" (Albala, 2015, p. 1269), to even try their products. Mary Keehn, credited with being one of the industry pioneers, reports that it took ten years for people not to say "yuck" when she suggested they try goat cheese (Fulton, 2011).

The industry today is described as "having a moment" (McGuigan, 2016). Sales of artisanal and specialty cheese have grown year on year while the consumption of processed cheese has decreased (Kiesel, 2016). Explanations for the successful resurgence of the industry have generally focused on the also burgeoning farm-to-table

movement, a growing trend towards farmers markets and indie food shops (McGuigan, 2016), changing consumer concerns, and nostalgia (Kiesel, 2016). However ongoing networking, information relationships, and a culture of informal collaboration is well recognized within the artisanal cheese industry, both anecdotally and within empirical research (Light, 2014; Muro & Katz, 2011; Paxson, 2013). The influence of these characteristics on the growth in the number of individuals deciding to become cheesemakers have yet to be explored in their own right.

The following sections provide a brief account of the different 'waves' of cheesemakers who have entered the industry since 1975.

1975-89: Experimentation, empowerment, innovation, creation and naïveté

The revival of artisan cheesemaking is thought to have emerged from the back-to-the-land movement of the 1970s (Paxson, 2013). People fled their desk jobs in droves in search of self-realization. In this early period, knowledge, skills, and abilities specific to cheesemaking weren't in abundance throughout the U.S. As pioneer Mary Keehn comments, "*There's many many books about making cheese now. At that time there was none, there was zero, there was one book in French and it was some French nuns and the whole recipe was in French so I read that as best I could which was not so good. About that time, a woman wrote a little book 'Cheesemaking the easy way', which is what I would recommend for anybody who is going make it at home. And so I read these books and it's like I…a lot of people cook that way, you know, you read little bits and pieces and you put it together. It was very much a trial and error, very opportunistic.*" (Keehn, 2010). Marjorie Susman and Marian Pollack began their journey into cheesemaking in 1982 and succinctly express the same sentiment: "W*e didn't go to any other*

cheesemakers because there weren't any" (Paxson, 2013, p. 109). As Keehn pointed out very few books on the subject existed and those that did were in high demand. An Amazon reviewer talks about her experience making cheese "years ago" and how a book she would often refer to, "Kitchen Cheesemaking", authored by Lue Dean Flake, and published in 1976, was stolen from her local library (Lambert Skeen, 2004). Letty Kilmoyer, a cheesemaker who started in 1971 reports it took three years of trial and error experimentation before her and her husband Bob could produce regular goat cheese: "*We gave away a lot of cheese.*" (Jenkins, 1993). A lack of codified knowledge turned out to be an advantage for these early entrants. Without the burden of tradition or a codified way of doing things, cheesemakers were free to experiment and invent. Cheesemaking once again became a craft, but still keeping the emphasis on safety, appealing to creative and innovative people as a way to combine creativity and scientific method.

The 1970s was also a time when dairy farmers were being told to "get big or get out". Many farmers began to view cheese as a value-added form of diversification to increase the viability of their farm business: *"Our first generation dairy farm had been struggling financially because of the challenges of selling milk on the commodity market. I literally woke up one day and my first thought was that I was going to learn how to make cheese as a way to add value to our milk.*" – Sue Miller (Friedman, 2019). These farmers already possessed entrepreneurial human capital in that they understood agriculture and working with animals, but many lacked the time required to develop cheesemaking skills (Caldwell, 2010). A popular business model that continues today was for dairy farmers to invest resources into producing quality milk and outsource the cheesemaking to an existing cheesemaker.

The 1970s back-to-the-land movement continued into the 80s with many rural counties experiencing an influx of newcomers inspired by the environmental and cultural politics of the 1970s. These people tended to be in search of abandoned farms as a way of maintaining an "engaged, relatively independent mode of living" (Paxson, 2013, p. 67), often as a semi-retirement project. These were second career people who wanted to handcraft cheese and left some other occupation to do so. They often had business management skills, expansive networks, and in some cases, substantial financial capital which enabled them to seek the advice of overseas cheesemakers and consultants in order to produce high-quality cheese. In doing so, they helped make a name for American artisan cheese, paving the way for future entrants with more modest financial capital and less influential social networks. Innovative new cheese styles became a hallmark of artisan cheese produced in the U.S.

A prime example of the second-career people is Miles and Lillian Cahn. Upon selling their luxury goods business, Coach Leather, the Cahn's had the idea that it would be nice to have a farm in the country where they "could enjoy a change of pace on the weekends" (Cahn, 2003, p. 6). They began their journey into cheesemaking in 1983 and employed Marie Claude Cheleix, a consultant from France, to help them do it. The Cahn's previous business experience combined with Cheleix's technical skills meant they had a strong supply of human capital. They were also well-connected and connected to other well-connected people. One of their daughters married Chef Mario Batali who "made an effort to promote his wife's family farm on television and at all of his restaurants" (101.5 WPDH, 2018), featuring their cheese on his restaurant menus. Coach Farm has also been featured on *The Today Show*, *Martha Stewart Living*, and

several *Food Network* programs. It is interesting to note that Cheleix also assisted Ann Dixon, an artisan cheesemaker located in Vermont, at the same time. Dixon couldn't make it work and was forced to close her business in 1988. Her son Peter explains why: "T*here were no farmers markets, and hardly any restaurants were using Brie of any quality*" (Levitt, 2015). That said, there are stark differences between the Cahn's who invested over a million dollars into the construction of infrastructure for their cheesemaking operation (Matsumoto, 2012), and Dixon who lost restaurant orders due to the inconsistency of her cheese and drove to cheesemongers with her products in the back of her station-wagon (Legg, 2012).

An important aspect of this first wave of cheesemakers is that their distribution models all focused on selling to restaurants. If they couldn't get in the mouths of consumers, they weren't going to be able to get it onto the shelves of retailers, and as Liz Thorpe points out, "It's the chefs who introduce us to the way we are going to eat." (2009, p. 220). Paula Lambert explains: "*...the general public had never heard of fresh Mozzarella, and so, I wasn't able to sell very much, so I decided from the beginning to try and sell to the restaurants. I felt the chefs in the restaurants would know what to do with it, and people would learn more about it after eating it in a restaurant, and if they did, they would buy it and take it home from a store*" (Strongin, 2011). Before Alice Waters agreed to feature Laura Chenel's chevre on the menu at Chez Panisse, Chenel was working tables at another local restaurant and offering it to diners there. Paula Lambert knew an importer of sun-dried tomatoes who introduced her to chefs who would continue to buy her cheese for the next 15 years (Thorpe, 2009). The Cahn's daughter married Chef Mario Batali, Allison Hooper found a willing buyer in Thomas Keller, Mary Keehn

had a friend with a restaurant (Paxson, 2017). After enjoying a goat cheese dish at a restaurant, diners would look for the cheese in stores, and from there "*it just mushroomed all around the country*" – Jennifer Lynn Bice (Bernard, 2015).

In 1983 the American Cheese Society (ACS) was founded by Frank Kosikowski, a professor at Cornell University. Those individuals who were part of a network of cheesemakers were able to benefit from the combined learning and experiences of other cheesemakers which incentivized membership.

The surge of artisan cheesemaking activity in the 1890s was due to the introduction of the factory system. It took place in male-dominated factories and involved formal cooperatives through which small dairy farmers relied on binding and enforceable contracts. The second surge, the one that took place in the late 70s-early 80s, began in homes and farms and was pioneered by women. There was no collective call sent out to revive the industry. It was simply that a few women began doing something differently, all for different reasons: Bob and Letty Kilmoyer started experimenting with cheese in 1971 after a friend asked them to look after his goats and never returned for them (Marcella, 2012); Laura Chenel and Allison Hooper were inspired by their experiences in France; Mary Keehn was simply "playing around" with the milk from her goats; Judy Schad brought goats because her children couldn't digest cows milk and soon had more milk than they could drink; Paula Lambert was looking for something different to do as she was about to turn 40 and was inspired by a previous trip to Italy (Thorpe, 2009). At the time, not much of what they were doing made sense from a practical, business standpoint, and there was certainly no vision of what it could become.

Alison Hooper was a French major in college and apprenticed on a farm in Brittany. Bitten by the food bug, she was convinced that America needed cheeses the quality of which she had tasted on her travels. Arriving in Vermont in 1984 she met Bob Reese while working at the Vermont Agency of Agriculture and the two began their cheesemaking business: "*Back in 1984 there was Vermont cheddar for sure, but that was about it. And in fact, if you think back, Americans weren't even eating goat cheese back then. So not only did we have to, we weren't even thinking about branding a Vermont product, but just trying to get Americans to put goat cheese in their mouth. That was our first project. 25 years ago there wasn't a market and it wasn't forgiving. And nobody really cared about American cheese"* (Hooper, 2009). Hooper continues in a later interview: "*Bob Reese and I started our business in Vermont at a time when it seemed a little bit crazy. Market research at that time would have told us there was absolutely no market for the products we were making, but we had a passion and we had a hunch that cheese made in this place could be great.*" (Hooper, 2015). Judy Schad comments similarly, "*I don't know why we did it. We were kind of crazy, I guess."* (Rigg, 2007). For these 'crazy' entrepreneurial pioneers making cheese eventually came to represent an opportunity to establish a means of independent income for themselves, and when they eventually found each other, there was an absolute willingness to share information and resources and support each other. Judy Schad and Mary Keehn met at a goat show where they were both showing goats. Driven by a common goal to find something to do with the excess goat milk they both had, the pair both read a book on cheesemaking (FreshPoint, 2019) and then travelled to Europe together to learn more (Culture, 2011) before returning to set up their individual businesses.

1990-99: A little more guidance and a few additional resources

More books on cheesemaking had entered the market by the 1990s. One of these, *Goat Cheese Small Scale Production*, written by the Mont Laurier Benedictine Nuns and published in 1989, is still considered one of the best books on cheesemaking (The Cheesemaker, 2019). To cater to increasing numbers of people producing dairy goat products, the American Dairy Goat Products Association was established in 1991 to promote the products of the American dairy goat industry, and to encourage growth through information, promotion, research and regulatory action (Jacobs-Welch).

The 1990's saw the establishment of the first commercial sheep dairies, with David and Cindy Major paving the way for many future sheep cheesemakers in Vermont after learning how to make cheese in France. Theirs was a diversification story in which they saw cheesemaking as a potential way to generate income from their farm after lamb prices in the U.S. fell due to competition from New Zealand and Australia. Inspired by the collective approach to cheesemaking that they had witnessed in France, the Majors later worked with local government and other agencies in Vermont to establish a cheesemaking school in order to increase the number of local sheep milk cheesemakers and meet increasing demand.

A strong U.S. dollar and domestic economy in the 1990s incentivized many Americans to travel to Europe and for these travelers, it was often the first experience they had with cheese as a cultural product. More restaurants in the U.S. began offering after-dinner cheese plates to cater to the increased curiosity of their diners. According to Marcia Pelchat, a physiological psychologist at the Monell Chemical Sense Center in Philadelphia, one of the keys to getting people to try new foods is mere exposure,

especially in a social setting. "*If someone serves it at a party, or you go to an expensive restaurant, that helps cognitively to make you want to try it again.*" (Fulton, 2011) Cheese was now a social experience.

By the early 1990's a degree of legitimacy had been achieved for U.S.-produced goat cheese in certain circles. Coach Farm, owned by Miles and Lillian Cahn referred to earlier, won the Outstanding Product Line award for their goat cheeses at the 1993 International Fancy Food Show (Gugino, 1999). In other areas of the U.S. however, "*domestic cheeses were still very much a question mark…especially in Indiana.*" Judy Schad, a goat cheese producer who first began experimenting with cheesemaking in 1982 continues: "*There were no farm markets, 'local' was anything but cool…there was literally no Southern cheese or a Southern cheese market.*" (Schad, n.d.)

As more cheesemakers began to establish themselves in specific pockets of the U.S., cheesemaking guilds began to be set up as semi-local organizations through which information and resources could be shared. The first of these was the Vermont Cheese Council, established in 1996. A case study of the Vermont Cheese Council as the first semi-local formal network established is presented at the end of this chapter. The role of these institutions varies according to the guild but most of them see themselves as bringing cheesemakers together to create a shared brand through activities designed to promote local cheesemakers and assist them in the production of high-quality, safe cheese.

2000-09 Cheese as a tool for economic development

The post-2000 period marked the start of significant market penetration (Thorpe, 2009), and a surge in new artisan creameries across the U.S. The American Cheese

Society reported a tripling of membership between 2001 and 2007 (Paxson, 2013). Lawyers, commercial brokers, managerial executives, doctors, and IT professionals continued to buy up old run-down farms and employ overseas consultants with a view to owning some livestock and making cheese, and in doing so, regaining a sense of freedom, flexibility, and independence. These second-career people saw cheesemaking as a way of merging their identity and sense of self-expression with meaningful labor in a sort of semi-retirement phase, something they may have lacked in their first career. Many report that they didn't intend to start another full-time business or career: "*We didn't intend to start a business. We just made some cheese for ourselves, made too much and gave it to some of our friends. They wanted to know where they could get more.*" (Caldwell E, 2009). What separates this wave of newcomers to rural areas from previous waves, is that many of them are also highly engaged in efforts to rebuild the local rural community via their cheesemaking business.

The "get big or get out" messages told to dairy farmers in the 1970s are still being expressed, three decades later (Soergel, 2018). Much like advances in science and automated technology enabled the transfer of cheesemaking from small artisan creameries to factories after the Industrial Revolution, three decades of consolidation continues to see rising numbers of small dairy operations gradually forced out of business by higher equipment prices, declining milk consumption, and increased production costs. Economies of scale achieved through automation and technology has meant the cost of food to consumers is cheaper than it ever was. However, the associated cost with the production of cheap food has been borne by displaced small farmers.

In order to stem this displacement, state governments and economic development agencies have implemented and supported programs designed to incentive dairy producers to diversify their operations towards the development of "value-added" products such as artisan cheese. The Vermont Institute for Artisan Cheese (VIAC), and Wisconsin's Dairy Business Innovation Center (DBIC), were both established with State funds in 2004 as institutions designed to provide technical support for value-added dairying. However, both have since closed due to a withdrawal of state funding.

This displacement of farmers has a financial and social effect on the communities in which they live. Andy and Mateo Kehler are just one example of entrants in this wave using cheese as a vehicle to rebuild their local community. The Kehler's began their cheesemaking operation in northern Vermont in 2003 as an economic development initiative that would provide small local farmers with a market for their milk. Another example is Marcia Barinaga and her husband, both academics who retired to Marin County. Paxson (2013) quotes Barinaga as follows: "*It was very important to us to pull our weight, to be active members of the community, to be employers in the community, to be doing all the things that strengthen the community*" (p. 75).

2010-18 Balancing art and science

According to the USDA Economic Research Service, per capita cheese consumption in the U.S. has steadily risen since 1970. In 2015, consumption was estimated to be 35 pounds per person. According to Euromonitor International, U.S. sales of processed cheese were projected to drop 1.6% for 2018 as millennials seek cheeses with fewer preservatives (Mulvany & Patton, 2018). The number of U.S. cheese factories increased by 40% between 2000 and 2017, and production increased with the greater

number of facilities (Mulvany & Patton, 2018). Although artisan, farmstead, and specialty cheesemakers contribute a relatively small percentage of total cheese production in the U.S., analysts believe the growth in U.S. cheese production is largely due to small, specialty cheesemakers (Mulvany & Patton, 2018). In a 2018 survey, 95% of cheesemakers responding produced less than 750,001 pounds of cheese in the prior year. Annual cheese production for cheesemakers who produced no more than 750,000 pounds averaged 51,484 pounds (Roach et al, 2019).

Since the introduction of the internet, aspiring cheesemakers have no need to reach out to other cheesemakers if that's not their thing. Cheesemaking courses are now offered across the U.S., and a virtual library of books on the subject exists. Three magazines[2] and a podcast[3] dedicated to cheese were launched between 2008 and 2010, with two more podcasts launched since 2017[4]. The industry has become highly 'professional'; few cheesemakers are running hobby farms (Thorpe, 2009), and many have implemented innovative business models and co-creation partnerships. As a value-added dairy product, cheese sales enable dairy producers to earn a higher price for their milk than what they could capture in today's commodity market, which is characterized by milk prices being lower than production costs. Science plays a big role, with this wave of cheesemakers likened to 'mad scientists' (Thorpe, 2015), and cheese described as "more of a science project than a delicious snack" (Berry, 2015). The cheese is still all about the milk, but in the minds of this wave of cheesemakers (and many from the past),

[2] Culture: The Word on Cheese, Cheese Connoisseur, and Say Cheese: For Cheese Lovers
[3] Cutting the Curd
[4] Behind the Rind, Cheese Underground Radio

mold and cultures are the key to innovation. Cheese craft is now a science (Herbert Izzi, 2012).

A timeline of the entrance dates of key actors and institutions in the U.S. artisan cheese industry is presented on the next page. In the sections following I present a summary of the 23 interviews conducted with cheesemakers across the U.S., followed by a summary of the establishment of the Vermont Cheese Council, the first semi-local formal networking association in the U.S.

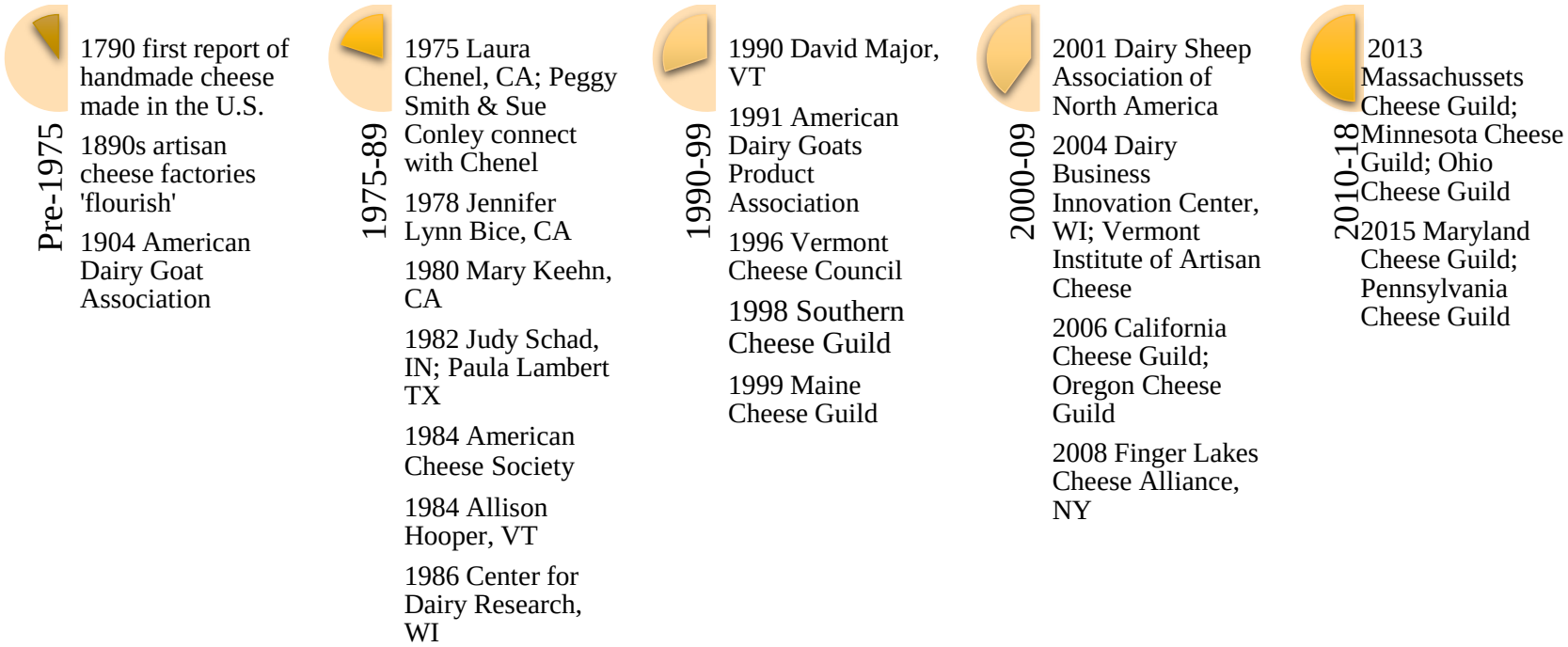

Figure 5 Timeline of entrance dates of key actors and formal networking institutions in the U.S. artisan cheese industry

Case Studies

Table 2 at the end of this section presents a contextual summary of the 23 cheesemakers interviewed by myself. The case studies are presented in date order of when the individual first took action towards entering the industry. Background is provided as to how the cheesemaker undertook this, how they developed the relevant technical knowledge and skills, and the process through which they created and utilize social networks.

A large majority of my interviews were conducted with cheesemakers in Vermont, and I present here a chronological description of the formation of the Vermont Cheese Council as identified from the data. This description contextualizes the process through which this formal network was created and the function that it fulfils for members.

Stage 1: Producers began experimenting with new products

In the late 1980's a number of different actors in Vermont (mostly dairy farmers) began to make artisanal cheese in attempts to supplement or provide the income they needed to continue living on the land. This meant the establishment of new product categories which required legitimation by consumers who were used to factory cheese. Not only did consumers not understand the product, early cheesemakers hadn't quite developed the skills needed to produce quality cheese: "*They couldn't get it into people's mouths…they didn't know what it was. The technical level, the skill level wasn't there either.*" (Cheesemaker 19)

Stage 2: A need for legitimacy meant a need for cooperation

In the mid 1990's Vermont producers recognized there was value in working together to establish a market for their product. Gaining legitimacy for their products at the group-level required the construction of a collective identity: "*There was a recognition from the beginning. There was somebody who had that idea about okay we need a Vermont trademark, or not trademark, we've got to have an identity…and developing a sense out in the greater market that Vermont is special because of the quality of these products. We needed to have an organization that could go to the Department of Ag, that could get money. Each of us individually trying to go to (the Department of Agriculture) and saying, 'Hey help us', wasn't going to work. We needed to create this organization and show them what we could do on our own and show them that we could get along, that we were working together*." (Cheesemaker 19) Thus, the Vermont Cheese Council was formed in 1996.

Stage 3: A perception of interdependence arose from a need to maintain legitimacy

As the number of producers grew, established producers weren't so much concerned about free riders gaining from their efforts, as they were about potential reputational threats in the event that a new producer didn't adhere to the standard of quality that the Vermont Cheese brand held within the wider marketplace. A recall of goat cheese made by an unlicensed producer and sold at a farmers market in the 1990's was still fresh in the minds of established producers who had fought hard to repair the image of Vermont cheese after several people became sick. These established producers approached this issue by ensuring that new firms had continual access to the knowledge and expertise required to make safe, high-quality cheese. There continues to be a very

real fear that one sub-standard cheesemaker, (big or small), could again threaten the entire Vermont cheese brand and thereby lower the probability of goal attainment for all Vermont cheesemakers. This appears to be a driving force behind continued knowledge sharing and exchange between members: "*Last thing we want is somebody to go out and not have the sanitation background, not have the safety measures in place and produce a bad cheese that gets somebody sick and all you see in the national headlines is Vermont cheese sickens, whatever, elderly, whoever.*" (Cheesemaker 20)

In order to limit this threat, larger organizations perceive themselves as being required to maintain an open door policy and see their role as being to provide knowledge resources for smaller organizations. "*We didn't want someone getting into the business that didn't have some kind of safety net to fall into…that just wasn't the way we felt it should go.*" (Cheesemaker 20). In this sense knowledge sharing and exchange takes place due to perceived interdependence. Vermont cheesemakers perceive that in order for them to be successful, other Vermont cheesemakers need to be successful also: "*We've put a lot of energy into Vermont cheese and (our) brand was also Vermont and we build on that brand to the extent that if somebody is out there with Vermont that is not a quality product, it doesn't help us at all*" (Cheesemaker 15).

Stage 4: Cooperation became part of the collective identity

In establishing the Vermont Cheese Council, knowledge sharing between cheesemakers was functional in that they had a shared goal of establishing an identity in order to provide legitimacy for their products. This type of cooperative behavior is now an unconscious part of the identity in itself: "*…the open door policy you know? That's who we* [the Vermont Cheese Council] *are.*" (Cheesemaker 20). The common perception

that knowledge will be willingly provided should the need arise, even where the actor has limited direct experience of this, is an outcome of cooperative behavior being well-recognized by council members: "[Cheesemaker 16], *if I'm having a birthing delivery issue, that's definitely who I'm calling for help…If I had the cheese totally turn on me and didn't know what happened, I would call* [Cheesemaker 19] *and ask for help…different people for different things…*[Cheesemaker 20] *is somebody I would call too.*" (Cheesemaker 13)

The belief of both insiders and outsiders that cooperation is a taken-for-granted characteristic of the Vermont artisanal cheese industry raises the amount of cooperation within the group in itself: "*…it's really hard to do the business of cheesemaking when you're a smaller cheesemaker. There's a lot to it and so everybody knows what it entails. So when someone's willing to give you a little help, it means a lot.*" (Cheesemaker 17) Unlike a purely competitive situation in which the probability of B attaining its goal decreases as the probability of A attaining its goal increases, Vermont cheesemakers believe the probability of attaining their goals is positively linked to the probability of other cheesemakers in the region attaining their own goals. As each organization undertakes some action that moves it closer to its goal, other organizations are also moved closer to their goals, a perception strongly identified within Vermont organizations: "*If you believe that a strong Vermont brand strengthens your branding, then having* [Cheesemaker 18] *win best freakin cheese in the universe is a good thing because it means people are thinking about, not just about* [Cheesemaker 18], *but about Vermont, things that come from Vermont.*" (Cheesemaker 19); "[Cheesemaker 15] *has*

been very generous all along with sharing their resources. [Another cheesemaker] *has been very generous both with* [the owner's] *expertise and with their media sharing opportunities, making sure that other cheesemakers were invited to events, having parties where other cheesemakers could meet distributors, writers, bloggers, that kind of thing. Rising tide raises all boats.*" (Cheesemaker 19)

Not all members share and exchange knowledge with every other member however. Within the group, size and goals/values are the two most common measures used to justify perceptions of high or low probability of future knowledge sharing and exchange: "*I wouldn't call some big company…if you had some question or problem, because I just don't think it would relate the same...mindsets or the way you're looking at things probably are different.*" (Cheesemaker 13); "*The huge guys are like* [Cheesemaker 15)*…they make like over a million pounds, they're very big. There's a lot of lip service from them because they're on the Cheese Council and this and that, but there's no follow through. They're not going to help you out.*" (Cheesemaker 17). In addition, the paradoxical nature of cooperating with competitors is recognized among members: "*…it's a double-edged sword…the double edge is there are a handful of cheesemakers in Vermont who have expanded, have gotten bigger rapidly. And as a result they take up shelf space in a way that is very hard to compete with.*" (Cheesemaker 19)

Table 2 Presentation of cheesemaker case study contexts

Cheesemaker ID, year of entry-exit, k-core	**Background**	**Entrance into industry**	**Human capital development**	**Industry network creation**	**Role of industry network**
15, 1980, 1	School leaver	Employment at local cheese factory	On-the-job training	Developed through work	Technical support, new ideas
19, 1983, 5	Cheesemaker parents	Carried on with parents cheesemaking business which was started by the mother who "wanted something to do"	Family, formal training at local university, apprenticeships in the U.S. and overseas	Through apprenticeships and teaching others, mainly other small-scale cheesemakers, member of local cheesemakers association	Knowledge sharing & creation, marketing opportunities
4, 1989, 4	Academia	Retirement project	Self-taught, advice from 2nd & 3rd generation cheesemakers in local area	Reached out to other cheesemakers for equipment and knowledge but maintains relatively small network and profile	Knowledge sharing & creation, partnerships
	Sheep farming family	Diversification when wool market tanked	Travelled to France for one-on-one education	Already highly connected in farming community, created network through educating others, member of local cheesemakers association	Giving back, helping others, supporting local industry
20, 1993, 5	Builder	Gained job at local cheese factory through family ties	On-the-job training, formal classes at local institution	Through work, member of local cheesemakers association	Mutual support for "neighbors", knowledge sharing, technical assistance, marketing opportunities

Cheesemaker ID, year of entry-exit, k-core	Background	Entrance into industry	Human capital development	Industry network creation	Role of industry network
2, 1995, 4	Food scientist, previously employed at local craft brewery, father was cheesemaker	Saw cheese as natural extension of existing work in fermentation & drew on father's knowledge to start own business	Family knowledge, formal training	Created through previous employment, attempted to build local network but didn't perceive much in common with others or payoff given time required	Mutual support in the fight against 'big industry', technical assistance & knowledge sharing within tight-knit group but looking to extend that
21, 1995, 4	Video producer	Looking for something to do on newly purchased farm & took advantage of local opportunity to learn cheesemaking from sheep milk	Formal training at local institution	Through training with other locals	Some technical support (unwilling to share everything), knowledge creation
18, 1998, 5	Raised on a farm	Local economic development initiative	Apprenticed overseas	Through various apprenticeships, member of local cheese association	Knowledge sharing & creation
7, 2002, 4	Medicine, grew up on a farm, as a child helped aunt in her cheese shop	Wanted to raise children on a farm, saw cheese as a natural extension of medical knowledge, attended ACS conference and identified with people in the industry	Formal classes, family friends in France, hired a consultant, ACS conferences	Tried to create a local network but geography and small numbers made it difficult, networks with people at ACS conferences	Specific problem-solving, creation of new knowledge

Cheesemaker ID, year of entry-exit, k-core	Background	Entrance into industry	Human capital development	Industry network creation	Role of industry network
8, 2005, -	Medicine	Retirement hobby, saw cheese as a natural extension of medical knowledge	Interned with another cheesemakers, formal classes, hired a consultant	Actively reached out to cheesemakers for advice	Technical support & advice
17, 2006, 4	Raised on a farm	Looking for an agricultural based business	Greek neighbor who made own cheese, formal courses at local institution, apprenticed overseas	Member of local cheesemakers association	Camaraderie with like-minded people, technical support, knowledge sharing, personal network building
11, 2007, 1	Dairy farmer	Diversification to support adult children & their families	Outsourced to contracted cheesemaker after finding locals were only willing to share basics and not much more	Founded local cheesemakers association for marketing opportunities but left due to perception of different goals	Marketing opportunities
1, 2007-16, 5	Ex-journalist & scientist, father was a sheep farmer	Looking for something to do on retirement property, sheep cheese recommended by local extension agent	Apprenticed overseas with extended family, and with other sheep cheesemakers in U.S., formal classes	Member of national dairy sheep association & local cheesemakers association, met people in classes, researched and contacted other sheep cheesemakers	Emotional support, technical assistance and advice, continued learning

Cheesemaker ID, year of entry-exit, k-core	Background	Entrance into industry	Human capital development	Industry network creation	Role of industry network
14, 2007, 5	Dairy farming family	Diversification to support adult children & their families	Formal classes, informal coaching from local cheesemakers once credibility achieved	Member of local cheesemakers association, felt sense of belonging once credibility established regarding technical skills & willingness to help	Support from like-minded people ("friends"), access to training resources, technical assistance, marketing opportunities
5, 2008, 3	Training & development	Hobby project	Formal classes	Met people through classes	Like-minded people, knowledge sharing
22, 2008, 5	Culinary school	Developed interest in cheese at culinary school & gained cheesemongers job	On-the-job training	Developed at work, member of local cheese association	Support from like-minded people, idea generation & knowledge creation, skill development, marketing & funding opportunities
10, 2009, 1	Family dairy farm since 1911	Diversification to support adult children & their families	Outsource to contracted cheesemaker	Member of local cheesemakers association	Marketing opportunities
6, 2010, -	Goat farmer	Began making cheese as a way to make business more profitable	Formal classes	No existing industry network except for when aspiring local cheesemakers reach out for advice	Doesn't have the time to maintain networks with other people but tries to help new cheesemakers

Cheesemaker ID, year of entry-exit, k-core	Background	Entrance into industry	Human capital development	Industry network creation	Role of industry network
3, 2011-16, 4	Food science & production, worked in creameries	Opportunity to purchase an existing creamery came up	Interned at various creameries, helped friend establish a creamery	Established through work, member of national cheesemakers association but doesn't feel part of 'golden circle/cool kids club', connected with small-scale cheesemakers at industry events	Some emotional support but no source of mentorship, feels isolated, information & resource sharing within tight-knit network
9, 2012, -	Food science, worked at university creamery	Gained cheesemaker job at creamery after graduation	Formal training, on-the-job training	Through work, currently trying to extend network through attendance at industry events, sees more benefits than did when was younger	Ideas, inspiration, career opportunities
23, 2012, 3	Dairy farming	Hobby project	Family, self-taught from books, formal classes, volunteering	Met people through classes, actively reaching out to other cheesemakers	Specific knowledge that couldn't be sourced from books or online
12, 2015, 3	Dairy farmer	Friends with an ex-cheesemaker, identified opportunity to start business together	Past experience of cheesemaking partner, also employed cheesemaker	Through existing friends, member of local cheesemakers association	Sharing love of cheese, marketing opportunities

Cheesemaker ID, year of entry-exit, k-core	Background	Entrance into industry	Human capital development	Industry network creation	Role of industry network
13, 2015, 3	Hobbyist with pet goats	Looking for ways to use milk	Self-taught from books & some classes	Had cheesemaker friends through children's school, member of local cheesemakers association	Support from like-minded people, technical assistance

Chapter 6 – Empirical Results

The purpose of this study is to gain insight into how rural entrepreneurs, including small to medium sized rural producers with innovative ideas for diversification, create and utilize entrepreneurial-supportive social networks as they transition their idea into a sustainable and profitable business. The study seeks to gain this insight through exploring structural characteristics of the networks of industry pioneers compared to later entrants, and the role that these networks play, particularly in gaining legitimacy for a nascent industry. This chapter presents the results of the study in an objective manner. Firstly, the results of the structural social capital analysis are presented (hypotheses 1-3). These results are presented by way of QAP correlation and regression tables with color visuals detailing the graphical distribution of networks over time. Qualitative data related to structural themes are also presented here. Next, the results of the relational social capital analyses are presented (hypotheses 4 and 5) by way of regression tables, visuals, and qualitative themes. Results of the cognitive social capital analyses are presented next (hypotheses 6-8), and finally, results of the competing hypotheses regarding legitimacy (hypotheses 9a-c and 10a-b) are presented.

Table 3 describes the characteristics of the sample of actors.

Table 3 Descriptive characteristics

	Pre-1975	**1975-89**	**1990-99**	**2000-09**	**2010-18**	**Total**
Total actors	41	122	133	207	33	536
Gender						
Male	56.1%	49.6%	49.2%	49.8%	24.2%	48.5%
Female	24.4%	43.8%	47.7%	47.0%	60.6%	45.5%

Structural social capital

Network correlations and regressions

To compare differences in structural social capital across time I created four different networks to represent the different 'waves' of entrants to the cheese industry as described by industry insiders (Thorpe, 2009). These waves were 1) 1975-89, 2) 1990-99, 3) 2000-09, and 4) 2010-18. These sub-networks include the connections between entrants in those waves, and omit connections with actors who entered the industry in a different wave. The quadratic assignment procedure (QAP) method was used to measure the correlation and differences in coefficients between the four networks. QAP is a permutation-based, non-parametric method for which computational details can be found in Krackhardt (1988). QAP correlation generates 5,000 random networks in order to determine whether the correlations between networks could be achieved by chance and generates an 'observed' correlation, such as Pearson's *r*, and a *p*-value, typically considered to be significant if less than 5%. As show in Table 4, the four separate wave networks are not significantly correlated with one another but are significantly correlated with the entire network. This is expected due to the fact that the sub-networks include only the relationships between actors within the same wave and omit connections that an actor has with another actor who entered the industry in a different wave. This result demonstrates that the ties formed between the actors in each wave are not related to each other and that each wave network is a subset of the entire network.

Table 4 Wave network correlation test results

	Entire Network	**Pre-1975**	**1975-89**	**1990-99**	**2000-09**	**2010-18**
Entire Network						
Pre-1975	0.091***					
1975-89	0.289***	0.00				
1990-99	0.257***	0.00	0.00			
2000-09	0.383***	0.00	0.00	0.00		
2010-18	0.107***	0.00	0.00	0.00	0.00	

***p<0.001

Table 5 displays the results of permutation-based OLS regression tests to determine the association between the wave in which an actor entered the industry and structural differences in their individual networks. My hypotheses related to structural social capital begin on page 52. Support is found for hypothesis 1 that later entrants are more likely to create tight-knit networks in which all members are known to each other, compared to early entrants, however the effect is minimal. Later entrants also have a lower average number of connections than earlier entrants, supporting hypothesis 2. Table 5 also shows a significant negative relationship between the average distance in miles between all of an actor's contacts and the wave in which the actor first took action towards entering the industry. This supports hypothesis 3a: over time, industry entrants tend to form more localized networks than industry pioneers. No support is found for hypothesis 3b however; there is no relationship between how geographically close an actor's connections are located and the diversity of their network.

There is no statistically significant difference between males and females in terms of network and geographical diversity, however females within the U.S. artisanal cheese industry are more likely to be connected to more people than males are.

Table 5 OLS regression coefficients for structural social capital hypotheses

	Clustering	**Degree**	**Distance**
Wave	0.075***	-0.479**	- 22.462***
Gender	-0.055	1.032**	11.142
Clustering			-10.105
Intercept	0.328	4.590	304.400***
R^2	0.029	0.028	0.047
Adj R^2	0.025	0.025	0.041
F	7.841***	7.724***	8.652***

**p<0.01; ***p<0.001

Network visualizations

In order to identify tight-net sub-networks with the entire network, a *k-core* algorithm (Seidman, 1983) was applied in Ucinet. Figures 6 to 12 visually demonstrate the position of these cores within the entire network. *K-core* 1, represented by light-blue nodes with at least one connection, are generally at the periphery of the network, as are *k-core* 2 nodes represented by purple. *K-core* 3 and 4, shown here in light green and orange respectively, make up the middle layers of the network, with *k-core* 5 (dark green) forming the center of the network. While *k-core* 5 looks to be tight-knit in that everyone in the sub-network is connected with each other, it is still possible for actors within this sub-network to have a high degree of diversity in that the personal connections they have are not connected to each other. Finally *k-core* 6 (pink) consists of three tight-knit sub-groups on the periphery of the network. The size of the node indicates the actor's eigenvector in line with the theory that actors located in central social positions have high influence. Actors who span the most structural holes are indicated by a yellow star in each individual *k-core* graph.

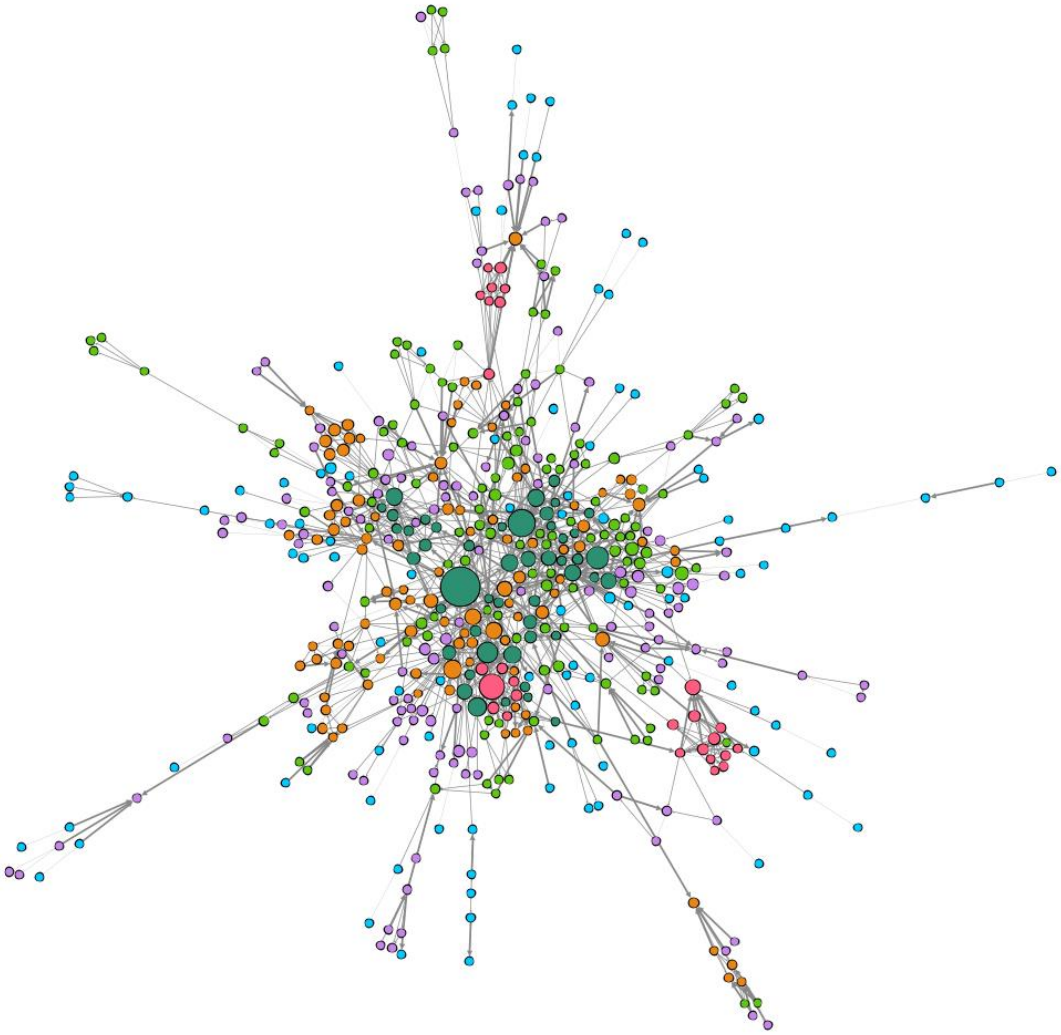

Figure 6 Connectedness of entire network by k-core

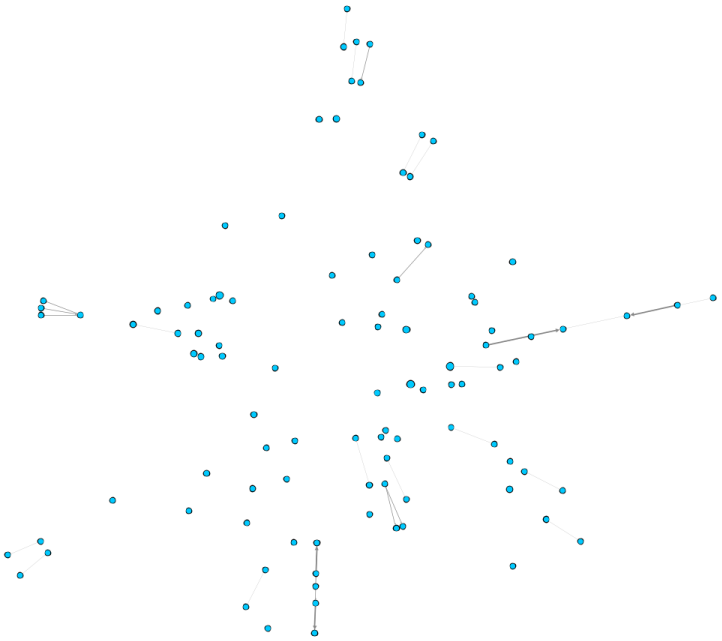

Figure 7 K-core 1

Figure 8 K-core 2

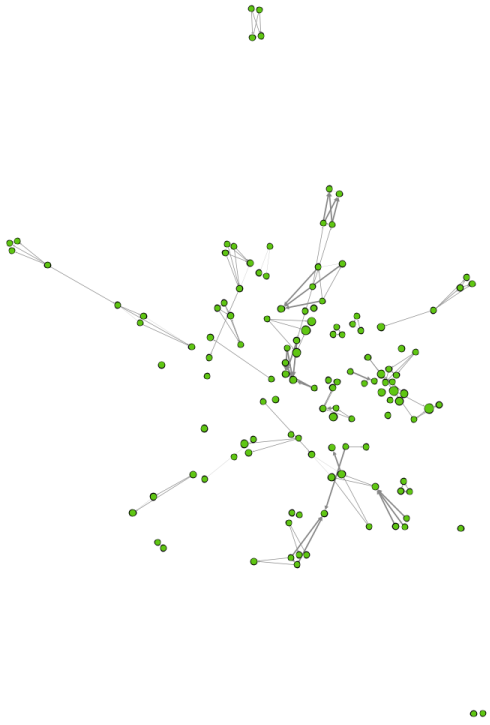

Figure 9 K-core 3

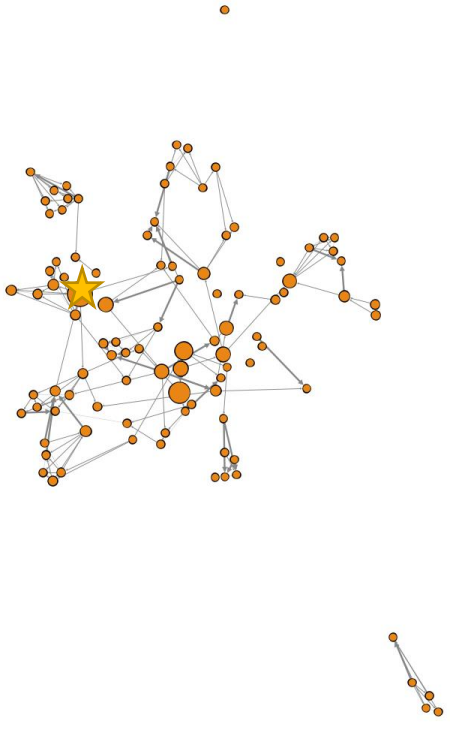

Figure 10 K-core 4

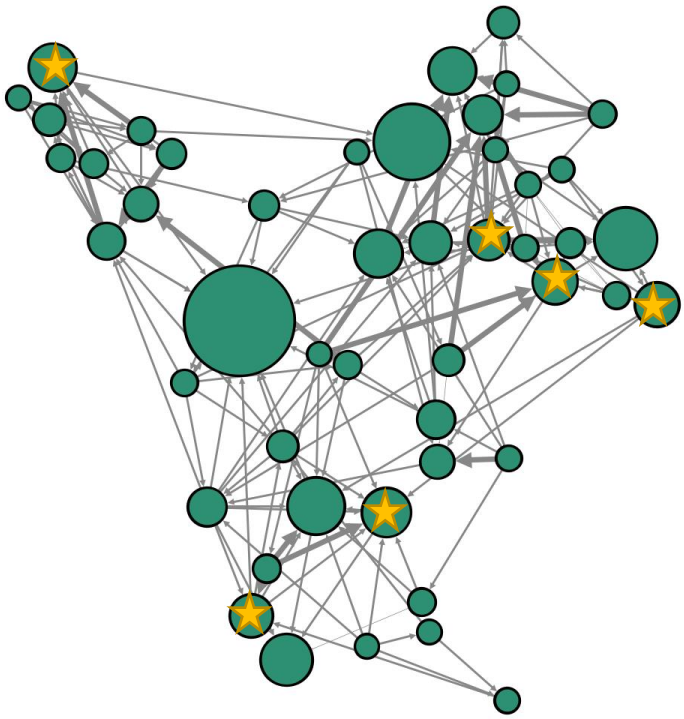

Figure 11 K-core 5

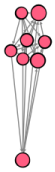

Figure 12 K-core 6

Table 6 Permutation based regression results for relationship between variables and network position

	K-core 1-5	**K-core 1-5** (Structural holes spanned>0)
Wave	0.058	
Gender	-0.104	
SCI category	-0.001	
Closeness	22.701***	
Clustering	0.509***	
Degree	0.235***	
Eigenvector	3.907*	
Structural hole	-0.014***	0.010***
Weighted degree	-0.005	
Intercept	-0.086	2.673***
R^2	0.598	0.072
Adj R^2	0.591	0.070
F	82.430***	39.108***

*p<0.05; ***p<0.001

Table 6 shows the relationship between network structure and role and the likelihood that an actor is positioned at the center of the network. For this regression I have omitted k-core 6 as k-core 6 is not at the center of the network. The strongly positive and statistically significant *closeness* variable indicates the closer an actor is to the highly-connected center of the network (*k-core 5*), the quicker they are able to diffuse information. This is intuitively understandable: actors located at the edges of a network will be slower at reaching every other actor than those with central positions. The degree of *clustering* among an actor's connections increases the closer they get to the core of the network also, indicating the presence of a "core-periphery" structure (Borgatti & Everett, 2000) in which the core members are highly inter-connected. Figure 11 shows that the central core, k-core 5, is more tight-knit than it is diverse. This indicates the presence of an 'in-group'. Having a high number of connections is associated with being at the core

of a network as shown by the statistically significant positive *degree* variable. A high *degree* value indicates that the actor is a major channel of information, whereas a low degree indicates the actor is not highly active in the process of relating information to others. Actors with less connections are more likely to be positioned at the periphery of the network. There is a slight negative relationship between the number of *structural holes* an actor spans and how close they are to the center of the network, indicating those who broker the flow of information between people are more likely to be positioned outside of the network center. This too makes sense: actors who span structural holes are more likely to be positioned between actors in the tightly-connected central core of the network and peripheral actors. However, Figure 10 and Figure 11 show that the actors who span the highest number of structural holes are positioned at the core of the network. As indicated by the yellow stars, one actor is located in k-core 4 while the other six are located in k-core 5. These actors are in fact outliers: 59% of actors span no structural holes at all. Removing these actors results in a statistically significant positive relationship between the number of structural holes an actor spans and network centrality (as shown in Table 6). Figure 6 and Figure 11 show that actors with the highest eigenvector values are located in k-core 5 (indicated in dark green), and a slight statistically significant relationship is found between the *eigenvector* value and *k-core*. This is in line with the theory that actors located in central social positions have high influence (Lockett et al., 2014). In the context of the U.S. artisan cheese industry, gender doesn't play a role in how central or peripheral an actor is within the network, nor does the wave in which the actor entered the industry, the degree of county-level entrepreneurial supportive social capital, or relationship quality.

In order to understand how geographical clustering may affect centrality and whether geography influences membership in the 'in-group', the following visualizations (Figures 13 to 18) show each of the k-cores by geography. It is clear that actors within the same core tend to cluster together. K-core 1 (Figure 13) represents actors with the least number of connections and there is no expectation of finding clusters within this core. Figure 17 shows the central actors in the U.S. artisanal cheese industry as being located on the West and East coasts and in Wisconsin. However Figure 16 shows that in these regions there are also actors on the periphery of this central core who tend to cluster together. These visuals may be thought of as an analogy to teenage social groups: there is the 'cool kids group' at the core of the network, the group of kids who sit just outside of this group, and then the 'outsiders' who sit on the periphery of the network and tend to have one or two 'friends'.

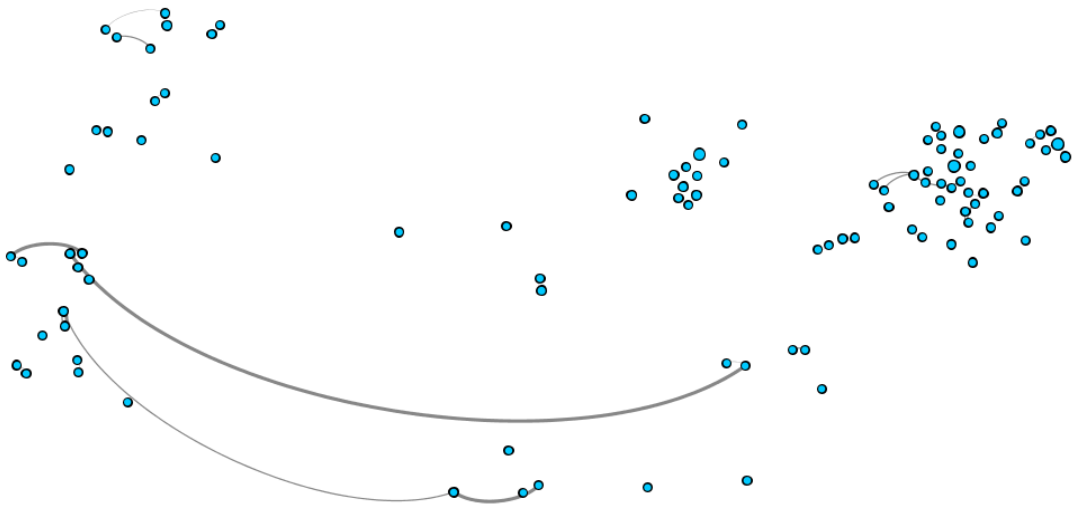

Figure 13 K-core 1 by geographical location

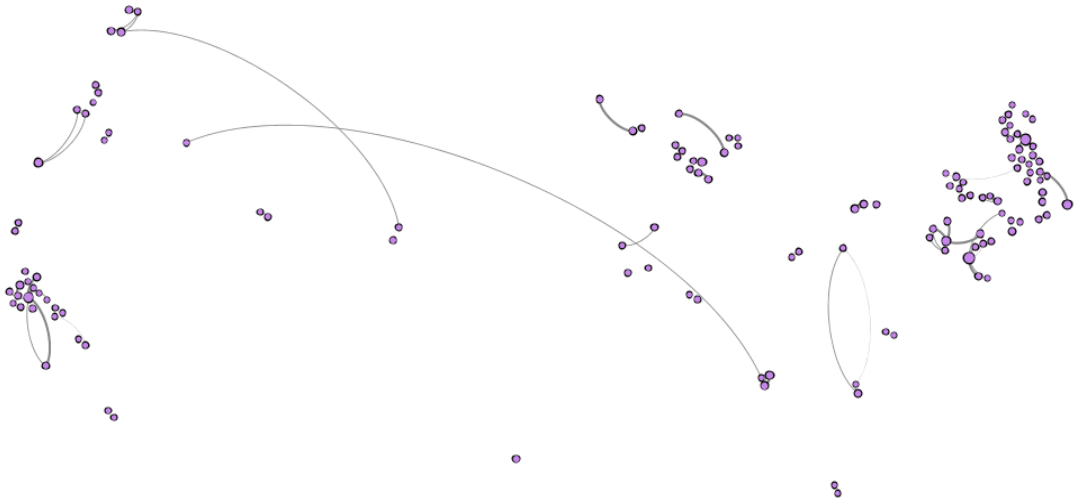

Figure 14 K-core 2 by geographical location

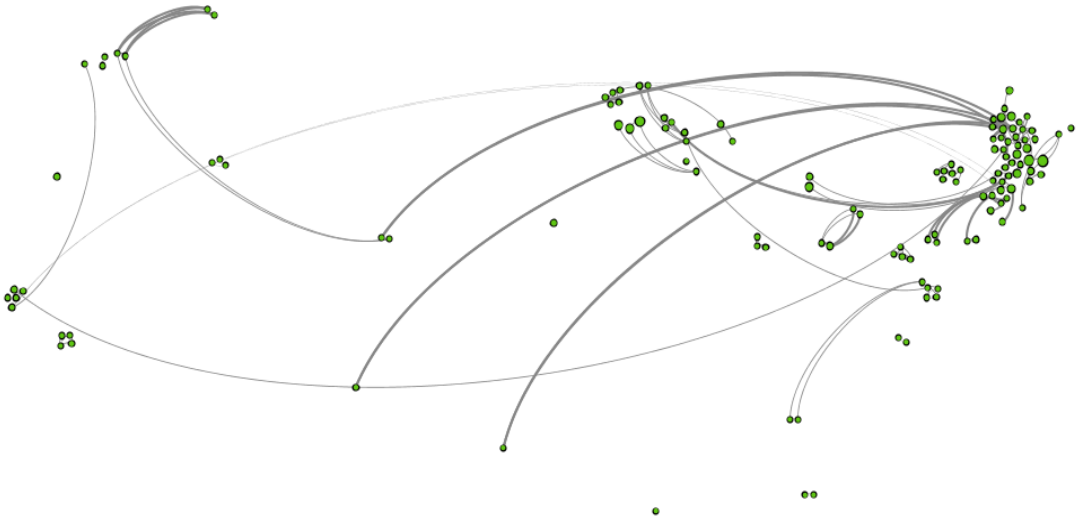

Figure 15 K-core 3 by geographical location

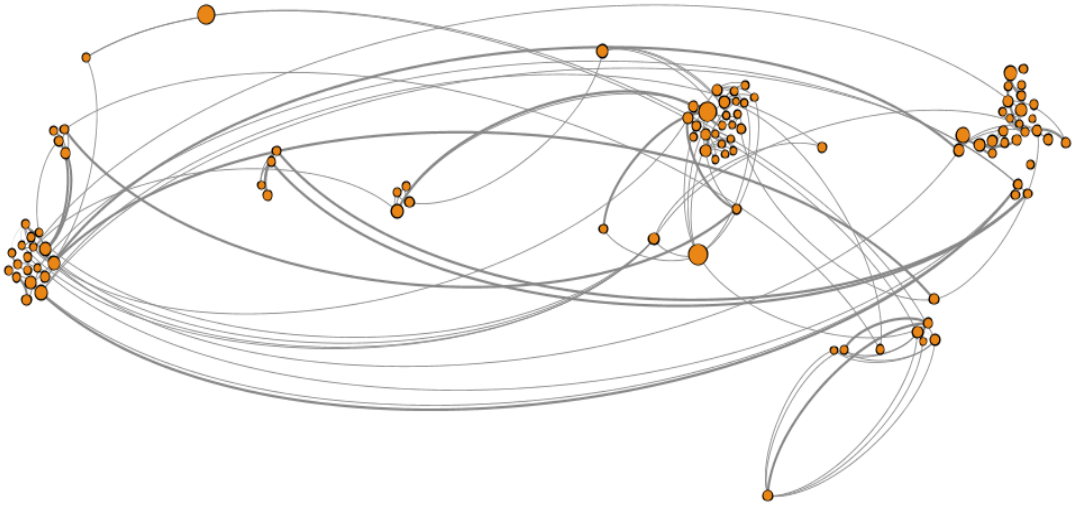

Figure 16 K-core 4 by geographical location

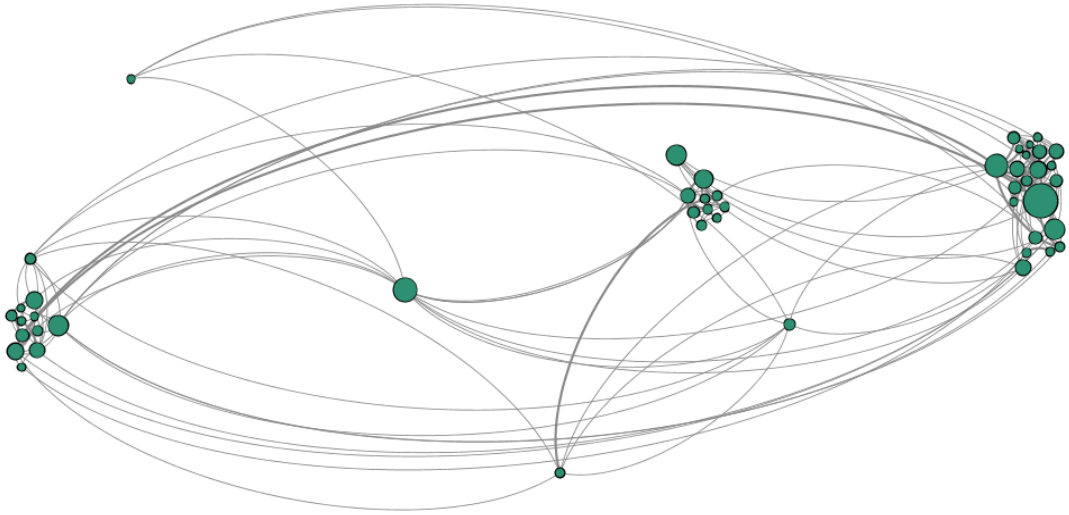

Figure 17 K-core 5 by geographical location

Figure 18 K-core 6 by geographical location

The following visualizations (Figures 19 to 22) provide further support for the result that later entrants create more relatively tight-knit networks than industry pioneers. By the end of the first wave (1989), there is one main group in which most people are members and many isolated nodes. As more actors enter the industry in later waves, they begin to cluster in tight-knit groups connected to the main group through an actor who acts as a connector between the small tight-knit group and the larger, more central, group. By taking up this position in the network, the actor is spanning a structural hole. The size of the node represents the weighted degree of the actor, i.e., the relative proportion of connections that involve the development of human capital through the exchange of information and resources in each wave (hypotheses 4 and 5 discussed in the next section). Nodes that span structural holes are generally larger than the other nodes, indicating that these actors have relatively more relationships that involve the development of human capital through the transfer of information.

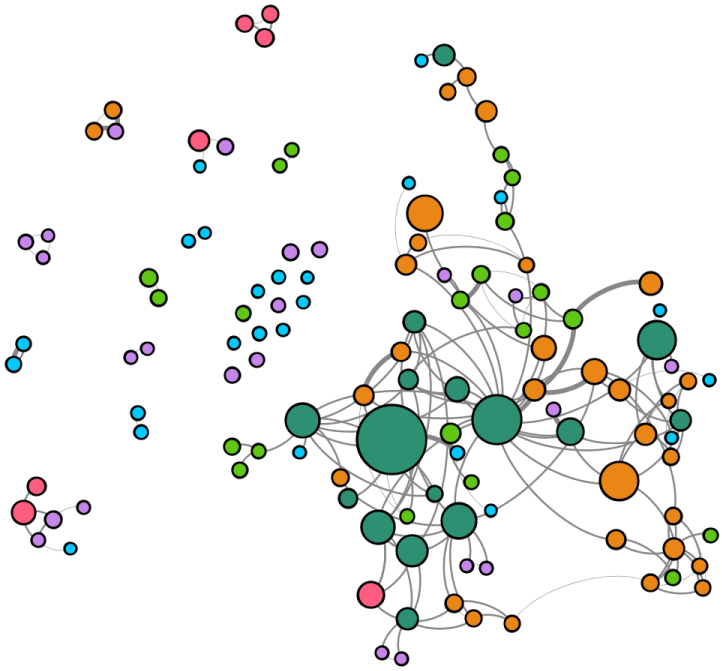

Figure 19 Connectedness of sub-network by k-core 1989

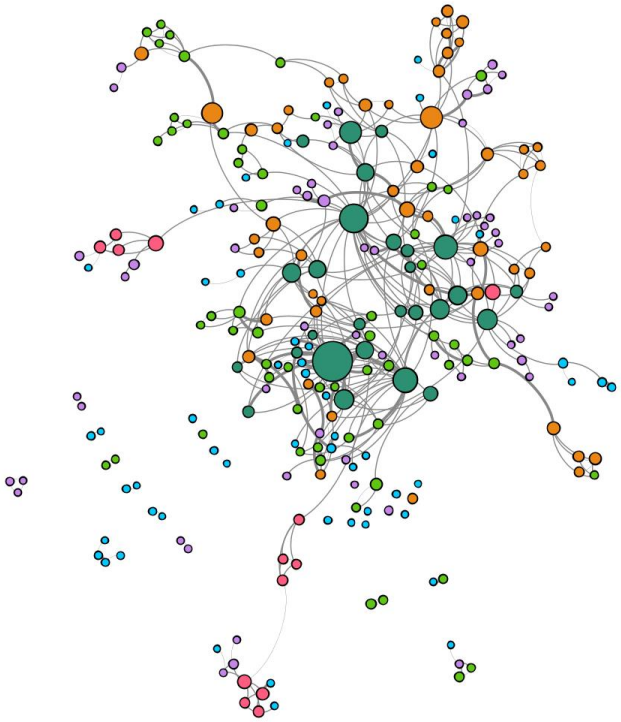

Figure 20 Connectedness of sub-network by k-core 1999

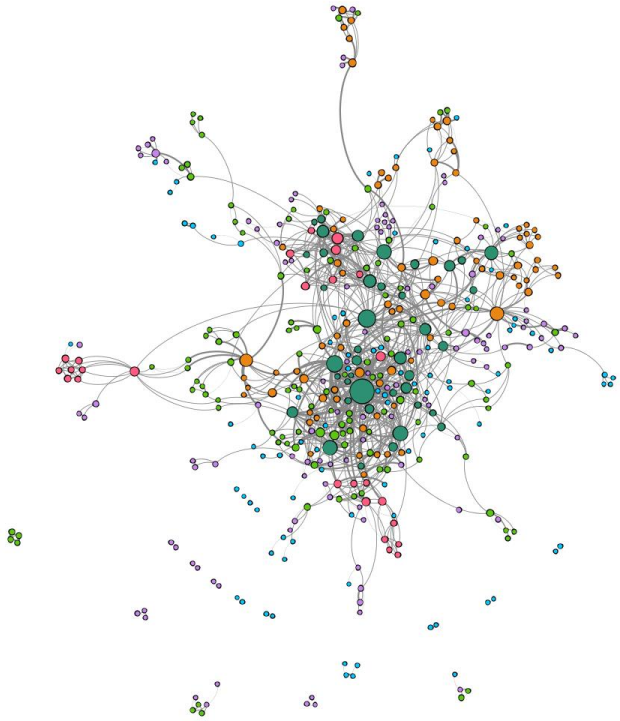

Figure 21 Connectedness of sub-network by k-core 2009

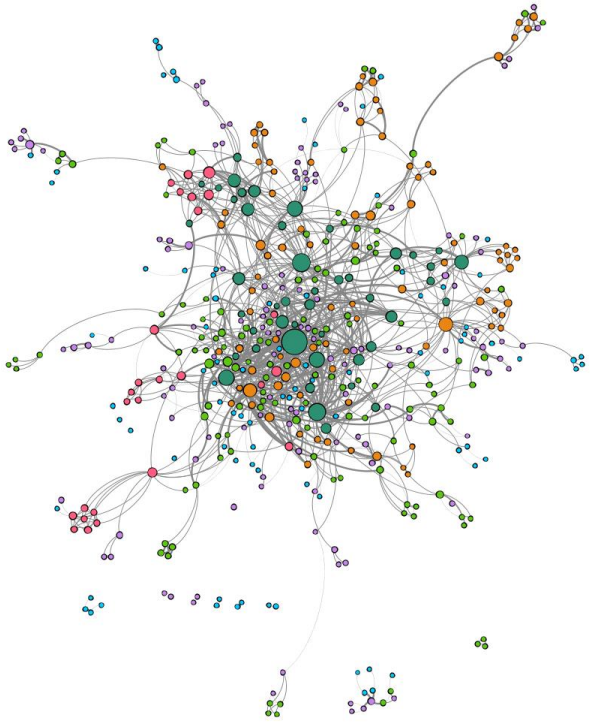

Figure 22 Connectedness of sub-network by k-core 2018

Hypothesis 3 predicted that later industry entrants will form more localized networks than earlier entrants. Network visualizations presented here (Figures 23-26) show connections between entrants in the 1975-89 wave are more geographically diverse than any of the other waves. It is worth noting that the 1975-89 sub-network includes 122 actors compared to 133 actors in 1990-99 and 209 actors in 2000-09. The fact that there are 73% more nodes in Figure 26 than there are in Figure 24 accounts for the seemingly high number of edges (lines between nodes that represent connections).

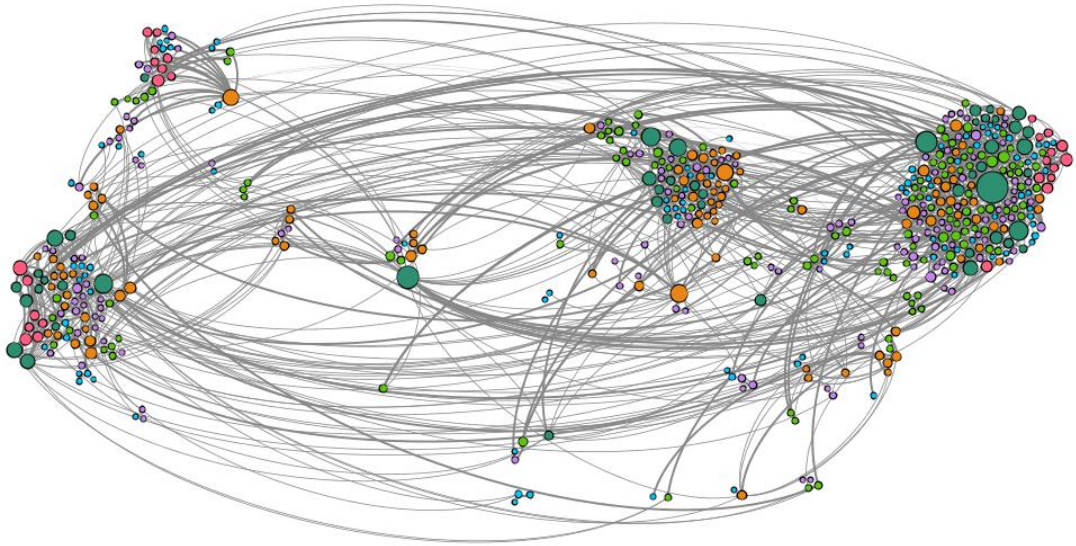

Figure 23 Geographical connections between entrants' entire network (N=536)

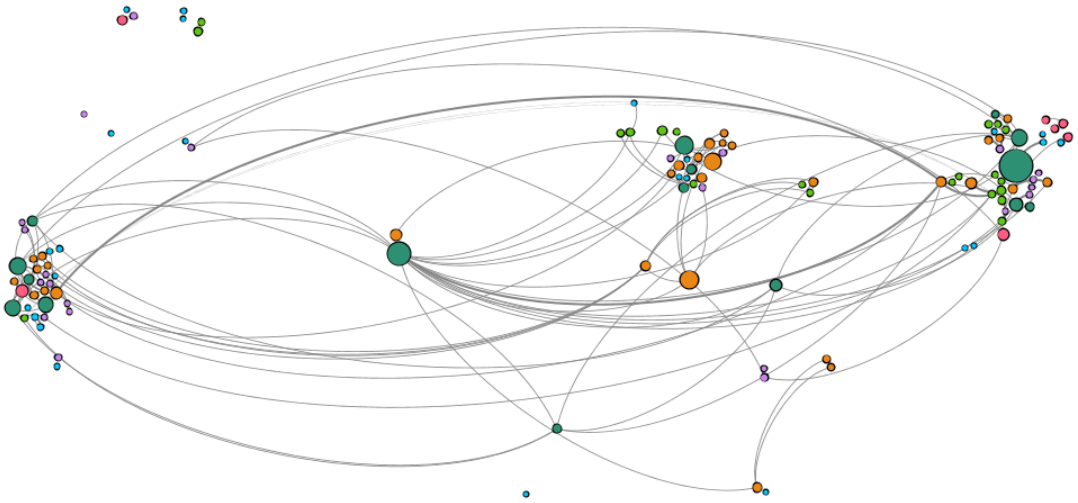

Figure 24 Geographical connections between entrants 1975-89 (N=122)

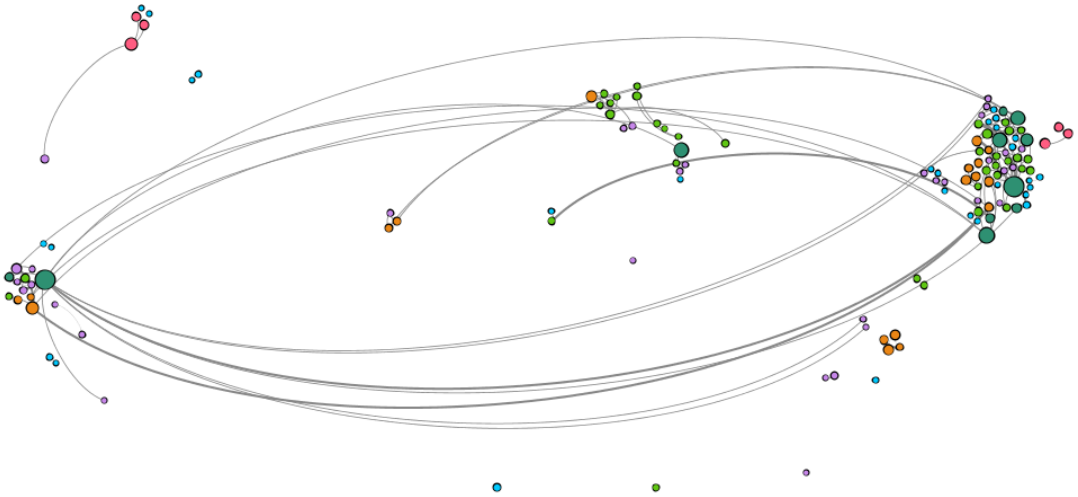

Figure 25 Geographical connections between entrants 1990-99 (N=133)

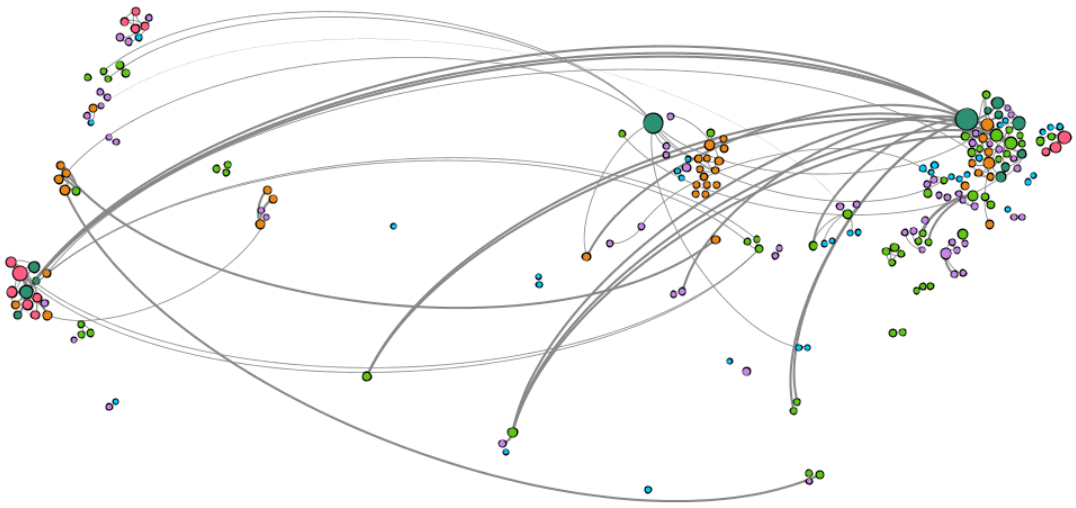

Figure 26 Geographical connections between entrants 2000-09 (N=209)

Qualitative evidence

The quotes in Table 7 on the next page are from actors within the U.S. artisanal cheese industry and provide evidence of the structure of entrants' networks as they transitioned their idea into implementation of a business. The quotes are categorized by wave and the State and k-core the actor is a member of is provided in brackets as an indication of their geographical location and their position within the network. Quotes in italics are direct quotes from the actor. Quotes not in italics are written by the journalist or book author.

Table 7 Quotes regarding network creation by wave

Wave	Quote
1975-89	Mary Keehn (CA, 5): *I was here in California, I have a really good friend now in Vermont and another friend in Indiana, and another friend in Texas, and we were all making cheese at the same time but we didn't know each other coz there was no community of cheesemakers so early on, we were some of the first people in the American Cheese Society. So we worked together and I was on the board of that organization probably for 12 or 15 years and what we've done…now it's not just goat cheese but at the beginning, you know, we had our little groups and we worked together and we shared recipes. And one of the nice things about the cheese industry now is that we're all growing fast enough that we can help each other. So even now, I'm in a group called supergoat.org...to inform people of the benefits of goat milk.* (Keehn, 2010) Judy Schad (IN, 5): *There was no France, or short courses for us then, but we quickly got to know each other—Mary Keehn* [CA, 5] *at a goat show in 1983 and Allison Hooper* [VT, 5], *Paula Lambert* [TX, 5], *at food shows and conferences.* (Murray's Cheese, 2018) Re Peggy Smith & Sue Conley (CA, 5): Peggy Smith and Sue Conley met at the University of Tennessee. They came west to California in a hippie van, Tales of the City-style, in 1976, and both went straight into kitchens. Smith cooked under Alice Waters [CA, 4] at Chez Panisse in Berkeley, while Conley worked for Bette's Oceanview Diner and, eventually, for [pioneer organic dairy farmer and future supplier of milk to their creamery] Albert Straus [CA, 5]. (Kane, 2015) *They needed help in marketing and selling the milk, so I sold my shares in Bette's Diner and started working with Albert Straus. I called my old friend, Peggy, to see if she was interested in partnering on a cheese-making venture and she happily made the move from chef to business owner.* (Hollister, 2016)
1990-99	Re Daphne Zepos (CA, 4): *…one of my most cherished cheese journeys was to Metsovo, Greece with the ACS back in 1996 where we all met Daphne Zepos and got totally jazzed about Greece, tradition and the Mediterranean diet. –* Allison Hooper (Marcella, 2015) Re Mark Fischer (VT, 4): A few years after relocating [to Vermont], Mark met David Major [VT, 5], one of the godfathers of Vermont artisan cheese and the owner of Vermont Shepherd, the state's most well- known small cheese making dairy located in Putney. The friendship changed the course of Mark's life, leading him down the path to professional cheese making. (du Marcyville, 2006)

Wave	Quote
2000-09	Seana Doughty (CA, 5): *It was Marcia Barinaga* [CA, 5] *who I connected with and who gave me the opportunity to buy a little bit of her flock's milk and use her creamery to make my first cheese, Fat Bottom Girl. By the end of the 2009 season, Marcia realized that she needed all of her milk for her own cheese and would not be able to sell anymore. I spent a couple of months thinking about what I was going to do, calling around and talking to various people who may be thinking about starting a sheep dairy (there are quite a few talkers, not many doers).* (Jackson K. , n.d.)
2010-18	Stephanie Angstadt (PA, 2): *Sue Miller* [PA, 3] *is responsible for so much of my success. She brought my under her wing when I as first starting off. She allowed me to shadow her in her creamery, shared advice on getting started, connected me to wholesalers in the city looking to branch out. She has been such a mentor and friend.* (Friedman, 2019) Anna Landmark (WI, 5): Anna Landmark met Anna Thomas-Bates [WI, 5] at the Women in Sustainable Agriculture Conference in 2012. Landmark was a hobby farmer, who was working on getting her cheesemaker license, and Thomas Bates was a food writer who moved her family to the country in an effort to downsize. The creamery was born one evening as the friends were drinking old fashioneds and chatting about Landmark's plans for a cheese business. (Fredrich, 2017)

Relational social capital

Network correlations and regressions

My hypotheses related to relational social capital begin on page 54. Table 8 provides support for hypothesis 5: later entrants have fewer relationships with each other that represent the development of human capital. Figures 19-22 in the previous section depict this finding visually. The size of the nodes relates to the relative degree to which the actor's relationships represent human capital development: the larger the node, the more types of these relationships the actor has. There are more large nodes in the earlier waves than in later waves (as depicted in Figures 24-26). Hypothesis 4 is also supported in Table 8: actors with more relationships that involve the development of human capital tend to also have more diverse networks. There are statistically significant gender differences between the creation of relationships for the purpose of human capital development with being female associated with a significantly higher number of relationships than those established by males.

Table 8 OLS regression coefficients for relational social capital hypotheses

	Weighted Degree	**Clustering**
Wave	-1.144**	
Weighted degree		-0.007***
Gender	3.592***	-0.027
Intercept	8.829	0.593**
R^2	0.042	0.028
Adj R^2	0.038	0.024
F	11.599***	7.630***

*p<0.05; **p<0.01; ***p<0.001

Survey results in regards to the role of social capital

In terms of the role of social capital within the U.S. artisanal cheese industry, survey data of 160 cheesemakers collected in 2018 showed that 61% had sought advice regarding cheesemaking methods in the last year, and 75% of these cheesemakers had sought advice from another cheesemaker (see Table 9). Cheesemakers were also more likely to consult another cheesemaker for advice regarding milk or equipment suppliers, and distribution channels. No statistically significant relationship was found between sourcing advice and performance in terms of production volume and profit.

Table 9 Survey data results regarding role of social networks N=181

Topic	**% who sourced advice**	**% sourced advice from another cheesemaker**
Food safety practices	63%	23%
Cheesemaking methods	61%	75%
Manufacturing practices	48%	34%
Manufacturing facility	47%	24%
Marketing	43%	33%
Distribution channels	30%	54%
Input Suppliers	18%	55%
Human resources	18%	14%

63% of the creameries who responded to the survey reported being members of the American Cheese Society (ACS). As is detailed in Table 10, members perceived the main benefits of membership to be advocacy on behalf of cheesemakers (76% of respondents), access to food safety resources (73%), opportunities to meet like-minded people (71%), access to knowledge and expertise of other members (69%), and a sense of community (67%). 62% of respondents reported being members of a state-level, regional, or local cheesemakers guild. Members were more likely to be located in the West and Northeast regions of the U.S. with 73% of respondents from the West reporting

membership of a semi-local guild, and 70% of Northeast respondents reporting guild membership. In contrast 43% of respondents from the Midwest reported guild membership, and 37% of respondents from the South. Table 10 shows comparative percentages in terms of perceived benefits of belonging to a semi-local institution as compared to a national one.

Table 10 Survey data results regarding perceived benefits of formal networks N=181

Benefits of Membership	**ACS members**	**Guild members**
Advocacy	76%	80%
Food safety resources	73%	58%
Meeting like-minded people	71%	77%
Knowledge & expertise of other members	69%	68%
Sense of community	67%	72%
Training resources	56%	56%
Marketing & promotion at events	40%	60%
Meeting potential collaborators	35%	49%
Marketing & promotion in media	30%	70%
Funding resources	11%	27%
Other	3%	3%
Not aware of any benefits	5%	1%

When asked about their motivations for sharing knowledge or resources with other cheesemakers, 91% of respondents agreed or strongly agreed with the statement that "Sharing knowledge or resources with other cheesemakers enables me to improve the quality of my cheese products". 86% agreed or strongly agreed that a reputation for sharing knowledge or resources benefits their business. There was less agreement with the statements that sharing knowledge or resources was important for the survival of their business (68%), or that sharing is only undertaken provided fellow cheesemakers reciprocate (65%). On an industry level, 91% agreed or strongly agreed that by sharing knowledge and resources with each other, the quality of all U.S. produced cheese would

improve, and 91% agreed or strongly agreed working together would enable more to be achieved than if they worked separately. 85% of cheesemakers perceive sharing knowledge or resources with each other is part of their collective identity, and 75% agreed or strongly agreed there is still room for all cheesemakers to increase their sales, despite 92% agreeing or strongly agreeing with the statement that the competition within the industry is increasing.

Table 11 Survey data results regarding motivations for maintaining personal connections N=181

Statement	**Strongly agree**	**Agree**	**Disagree**	**Strongly disagree**
Sharing knowledge or resources with other cheesemakers:				
Enables me to improve the quality of my products.	44%	47%	7%	2%
Is important for the survival of my business	25%	43%	30%	2%
Is something I do only if it is reciprocated	22%	43%	29%	6%
Benefits the reputation of my business	42%	44%	11%	3%
Helps the quality of U.S. produced cheese to improve	44%	47%	8%	1%
Helps each of us achieve more together than we could separately	44%	47%	8%	1%
Is an integral part of who we are as U.S. cheesemakers	34%	51%	12%	3%
There is room for all U.S. cheesemakers to increase their sales	37%	41%	19%	4%
The competition in this industry is increasing.	47%	44%	7%	2%

Qualitative evidence

The quotes in Table 12 provide evidence of how entrants utilize the networks they established. In other words, these quotes are indicators of the role that social capital plays in the different waves. The quotes are categorized by wave and the state and k-core of the

actor is provided in brackets as an indication of their geographical and structural position within the network.

Table 13 provides evidence of the sources entrants in the different waves used to develop human capital. The quotes are categorized by wave and the k-core the actor is a member of is provided in brackets as an indication of their position within the network.

Table 12 Quotes regarding role of network by wave

Wave	Quote
1975-89	Judith Schad (ID, 5): W*e quickly got to know each other—Mary Keehn* [CA, 5] *at a goat show in 1983 and Allison Hooper* [VT, 5]*, Paula Lambert* [TX, 5]*, at food shows and conferences. This was how we learned and inspired each other.* (Murray's Cheese, 2018) *We had to talk to each other. There was no place in the United States to go and learn.* (Schatz, 2004) *Looking back to the most important moment in a 30+ year cheesemaking journey, I think it was my visit to Westfield Farm in the spring of 1988 and the opportunity to work with Bob and Letty Kilmoyer* [4, MA]. *I had to do a lot of persuading to get the two best chevre producers in the country to let me make cheese with them.* (Schad, 2018)
1990-99	Soyoung Scanlan (CA, 2): *As I was looking for a plant to experiment with making my own cheese, I met Barbara and Rex Backus in St. Helena* [CA, 2]*, and they allowed me to make small amounts of cheese at their dairy…Barbara introduced me to her best customers, including Oakville Grocery. Local markets were always open, and I could drive around to introduce my product easily. The personal contact with cheese sellers and chefs gave me lots of ideas for new products…If Barbara and Rex Backus hadn't opened the doors to their cheese plant, I don't know where I would be.* (Scanlan, 1996) Cheesemaker 20 (5): *Just as far as technical resources I do a lot of work with those guys* [a large cheesemaking facility] *too. They've got a full lab down there so I've got a lot of ties with them specifically.*
2000-09	Jean Mackenzie (OH, 3): *As cheesemakers, we do not look at ourselves as competitors but rather as a group of people with the same passion who have come together to support the business of cheesemaking in Ohio and across the country.* (Mackenzie, 2013) Jessie Dowling (MA, 3): *I researched farms online, visited about a dozen and landed in late spring 2007 at Ells Farm Sheep Dairy in Union, working for Perry Ells, and splitting my time between there and Appleton Creamery, with Caitlin Hunter* [MA, 6] *in Appleton. I learned so much from these amazing women including rotational grazing, animal husbandry and milking sheep at Ells Farm and how to make cheese, milk goats, and how to market cheese at Appleton Creamery. I spent five years learning to make cheese from Caitlin*

Wave	Quote
	Hunter of Appleton Creamery. Caitlin is one of my dearest friends and mentors and she has helped me every step of the way as I learn how to make it on my own. (Dowling, n.d.) Cheesemaker 17 (4): *I have a friend who's a cheesemaker but also a consultant here in Vermont, so I went over to his place for a day to get some consulting and how to tune up my mozzarella making skills right before and was totally happy to pay him as a consultant because that's a good sideline for him. I mean, he's a great consultant aside from having a cheesemaking business. I love being able to do that.* Cheesemaker 14 (5): *…the Vermont Cheese Council has a huge mailing list, and if you've got a question, you can put it out there and different members can answer you.*
2010-18	Jenna Kelly-Landes (TX, 1): *These relationships* [with other dairy farmers] *are some of the deepest friendships I have, and they're with people who in some cases I have never seen.*[Working with goats] *is an esoteric language that we all speak. We all rely on each other.* (Smith, 2018) Rachel Fritz Schaal (VT, 2): *Because we're all doing it together there is this sense of community and collegiality, where we can talk to one another, face problems and figure out solutions together.* (Kramer, 2019)

Table 13 Quotes regarding sources of human capital development by wave

Wave	Quote
Pre-1975	Patricia Morford (OR, 1): *Back then, there wasn't a whole lot of information out there for home cheese makers. In fact, there was none. I was experimenting on my own.* (Tobias, 2014)
1975-89	Laura Chenel (CA, 4): Chenel stumbled on a French publication on goat cheese making and spent three months translating it. Then she decided to travel to France to see firsthand how goat cheese was made. (Dosti, 1985) Anne Topham (WI, 4): When Topham started in 1980, goat cheese was practically unheard-of in the US (except, perhaps, for Greek feta cheese), and she had to send for an instruction book from France. (Levitan Spaid, 1992) Marjorie Susman & Marion Pollack (VT, 4): *All we did was work and figure things out because there weren't people we could turn to for help because nobody else was doing it"* (Munson, 2016). Allison Hooper (VT, 5): *…there wasn't anyone to help us on the cheese side; I was really on my own and ended up looking to France.* (Fratini, n.d.) Jennifer Lynn Bice (CA, 5): *I started out in the kitchen and made yogurt and cheese and read from books. Originally, the Bible of goat cheesemaking was*

Wave	Quote
	a small book only in French, which I translated word for word. In those days, there weren't any classes. (Peterson, 2016) Paula Lambert (TX, 5): *I'd never made cheese by myself. Then I had Giovanni Marchesi, a professor of cheesemaking, come from Italy to teach me. He was here for a month and taught us how to make mozzarella and ricotta. The day he left, it didn't work for us. He was on the plane back to Italy, and we just had to figure it out. I met a guy named Danny Brackeen from Americana Foods. He was selling frozen yogurt under the escalator at Neiman Marcus downtown. He got an investor and became TCBY. He told me Neiman's needed crème fraîche, so I figured out how to make it.* (Nichols, 2017)
1990-99	Alise Sjostrom (MN, 4): *I developed my own college curriculum at the University of Minnesota revolving around cheese and dairy food quality and trained at the Vermont Institute for Artisan Cheese. Soon after graduation I took a job in the retail grocery world to better my understanding of the entire 'food-chain' of cheese.* (Sjostrom, 2017)
2000-09	Seana Doughty (CA, 5): *I took 2 of the short courses in cheesemaking offered at Cal Poly, had a class with Margaret Morris, and also did a 3-day cheesemaking class with Moshe Rosenberg of UC Davis. Before that, I began by reading and studying – I bought many books, including dairy science textbooks (the books for hobbyists were of little value to me). I read, took notes, and then read some more. I studied cheese recipes, over and over, asking myself why certain steps are taken, what would happen if I did this or that differently?* (Jackson K. , n.d.) Debbie Hahn (MA, 6): *It's a lot of trial and error but you really, you know you really have to eventually, I think, if you're serious about it, you really need to take some type of formal training from, you know, if it's not in Maine, from some other, like UVM, or another educational institute where it's more formal and you can really get the chemistry and the, you know, understanding what actually happens when you're making cheese. I think that's really critical.* (Hahn, 2011)
2010-18	Cheesemaker 12 (3): *We have a tendency to go to Italy for a lot of information which is both a plus and a negative. There may be some very good products that are here that we are looking past because we're so focused on, 'This is what is used in Italy'. We may be spending more or getting things that aren't necessarily to United States codes…because we are making cheeses that are so different with the mentorship of a professional cheese-maker, we have tended not to reach out as much to our fellow, stumbling along cheese-makers. That is probably to our detriment.*

Cognitive social capital

Regression results

My hypotheses related to cognitive social capital begin on page 54. Permutation-based regression tests (Table 14) show no influence of county-level social capital on the stage in which an entrepreneurship is more likely to enter an industry (hypothesis 6). No support is found for hypotheses 7 either: there is no statistically significant relationship between county-level social capital and the geographic diversity of an actor's networks. For hypothesis 8, a statistically significant relationship is found between *eigenvector* and county-level social capital (*SCI*), in that well-connected actors who are connected to well-connected others tend to be located in counties with relatively higher social capital, however there was no significant relationship between the wave in which the actor entered the industry and how well-connected they were. Controlling for gender, a statistically significant positive relationship is shown between being female and the amount of influence the actor has in the network as shown by the *eigenvector* variable.

Table 14 OLS regression results for cognitive social capital hypotheses

	Began	**Distance**	**Eigenvector**
SCI	-1.195	-1.756	0.006**
Gender	0.246	11.795	0.010***
Intercept	1993	228.402	0.007
R^2	0.003	0.004	0.039
Adj R^2	-0.001	0.000	0.036
F-test	0.756	0.958	10.889***

*p<0.05; **p<0.01

Qualitative evidence

Table 15 provides evidence of the support received (or not received) by U.S. artisanal cheesemakers from their communities as they were establishing their businesses.

The quotes are categorized by wave and the k-core the actor is a member of is provided in brackets as an indication of their position within the network.

Table 15 Quotes regarding community level social capital by wave

Wave	Quote
1975-89	Allison Hooper (VT, 5): *I think it was difficult for me, in this industry, to gain credibility as a young woman. Particularly making a very unconventional product, it was hard to get people to take me seriously in the dairy industry, which is a man's industry… the farmers in our valley were so skeptical, they just didn't know what to say to me because they were so certain we would go out of business.* (Fratini, n.d.)
1990-99	Karen Galayda (VT, 3): *In 1992, when we tried to get financing to make cheese, people thought we were being ridiculous.* (Calta, 2002) Cheesemaker 19 (5): *Everybody would much rather see some spectacular failure than to see somebody succeed. We're huge cheerleaders for our compatriots and anybody's that's got an idea. We spend a lot of energy fanning the flames of belief. I think those people and that phenomenon is everywhere, and that's human nature. The preference is to stand by and watch a train wreck. There's nothing more exciting in a small town than a train wreck…I think we have huge amount of support from within our community, but human nature is... I think the nature doesn't change. When somebody succeeds, everybody's proud and supportive, but I think human nature is really founded on negative belief.* Kurt Beecher Dammeier (WA, 6): *I started Beecher's because I love good cheese and couldn't find any being made near my home in Seattle. This was back in 2001, and artisan cheesemaking hadn't taking off yet in the United States…People thought I was crazy. The dairy industry was consolidating and creameries were going out of business, not setting up shop. But I'm a stubborn guy and I wasn't deterred.* (Beecher Dammeier, 2016)
2000-09	Stuart Veldhuizen (TX, 2): When Stuart Veldhuizen expressed a desire to start a dairy farm and make cheese with raw milk, he was met with opposition. Inspectors did their best to dissuade him. He laughs, *They said, 'No, no, you don't want to do that!'* (Mora, 2015) David Muller (VT, 3): *The local farmers all thought I was crazy. I could see them snickering behind their hands at me. But the experts I talked to said there was no reason it couldn't work.* (Johnson, 2003)

Establishing legitimacy

Regression results

My hypotheses related to the establishment of legitimacy begin on page 55. Results shown previously in Table 5 and Table 8 provide support for hypotheses 9a. Early entrants have a higher number of connections and a higher number of relationships that represent the development of human capital through the exchange of information and resources. Table 16 provides some support for hypothesis 9b. Later waves had mildly significantly lower closeness values meaning information would not have spread through the entire network in later waves as fast as it did between 1975 and 1989. Support of hypotheses 9a and b lend weight to the theory that early entrants cooperate with each other in order to gain legitimacy for their products, after which time businesses tend to avoid transaction costs associated with the establishment and maintenance of large and diverse cooperative networks. Hypothesis 9c is also supported (see Table 5). Actors who entered the industry early had more diverse networks than those who entered in later waves who tended to form more clustered and localized networks. Taken together, this suggests that founding cheesemaking firms cooperated together to produce a joint understanding and collective identity by observing and building on the work of each other, and now that legitimacy for U.S. produced artisan cheese has been established and the products become more mainstream, firms are less likely to incur the costs of creating and maintaining cooperative networks due to lower incentives to do so.

That said, support is also found for hypotheses 10a and b which were created as tests of the competing theory that legitimacy for a new product category is achieved through certain actors in key discursive positions using normative language that is

adopted by others in a somewhat linear fashion. Table 16 shows that, in line with hypotheses 10a early entrants are more likely to span structural holes meaning they are more involved in spreading new ideas and behaviors between groups than later entrants. Actors who span structural holes are more likely to have higher popularity and influence in that they are well connected and connected to well-connected others, represented by the *eigenvector* variable. This supports hypothesis 10b. Support for these hypotheses supports my theory that 'key actors' are those that are highly influential and are positioned between a number of groups, meaning they monitor and control the flow of information through a network. However, there is a statistically significant relationship between gender and the number of structural holes an actor spans meaning that in this context, females are less likely to hold these positions within the network. As show in Table 14, page 132, there is a statistically significant positive relationship between being female and having a high degree of influence within the network. Females are also more likely to have a higher number of connections and a higher number of relationships that involve the development of human capital. This suggests that in the context of the U.S. artisan cheese industry, men influence others through monitoring and controlling the follow of information between groups, while women influence others through sharing information widely. Qualitative evidence provided in Table 18, page 138, shows that the actors repeatedly described as setting standards within this industry were the female pioneers. The ongoing cooperative nature of the industry is also attributed to these women. When one considers the qualitative story in conjunction with these statistical results, there is clearly more evidence in favor of the theory that legitimacy for a new product category is established through cooperation between founding firms. The

question remains then, how do they find each other? I attend to this question in the next chapter.

Table 16 OLS regression results for legitimacy hypotheses

	Closeness	**Structural Holes**
Wave	-0.001*	-2.490**
Eigenvector		546.708***
Gender	0.000	-6.748***
Intercept	0.066	12.145*
R^2	0.008	0.395
Adj R^2	0.005	0.392
F	2.210	115.785***

*p<0.05

Qualitative evidence

Hypotheses 9a-c test the theory that firms cooperate to produce a joint understanding and collective identity by observing and building on the work of each other. Table 17 features quotes from actors within the U.S. artisanal cheese industry that provide evidence of the cooperative nature that was established early within the industry in terms of sharing information and resources. The quotes are categorized by wave and the state and k-core group to which the actor belongs is provided in brackets.

Hypotheses 10a and b test the competing theory that legitimacy is established by certain actors in key discursive positions who use normative language that is adopted by others in a somewhat linear fashion. Table 18 provides evidence of key actors in key discursive positions setting the standards through normative language that is adopted by others in a somewhat linear fashion. The quotes are categorized by k-core and the year the actor first took action towards entering the industry is provided in brackets.

Table 17 Quotes regarding cooperative nature of industry by wave

Wave	Quote
Pre-1975	Tony Hook (WI, 5) (replying to a comment that cheesemakers seem like friends, not rivals): *Up until the '80s it was the opposite way. You were always concerned your neighbor was going to steal your patrons, that they might pay a few cents more a hundredweight and take your milk. Now it feels like we all have different niches in different areas. We actually complement each other, especially at the Dane County Farmers' Market. There's probably 12 places that sell cheese but I think we all together bring more customers to the market instead of us thinking, "I've got to have a better price than they do.*" (Burns, 2012)
1975-89	Mary Keehn (CA, 5): *When we all started, I was making cheese literally in my kitchen at the very beginning so there wasn't any sense of competition. It was more, 'oh can I call my friend and find out what's happening when this problem exists?' And it's continued, even though the businesses have gotten a little big larger. We're all shipping cheese all around the country now but I wouldn't hesitate to call any of my cheesemaker friends for advice or help.* (Conley & Keehn, 2018) It took several years before consumers were attracted to the smooth, delicate flavors of Mary's cheeses. But she persevered, working with other goat-cheese pioneers to develop the U.S. market. (Burch, 2011) Sue Conley (CA, 5): *The local cheese makers were really very generous with sharing information when I started making cheese.* (Flaherty, 2007)
1990-99	Cheesemaker 20 (5): *Where I can walk into* [Cheesemaker 17's] *and say, "Hey* [Cheesemaker 17], *I need to wax some cheese because I know you've got wax pots and I don't." Okay, come on over. That type of stuff is who we are. That's who we are…It's all about keeping us all running because nobody wants to see somebody else go down. That's it at the end of the day you try to help your neighbor and knowing that if you need it your neighbor's going to help you back. It's pretty as simple as that I think.*
2000-09	Jessica Little (GA, 3): *Right now in the South, there is a fun culture of sharing and promoting each other. It is so awesome that we have not become too competitive.* (Little, 2014) Cheesemaker 7 (4): *I've often wondered why the artisan cheese industry feels so much more welcoming than many other kinds of businesses. It really does feel very welcoming. There is a strong sense of that collaboration is not only welcome, but expected. I also belong to the Specialty Food Association and we've been to the Fancy Food Show. But that organization hasn't been anywhere near as welcoming and has not offered as many resources as the American Cheese Society.*
2010-18	Cheesemaker 13 (3): *I already have felt like if I had some major question, that there are other cheesemakers right here that we have already known or gotten to know, either from living right here or just from the markets that we go to… They already feel welcome to come and ask me and vice versa.*

Table 18 Quotes information regarding key actors setting standards

k-core	Quote
1	[Sally Jackson, 1975] *helped pave the way for cheesemakers today by virtue of the fact she did it her way*. (Werlin, 2011)
4	*I give credit to the chefs for paving the way for goat cheese to become accepted and then more popular…Alice Waters* (1971) *at Chez Panisse in Berkeley was really a trailblazer for goat cheese…When people go and spend $50 for dinner and get served goat cheese, their attitude changed. The chefs were serving it in some delicious, exotic, unique ways, and that's what launched it.* – Jennifer Bice (Peterson, 2016)
5	The American "goat ladies" are a small but mighty collective of pioneering cheese makers who transformed the palate of America in the early 1980s [Laura Chenel; Mary Keehn, 1980; Judy Schad; Jennifer Bice, 1978; Allison Hooper, 1984; Paula Lambert] (Donnelly, 2016). Cheesemaker 1 (2007): *One of my theories was that some of the early, early, pioneers in cheesemaking in America, like Sue Conley and Peggy Smith at Cowgirl Creameries, are such generous spirits, that they set a tone. And you have Jennifer Bice at Redwood Hill, and these are just such wonderful people. Just generous and inclusive in their whole philosophy. They're not about getting ahead of their competition, they're about raising everybody together… There were a lot of women, early on, who set that tone.* Sue Conley (1975) (replying to a comment that industry participants regard each other as friends and fellow mentors): *I think that's the tone that was set by the American Cheese Society early on…it was started at Cornell University by one Professor… with the goal of teaching each other to make better cheese. And that spirit continues nationally and locally for us.* (Conley & Keehn, 2018) Cheesemaker 16 (1990): *Allison Hooper (1984) and Bob Reese, Alison especially, who are the owners of Vermont Creamery, have been huge voices in the cheese industry in the state and in the attitude of the cheese industry.* Women like California's Laura Chenel [1975], Paula Lambert [1982] of the Mozzarella Co. and Judy Schad [1982] of Capriole…paved the way and set standards for hundreds of skilled cheesemakers who have followed in their paths. (Marche, 2019) [Peggy Smith and Sue Conley, 1975] *symbolize the spirit of collaboration that is so unique in today's very competitive artisan-cheese market* – Lynn Devereux of the California Artisan Cheese Guild (Clark, 2017). Jessica Little (2003): *I think we can credit great southern cheesemakers Alyce Birchenough of Sweet Home Farm* [1984] *and Judy Schad of Capriole* [1982] *for being open and helpful to the rest of us.* (Little, 2014)

Principal component analysis

It was expected that some of the variables used to measure structural and relational social capital may be related and so for that reason, principal component analysis (PCA) was used in order to identify variables that could be grouped together due to high correlation. PCA has the benefit of being able to simplify data analysis (Olawale & Garwe, 2010), as the goal is to explain the maximum amount of variance with the fewest number of principal components. Only those principal components with eigenvalues greater than one are usually retained. Table 19 shows that the four components with eigenvalues greater than one account for 73.8% of the total variance in the data. In order to interpret the components, Varimax rotation was used to transform the components into factors. This method usually results in high factor loadings for a smaller number of variables and low factor loadings for the rest, highlighting the important variables and thus making the interpretation of the results easier (Kaiser, 1958).

Table 20 shows the items that make each of the first four factors. Factor one items include *weighted degree*, *degree*, *eigenvector*, *structural holes*, and *k-core*. These factors represent structural social capital through the number of connections the actor has, and their position in the network in terms of how well-connected they are to well-connected others, the number of structural holes they span, and how centrally positioned they are. These variables are highly correlated with the actor's use of connections to develop human capital as a measure of relational social capital. It seems then that when it comes to being in the 'in-group' in the U.S. artisan cheese industry, it isn't simply a matter of who you know: who you know and what you know are in fact highly correlated. Factor 2

consists of three items: *began*, as the year the actor first took action to enter the industry, the level of *clustering* versus diversity of their network, and *gender*. Factor 3 also includes *clustering* but as a negative correlation with *closeness*. This makes sense: actors who have high *closeness* values, meaning they can diffuse information throughout the network relatively faster than those with low *closeness* values, will be highly likely to also have low *clustering* values meaning their connections are not related to each other. Factor 4 includes just one item, county-level social capital.

Table 19 Principal component analysis and total variance

Factor	Value	Percent	Cumulative %	Ratio
1	3.91967	39.2	39.2	3.008
2	1.30317	13.0	52.2	1.128
3	1.15522	11.6	63.8	1.152
4	1.00261	10.0	73.8	1.166
5	0.85962	8.6	82.4	1.160
6	0.74080	7.4	89.8	1.215
7	0.60991	6.1	95.9	2.255
8	0.27042	2.7	98.6	2.500
9	0.10816	1.1	99.7	3.556
10	0.03041	0.3	100.0	

Table 20 Related component matrix

Factor	1	2	3	4
Weighted degree	0.965			
Degree	0.952			
Eigenvector	0.871			
Structural holes	0.796			
K-core	0.666			
Began		0.697		
Clustering		0.529	-0.642	
Gender		0.511		
Closeness			0.517	
SCI				-0.865

Thematic analyses

In this section, I present the results of the both thematic analyses of the 23 cheesemaker interviews. For the first thematic analysis interviews were analyzed based on replication of a theoretical pre-understanding of the entrepreneurial process as proposed by Ronning et al. (2010). A theoretical pre-understanding provides a frame of reference that guides the analytical process (Yin, 2009). Consistent with the research model, analysis was focused on identifying the presence (or absence) of entrepreneurial human and social capital and the level of which assistance or expert knowledge was accessed. A summary has been provided in Chapter 5 (Table 2) in order to help provide context for the study and here I present the findings in light of the results already presented in this chapter.

Two of the cheesemakers I interviewed entered the industry in the first wave (1975-89), six entered between 1990 and 1999, nine entered between 2000 and 2009, and six entered between 2010 and 2018. Three cheesemakers were located in k-core 1, at the periphery of the network, four were located in k-core 3, six in k-core 4, and seven in the center of the network in k-core 5. Three cheesemakers that I interviewed had zero connections to any actors in my sample and were therefore not included.

Two of the cheesemakers located in k-core 1 were dairy farmers who began cheesemaking as a diversification project. Neither had developed the human capital required to make cheese themselves, and apart from joining the local cheesemakers association, through which they'd made some contacts, they'd not made an effort to build a network in the industry. Their main objective of belonging to the local association was to take advantage of marketing opportunities. These characteristics weren't shared by

other dairy farmers who had embarked on cheesemaking as diversification. The eight other farmers that I interviewed were located in k-cores 3-5 and had built their networks through joining the local cheesemaking association and also through meeting people at formal classes they took to develop cheesemaking skills. Of the 10 farmers in total, two entered the industry in the 90s, four entered between 2000 and 2009, and four between 2010 and 2018. The farmers were split between utilizing their networks for specific technical support and knowledge sharing. Those who had already taken classes and sought advice from other local cheesemakers all utilized their networks for specific technical support and support from like-minded people who they saw as friends. Those who utilized their networks for sharing knowledge had entered the industry earlier than the other farmers and had developed human capital through overseas apprenticeships.

Other cheesemakers who utilized their networks for specific technical knowledge were those who had a background in science or medicine and had completed formal education. These cheesemakers had mostly entered the industry between 2000 and 2009. The ex-scientists/medical doctors were all located in k-cores 4 and 5 indicating their effectiveness at building networks within the industry. Only two belonged to their local cheesemakers association, the rest had created networks through meeting people at the classes they took. This group also utilized their networks for sharing knowledge with others and inspiration.

Seven of the cheesemakers talked about the people in their networks as friends, people that they liked to socialize with and felt they could count on for support: "*I know* [another local cheesemaker] - *she's become a really good friend of mine"* (Cheesemaker 10). Four of these were farmers, two ex-scientists, and one had begun cheesemaking as a

retirement project. All but one of these cheesemakers were members of their local cheesemakers association and all were located in k-cores 3-5. Five of these cheesemakers had entered the industry between 2000 and 2009 with the other two entering between 2010 and 2018. These cheesemakers reported a variety of sources they had used to develop the skills and knowledge they required to make cheese: self-taught, formal classes, overseas apprenticeships, other local cheesemakers, or from other family members.

While 23 cheesemakers isn't a high enough number to draw associations between variables from, these interviews do add support to previous findings. On a structural level, those who said they had actively contacted other cheesemakers and connected with people in formal classes while they were developing cheesemaking skills and knowledge, were located closer to the central core of the network than those who had not done this. This comment was from an ex-scientist turned cheesemaker who entered the industry in 2007 and is now at the central core of the network: "*I just contacted all the sheep dairies in Vermont and some of them, 'I'm too busy',* [a well-known cheesemaker] *was one of them, and I understood. But a number of them were so welcoming"* (Cheesemaker 1). Most cheesemakers reported developing a network through the people they met at classes and the ones who didn't were more inclined to say they really only talked to a couple of other cheesemakers they knew and didn't really feel part of a group: "*I do have a little network but there's not really a mentorship, you know what I'm saying? There's not somebody out there saying 'Oh yeah I have that problem', or 'Here's a quick fix'"* (Cheesemaker 3).

On a relational level, I find that all cheesemakers who entered the industry prior to 2000 utilize their networks for specific technical advice and/or knowledge sharing. In line with the finding that later entrants are less likely to utilize social networks for the development of human capital (but only slightly), I find that seven of the nine cheesemakers who entered the industry between 2000 and 2009, and five out of the six cheesemakers who entered the industry between 2010 and 2018, utilize their networks for: sharing knowledge or accessing specific technical advice. All of these cheesemakers had undertaken formal training either through classes or apprenticeships and utilized their networks for extending that knowledge through gaining knowledge regarding specific questions relating to problem solving or increasing the quality of their cheese, or for staying up-to-date on the latest information. Of all 23 cheesemakers that I interviewed, the only cheesemakers who didn't belong to a local association were ones who were located in states where one didn't exist. All of these cheesemakers reported utilizing their networks for specific technical support or sharing knowledge, with half sourcing their networks for inspiration*: "I'm not always carrying questions to people, I'm just having conversations with them where they give me insights and ideas and they inspire me. It's not just that I'm getting answers to burning questions that I have or problems, or having somebody help me with a problem, it's that I get inspiration. I get knowledge. I get insight into things that I hadn't thought of"* (Cheesemaker 7). Of the cheesemakers who did belong to a local association, two groups appeared: those who use the formal network for marketing opportunities, and those who consider the other members to be friends. All of the cheesemakers who talked about the people in their networks as friends entered the industry after 2000. The majority of them used their networks mainly for sourcing

specific technical advice. This is in line with the reported cooperative nature of the industry: "*I see them as my competitors, I know they're my competitors, but I don't feel competitive towards them"* (Cheesemaker 7). Later entrants have much more access to online resources and formal classes to assist them with developing the necessary human capital, and therefore create networks through joining a semi-local cheesemakers group through which they can gain both advice for specific problems, and meet like-minded people. The cheesemakers who utilized the formal network for marketing purposes only didn't access their networks for specific technical advice or knowledge sharing and tended to be on the periphery of the network: "*I don't make the cheese so I don't have the need to be bouncing ideas off other farmers, but the other folks that are making their own cheese, they help each other"* (Cheesemaker 10). While this may suggest that access to knowledge is granted to those who make an effort to be part of the 'in-group', these actors also hadn't developed the human capital required to make cheese themselves in preference to contracting someone else to make it for them. Given all of the evidence I have collected so far, and the observations I made at different events, it is more likely that it is only after you've learned how to make cheese and proven yourself as having a high degree of skill, that you gain access to the relational social capital held within the network: *"When we first started, because of that closed door thing, that just irritates me to no end because why should I have to recreate the wheel when they've already been there, done that? You know, and it's like having to pull teeth in the beginning until they trusted you"* (Cheesemaker 14). In line with Kim (2018), for those who don't have the necessary human capital, the role of the network is to assist in the development of human capital. Given the vast amount of resources available to aspiring cheesemakers nowadays,

it is understandable that existing cheesemakers don't see this as their role. There is little benefit to them given the cost involved. However, for those who do have the necessary human capital, the role of the network is to provide encouragement and feedback. In this study, it seems to be those who can prove general skill and determination that gain access to the expertise of the more experienced cheesemakers.

The secondary thematic analysis resulted in the identification of five main themes. The aim of the secondary thematic coding approach was to explain the presence or otherwise of each of the resources through an in-depth understanding of underlying structures and generative mechanisms. Table 21 displays the five most common themes in terms of number of references.

Table 21 Secondary thematic analysis results

Theme	**No. of references**
Functional cooperation	67
Workmanship	61
In-group versus out-group	43
Community	33
Inter-dependence	23

The most common theme that cheesemakers raised was functionality in terms of how they utilized their networks. Cheesemakers with large networks called upon different people depending on their specific need which were often related to product quality: "*First, you have to make a good product, so maybe you need help for that. You're going to need to know the right people. There's a lot of good consultants in Vermont. You can start to know them soon off once you start taking courses and developing relationships or business relationships or whatever it is, friendships with these people cause you need to make something good… the hard part really is selling the thing…so you need to develop*

the relationships for. The successful cheesemakers know those people because they sell their products so they go hand-in-hand…he knows where to sell that cheese, too, cause you need the distributors. You need premier accounts. You need to be able to sell your stuff." (Cheesemaker 17)

Another interesting theme was that new cheesemakers who were on the periphery of a sub-group within the network had clear expectations of what they would use those connections for, despite having never used them in the past: "*I am suspecting that they'll be fantastic about helping us with our marketing.*" (Cheesemaker 12) *"I already have felt like if I had some major question, that there are other cheesemakers right here that we have already known or gotten to know, either from living right here or just from the markets that we go to.*" (Cheesemaker 13) The emphasis on functional networks was because cheesemakers are busy people. While they certainly appreciate having a network of people to connect with if need be, there isn't time for socializing for the sake of being social: "*That network was important but during those years that I was making cheese, I didn't have time to socialize. I mean the idea of going out and having lunch with somebody, or just staying in touch by phone or email, every day was just non-stop."* (Cheesemaker 1) "*It's a pretty tight community in Vermont. We don't get to see each other very much because everybody's working a lot. The Cheese Festival and our annual meeting are really like the only time we get together.*" (Cheesemaker 18) These sentiments add weight to the fact that cheesemakers are wary about who they provide advice to. It's not so much that they're guarding their knowledge but more that they want to maximize the pay-off of investing time into mentoring a new cheesemaker. Even if their motivations are altruistic, they want to ensure they aren't wasting their time.

A dedication to workmanship and increasing quality is strongly associated with the perceived need to maintain a network of people for developing new knowledge. Experienced cheesemakers expressed a strong desire to connect to other experienced cheesemakers with a similar or higher level of knowledge: "*...what I'm looking for in workshops now is that connection with other people, to help solve really specific problems. You can talk to other people about it, or talk to a person who is another level of expert higher than where I'm at in my cheesemaking knowledge, and learn even more. Just really drill down on many of the details. There is emerging knowledge that we don't understand about."* (Cheesemaker 7) "*I think we are all working on the same, essential goal, which is to make delicious cheese every day without standardizing it."* (Cheesemaker 22) A belief in the uniqueness of their cheese means that many cheesemakers are happy to be open about their recipes and processes: "*...some of the guys worry about their recipes and somebody stealing secrets and all that kind of stuff but honestly my own personal philosophy has always been I can give you my recipe and if you think you're going to go to wherever and replicate my cheese exactly it's not going to happen. It's just not going to happen. There's too many variables, there's the grass that these cows eat every day is the first and foremost right? The components of my milk are going to be completely different, you're never going to replicate what I'm doing here exactly. The natural bacteria that are in my facility add a lot to my cheeses so I'm not protective. That doesn't mean I want to just give somebody my make sheets by any stretch. I'm not concerned about somebody coming in here and seeing something and going, "Oh. I'm going to go do that."* (Cheesemaker 20)

One of the main benefits of conducting anonymous interviews is that you often hear another side of the story that is told publicly. It is definitely apparent that there is a spirit of collaboration and openness within the U.S. artisanal cheese industry, but it doesn't seem to be distributed evenly across the network. Some cheesemakers spoke of an in-group/out-group culture: "*There's definitely I feel like a golden circle of people. Some of us are, you know, we're doing good stuff, and we feel like we're sort of, not in the cool kids club. I know other people who have that same perception. I mean there are really spectacular people that I've met in the cheese world, don't get me wrong. But I think a lot of them are sort of, are in that out-group, not the cool kids. It's just my husband and me, and a handful of people that we've met. Just finding those little threads (people who can help you), that's very time consuming too*" (Cheesemaker 3). "*This cheese world is so small. I mean there's maybe 2 or 300 people in the whole world that really are the, from an artisanal cheese standpoint, they're the people that are the all-knowing people, that are helping and keeping this cheese world together. In every world, there's the wanna-be's, the ones that aren't quite there, and they can be really nasty people. But the ones that really are the stars, there's people in there that are so down to earth and real, and they're not afraid of anything, so they're very open"* (Cheesemaker 4).

Another strong theme within the interviews was a desire to help the local community: "*Sue and Peg, when you read and talk to them about why they started their business…When they started their business, they were looking to do something for the wives of the Hispanic ranch workers to give them jobs where they would have health care. It was very community minded.*" (Cheesemaker 1) "*From an economic perspective,*

we're fully rooted in this belief that cheese can be transformative and that cheese can be a force for good in our community. That development can be a good thing." (Cheesemaker 18) "*These communities are pretty fragile in fairness and I think a fair amount of tension to just keep them going.*" (Cheesemaker 16)

The fifth most common theme was a sense of inter-dependence between cheesemakers: *"Everybody's kind of working on their own thing but there is definitely a spirit of camaraderie and helpfulness but again, we're a small group, so it's really hard to do the business of cheesemaking when you're a smaller cheesemaker. There's a lot to it and so everybody knows what it entails so when someone's willing to give you a little help, it means a lot*" (Cheesemaker 17). "*Those guys are all struggling to find their niche, make it work somehow, and they can't afford to be butting heads with each other. The knowledge is tough at that level. You don't have just cheese making; you've got to have a real understanding of what you're making with your product. It's got to be hard, without being able to hire the technical expertise like we can. They've got to learn from other people* (Cheesemaker 15). "*It's community, a sense of community. When somebody needs something or has something, it's a really targeted group of people who can help*" (Cheesemaker 22). "*We didn't want someone getting into the business that didn't have some kind of safety net to fall into… that just wasn't the way that we felt it should go"* (Cheesemaker 20).

In the next chapter I triangulate the results from this chapter. These results have been established through the analysis of data gathered from four different sources: 1) interviews conducted with 26 cheesemakers, creamery owners, and other industry participants across the U.S. between June 2016 and July 2018; 2) narratives of industry

participants, commentators, and researchers regarding founding conditions and growth of the US artisanal cheese industry were sourced from empirical research and publicly available books, media stories, interviews, and podcast; 3) narratives from a core set of actors involved in the production of artisan cheese in the U.S. about their pre- and post-entry activities including how they developed the human capital necessary to make cheese and the type of interactions they had with other industry participants, e.g., mentored by, attended classes taught by, employed by, connected with. These data were sourced from publicly available books, online articles featured in regional and national newspapers, community newsletters and blogs; and 4) survey analysis of creameries which took place from July to September 2018.

Chapter 7 – Discussion

The purpose of this study was to gain insight into how rural entrepreneurs, including existing producers with innovative ideas for diversification, create and utilize entrepreneurial-supportive social networks as they transition their idea into a sustainable and profitable business. The U.S. artisan cheese industry was isolated for the purposes of this study, the context of which is provided in Chapter 5.

This chapter is dedicated to specifically answering my research questions: 1) Are there structural differences in the networks of industry pioneers compared to later entrants, and if so, what might explain these differences? 2) In nascent industries, what role do diverse social networks play for entrepreneurs and does this role change over time? and 3) Does the way in which industry pioneers construct and utilize social networks influence the establishment of legitimacy for a new product category? In this chapter I also discuss gender differences in network structure, and the changing role of institutions in network creation as an industry evolves.

This study contributes to the literature in four main areas. First, to the best of my knowledge, this is the first empirical study that examines changes in network structure and role over time and space in conjunction with industry evolution and community culture. Second, the different roles of diverse and tight-knit networks in relation to industry stage have been delineated, providing insight as to the potential value of each for entrepreneurs. Third, the use of a geographic layout to understand network structure is still a fairly new method, and this study highlights the benefits that can be gained from being able to visualize networks across geographic space. Finally, it provides a better

understanding of the social process through which legitimacy is achieved for a new product category.

Structural social capital

In exploring the exchange of valued resources between actors, prior studies have investigated the role of structural factors such as the positions of individuals, groups, and organizations within the networks they belong to. Many of these studies have focused on how the structure of an actor's social network provides certain advantages to the actor e.g., Markovsky et al., 1988, Tsai & Ghoshal, 1998, and Uzzi, 1997. Successful entrepreneurs have been associated with diverse social networks for a number of reasons, however transaction costs associated with developing these networks mean that people prefer to form relationships with those closer to themselves, not only in geographic terms but also in terms of demographics, world views, and interests.

In investigating changes in the structure of the wider network as an industry evolves, I predicted that early entrants in a nascent industry would be more incentivized to incur transactions costs associated with developing diverse networks. The reasoning behind this was that small numbers and a lack of codified knowledge in the early days of an industry mean that the marginal benefit pioneers gain from each new connection outweigh the cost of the time and resources required to create the connection: each additional connection represents a new source of knowledge, and with only one reference book (written in French) on cheesemaking available to the pioneers of the 70s and early 80s, they were incentivized to actively search for people with any knowledge that might be helpful, and invest resources into maintaining these connections. As predicted, early entrants had more diverse networks than later entrants, with a greater number of

connections that were geographically spread out. As knowledge became codified and more cheesemakers entered the industry, actors were less likely to invest time and resources into creating new connections and tended to form more tight-knit, small networks with the cheesemakers in their local area.

Tight-knit networks can be detrimental to innovation because of their tendency to induce conformity and constrain individuals' autonomy, creativity, and innovation (Borgatti, 1997; Gargiulo & Benassi, 2000; Hansen, 1999; Putnam, 2000). Within the qualitative analysis I found that cheesemakers who were focused on workmanship and improving the quality of their cheese continued to maintain diverse networks. Conversely those cheesemakers who were not so invested in the art of cheesemaking itself were more likely to maintain small, tight-knit networks with one or two cheesemakers and join formal associations mainly for marketing opportunities. This is not to say that tight-knit networks are automatically associated with low creativity on the part of the individual actor. Diverse networks have generally been thought of as benefiting an actor through the supply of a higher volume of unique knowledge and information (as opposed to redundant knowledge common to all members of a tight-knit group) (Burt, 2000). Yet as knowledge has become codified, and advances in technology have increased the volume and speed of information that a given actor has access to, modern day cheesemakers are arguably able to access a higher volume of information than any number of connections could provide meaning diverse networks don't necessarily offer the same benefits to entrepreneurs as they did before the introduction of the internet.

Common among all waves of entrants to the U.S. artisan cheese industry, was that some actors actively participated in associations and aggressively sought out new

contacts at meetings while others preferred a more independent approach, teaching themselves and relying on input from professional consultants. Those actors who adopted an active approach to network creation had more diverse networks (Davis et al., 2006), and a higher number of connections; both structural characteristics associated with being a member of the central core of the network. In other words, active participation and creating lots of connections mean a nascent entrepreneur is more likely to gain access to the 'in-group'.

In this respect, geographical location also matters. As more cheesemakers entered the industry in later stages and began to form sub-groups within the wider network, a driven and motivated aspiring cheesemaker living in the same area had much greater access to these 'in-groups' than cheesemakers who began in locations where there were few other cheesemakers, if any. This is not to say that cheesemakers on the periphery of the network or in isolated areas are disadvantaged. While I didn't formally explore the relationship between financial performance and network structure in this study, prior survey data analysis for another study showed no statistically significant relationship between profit margin or production volume and industry participation (Roach et al, 2019). Cheesemakers on the periphery of the network were not active in the process of relating information to others however they had direct and indirect linkages to actors who spanned the structural hole between groups located closer to the central core of the network and those on the peripheral edges. These structural hole spanners were found to be highly involved in the development of human capital through the transfer of information. Hence cheesemakers who are not greatly interested in, say, the latest knowledge or science, but are interested in staying informed about important

developments, save search costs by being connected to such an actor (Burt, 2017): "*There are definitely folks who are not part of the* [local cheesemakers association] *and when I came on I went and talked to them and tried to get them to join, just because I didn't know any better. And now, having been here a while, I've realized that they are just not joiners. They don't need us. There are people who have no intention of scaling up, they sell everything they make, they make a good living, they don't want to be a part of the gang, they don't want to go to the party. And that's fine. There are people who, their whole goal is to sell at their local few farmers markets. A lot of times those are situations where it's a diversified farm and it's not their main product, it's just one of many. Or it could be something where there's somebody who just wants to make a product and sell it from their on-farm store or it's their hobby"* (Cheesemaker 19).

The presence of key actors who span structural holes is indicative of the willingness of early entrants to share information within the industry. Of the seven actors who span the most structural holes in the network, five had been in the industry since the late 70s/early 80s, and two since the early 90s. Five of the seven are heavily involved in 'giving back' to the industry with three passing on knowledge through training or consulting, with the other two actively involved in the formation of formal and informal sub-groups designed to provide support for local cheesemakers and promote the local industry.

Relational social capital

The relational dimension of social capital focuses on the quality of the relationships between the actor and the actors they are connected to. Entrepreneurial-supportive social capital has been positioned as being valuable to an entrepreneur as a

source of information and knowledge, reducing the negative consequences of possible failure (Ronning et al., 2010). The idea that social capital: 1) provides access to information and resources held by other people (Burton et al, 2002), and 2) is necessary for making the transition from idea to implementation (Aldrich & Zimmer, 1986; Johannisson, 1989; Ronning, 2009), is dominant in the entrepreneurship literature. Another important, but less explored, role of social capital is the provision of encouragement. Kim (2018) finds that when individuals lack the human capital necessary to implement their idea, the main role of social capital is to provide information and resources. However for those individuals who already possess the necessary human capital, the main role of social capital is to provide encouragement and feedback. This study has increased our understanding of the different functions fulfilled through the relational dimension of social capital.

I predicted that due to a shortage of codified knowledge, the role of social networks in the early stages of an industry would be to assist in the development of human capital. Consistent with this theory, Kim (2018) finds that when individuals lack the human capital necessary to implement their idea, the main role of social capital is to provide information and resources. However, for those individuals who already possess the necessary human capital, the main role of social capital is to provide encouragement and feedback. Since the introduction of the internet, cheesemaking courses offered across the U.S., and a virtual library of books on the subject, mean that social capital doesn't have the benefit it may have once did as a source of entrepreneurial human capital. This is certainly borne out in the data analysis where I find that later entrants have fewer connections with other actors that represent the development of human capital. If Kim's

theory is correct, later entrants to an industry are more likely to access formal educational courses and workshops for human capital development, and instead utilize social networks for encouragement and feedback.

Diversified networks are thought to represent an increase in the volume of knowledge an actor has access to, however because diverse network ties tend to be weak through intermittent contact, less trust is created between partners and as such there is a decreased likelihood that valuable information will be freely shared (Burt, 1992; Granovetter, 1973). I find support for the theory that actors who utilize networks for human capital development are more likely to have diverse networks. However, there is a clear distinction in the type of human capital that is being developed through these types of networks as an industry evolves. Secondly, I find that on a global level, the presence of both a core-periphery structure and structural hole spanners can influence the spread of valuable information through diverse networks.

In the beginning of the industry diverse networks had the benefit of diffusing knowledge quickly to all actors, demonstrated by the fact that early entrants had networks structured in such a way that information spread quicker throughout them than the networks of later entrants. This structure is useful for developing a joint understanding and collective identity among industry participants without all participants necessarily needing to know each other. By observing and building on the work of one another, producers are more able to communicate a common explanation of their products to consumers without ever having met each other or formally agreeing on what their identity should be (Khaire & Wadhwani, 2010). Part of the collective identity that was created within the U.S. artisan cheese industry came from the spirit in which industry pioneers

willingly shared information and assisted each other with their individual ventures; in line with the evolutionary theory that certain behaviors arise because referent individuals, groups, or organizations use them and thus legitimize them (Smith et al, 1995), eventually becoming part of the collective identity of the group (Lockett et al, 2014).

As the industry evolves and legitimacy is achieved, firms focus their efforts more on gaining market share, however it is worth noting that in the context of the U.S. artisan cheese industry, actors frequently report that while they know they are competing for the same dollar, they don't feel competitive towards each other; rather, they see factory cheesemakers as their competition. General knowledge regarding cheesemaking techniques is now widely available and most actors in my sample have undertaken at least one formal course. The few that haven't have generally learned on-the-job or from family members. Those actors with relatively tight-knit networks are somewhat less inclined to continue to further their knowledge but express a desire to create geographically close connections and friendships with a small group of like-minded people. Their strategy towards gaining market share tends to be through being part of initiatives designed to lift the profile of the geographic region and the producers within it as a group. Conversely, actors who actively and continuously create new connections are highly motivated to increase market share through improving the quality of their cheese. At this stage of the industry, diverse networks benefit growth-oriented producers by fulfilling whatever idiosyncratic need the producer has. The fewer idiosyncratic needs a producer has, the less likely they are to actively create new connections. In other words, cheesemakers who have learned to make cheese and aren't focused on growth or quality improvement are less likely to be motivated to incur the costs of creating new

transactions because of a lack of idiosyncratic needs that can't be fulfilled by their existing connections. Providing evidence of the importance of diverse contacts, cheesemakers reported 'access to knowledge and expertise of other members' higher on the list of benefits of American Cheese Society membership than they did for membership of their local cheesemakers association for which perceived benefits of marketing and promotion, and a sense of community ranked higher. Many modern day cheesemakers continue to build new connections and utilize these for answers to specific problems. These are cheesemakers who have developed the necessary human capital to make cheese and while they don't necessarily draw upon these networks for feedback and encouragement as per Kim (2018), they do report using them as a source of ideas and inspiration. In this sense, with the advent of the internet, diverse networks are now more valuable for innovation than they are for the development of human capital.

Cognitive social capital

The cognitive dimension of social capital takes the social capital concept wider than the individual and their immediate networks and refers to the internalized cultural norms and values within the local community. The concept of cognitive social capital suggests the norms and values of the wider community impact upon the ability of an individual to transition from idea to implementation of their idea. Rural communities can be inhibitive of entrepreneurship in that they dislike change and would-be entrepreneurs are discouraged from pursuing ideas that are outside the norm (Macken-Walsh, 2011; Portes, 1998; Ronning, 2009). Ginnie Tate, known in her local area in Illinois as 'The Goat Lady' started making cheese in 1994 and continued right up until her death in 2009. Her younger brother relays the story of how she started: "*Almost every one she went to*

for advice laughed at her and told her she was foolish. When she did the research, she went to agricultural advisers and extension agents and almost all of them said to her, 'You're crazy, it won't work, you won't make any money, and people won't buy any goat cheese'" (Jones, 2009). A similar story is told by Marjorie Susman and Marion Pollack. When they started their artisan cheese business in rural Vermont in the 1980s, "the neighbors laughed…Susman and Pollack squared their shoulders and plowed on" (Munson, 2016).

While I find no statistically significant relationships between county-level social capital and the incidence of entrepreneurs in a location, or the structure of their networks, the formation of national and semi-local institutions may be working to protect entrepreneurs in low-social capital counties in that there is a network of like-minded people that they can tap into. Survey research showed that this was perceived as the third most popular benefit of belonging to the American Cheese Society, and the second most popular benefit of maintaining membership in a semi-local cheesemakers association. A sense of community was also reported as a benefit of membership in both formal networks. Many goat milk and sheep milk cheesemakers are also members of associations dedicated to producers of goat milk or sheep milk products. These institutions may also provide the same benefits to members in terms of a sense of community. As Jennifer Lynn Bice points out: "*Goat dairying never was, and still isn't, accepted by mainstream farming and agriculture in this country"* (Peterson, 2016).

Gender differences

Given the highly popular legend of 'the goat ladies' as pioneers of the resurgence of the artisan cheese movement in the U.S., it is important to pay attention to the gender

differences identified in the role that networks play. I have made no formal predictions related to existing literature on gender differences in relation to network structure or role but have simply identified differences. From a structural social capital stand point, I find no statistically significant difference between males and females in terms of network and geographical diversity. A seminal paper by Ibarra (1993) proposes that women develop alternative networking strategies than those typically chosen by men. In particular, women's networks will be more diverse, and women are more likely to span structural holes between different social circles rather than be connected to influential actors. In contrast, empirical research suggests spanning structural holes within a network to be a more effective strategy for males with few peers (Burt, 1992). In this study, I find that actors positioned to span structural holes between groups are more likely to be males, while women are more likely to be influential and connected to other influential actors. Within the U.S. artisan cheese industry, males are more likely to gain early access to information; monitor and move information between people; and act as interpersonal bridges between parties, by taking up positions in the network that span structural holes between different groups. On the other hand, women are more active in the process of building their networks in that they create a higher number of connections and these connections tend to be of higher quality in that they involve the dyadic transfer of information and knowledge between two actors. A recent study by Psylla, Sapiezynski, Mones, & Lehmann, (2017) reports similar results.

Within my sample at no stage is there evidence of women entering the industry in greater numbers than men, however it is important to note that when the 'goat ladies' began their ventures, the male cheesemakers already making artisan cheese were using

cow's milk and may not have viewed the efforts of the 'goat ladies' as credible long-term ventures. Cheesemaking was the domain of "*hippies*" (Levitt, 2015), and certainly not the domain of self-respecting dairy farmers (Kowitt, Quinlan, Madison, & Alame, 2015), thus these early female entrants were free to create their products and ventures however they pleased without interference from the few existing male artisan cheesemakers. It is also of no small significance that the feminist movement was particularly strong in the 1970s and the increased frequency and social acceptability of women making a living on their own meant that women created networks through which social capital was translated into economic opportunity (Paxson, 2013). As institutionalized attitudes began to break down women found it easier (and sometimes necessary) to transition their hobby into businesses through these networks. Mary Keehn points to the feminist movement of the time as being instrumental in the emergence of domestic goat cheese in the period to follow, noting that it was women struck with the realization they could do what they wanted who "brought it into being and to the market" (Paxson, 2013, p. 69). For these women, utilizing the skills they had developed in making cheese as a hobby in order to make a living independent of men, worked to reassure themselves of their own competence, as well as inspiring others. The early female cheesemakers willingly shared information, resources, and support and it could be that they did this because it was all they had. As many of the quotes have attested to, there were no books and no-one to ask, because no-one else was doing it. Little did they know that there were in fact others just like them, they just didn't know each other. When they did eventually come together, through events such as the Fancy Food Festival and associations like the Dairy Goat

Association, they quickly created a network among themselves, and grew it by sharing contacts with each other.

Previous empirical research finds that women utilize networks for support (Kim, 2018; Phalen, 2000) and there is an undeniable element of women in the artisan cheesemaking industry continuing to gain support from each other over time. As Sarah Hoffmann, who entered the industry in 2002 comments: "*We're* [more than] *80 percent women. It's not intentional, but there may be an unconscious bias involved. I gravitate toward people who are collaborative and who have empathy for others. I think women have those qualities more often than men do"* (Wills, 2018). This could be a gender issue: women have a stronger propensity to share information and power than men (Rosener, 1990; Smoreda & Licoppe, 2000). I find being female to be positively associated with the number of relationships created for the development of human capital. One cheesemaker shares her theory on why she perceives women in the industry to be more cooperative: "*I think it's an ego-based thing. Women are used to needing to help and be collective in everything, if you go back. Yet, a man almost can be more successful if he's a loner in terms of hunting. Women are dependent upon groups because they're the people with the children"* (Cheesemaker 12). The fact that this culture still exists among many cheesemakers today may be because it was handed down by these women. Evolutionary theory proposes that the behavior of referent individuals becomes part of the collective identity of the group (Lockett et al, 2014), and the media articles and interview data that I collected certainly attest to that. This phenomenon is also seen in the broadcasting industry in which female pioneers served as mentors to younger women (Phalen, 2000). However, the fact remains that artisan cheesemaking can be a lonely, isolating business,

as the quotes from later cheesemakers demonstrate. It makes intuitive sense that when they are around each other, artisan cheesemakers want to tap each other for solutions to specific problems, or simply just take heart in the realization that they are not alone. One cheesemaker I interviewed embodies this in the following statement: "*We've had a lot of successes too but they've been all counter-balanced by massive failures that I couldn't have overcome without the advice, and the support of people in my professional network. I use it for any, everything. Just having conversations. I'm not always carrying questions to people, I'm just having conversations with them where they give me insights and ideas and they inspire me. It's not just that I'm getting answers to burning questions that I have or problems, or having somebody help me with a problem, it's that I get inspiration. I get knowledge. I get insight into things that I hadn't thought of"* (Cheesemaker 7).

Some female cheesemakers that I interviewed reported feeling somewhat left out of the local in-group of cheesemakers until they had proved themselves. It is one thing to be connected to a group of people, however it is a totally different kettle of fish (or cheese) when it comes to them actually sharing what they know with you. In this study, women who are highly-connected are more likely to be connected to highly-connected others, signifying the presence of a definite 'in-group' between some women. It appears that winning an award at the American Cheese Society is one way to gain access to this group: "*...they'll help you in the very, very beginning, but they're like guarded secrets... I think we just needed to prove ourselves to the rest of them, and now they're like - anything is fine. We joined the Vermont Cheese Council the very first year, and it's like everybody's eyes were on us. But there had been cheese makers that would start up and not last. So I think that we just had to prove that we're in it*" (Cheesemaker 14). For some

older, more experienced cheesemakers, it's simply a matter of scarce resources: time is their greatest asset and any time they spend helping people outside of their own business has to be used wisely: "*My attitude has always been to share whatever people care to know, and I tell people there's only one industrial secret here - it's the real secret - and that it's a lot of hard work. If you're willing to do all this work I'm willing to give you anything you want to know*" (Cheesemaker 16). This suggests a definite hierarchy in terms of the difference between human and social capital as an industry develops: in order to get access to a greater volume of specific knowledge, you have to have first developed enough skill to prove you are worthy of investment from others. What you know comes before who you know.

Establishing legitimacy

For a new product to be accepted by the market, it must comply with social norms and standards of legitimacy (Deephouse, 1999; Kennedy, 2008; Navis & Glynn, 2010; Suddaby et al., 2017). The survival of firms is dependent on consumers understanding of these new products (Rao, 1994). In many instances, the market has few, if any, benchmarks against which to measure a new product. Prior research argues that homogeneity matters: when an audience sees similar behavior between firms producing similar offerings, it is easier for them to understand and associate meanings with new product labels (McKendrick & Hannan, 2014). In this study, I set out to test two competing theories as explanations of how legitimacy for a new product category is established: 1) certain actors in key discursive positions use normative language that is adopted by others in a somewhat linear fashion (Green, 2004), or, 2) firms cooperate

together to produce a joint understanding and collective identity (Suddaby et al., 2017) by observing and building on the work of each other (Khaire & Wadhwani, 2010).

My results suggest that in the context of the U.S. artisan cheese industry, men influence others through monitoring and controlling the follow of information between groups, while women influence others through sharing information widely. Analysis of qualitative data in conjunction with the quantitative results provide evidence of the presence of female pioneer cheesemakers as actors in key discursive positions, and cooperation between founding firms. This suggests then that the competing theories as suggested by the literature aren't substitutes but in fact act as complements: female actors 'set the tone' of cooperation and information sharing and this has been adopted by later entrants in a somewhat linear fashion, ultimately becoming part of the collective identity of the industry. This process of cooperation becoming part of the collective identity is also identified in a study of the Danish agricultural cooperative movement after World War Two (Svendsen & Svendsen, 2004).

In terms of network structure, Gnyawali et al. (2006) predict that actors occupying central positions in a network will undertake more competitive actions than peripheral actors, yet I find the opposite with the U.S. artisan cheese industry: actors within the central core of the network are more likely to cooperate. In a review of the network research literature, Brass et al. (2004) highlight mixed results from studies investigating the role of network structure in industry innovation. They propose that where central organizations are committed to sharing information, industry actors are more able to resolve the tension produced by the presence of both 1) cohesive ties between actors that generate trust and cooperation, and 2) key actors who maintain and control the flow of

information by spanning structural holes between otherwise disconnected groups. This then raises the question as to whether legitimacy of new products is achieved relatively quicker when industry networks are structured in this way. In other words, do central actors committed to sharing information take up key discursive positions and act as standard setters, while actors who span structural holes disperse this information out to peripheral actors? If this is true, it would help to explain the question of how industry pioneers find each other. As Khaire and Wadhwani (2010) write, "…it is difficult to imagine how a fragmented and heterogeneous set of producers and consumers would engage in a meaningful discourse that would lead to a consolidated understanding of a category and the value of products within it" (p. 1298).

As discussed earlier in the relational social capital section of this chapter, in the late 1970's and early 1980's, early entrants formed diverse networks that consisted of a high number of connections involving the transfer of information and knowledge. These connections were not only structurally diverse, they were also geographically diverse. This structure meant that information spread relatively fast across all actors and created an environment in which a joint understanding and collective identity was established by industry participants without them all necessarily needing to know each other, let alone engage in direct conversation with each other. By observing and building on the work of each another, producers were more able to communicate a common explanation of their products to consumers without ever having met each other or formally agreeing on what their identity should be.

It should be noted that when I talk about actors, I am including chefs and retailers who were highly connected to many cheesemakers in the industry and also played a role

in the establishment of legitimacy for this new product category. As Liz Thorpe points out, “It’s the chefs who introduce us to the way we are going to eat.” (2009, p. 220). The emergence of the good food movement in the 1970s was instrumental in the establishment of markets by pioneers such as Laura Chenel (1975), Jennifer Lynn Bice (1978), Mary Keehn (1980), Paula Lambert (1982), and Judy Schad (1982). Because the American public wouldn’t taste, let alone purchase, their products, these women were all forced to adopt business models that relied on selling to restaurants. As more Americans began to holiday in Europe in the 1990s, they were exposed to cheese as a cultural product. More restaurants in the U.S. began offering after-dinner cheese plates to cater to the increased curiosity of their diners. According to Marcia Pelchat, a physiological psychologist at the Monell Chemical Sense Center in Philadelphia, one of the keys to getting people to try new foods is mere exposure, especially in a social setting. "*If someone serves it at a party, or you go to an expensive restaurant, that helps cognitively to make you want to try it again*" (Fulton, 2011). Positioning artisan cheese as a social experience was instrumental in establishing its legitimacy.

The role of institutions

A key theme emerging from my analysis of the U.S. artisan cheese industry is the importance of institutions. The institutional entrepreneurship literature proposes that incentives determined by the quality of economic, political, and legal institutions, significantly affect entrepreneurial entry decisions (Baumol, 1990; Sobel, 2008). Baumol (1990) argues that in any location, “…entrepreneurs are always with us and always play some substantial role…” (p. 894), however whether the entrepreneur invests effort into productive, unproductive, or destructive money-making ventures, is dependent on the

reward structure determined by the quality of local economic, political, and legal institutions at the time. Sobel (2008) tests this hypothesis and finds a positive relationship between institutional structure and economic growth: "good institutions channel effort into productive entrepreneurship, sustaining higher rates of economic growth" (p. 641).

At the outset, no dedicated institutions exist through which pioneers can not only develop specific human capital, but more importantly, connect with each other in order to create a network through which information can be shared and legitimacy for the new industry achieved. Events and associations designed to support mainstream producers may be critical in facilitating these activities for peripheral producers until they are organized enough to create their own institutions. In this study it is clear that institutions such as the American Cheese Society, the American Dairy Goat Association, and the Dairy Sheep Association of North America have been instrumental in providing resources to would-be entrepreneurs and cultivating contacts between cheesemakers. One cheesemaker reported that before she decided to enter the industry, she attended an American Cheese Society conference to get some information: "*I was very, very impressed with the organization and all the people I met and how open and welcoming they were. And I would say that it was probably fairly pivotal in my decision to want to make cheese. You know to have met those people and to like them and feel like these are my people"* (Cheesemaker 7). The first wave of cheesemakers found each other through events such as the Fancy Food Festival and associations such as those listed earlier. Formal education institutions such as the Vermont Institute of Artisan Cheese were instrumental in assisting cheesemakers to create social capital while they were

developing human capital. Many cheesemakers reported having created connections with the people they met in classes or workshops.

As discussed at the end of Chapter 5, the spirit in which the Vermont Cheese Council was set up has meant that cooperation has become part of the collective identity of Vermont cheesemakers. A local cheesemaker who started in 2007 attributes the success of Vermont cheesemakers to the collaboration between them: "*The reason why Vermont cheese is so successful is because there's so much collaboration going on. Cheesemakers have such a great open-door policy. It's like, if you're a cheesemaker, then come in, see what I do, see my operations"* – Kate Turcotte (Barrie & Connor, 2015). In establishing the Vermont Cheese Council, knowledge sharing between cheesemakers was functional in that they had a shared goal of establishing an identity in order to provide legitimacy for their products. This type of cooperative behavior is now an unconscious part of the identity in itself: "*…the open door policy you know? That's who we* [the Vermont Cheese Council] *are.*" (Cheesemaker 20).

Group generalized exchange (Yamagishi & Cook, 1993), and indirect reciprocity (Alexander, 1987) both state that at the group-level expected benefits need not be received directly for members to share information and expertise: the benefit that one participant receives is not directly contingent on the resources he or she gives to another participant. Rather, group members provide resources at some time with the expectation that they will receive some future benefit in turn from a fellow group member. A common perception among Vermont Cheese Council members, is that knowledge will be willingly provided should the need arise. Even relatively new members who have no direct experience of this perceive this to be a benefit of membership. An evolutionary

perspective of network theory states that certain behaviors arise because referent individuals, groups, or organizations use them and thus legitimize them (Smith et al., 1995). These behaviors come to operate as part of a collective identity and as such become motivated by the act in itself rather than by a predetermined outcome as members simply act to maintain the norms of the group (Lockett et al., 2014): "*…they're really doing it, like they're in the cheese room and then they're on the phone. There's a lot of collaboration between those people"* (Cheesemaker 17). The belief of both insiders and outsiders that cooperation is a taken-for-granted characteristic of the Vermont artisanal cheese industry raises the amount of cooperation within the group in itself. A representative from Cabot, a relatively large cheese factory by Vermont standards, comments on the collaboration between themselves and Jasper Hill, a local artisan cheesemaking firm: "*People were scratching their heads. Cabot makes the cheese? And Jasper Hill ages the cheese? And you don't fight about this? For that cheese to win best in show provided validation for everything that Vermont is all about. Not that there's just great cheese coming out of here, but that our whole approach to it is innovative and unique."* (Vermont Sustainable Jobs Fund, 2008).

This shared identity of cooperation as a taken-for-granted characteristic of Vermont cheesemakers isn't unique to Vermont. Doe Run, a creamery established in Pennsylvania in 2010, doesn't make any blue cheeses because a neighboring creamery does. The interviewing journalist comments, "This kind of solidarity and sense of community is wound into every aspect of their processes" (Righteous Cheese, 2015). Cheesemakers located in isolated areas but active in the industry through association membership express the same non-competitive sentiments: "*I see them as my*

competitors, I know they're my competitors, but I don't feel competitive towards them" (Cheesemaker 7).

It is interesting to note that the same pioneers who have been instrumental in setting up these semi-local cheesemakers associations, were also instrumental in establishing the American Cheese Society. These pioneers have garnered a lot of press attesting to the collaborative way in which they created their businesses and 'paved the way' for future cheesemakers. It makes complete sense that these institutions have been set up in the same spirit in which they created and utilized their informal networks. What is potentially even more interesting, is that the semi-local cheesemakers associations set up in later waves by later entrants haven't been able to achieve the same collective identity as those established by the pioneers: "*New York has tried several times to have a guild or a council and it is very difficult because of the monopoly. When I was working for the Vermont Cheese Council, it was not at all unusual for me to get called by half a dozen other states, cheesemakers from other states, in a given season, just about "hey you have that amazing festival, how does that work, what did you do?" "Can I see your bylaws?" There are all of that. Folks trying to organize and trying to figure out a way...."* (Cheesemaker 19). While sourcing cheesemakers for interviews for this study, one president of a semi-local cheesemakers association contacted me to tell me he was advising their members to not take part in the study. His explanation was that he was trying to get them to work together and if my study showed that they weren't, it wouldn't be helpful.

The use of a geographic layout to understand network structure

Despite being geographically dispersed and existing in small numbers, industry pioneers have succeeded in establishing markets for their products, as well as norms and standards, and as a consequence, legitimation, not only for their own products, but for an entire industry. In seeking to develop an increased understanding of how entrepreneurs create and utilize networks in a nascent industry it was therefore important to pay attention to geography. Combining cultural geography, network theory, and industry evolution is still a relatively novel approach for analyzing social networks. Some theoretical frameworks have been developed, e.g., Martin & Sunley, 2011 and Ter Wal & Boschma, 2011, and studies have explored network differences between firms located in economically advantaged and disadvantaged regions, e.g., Huggins, Izushi, & Prokop, 2019 and Laursen, Masciarelli, & Prencipe, 2012, and changes in geographical networks over the evolution of an industry, e.g., Ter Wal, 2013. To the best of my knowledge however, no empirical studies exist that examine geography, networks, and industry evolution together.

As mathematical algorithms have continued to be refined, allowing the formation of new measures that describe different characteristics of networks, it is now possible to not only empirically assess the structure of networks but also the interactions within them and their evolution over time in a more quantitative manner (Ter Wal & Boschma, 2011). Using two different social network analysis software programs I was able to assess structural characteristics of a network such as *clustering* from a geographic perspective, allowing me to gain insight as to changes in the geographic diversity of networks as time progressed. Adopting this research methodology meant that I was able to identify the fact

that actors positioned in the central core of the U.S. artisan cheese industry were largely located in three geographic clusters, being California on the East Coast, Vermont on the West Coast, and Wisconsin. Three tight-knit geographic clusters were also identified representing actors on the periphery of the global network who had developed small, tight-knit local networks. Graphical visuals supported the finding that as time progressed, entrants tended to form connections with actors located geographically close compared to the early days of the industry when actors formed close connections with actors located on the other side of the country. This study therefore acts as empirical support for the theory that geographical proximity is a key driver in how individuals create networks (Cowan, Jonard, & Ozman, 2003). While many studies have explored the role of homophily in these decisions (Ruef et al., 2003), future studies should also pay attention to the role of geography.

Implications for alternative strategies to facilitate rural economic development through entrepreneurship

Gaining an insight into how small to medium sized rural producers create and utilize social networks to assist in the implementation of their diversification idea is relevant and timely for rural communities. Many rural communities have been dependent on agriculture first, and manufacturing second. Declining returns[5], increasing mechanization (Downing, 2018), and larger, more specialized and commercialized farms mean agriculture no longer contributes to the local rural economy in the same way as it did a generation ago, with agricultural profits mostly accruing to investors in corporate

[5] According to the United States Department of Agriculture, National Agricultural Statistics Service, between 2007 and 2017, the prices farmers paid for farm inputs increased more than the prices they received for the agricultural products they sold (National Agricultural Statistics Service, United States Department of Agriculture, 2018).

agribusinesses (Ikerd, 2017). Manufacturing companies relied upon for employment are relocating to urban centers with better infrastructure, larger markets, and a greater pool of specialized and talented labor (Poot, 2012); factors that are becoming increasingly important as agriculture faces competition from low-cost imports and production becomes more complex. A declining population combined with an aging workforce compounds the existing problem of a lack of individuals with the skills and capabilities necessary to create, or supply labor to, businesses that will contribute to economic growth. It is not all bad news however. Globalization has provided increased opportunities for small businesses to be non-local through advances in technology and communication, and to specialize in certain goods or services with large national (and international) firms as their customers. Recognizing this, researchers, economic development agencies, and local governments have explored and implemented numerous programs designed to identify opportunities for local varieties of agri-produce to be grown and incentivize local producers to capitalize on these opportunities (Karlsson, Johansson, & Stough, 2010). Alongside these efforts, regions have implemented programs and institutions designed to foster an entrepreneurial-supportive regional culture (Karlsson et al., 2010; Westlund & Bolton, 2003). For the most part, these economic development programs have not had any measurable effect (Bowen & Song, 2014), and it is unclear whether they attain even the most basic local economic development goals such as job creation (Felsenstein & Persky, 2007). The failure of these programs is due partly to two key problems that to date have been largely either unaddressed or unrecognized by practitioners, politicians, or policymakers.

Firstly, many of these programs are championed by local politicians. The goal of every politician is to get elected (Rubin, 1988) and in terms of activity to be publicly involved in, economic development is the most popular (Petersen, 1981). Mayors often take the lead in promoting economic development and perceive their electoral prospects as being tied to local economic performance. A significant negative relationship has been found between a mayor's margin of victory and the level of engagement in local economic development activity (Reese, 1991): the closer the margin, the higher the engagement. While newly elected officials are aware of the failures of past economic development initiatives, hubris leads them to believe that now they are in power, 'this time will be different' (Rogers, 2013). A combination of hubris and the need for job security in a highly scrutinized position propels both elected officials and practitioners to search for opportunities that can deliver visible success quickly. In fact it is suggested that the "most fundamental problem" in local economic development is that many public officials appear to believe the activities undertaken by them can influence the performance of their economies "to a degree far beyond anything supported by even the most optimistic evidence" (Peters & Fisher, 2004, p. 35). What local politicians fail to recognize (or ignore), is that building an entrepreneurial-supportive community culture requires investment in social relations and social organization over time. Social capital is dependent on structural stability and continuity (Nahapiet & Ghoshal, 1998), but when a program fails to deliver the promised results in a short period of time, it inevitably loses its funding and is discontinued.

Secondly, innovation depends on the provision of opportunities for actors to cultivate their own ideas and actions (Cornett, 2010; Goddard & Jaana, 2008; Kendall,

2013; Lengyel, 2009). Ironically, the relative predictability of routinized and imposed local economic development programs can work to restrain innovation simply because individuals are not empowered to cultivate their own ideas (Boland, 2007). The publicizing of economic development efforts lessens the perception of voters that they need to be responsible for developing opportunities for themselves (Bowen & Kinahan, 2014). A cycle of politicians and other agents promising jobs as political campaign strategies, and the expectation of voters that they deliver on these promises, means that people become less able to see themselves as active participations in shaping their own futures (Bowen & Kinahan, 2014). In time, people develop the expectation that central and local government should devise and implement policies and programs that will remove the uncertainty and instability of the current economic climate (Bowen & Kinahan, 2014). Individuals become entrapped, believing themselves to have limited options, and come to focus on perceived constraints rather than freedom (Pawson & Le Heron, 2005). Once this mood has influenced local culture, it becomes very hard to shift (Tibi, 2009). Research investigating the developmental process of nascent entrepreneurs suggests that focusing on structural relationships between relevant actors is a more promising focus for national and regional governments than the implementation of programs designed to incentivize specific entrepreneurial activity (Davidsson & Honig, 2003).

An increased understanding of how innovative entrepreneurs create and utilize entrepreneurial supportive network is important for geographically isolated entrepreneurs living in rural areas, including small to medium sized producers looking to create sustainable livelihoods through diversification. In that the U.S. economy is the sum of its

individual geographic parts, the ability of rural communities to provide economic opportunities and jobs for the people that live there is not only important for rural regions, but for the country as a whole. This study is relevant and timely for rural communities in the U.S. facing a predicted decline (and in some cases stagnation) in population, ever-increasing shortages in skilled labor, and an aging workforce. Previous research identifies rural communities as having additional constraints to their urban counterparts, however innovative, motivated, and dedicated producers stand to benefit from increased opportunities offered through globalization, increasing demand for local and specialised agri-food produce, and advances in technology. The building of a supportive entrepreneurial culture is a long-term exercise. One policy recommendation is to shift policy focus from diversification of the farm business to pluriactivity (Blad, 2015) within the farm household, encouraging farm households to search for innovative business opportunities outside of a somewhat traditional agricultural sector.

This study has highlighted the importance of institutions for local economic growth such as formal education institutions that assist in the development of specific human capital required for entry into a nascent industry. These institutions also act as facilitators of network creation in that would-be entrepreneurs form connections with other people in the classes and workshops. These connections are vital for assisting entrepreneurs to create diverse networks capable of fulfilling idiosyncratic needs such as specific technical advice regarding product quality improvement. In the early stages of a nascent industry these types of institutions and associations have yet to exist however events and associations that are closely related or exist to support mainstream producers can act as vehicles through which geographically dispersed industry pioneers become

aware of each other. In addition, facilitating the development of social capital between different social groups such as full- and part-time farmers, and urban entrepreneurs, can also stimulate entrepreneurial activity. Focusing on facilitating the creation of structural relationships between relevant actors is a more promising focus for national and regional governments than the implementation of programs designed to incentivize specific entrepreneurial activity (Davidsson & Honig, 2003).

Implications for studying the changing structure and role of entrepreneur networks in nascent industries

My study follows previous conceptualizations of social capital and networks as a relevant component in entrepreneurial startups (Abell et al., 2001; Adler & Kwon, 2002; Burt, 2000; Jun Wang & Hwang, 2018; Kim, 2018), especially within a rural context (Laukkanen & Niittykangas, 2003; Meccheri & Pelloni, 2006; Ronning, 2009; Ronning et al., 2010; Shields, 2005). This study has highlighted important gender differences in the structure and role of social networks. While there is existing literature investigating these differences, e.g., Neumeyer et al. (2018), to the best of my knowledge no empirical studies exist that specifically examine gender differences in network structure together with industry evolution. The U.S. artisan cheese industry reportedly stands "as an obvious if undersung exemplar of the ultimate matriarchal workplace" (Jacobs, 2017), and I find women in this industry as being more likely to have a high number of connections that involve the development of human capital. Therefore, mentorship relationships are a valuable path to further explore changes in network structure and role as an industry progresses. A possible industry for comparison is the cooking industry, historically dominated by male chefs adopting a top-down, autocratic approach to running their kitchens. In contrast, female chefs located in Northern California in the

mid-1980s adopted a more collaborative approach. They mentored and promoted other women, giving them important positions within their kitchen and abandoning the hierarchical tiles associated with the male run kitchens. In 1993 a group of these women founded Women Chefs and Restaurateurs, an organization dedicated to promoting the advance of women in the restaurant industry. Less than a handful of men were associated with the newer Californian restaurants which became largely a "woman-run food community" (Goldstein, 2013, p. 1976). Eventually the collaborative kitchen model extended to male chefs and today more and more men are beginning to organize their kitchens in this manner, reporting that the collective style allows them to continuously evolve and achieve higher standards (Goldstein, 2013). In recent years there has been a surge in the number of female owned restaurants and the fact that these years have also seen an increase in female empowerment, a study of the creation and role of networks in this industry would be opportune given its similarity to the social environment of the 70s in which the pioneer 'goat ladies' report being buoyed by a rise in female empowerment.

In addition, my choices with respect to research design and methodology provided a bridge between studies on social networks and geography. Given that the combining of these two methods is still at an early stage, my approach offered empirical insights to develop a framework for exploring diffusion that combines visual graphs, quantitative data, and qualitative evidence to provide further insight.

Study limitations

This empirical study should be interpreted in the context of its limitations. First, while the setting of the U.S. artisan cheese industry resembles many other cases of entrepreneurial transition in diversification efforts of producers such as agri-tourism,

organic farming, and grass-fed beef, as well as hobbyist industries such as beer, board-games, and knitting, the case study approach limits the ability to generalize results to other industries. It is feasible that the U.S. artisan cheese industry has a unique culture given the environment in which it was re-energized in the late 70s and early 80s. Interviews conducted with three Canadian artisan cheesemakers (not included in this study) describe a much more individualistic industry in which cheesemakers in the same geographic area have no interaction with each other. Observation and informal conversations with New Zealand artisan cheesemakers suggest a highly competitive environment in which some cheesemakers actively try to sabotage the efforts of others. Thus there is a need for further replication of this research design in other contexts.

Second, the 26 interviews conducted by myself within this study were conducted in order to identify general themes that were then investigated in more detail via a larger pool of participants. The data collected in relation to this wider pool of participants was not consistent and it is highly likely that there are connections between cheesemakers that are missing from this network. While every attempt was made to limit this possibility, the data was sourced from interviews that in most cases weren't designed to question the actor about how they created and utilized their social networks. Therefore the data includes only the connections that each actor talks about within their interview. In future studies, a survey should be sent out to all actors in the sample asking inviting them to share this specific information.

Finally, placing a financial value on the benefits of diverse versus tight-knit networks can be a subjective process, therefore this study has not attempted to undertake such a task.

Chapter 8 – Conclusion

The purpose of this study was to gain insight into how entrepreneurs, including existing rural producers with innovative ideas for diversification, create and utilize entrepreneurial-supportive social networks as they transition their idea into a sustainable and profitable business. I set out to explore the relationship between innovation, diverse networks, and geographic culture in order to identify whether innovative entrepreneurs in entrepreneurial-supportive communities have different structural networks than those in entrepreneurial-inhibitive communities, and the role of diverse networks in both situations. While I didn't find any relationship between entrepreneurial-supportive or –inhibitive communities and innovation, I have provided a contextually-based increased understanding of how the structure and role of entrepreneur networks changes as an industry evolves.

In this mixed-methods study, conducted in the U.S. artisan cheese industry, I find that in the early stages of a nascent industry, entrepreneurs create and utilize networks mainly for the development of human capital. Diverse networks provide the greatest payoff for entrepreneurs in terms of the volume of information and these networks also function to create legitimacy for a new product category in that information is more likely to reach all actors in the network faster. In the later stages, once legitimacy has been established, entrepreneurs are more likely to focus on growing market share than investing resources into cooperative information sharing. Growth-focused entrepreneurs with a strategy of increasing quality continue to create new connections, the role of which is to fulfil idiosyncratic needs unable to be fulfilled by other sources such as resources designed to develop general human capital. Entrepreneurs focused on growing market

share through increased marketing rather than quality are more likely to join local associations but maintain small, tight-knit networks.

I also find gender differences in network structure and role. In the context of the U.S. artisan cheese industry, women are more likely to influence other network members through maintaining a high number of quality connections in which information is transferred one-to-one. Men are more likely to influence other members by spanning structural holes between groups, thus gaining early access to new information, and monitoring and controlling the flow of information throughout the network.

Finally, I began this study from the approach that individuals who transition their idea into a business have structurally distinct networks (Abell et al., 2001). In other words, the difference is what most people believe it to be: it's not what you know, it's who you know. This may be true in the early stages of an industry. However, as an industry evolves, what you know comes before who you know. Entrepreneurs are unlikely to gain access to the knowledge and expertise held by network members until they have developed the necessary technical skills and know-how to prove to network members they are serious about implementing their business idea.

To conclude this study, I end with a quote from one of the cheesemakers I interviewed that embodies the motivation, relevance, and importance of this study and the concerns of many of the entrepreneurs I have met over the last couple of years: "*What's the future of artisanal cheese? Is there a future? I fret about this a lot actually, wondering whether artisanal cheese can be economically sustainable. Because there are companies that I look to that are sort of my heroes and what I hear from them is that they aren't really economically sustainable, you know what I mean? And that's distressing in*

the sense that if we're doing this and we can't be here for the long term and we can't provide a base of economic security for our employees and a sense that we can be here for the long-term for our community, then I feel kind of like I'm cheating people, do you know what I mean?" (Cheesemaker 7).

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Appendix I

Interview questions

1. Tell me about how you came to be in the cheesemaking industry? - Follow-up to include: any agricultural background, family influence, formal or informal training.
2. Are you a member of any local/national/international cheesemaking organizations? If yes:
    a. How did you come to be a member?
    b. What benefits do you get from membership?
    c. Can you tell me how the group was founded? Any persons in particular led the way? Any non-creamery leaders?
    d. What would you like the future of the group to be? Why?
3. How is your creamery similar to other creameries in this area?
4. How is it different?
5. What attracts visitors to the creameries in this area?
6. How important is your professional network to the success of your business?
7. How do you use it (technical advice, business or marketing ideas, finding customers or suppliers for example)?
8. How important are trade groups, membership group events, other food events and celebrations, tastings, cheese competitions to your business?
9. Do you think you are typical of cheese makers in this region?
10. If my research project could answer one question for YOU, what would it be?

Appendix II

Survey questions

During the past three years, did you engage a third party for any of the following? (Please check all that apply.)

- ☐ Audit/inspection/advice related to the manufacturing facility
- ☐ Audit/inspection/advice related to manufacturing practices
- ☐ Audit/inspection/advice related to food safety practices
- ☐ Advice related to artisanal, farmstead, or specialty cheesemaking methods
- ☐ Advice related to distribution channels
- ☐ Advice related to marketing
- ☐ Advice related to milk or equipment suppliers
- ☐ Advice related to human resources
- ☐ Other (please specify)

Was this service or advice provided by another cheese producer?

	Yes	No
Audit/inspection/advice related to the manufacturing facility	○	○
Audit/inspection/advice related to manufacturing practices	○	○
Audit/inspection/advice related to food safety practices	○	○
Advice related to artisanal, farmstead, or specialty cheesemaking methods	○	○
Advice related to distribution channels	○	○
Advice related to marketing	○	○
Advice related to milk or equipment suppliers	○	○
Advice related to human resources	○	○
Other (please specify) _____	○	○

Is your business a current member of the American Cheese Society?

- ○ Yes
- ○ No

Please indicate the ways in which ACS membership benefits your business. (Select all that apply.)

- [ ] Access to food safety resources
- [ ] Access to training
- [ ] Access to funding for training
- [ ] Access to funding for participating in competitions
- [ ] Access to knowledge and expertise of other members
- [ ] Advocacy on behalf of cheesemakers
- [ ] A sense of community
- [ ] Opportunities to meet like-minded people
- [ ] Opportunities to identify potential collaborators
- [ ] Marketing and promotion of our business in the media
- [ ] Marketing and promotion of our business at events
- [ ] Other, please specify

_____

- [ ] I'm not aware of any benefits

Is your business a current member of a state, regional, or local cheese council or guild?

- ○ Yes
- ○ No

Please indicate the ways in which membership of this council or guild benefits your business. (Select all that apply.)

- [ ] Access to food safety resources
- [ ] Access to training
- [ ] Access to funding for training
- [ ] Access to funding for participating in competitions
- [ ] Access to knowledge and expertise of other members
- [ ] Advocacy on behalf of local cheesemakers
- [ ] A sense of community
- [ ] Opportunities to meet like-minded people
- [ ] Opportunities to identify potential collaborators
- [ ] Marketing and promotion of our business in the media
- [ ] Marketing and promotion of our business at events
- [ ] Other, please specify

_____

- [ ] I'm not aware of any benefits

Please indicate the extent to which you agree or disagree with the following statements.

	Strongly agree	Agree	Disagree	Strongly disagree
Growing consumer interest in U.S.-produced artisanal, farmstead, and specialty cheese is important for my business.	○	○	○	○
Sharing knowledge or resources with other cheesemakers enables me to improve the quality of my cheese products.	○	○	○	○
Sharing knowledge or resources with other cheesemakers is important for the survival of my business.	○	○	○	○
I share knowledge or resources with other cheesemakers as long as they also share knowledge or resources with me.	○	○	○	○
A reputation for sharing knowledge or resources with other cheesemakers benefits my business.	○	○	○	○

	Strongly agree	Agree	Disagree	Strongly disagree
The quality of artisanal, farmstead, and specialty cheese produced in the U.S. will improve if we (as producers) share our knowledge or resources with each other.	○	○	○	○
Sharing knowledge or resources with other cheesemakers helps each of us achieve more together than we could separately.	○	○	○	○
Sharing knowledge or resources with each other is an integral part of who we are as U.S. cheesemakers.	○	○	○	○
There is room for all U.S. artisanal, farmstead, and specialty cheesemakers to increase their sales.	○	○	○	○
The competition in this industry is increasing.	○	○	○	○

Vita

Annette Kendall was born and raised in New Zealand and moved to the United States in August 2015 to undertake her PhD degree. Annette comes from an industry background and has been employed in a number of management roles in a variety of industries before starting her own consultancy business assistant start-ups and entrepreneurs in rural areas. She also consulted to economic development agencies in New Zealand. Since coming to the U.S. Annette has been teaching under-graduate courses in entrepreneurship, strategy, and macro-economics and plans to continue her career in academia.

Annette's husband and 19 year old son live with her in Columbia, Missouri and her son looks forward to studying architecture at the University of Missouri-Columbia in Fall of 2019. When she is not working, Annette enjoys music and theatre, having acted in and directed a number of plays since she was ten years old.