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Good as Gold: The Marin-Sonoma Artisan Cheese Cluster

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by

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Abstract

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The overall economic performance of rural communities across the United States is challenged by shifting patterns of production, consumption, and global competition. Recent research has identified clusters - geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementaries - as a prominent feature of successful rural economies. This dissertation explores the emergence of an artisan cheese cluster from historic dairy roots in Marin and Sonoma Counties in the North Coast region of California. The artisan and farmstead cheese producers there provide an instructive case study to assess the social, cultural, and economic impacts of the artisan cheese clusters generally. Michael Porter's (1990) "Diamond Model of Competitive Advantage" is utilized as an analytic framework to consider factors that provided competitive advantages during various historical periods before and during the emergence of the cluster, as well as to assess its current business environment. The viability of encouraging such artisan cheese clusters in other rural regions as an economic development strategy is evaluated based on these findings.

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

1. Introduction

Simply put, clusters—such as the Silicon Valley technology cluster or the Vermont cheese making cluster—represent an antidote to the nation's recent economic malaise.
~M. Muro & B. Katz, Brookings Institute, 2010

Our nation's rural landscapes and communities have long been recognized for their rich potential to produce food and fiber, as well as income and employment. United States' (U.S.) economic and farm policy relies on these rural landscapes and communities to respond to challenges to produce healthier foods, advanced biofuels and other sources of alternative energy, to compete in global markets, and to battle global warming. However, in an era of global competition and economic restructuring, many rural U.S. communities are struggling. Despite significant efforts to boost rural regions through a variety of programs and policies, the overall economic performance of rural areas is lagging that of urban areas. Policy makers and practitioners, guided by recent research that identifies clusters as a prominent feature of successful economies, are increasingly turning to cluster-based economic development strategies to address this gap (Brasier et al., 2007; Goetz, Deller, & Harris, 2009; Porter, Ketels, Miller, & Bryden, 2004). For purposes of this study, a cluster is defined as a "geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementaries" (Porter, 2000c, p. 8). Previous studies identify numerous benefits communities and regions derive from clusters, including job growth, higher wages, an increase in worker training programs, and other positive social, environmental, and cultural impacts (Brasier et al., 2007).

Clusters are not a new part of the economic landscape. Geographic concentrations of firms and companies in particular industries date back hundreds of years. Marshall (1920a) is generally cited in relevant literature as the first to acknowledge the benefits of clusters, termed "industrial agglomeration" in his work that associated geographic proximity of firms with improvements in productivity (von Hofe & Chen, 2006). While agglomeration has traditionally been seen as an urban phenomenon (Ottaviano & Thisse, 2003), more recent work (Conley & Udry, 2010; Deller & Williams, 2011; Feser & Isserman 2005; Porter et al., 2004) has focused on clusters in rural regions – which for purposes of this analysis are defined as areas that are not part of an urban area as defined by the United States Census Bureau.[1]

A 2004 study by Harvard Business School's Institute for Strategy and Competitiveness (Porter et al., 2004) finds evidence of industry clusters in rural areas, particularly in those adjacent to metropolitan counties. The U.S. Economic Development Administration funded report, entitled "Competitiveness in Rural U.S. Regions: Learning and Research Agenda" examines the incidence of rural clusters, viewing them through a lens of economic outcomes such as job growth, formation of new firms and enterprises, and increased competitiveness. The authors hold that spatial proximity of businesses creates a favorable environment for economic

[1] The Census Bureau's urban-rural classification is fundamentally a delineation of geographical areas, identifying both individual urban areas and the rural areas of the nation. The Census Bureau's urban areas represent densely developed territory, and encompass residential, commercial, and other non-residential urban land uses. The Census Bureau delineates urban areas after each decennial census by applying specified criteria to decennial census and other data. The Census Bureau identifies two types of urban areas:
•Urbanized Areas (UAs) of 50,000 or more people;
•Urban Clusters (UCs) of at least 2,500 and less than 50,000 people.
"Rural" encompasses all population, housing, and territory not included within an urban area.

growth. Porter et al. note that viewing regional economies in terms of clusters is central to understanding the competitiveness of rural areas and how it can be improved.

The substantial heterogeneity of economic performance among rural regions is widely recognized in the literature (Deller & Williams, 2011; Feser & Isserman, 2005; Porter et al., 2004). Various classification systems for rural regions, based on factors such as population density, proximity to cities or more urban areas, or primary economic activity, have been created to capture these differences. There is however a dearth of research on how clusters in the agricultural sector interact (or do not) with regional economies (Braiser et al., 2007; Deller, 2004). This dissertation seeks to extend the research in this area.

Agriculture is itself a heterogeneous sector, and the challenges and opportunities faced by large, export-focused farms are very different than those encountered by small farms located close to large cities and/or selling into local markets. The diversity of rural America's agricultural sector is nowhere more apparent, and relevant, than in California.[2] While the state's complex agricultural sector produces products valued at over $43 billion annually,[3] the direct impact of the entire California Agricultural Value Chain[4] – the multiple industry clusters involved in the support, production, processing, packaging, and distribution of agricultural products – is over $344 billion each year.[5] The dairy sector, as the highest-grossing agricultural product in California, is of particular importance to the California rural economy, and faces unique challenges as local food systems are developed to meet the growing demand for organic, specialty, or premium foods.

Porter et al. (2004) note that while there is widespread agreement on the importance of cluster thinking in rural economic development, there is still no rich understanding of the composition and evolution of rural economies at the industry cluster level, and little comprehensive evidence on the success of regional, state, and local rural cluster initiatives. Braiser et al. (2007) and others (NGA, 2002; Porter et al., 2004) observe that economic clusters are increasingly seen by economic developers and policy makers as key to the creation and exploitation of regional innovation and competitiveness, leading to a growing emphasis on the development of clusters as an economic development strategy. A better understanding of the factors that contribute to the success or lack of success of California's rural agro-foods clusters would be constructive from a local, regional and a national perspective. Data demonstrating the presence, characteristics, and beneficial aspects of an agro-foods cluster will be useful in assessing the potential of such clusters to catalyze economic growth, as well as to determine whether the cluster model should be pursued as a strategy to achieve economic performance in

[2] Kuminoff, Sumner, and Goldman (2000), using data from the Census of Agriculture, (U.S. Department of Agriculture, 2002), report "California agriculture is far larger, measured by sales, than that of any other state. California agriculture produces more value than most countries and is larger than, for example, such major agricultural producers as Canada or Australia" (p. 26).

[3] The 2011 California Department of Food and Agriculture (CDFA) Agricultural Production Statistics report notes the state's 81,500 farms and ranches received a record $43.5 billion for their output last year, up from the $38 billion reached during 2010. California remained the number one state in cash farm receipts with 11.6 percent of the US total. The state accounted for 15 percent of national receipts for crops and 7.4 percent of the US revenue for livestock and livestock products.

[4] Michael Porter introduced the term "value chain" in his 1985 classic business management book, *Competitive Advantage: Creating and Sustaining Superior Performance*. Porter notes that the activities every firm performs to design, produce, market, deliver, and support its product can be represents using a "value chain".

[5] As reported in the California Community Colleges Chancellor's Office Center of Excellence Environmental Scan of Agricultural Value Chain, California. June 2011.

rural regions.[6] The implication for communities, business owners, and rural development policy makers is that such data would encourage development of conditions, investments, and incentives supportive of locally anchored clusters.

This research explores the agro-foods cluster emerging from historic dairy roots in Marin and Sonoma Counties in the North Coast region of California. While the changing structure of the California and the U.S. dairy industry contributes to doubts about the viability of the "local" dairy farm in these areas, the artisan and farmstead cheese industry is "thriving" in this region (Rilla, 2011).[7] Industry consolidation (the move to fewer and larger dairy farms) and industry concentration (the extent to which fewer businesses control sales) are increasing rapidly. At the same time, consumer demand for value-added dairy products, particularly artisan and farmstead cheese is growing. Innovative farmers have shifted from commodity dairy operations to new specialty products, including artisan and farmstead cheeses—specialty cheeses produced in small batches, with particular attention paid to the tradition of the cheese maker's art.

There is a recognized geographic concentration of artisan and farmstead cheese producers in Sonoma and Marin Counties. The California Department of Food and Agriculture (CDFA) identifies 26 such businesses in the North Coast region; this is more than half of California's forty-three artisan and farmstead cheese companies (See Figure 1).[8] Of these, nineteen are located in Sonoma County, and seven are located in Marin County.

[6] The economic cluster model, represents a synergy, a dynamic relationship, and a network between not only the companies that comprise a cluster but also the successful partnering of the stakeholders. Government, education, and other supporting organizations vital to regions economic success represents these stakeholders. Policy makers and economic development professionals consider fostering cluster development as building blocks of regional economies.

[7] In order for a cheese to be classified as "farmstead," as defined by the American Cheese Society, the cheese must be made with milk from the farmer's own herd, or flock, on the farm where the animals are raised. Milk used in the production of farmstead cheeses may not be obtained from any outside source. Farmstead cheeses may be made from all types of milk and may include various flavorings.

[8] The California Department of Food and Agriculture (CDFA) lists 19 artisanal cheese makers in Sonoma County and 7 in Marin County as of April 13, 2013. These numbers are also included on the California Cheese Trail (2013) organization website.

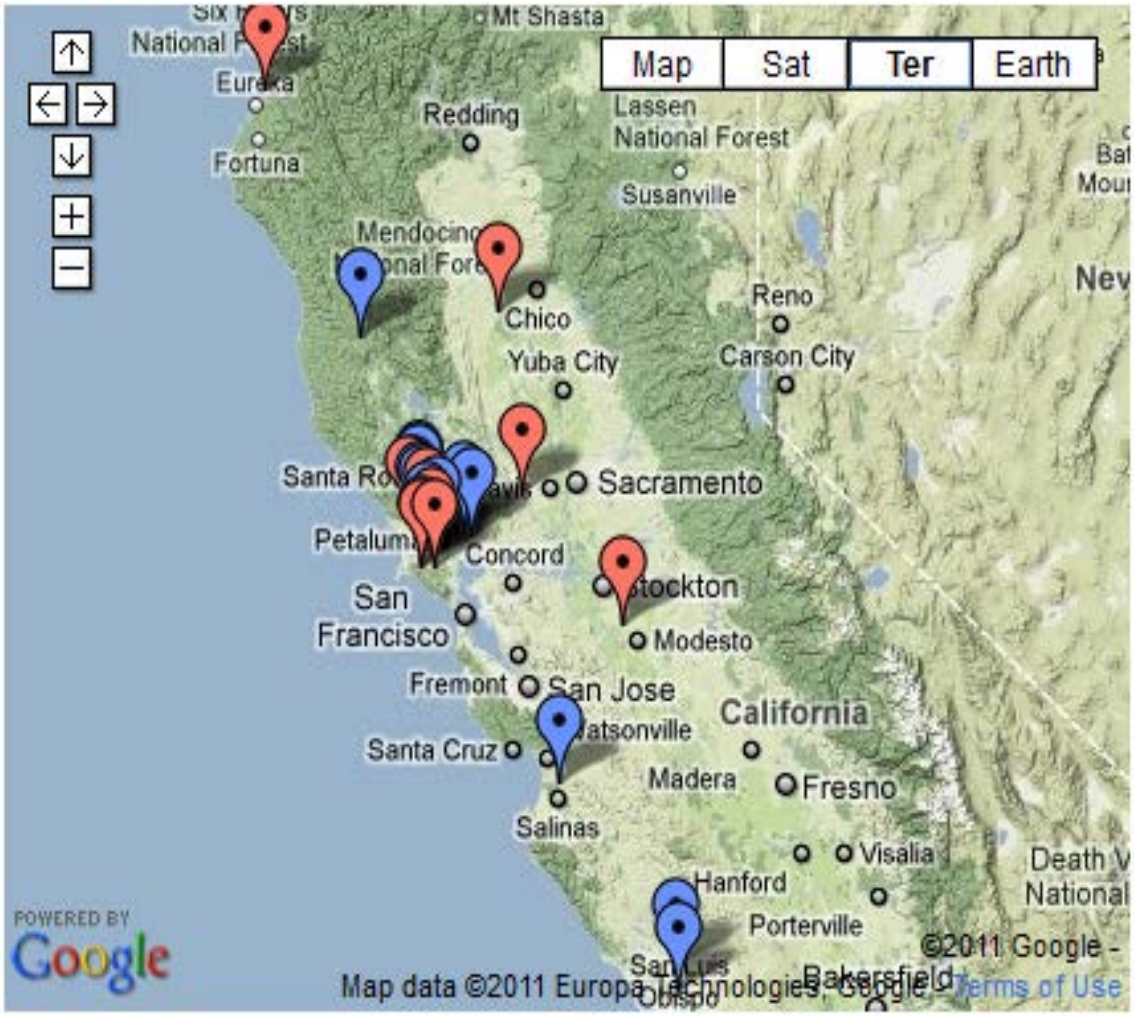

Figure 1. Map of Artisan Cheese Companies in California. Adapted from "CACG Cheesemaker Member Map," by California Artisan Cheese Guild, 2013, *California Artisan Cheese Guild*. Copyright 2013 California Artisan Cheese Guild.

In this dissertation, I use the artisan and farmstead cheese producers of Marin and Sonoma Counties as a case study to assess the social, cultural, and economic impacts of the artisan cheese cluster in this region.[9] This project seeks to develop data characteristic of this cluster, and explore the viability of encouraging such cheese clusters in other rural regions as an economic development strategy.

The word "artisan" comes from the Italian, where *artigiano* translates as "artist," particularly in relation to handcrafted skill. When applied to cheese—where it lacks any legal definition with labeling or certification requirements—it maintains that handcrafted connotation. The parameters used to discuss these types of specialty cheeses are based on characteristics outlined by the American Cheese Society (ACS) in their Cheese Glossary (2011). The ACS designates small volume, superior quality cheese as "specialty" cheese, using the terms

[9] Researcher Robert K. Yin (1994) defines the case study research method as an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used (p. 23).

"artisan" and "farmstead" to refer to the type of production scenario under which the cheese is made. Specialty cheese is defined as a cheese of limited production, with particular attention paid to natural flavor and texture profiles. Specialty cheeses may be made from all types of milk (cow, sheep, and goat) and may include flavorings, such as herbs, spices, fruits and nuts. The word "artisan" or "artisan" implies that a cheese is produced primarily by hand, in small batches, with particular attention paid to the tradition of the cheese maker's art. Farmstead cheeses may also be hand-made, or artisan, but the ACS notes they must also be made with milk from the farmer's own herd, or flock, on the farm where the animals are raised. Both artisan and farmstead designations are meant to convey heightened product quality and uniqueness, allowing for a price premium above that of standard commodity cheese.

My research is shaped by a strong interest in regional economic development programs and policies. This has grown from my experience with business and community development efforts in a number of rural areas of the Western United States. In my work, I have seen the complexity and interrelatedness of issues that impact economic performance of rural firms, industries, and regions, and the challenge of creating effective policies and a productive economy.

1.1 Outline of the Dissertation

I begin Chapter 2 with a review of the literature associated with the cluster concept. In this chapter, I survey the various benefits and advantages attributed to clusters, and examine the conceptual foundations of the cluster approach within an economic development framework. I briefly review economic theories that relate to the cluster concept. Given the strong response accorded to Porter in much of the business community and academic literature (Martin & Sunley, 2003), I characterize Porter's concept of clusters against the backdrop of related concepts, including:

1. Marshall's (1926) notion of the "localized industry",
2. industrial-complex economics,
3. agglomeration economies
4. networks
5. terroir

In this Chapter, I also introduce Michael Porter's (1990) widely-used "Diamond Model of Competitive Advantage". In subsequent chapters, the Diamond model will be utilized as an analytical tool to consider factors that provided competitive advantages during various historical periods, as well as to assess the current business environment of the Marin-Sonoma artisan cheese cluster. The so-called "Diamond Tool" includes four elements that interact in their impact on individual companies and clusters:

- The context for strategy and rivalry (e.g., taxation structure, competition laws, and the strategies of competing local companies);
- Factor conditions (e.g., physical infrastructure, skills, etc.);
- Demand conditions (e.g., sophistication and number of local customers, product and consumer regulation);
- The presence of related and supporting industries (e.g., the cluster breadth and depth).

I will assess the historic and current impact and interplay of these four elements on the Marin-Sonoma cheese industry.

In Chapter 3, I situate the Marin and Sonoma County artisan cheese industry in the broader historical context of the California dairy industry. I consider the myriad of factors that contributed to the development of the pasture-based dairy farms located in this region, as well as dynamics that have resulted in persistence of these farms despite the advance of the "dry-lot" or large scale concentrated animal feeding operation (CAFO)[10] dairy farms, predominately located in California's Central Valley, that are now responsible for most of the milk and milk-products produced in California. I explore the role of the existing and emerging artisan and farmstead cheese cluster in preserving dairying in this North Bay region, as well as the factors driving growth of the artisan cheese industry within and outside the cluster

[10] APO and CAFO are designations given by The United States Environmental Association (EPA) to describe an animal agricultural facility that has a potential pollution profile (EPA, 2012). Animal Feeding Operation (AFOs) are agricultural operations where animals are kept and raised in confined situations. AFOs congregate animals, feed, manure and urine, dead animals, and production operations on a small land area. Feed is brought to the animals rather than the animals grazing or otherwise seeking feed in pastures, fields, or on rangeland. Concentrated Animal Feeding Operations (CAFOs) are animal feeding operation (AFOs) that (a) confines animals for more than 45 days during a growing season, (b) in an area that does not produce vegetation, (c) meets certain size thresholds, and (d) and the facility discharges to waters of the United States (WUS). The EPA defines "Dry lot" as open lot that may be covered with concrete, but that has no vegetative cover.

In Chapter 4, I focus on the current state of the Marin-Sonoma artisan cheese cluster. I present a diagram of the cluster to illustrate the horizontal and vertical linkages across industries and institutions that are characteristic of clusters generally, and discuss agent's specific to the Marin-Sonoma artisan cheese cluster. I highlight the relationships and interactions between the firms and institutions that participate in the cluster.

In Chapter 5, I apply the "Diamond Model" to evaluate the Marin-Sonoma artisan cheese cluster after 2000. Of particular interest is what the cluster perspective contributes to an understanding of the competitiveness and organization of the California's North Bay artisan cheese industry. The overarching question guiding this research is whether Porter's (1990) cluster-perspective yields practical insights that can help actors in the artisan cheese industry maximize the likelihood of success, particularly in rural California regions.

Chapter 6 offers insights developed through the case study. It addresses the implications of cluster-perspective for policy making and collective action, and suggests further areas for academic research.

Methods

Two primary data gathering approaches were utilized: document review and interviews with key actors. Document review facilitated understanding how various regional policies and activities inform the evolution of this cluster. In addition to published accounts of the California and North Coast dairy industry, this analysis used data amassed from the websites and publications of various interest groups, government agencies, press coverage, and relevant journal articles.

Multiple key informants were identified through research and discussions with key individuals working in the agro-foods industry at the local, regional, and state level. Selection of these individuals was based on their knowledge of the artisan and farmstead cheese industry, their position within the firm and cluster, and their years of experience (or lack thereof) in the industry. Dairy farmers, cheese makers, customers, institutional support personnel, policymakers, economic development experts, and intermediaries affiliated with the industry were interviewed, reflecting the diverse groups of interests involved in the artisan and farmstead cheese industry. These actors were the main "units of observation"; interviews with them provided much of the actual data for analysis.

2. Clusters

Clusters represent a new way of thinking about national, state, and local economies, and they necessitate new roles for companies, government, and other institutions in enhancing competitiveness.
~Michael E. Porter, 2000c, p. 16

The concept of clusters of related businesses dates back to Alfred Marshall's 1890 work investigating the concentration of specialized trades in certain localities. Over the course of the last two decades, geographers and economists and scholars in related fields have refined Marshall's cluster concept (e.g., Deller, 2009; Enright, 2003; Greenstone et al., 2010; Ketels et al., 2008; Krugman, 1991; Porter, 1998a; Rosenfeld, 1997; Storper, 1989). While a review of the literature reveals no consensus among scholars on cluster definition, Michael Porter's (1990, 1998a, 1998b) work has strongly influenced the understanding of the cluster concept among scholars and practitioners and has defined the standard theme in the field (Martin & Sunley, 2003). For the purposes of this study, "A cluster is a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementaries" (Porter, 2000b, p.8).

A large body of research suggests that clusters matter both for innovation and economic prosperity of regions and firms (Ketels et al., 2008). The benefits of proximity—both in terms of geography and of activities—are ultimately reflected in gains that occur due to location-specific externalities. Ketels et al. note these externalities include access to specialized human resources and suppliers, knowledge spillovers, pressure for higher performance in head-to-head competition, and learning from close interactions with suppliers and customers. Saxenian (1996) described this phenomenon in her work detailing the origins of the Silicon Valley cluster, where firms locate close to each other to learn and to speed their rate of innovation.

2.1 Explanations of Geographic Concentrations of Businesses

While there is a long history of economic research regarding the geographic concentration of related businesses in urban areas, the literature concerned with the spatial organization of rural businesses is sparse. The concept of "cluster" in the agricultural sector is perhaps best appreciated by briefly reviewing several underlying theories that contribute to the explanation of the origin and persistence of clusters. These include conventional explanations of spatial concentrations of firms, such as (i) Marshall's (1920) ideas about "localized industry", (ii) industrial-complex economics, and (iii) agglomeration economics, as well as literature that addresses the theory of (iv) networks, and notions of (v) *terroir*.

2.2 "Localized Industries"

The concept of "Localized Industries" was first addressed by Marshall (1920/1979) in "The Concentration of Specialized Industries in Particular Localities". Marshall calls an industry that is concentrated in "certain localities" a "localized industry" and considers the causes of concentration as well as the reasons for persistence in that location over time. He finds the chief causes for an industry to concentrate at a certain location are, "physical conditions, such as the character of the climate and the soil, the existence of mines and quarries in the neighborhood, or within easy access by land and water." (p. 223). He also notes "the patronage of a court"[11] as a

[11] Mueller, Sumner, and Lapsley (2006) note that "today we would probably speak of "regional policy" rather than "patronage of the courts" (p. 3).

factor "that may have determined whether any particular industry flourished in any one town" (p. 224).

Marshall (1920/1979) suggests that the reasons for an industry to flourish and persist in an area where it is concentrated are more complex than the causes that bring the concentration about. In discussing the demystification of the trade skills and knowledge that occur when a skilled workforce is spatially concentrated, he notes "The mysteries of the trade become no mysteries; but are as it were in the air, and children learn many of them unconsciously," and goes on to note "inventions and improvements in machinery, in processes and the general organization of the business have their merits promptly discussed" (p. 225). Moreover, subsidiary industries spring up "devoting themselves each to one small branch of the process of production, and working for great many of their neighbors" (p. 225). Finally, the localized industry benefits from offering a "constant market for skill" and from the "convenience of the customer."

2.3 Industrial Complexes

Industrial complexes are groups of firms that maintain stable trade relationships with each other, and these trade relationships govern their decisions about where to locate (Gordon & McCann, 2000). The key economic variables determining the choice of location are transport costs and transaction costs. No other costs are usually considered in industrial complex explanations of clusters. Membership in an industrial complex is open to all and the benefits of clustering are mediated through anonymous markets (Mueller et al., 2006). Industrial complex theory could explain the co-location of dairies and cheese making in California's North Coast artisan cheese cluster. From a technological point of view, cheese does not have to be made in close proximity to where the animals produce milk, but it minimizes the transport and transaction costs.

2.4 Agglomerations

Agglomeration economics, rooted in Marshall's (1926) work, recognizes that firms that are part of agglomerations benefit from close geographic proximity. Like industrial complexes, agglomerations are assumed to be open to entry, with inter-firm relationships fluid rather than necessarily specific and enduring. Greenstone et al. (2010) identify several aspects that affect agglomeration: the size of the labor market, local services and local intermediate goods, knowledge spillovers, local amenities, and natural advantages and production amenities. Mueller and Sumner (2006) note that agglomeration theory recognizes benefits that are ignored by industrial complex economics, including:

1. Because of a larger pool of specialized inputs firms can react more flexibly to changes in demand.
2. Economies of scale can be realized in the use of investments in public goods, including investment in advertising and research.
3. Firms may be better informed about market conditions, and;
4. Innovative products and production processes may spread more quickly when information does not have to travel far.

A number of characteristics of the North Coast artisan cheese cluster conform to the agglomeration model. The highly specialized input suppliers—from milk suppliers to producers to marketing groups—are co-located in the area. Cheese mongers and membership organizations

(e.g. California Artisan Cheese Guild) keep the cluster informed on market trends.[12] Numerous organizations (e.g. the University of California, the Marin Convention and Visitors Bureau) provide information related to new technologies, marketing, etc.

2.5 Networks

Localized industries, agglomerations, and industrial complex theories deal with general relationships between firms—identities of the actors and mechanisms by which information flows within the cluster does not matter. Network theory adds specificity to the cluster concept. Network theory requires that the relationship and connection between agents—people, firms, or organizations—are made explicit. Linkages may be of many types; some may be physical (i.e. telephone connection) or metaphorical (i.e. interpersonal relationships). Mueller, Sumner, and Lapsley (2006) note four characteristics of networks that are of interest relative to concentrations of economic activity such as that found in the North Coast artisan cheese cluster:

1. Trust. Because the identity of actors is known in a network, trust among members may evolve.
2. Lowered transaction costs and "reduced stickiness of information (Hippel, 1994).
3. Development of social relationships. Networks are durable club goods that require some investment. A firm that is unable to establish a relationship with another firm that is already part of a network cannot become a member of the club. Local proximity may, however, reduce the costs of developing linkages.
4. Networks are not limited to a cluster and may reach beyond cluster boundaries.

There is rich evidence of the existence of networks within the artisan cheese industry. Several associations, such as the California Artisan Cheese Guild and the American Cheese Society have active members in the region, and provide platforms for social networking as well as hosting annual workshops, competitions, and festivals.

2.6 Terroir

As California's North coast area exhibits a growing interest in the "local"[13] food movement, the notion of terroir has taken on a new importance. Terroir "is a definite and homogeneous territory endowed with a strong identity which is characterized by the whole of natural (soil and climate) and cultural (historical and social) resources" (Ditter, 2005, p. 48).[14] Cheese produced within Marin and Sonoma counties may be considered to be part of a localized industry defined by the terroir.[15]

Terroir may have important implications for a cluster. Some researchers (Bowen, 2010; Paxson, 2010; Trubek & Bowen, 2008) discuss instances in which the connection between terroir and quality is understood. Economists (Ditter, 2005; Mueller, Sumner, & Lapsley, 2006) suggest the most important characteristic of a terroir is whether or not it enjoys protection by the state, as

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[12] The Guide to Sonoma and Marin Cheesemakers (2010) defines a cheese monger as "A knowledgeable person who sells cheese".

[13] The term "local food system" (or "regional food system") is used to describe a method of food production and distribution that is geographically localized, rather than national and/or international. Food is grown (or raised) and harvested close to consumers' homes, then distributed over much shorter distances than is common in the conventional global industrial food system. Variants of the "buy local" movement include "locavores"; Community Supported Agriculture, farmers markets, and place-based food labels.

[14] Social scientists Trubek and Bowen (2008) note, in regard to *terroir*, that while the concept is well-understood in cheese making regions of France, consumers in the United States are not familiar with the idea of *terroir*.

[15] This assumes the milk is locally produced as well.

is seen in European areas protected by government regulations, such as the AOC-certified cheese in France or the QbA-wines in Germany. Once installed, such regulations tend to persist, supporting the continued existence of a localized industry.

2.7 Porter's Clusters

The notion of "economic clusters" has entered into the economic growth and development policy realm due to the work of Harvard business economist Michael Porter (Deller & Williams, 2011). While regional economists have debated the scholarly contribution of Porter (see, for example, Deller, 2009; Woodward & Guimaraes, 2009) his work has greatly influenced how states and local governments think about and pursue economic growth and development policies. A substantial literature on the benefits of clusters with respect to regional development in the 21st century exists (see, for example, Bergman & Feser, 1999; Brasier et al., 2007; Deller & Williams, 2011; Feser, 1998; Jacobs & de Jong, 1992; Jacobs & de Man, 1996; Hill & Brennan, 2000). A number of regional and urban scholars hold that clusters represent a "pervasive aspect of modern economies"[16] (Bergman & Feser, 1999, p. 1).

Porter's (1990, 1998a, 2000b, 2001, 2003a) reports of clusters emerge inductively through a series of case studies rather than rigorous empirical analysis.[17] In a succession of articles and books, Porter argues that local clusters are central to microeconomic competitiveness, emphasizing the number of ways clusters effect performance of the individual businesses within it. Many of these effects are similar to those identified in the economics of industrial- complexes, agglomerations, and social networks. However, Porter moves beyond these traditional concepts of spatial concentration, network relationships, or comparative advantages of particular regions to focus on competitive advantages; that is, on the ability of firms to innovate, raise productivity, and stimulate new business formation.

Although cluster analyses often cite California's Silicon Valley high-technology cluster (Saxenian, 1996), Porter selects the Napa Valley wine cluster as an example of an "innovating cluster" (Porter & Bond, 2004). He hypothesizes that regardless of the comparative advantage of natural endowment (e.g. *terroir* of various wine regions); firms require supportive microeconomic conditions to thrive. His model of the Napa Valley wine cluster (Figure 2) shows how clusters transcend conventional classifications of industries; many partners, suppliers and complementary industries are included.[18]

[16] Bergman and Feser (1999) present a valuable review of Porter's impact and prominence.
[17] An exception is Porter (2003).
[18] Porter (1998a) suggests that clusters take varying forms depending on their depth and sophistication, but finds most include firms in downstream (e.g., channel customer) industries, producers of complementary products, specialized infrastructure providers and other institutions that provide specialized training, education, information, research, and technical support, such as universities, think tanks, vocational training providers, and standards-setting agencies. Finally, many clusters include trade associations and other collective bodies covering cluster members.

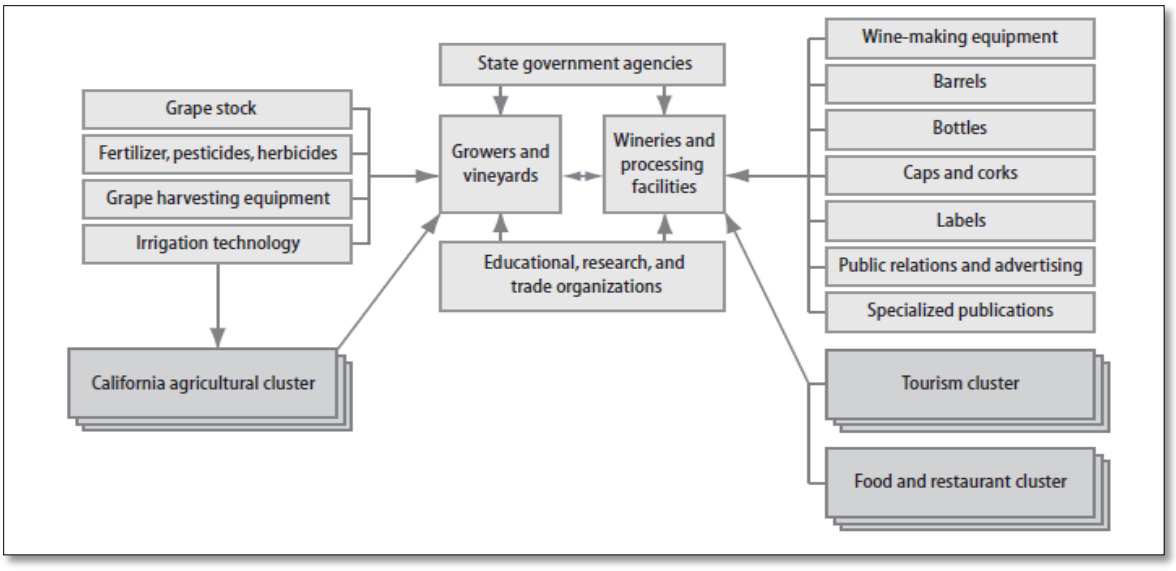

Figure 2. Napa Valley Wine Cluster. Adapted from "Clusters and the Economics of Competition," by M .E. Porter, 1998, *Harvard Business Review, Nov-Dec, 1998*, p. 79.

Porter (1998b) maintains that clusters only are one aspect of competitiveness in the global economy where, "the enduring competitive advantages . . . lie increasingly in local things - knowledge, relationships, motivation - that distant rivals cannot match" (p. 78). Porter (1990) posits that "national prosperity is created, not inherited" (p. 73), and throughout his work maintains a focus on competitiveness. His classic *The Competitive Advantage of Nations* (1990) puts forward a microeconomically based theory of national, state, and local competitiveness in the global economy, suggesting clusters are a striking feature of virtually every national, regional, state, and even metropolitan economy, especially in more advanced nations. Porter (2000a) notes clusters cannot be understood independent of a broader theory of competition in a global economy, and goes on to explain the important role of location in competitive advantage:

> Competition is dynamic and rests on innovation and the search for strategic differences. Close linkages with buyers, suppliers, and other institutions are important, not only to efficiency but also to the rate of improvement and innovation. Location affects competitive advantage through its influence on productivity and especially on productivity growth. Generic factor inputs themselves usually are abundant and readily accessed. Prosperity depends on the productivity with which factors are used and upgraded in a particular location. (p 35)
>
> Economic development seeks to achieve long-term sustainable development in a nation's standard of living, adjusted for purchasing power parity. Standard of living is determined by the productivity of a nation's economy, which is measured by the value of the goods and services (products) produced per unit of the nation's human, capital, and physical resources. Productivity, then, defines competitiveness. The concept of productivity must encompass both the value (prices) that a nation's products command in the marketplace and the efficiency with which standard units are produced. The productivity and prosperity of a location rest not on the industries in which its firms compete but rather on how they compete. Firms can be more productive in any industry if they employ sophisticated methods, use advanced technology, and offer unique products and services, whether the industry is shoes, agriculture, or semiconductors. (pp. 15-34)

Porter (2000a) demonstrates the effect of location on competition through four interrelated influences, which he depicts in a diamond-arrangement. Commonly referred to as the "Diamond of Competitive Advantage", or the "Diamond Model," it is intended to capture the nature of the business environment in a location (See Figure 3).

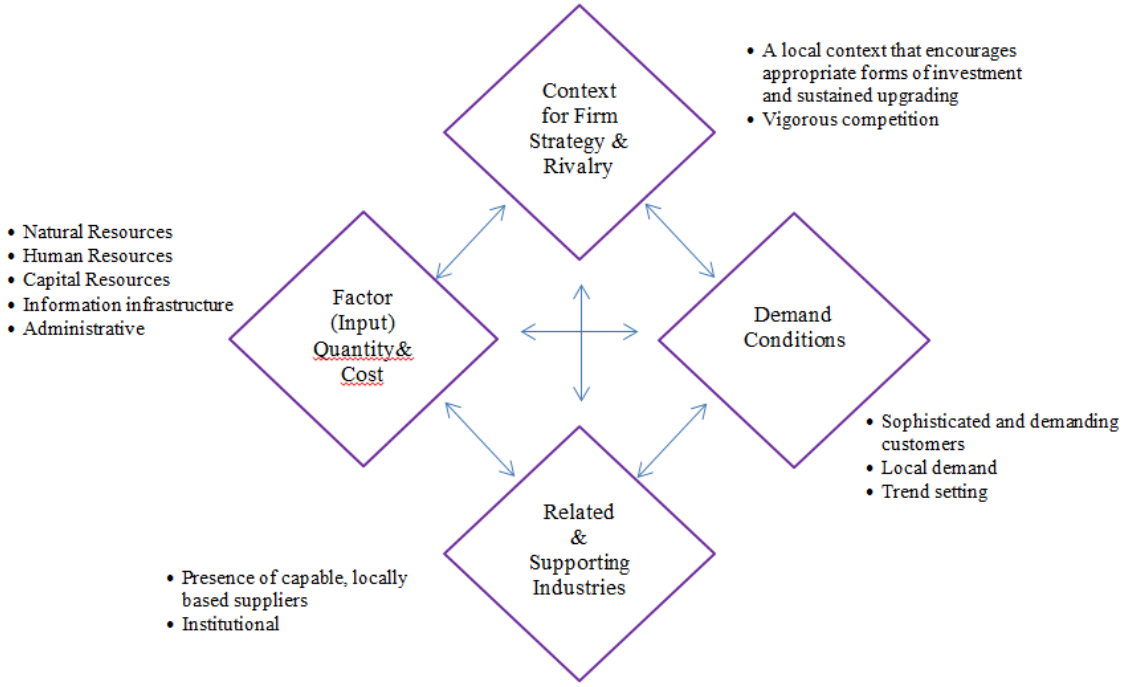

Figure 3. Porter's Diamond of Competitive Advantage. Author's image. Adapted from "Location, Competition, and Economic Development: Local Clusters in a Global Economy" by M. E. Porter, 2000c, *Economic Development Quarterly*, *14*, 15-34.

Porter (2000c) holds that competitive advantage is the outcome of the interaction of these blocks in this diamond.[19] Competitive advantage is traced to the drivers shown at the four corners of the diamond:

1. *Context for Firm Strategy, Structure, and Rivalry* refers to the norms, rules, and incentives governing the type and strength of local rivalry. This includes attitudes toward competition, market institutions, the degree of local competition, and other cultural and historical factors affecting how firms do business with each other, their workers, and the government. These conditions are dynamic; when strong local rivalry develops, successful firms innovate and differentiate. In the Napa Valley Wine Cluster, for example, the competitive structure is sharpened by the regular appearance of new wineries and the presence of vintners who cooperate through marketing efforts and trade associations, but have keen rivalries.

2. *Factor conditions* refer to the basic inputs and resources that allow competition to take place. They include physical infrastructure, skilled labor, capital, and more "intangible" things such as information, the legal system and university research. Better, more efficient factor conditions lead to more productive clusters. For instance, the extraordinary *terroir* of Napa Valley supports productive vineyards, but the presence of transportation routes, access to

[19] Traditional economic theory mentions five factors for comparative advantage: 1) location; 2) land; 3) natural resources; 4) labor, and; 5) population size. Because these factors cannot be easily influenced, Porter (2000) and other considered them as passive, and argued that key factors are created, not inherited. .

markets in and around San Francisco, and the availability of a specialized labor force contribute to the cluster.

3. *Demand conditions* refer to the nature and sophistication of local demand. Changes in the marketplace, such as the availability of similar, better, or less expensive products lead firms to innovate, improve, and invest.[20] For example, the tourism industry adds to demand for Napa Valley wines, and the new "Californian cuisine"[21] that grew out of the San Francisco Bay Area in the 1970's and 1980's encouraged growth, innovation, and competition in the wine cluster.

4. *Presence of related and supporting industries* (linkages in the input-output framework[22]) stimulates the exchange of information, learning, and innovation. The Napa Valley wine cluster is supported by academic institutions such as the University of California at Davis,[23] as well as Bay Area advertising, marketing, and financial professionals.

Fundamentally, Porter argues that the spatial proximity of firms creates a favorable economic environment, and provides a competitive advantage to those businesses within the cluster as well as related partners, institutions, and associated entities.

2.8 Porter's Rural Clusters

Although there has traditionally been emphasis on clusters as an urban phenomenon (Ottaviano & Thisse, 2003), rural clusters have been recently documented (see for example Brasier et al., 2007; Conley & Udry, 2010; Deller & Williams, 2011; Feser & Isserman, 2005). Porter et al.'s landmark 2004 report, "Competitiveness in Rural U.S. Regions: Learning and Research Agenda" finds evidence of industry clusters in rural areas, particularly in those adjacent to metropolitan counties. The study, undertaken with colleagues at the Harvard Business School's Institute for Strategy and Competitiveness (ISC), is part of the ISC's long-term efforts to investigate the economic performance and competitiveness of rural regions of the U.S. The report provides a summary of the literature on the rural economic performance, investigates the composition and evolution of rural economies in the United States, discusses the nature of the business environment in rural regions, and provides evidence on the role of clusters in these areas. Porter et al. posit that viewing regional economies in terms of clusters is central to understanding the competitiveness of rural areas and how it can be improved, explaining:

> While inherited factors are important, however, they do not determine the evolution of a regional economy. Choices made within a region shape its economic trajectory, such as investments in infrastructure and the formation and support of universities. Also, the creation of companies through acts of entrepreneurship can trigger the development of clusters via spin-offs and the establishment of suppliers or related companies. The presence of research and training institutions, such as government laboratories and universities is of increasing importance in modern competition. In rural regions, landlease

[20] Porter (2000) notes the government has an array of policy levers to upgrade demand conditions, such as setting challenging quality, safety, and environmental standards, the use of government procurement to stimulate product improvement and innovation, or establishing policies governing buyer information and re course to products or services of poor quality.

[21] "California cuisine" is the term used by magazine critics to describe the food served at Alice Water's Chez Panisse restaurant in Berkeley. The term arose as a result of culinary movements in the last decades and should not be confused with the traditional foods of California.

[22] In traditional economic development models, input-output models were used to measure the various linkages among firms in a region.

[23] The University of California at Davis Department of Viticulture and Enology works closely with many Napa Valley vintners and wineries.

> (sic) colleges and agricultural research institutions have played an important role in economic development. The composition of a region's economy at every point in time creates its own opportunities. New businesses typically emerge out of existing ones. (p. 31)

Porter's work emphasizes cluster analysis as a break from traditional industrial targeting (Figure 3). In this way, Porter moves the notion of geographic clusters from descriptive of successful regions to prescriptive policy for rural regional development. Woodward and Guimaraes (2009) explain that Porter's findings demonstrate that clusters can act as centripetal force, holding regions together despite the centrifugal forces of contemporary globalization. In Porter's (2000c) words:

> Clusters, broader than traditional industry categorizations, capture important linkages, complementarities, and spillovers in terms of technology, skills, information, marketing, and customer needs that cut across firms and industries. These externalities create a possible rationale for collective action and a role for government. (p. 62)

Table 1

Porter's view of Industrial Policy versus Cluster Policy

Traditional Industrial Policy	Cluster-Based Policy
Targets desired industries and sectors	Recognizes that all clusters can contribute to prosperity
Focus on domestic companies	Focus extends to all companies that enhance productivity
Intervenes in competition (e.g. protectionism, subsidies, preferences)	Emphasizes cross-industry linkages & complementarities
Centralizes decisions at national level	Encourages initiative at state or local level

Note. Author's table. Adapted from "Building a Competitive U.A.E Economy: The New Learning," by M. E. Porter, 2003b, *Institute for Strategy and Competitiveness*, p. 31.

3. Introduction to the Case Study: Historical Origins of the Marin and Sonoma County Cheese Industry

3.1 Gold Rush Roots

The legacy of California's Great Gold Rush lives on among the artisan and farmstead cheese producers in Marin and Sonoma Counties. Here, on the same "cow heaven"[24] lands where failed miners found new opportunities in dairying, long-time dairy farmers and enthusiastic newcomers continue the quest for riches in the form of good living and personal fulfillment. Today's treasure is measured in wheels of cheese rather than nuggets of gold, but the entrepreneurial spirit that characterized the "Forty-Niners" remains. An examination of the historical origins of California's dairy industry is useful in understanding the forces that drive the renaissance and concentration of artisan and farmstead cheese producers in the Marin and Sonoma County region. Located just north of San Francisco Bay, Marin and Sonoma Counties have a rich heritage of dairy and cheese production. Experts say the region's coastal climate, pasture-covered hills, and abundant supply of fresh water create a particular *terroir*[25] that is perfect for producing cheese.[26] Cows, goats, and sheep all flourish within this diverse terrain, allowing cheese makers to produce a wide range of different cheese styles.

[24] In 1857, Colonel Lewis, when surveying land near Point Reyes with his business partner Isaac Steele, declared it "cow heaven".

[25] Terroir describes the distinctive aspects of a product that are determined by its place of production and its production techniques.

[26] Unknown to the early ranchers, the expansive coastal prairie was most likely the byproduct of burning, weeding, pruning and harvesting for at least two millennia by Coast Miwok and their antecedents.

Figure 4. Author's image. Marin and Sonoma Counties (California's North Coast Artisan Cheese Region).

Cheese, a staple of the American diet since colonial times, was introduced to the North Coast region in 1817, when the Spanish Franciscan missionaries established the San Rafael Asistencia as an annex to Mission Dolores in San Francisco.[27] The missionaries brought cattle to the region, and after the missions were secularized in 1834,[28] Mexican rancho owners continued to raise cattle in the North Coast region. The animals were valued not for milk or even cheese but for their hides and tallow (Hart, 1991). Settlers who colonized the area continued to trade these goods to the American merchants who traveled along the California coast. The meat was considered so worthless that a traveler in California was allowed to slaughter a cow for its meat

[27] San Rafael Asistencia served as a recuperative center for ailing Coast Miwok and Ohlone natives. Secularization of the missions following Mexican independence from Spain in 1821 led to land grant subdivision and resulted in expansion of cattle ranching on the peninsula.

[28] The Mexican government passed the Secularization Act in 1833, making mission lands available to individuals. Mexican citizens and individuals willing to convert to Catholicism and become citizens were allowed to apply for land grants of 50,000 acres. Twenty-one men were granted these "ranchos" in Marin County before the U.S. takeover in 1846.

as long as the hide was left behind (Avery, 2009, p. 21). Cheese was a means of preserving milk, but the market for it would not develop until the Gold Rush of 1848 was well underway.

The large-scale immigration of the Gold Rush created a demand for dairy and other agricultural products that would last far longer than most miners' luck. More than 80,000 fortune-seeking immigrants surged into the state during 1849 alone. By the end of the year, the non-native population of California was estimated at 100,000, as compared to 8000 in March of 1848 (Whaples, 2008).[29] With more than 300,000 new arrivals, one in every 90 people in the U.S. was living in California. Many stayed on even as the gold played itself out, making California one of the most ethnically and racially diverse populations in the world. A quarter of California's population had been born outside the United States (Maranzani, 2013) by the time the Gold Rush was underway. In late 1849, the flags on ships in San Francisco Bay included those of England, France, Spain, Portugal, Hawaii, Hamburg, Bremen, Belgium, Sweden, Chile, Peru, Russia, Mexico, Norway and Tahiti, and many Chinese, Irish, Italians and Australians emigrated as well (Wiegand, 1998).

By the mid 1850's the Gold Rush had peaked, but the "Forty-Niners" and others who prospered during it – men like Levi Strauss,[30] Domingo Ghiradelli,[31] and Leland Stanford,[32] learned well the axiom that the main chance for success lay not in mining gold but in mining the miners. San Francisco, the central metropolis of the new frontier, quickly became the largest U.S. city west of the Mississippi River.[33] Correspondingly, providing food and fiber to the new residents was big business. Land and livestock quickly became valuable commodities. Many newcomers, having given up the search for gold, turned back to their previous occupations of farming and dairying. In 1850, almost 60,000 California residents were miners, while only about 2,000 engaged in agriculture. Ten years later, 35,792 Californians worked in agriculture, and by 1870, those working in agriculture numbered 47,683. That same year, the total value of

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[29] Whaples (2008) also notes that in March 1848, there were roughly 157,000 people in the California territory; 150,000 Native Americans, 6,500 of Spanish or Mexican descent known as Californios and fewer than 800 non-native Americans.

[30] Levi Strauss was born in Bavaria and came to San Francisco in 1850. A skilled tailor, he planned to manufacture tents and wagon covers for the Forty-niners. Finding a limited market for these items, he instead used the heavy canvas he had brought with him to make durable pants. The "wonderful pants of Levi's" were popular with the miners. Strauss opened a factory in San Francisco, added copper rivets at the stress points in his pants and started using a blue denim material called genes in France, which became "jeans" in California. The company's slogan in 1900 was "For Men Who Toil". Levi Strauss & Co. has since become the world's largest pants manufacturer.

[31] Domenico "Domingo" Ghirardelli was born and raised in Italy, where he apprenticed at a chocolate shop before leaving to open his own chocolate shop in Montevideo, Uruguay. He later moved to Lima, Peru, where he opened a chocolate shop next door to an American expatriate, piano-maker James Lick, who convinced left for the Gold Rush Ghirardelli to follow him to California to participate in the Gold Rush. Arriving in 1849, Ghirardelli first worked as a prospector and then as the operator of a general store. He opened a confectionery in 1852, now known as the Ghirardelli Chocolate Company. The company's former factory on San Francisco's waterfront is now a famed tourist attraction, Ghirardelli Square.

[32] Leland Stanford (1824-1893) was an entrepreneur, politician, and (with his wife Jane) the founder of Stanford University. Born in New York, Stanford moved to Wisconsin as a young man to pursue a career as an attorney. The Standfords followed family members to California in 1852, where Stanford Leland made a small fortune operating a general store to supply miners in the Gold Rush. In the 1860s, he invested in a stake in the Central Pacific Railroad, joining fellow Gold Rush merchants Collis P. Huntington, Mark Hopkins, and Charles Crocker to form the "Big Four" C.P.R.R. cofounders. After serving as President of the railroad, Stanford was elected to the governorship of California and to the United States Senate. In 1891, he and wife Jane founded Stanford University in memory of their deceased son, Leland Stanford, Jr.

[33] In 1849 San Francisco had approximately 1,000 inhabitants; by 1856 the population had soared to 50,000.

California's agricultural products was greater than the value of the state's mined products (Gates, 1967).

Settlers continued to flock to the North Coast area to raise marketable commodities such as potatoes, grain, and livestock, and the lush pastures beckoned to dairy farmers. Entrepreneurs and other newcomers, particularly those who arrived from the Eastern US or Europe with well-honed dairying skills and knowledge, saw tremendous opportunity. John Hart (1991) explained the natural features of the rangeland that made it the best in the state:

> The abundant grass, the cool summers near the shore, the unusually long growing season in the spring – all gave the early dairy farmers a natural edge over competitors north, south, and inland. And the customers – the largest urban population in the state – were right next door. (p. 7)

The North Coast's grassy pastures lured dairy farmers to the area, and the proximity to San Francisco by water made the region, with its navigable tributaries and accessible bay waters, well-suited to fill the rising demand. Small shallow draft boats known as Schooners were the most efficient means of transport. Landings in the Limantour and Drakes Bay Esteros along the Pacific coast were less dangerous to navigate than the rough ocean frontage along the Point Reyes Peninsula. One of the first wharfs was built by the Steeles on Limantour Estero in 1857. Shafter utilized this wharf with the Monterey in 1870. This wharf, along with the Schooner Bay and Limantour Bay wharves were built and utilized by the New Albion Ranch, the Drakes Head Ranch, Pierce Ranch and Laird's Cheese Company (Steel, 1941, pp. 256-261).

Transportation logistics and costs constituted preeminent challenges for the industry in this rugged and vast land, miles from the urban demand center of San Francisco. The efficiencies realized from shipping via Schooners were substantial compared to shipping products over the overland wagon train trails to San Rafael and Sausalito were small steam ferries plied the North San Francisco Bay waters to the city wharfs. For example, the overland journey between Tomales and San Francisco could take more than five days by wagon, while a schooner could generally complete the trip in less than eight hours.

The 1850 Census of Agriculture for California lists 18 Dairymen in all of the state, with 4280 "milch cows" and 255,122 total state residents, some 35,000 of who were living in San Francisco. By 1860, 173,241 cows were supplying dairy products for 379,994 residents, including 56,802 San Franciscans. However, the distance to the Greater San Francisco Bay Region precluded shipping fluid milk for domestic consumption,[34] particularly without the benefit of more modern refrigeration and bottling techniques to reduce spoilage. Cheese, long used as a means of preserving milk, also reduced the transportation weight of milk.[35] Butter, which could be produced in less time than cheese, commanded a higher price, so most early North Coast dairymen produced butter. In 1867, Marin County produced 932,429 pounds of butter, the largest yield of butter in California.

As the North Coast dairy industry developed, butter and cheese continued to be procured from Boston, New York, or Chile. Local production was minimal in the early years of the Gold Rush boom – 705 pounds of butter and 150 pounds of cheese in 1850. The limited availability led to high prices – $1.50 a pound for butter and 40 cents a pound for cheese,[36] which

[34] The term "Greater San Francisco Bay Region" is applied to counties which are adjacent to the San Francisco Bay, including San Francisco, Napa, Sonoma, Solano, Alameda, Contra Costa, Marin, San Mateo, and Santa Clara.
[35] Paxson (2010) notes that cheese reduces the transportation weight tenfold.
[36] $1 of 1850 dollars would be worth: $30.30 in 2013 according to the Oregon State University (2013) inflation calculator.

encouraged entrepreneurs to import dairy cows,[37] and increase production. The San Francisco *Alta California* (newspaper) in 1858 reported:

> The butter and cheese shipped from Petaluma now form a very considerable portion of the freights and San Francisco market depends upon this valley for its supplies of these articles . . . The supply is, however, but a fraction of the demand, and large quantities are yet shipped here from the Eastern ports. (p. 2)

Still, weaning the new urban dwellers in San Francisco from eastern butter and cheese took a number of years. E. J. Wickson (1860), a Professor at the University of California, urged North Coast cheese producers to make "some effort to give their product the form and character of the popular Eastern and European cheese" (p. 28). He wrote, "The prejudice for Eastern cheese . . . is a serious obstacle and prevents the local producers from securing even the best of the local trade" (p. 27). It took several decades of production for California cheese to meet the local need and begin exporting cheese. In 1890, Overland Monthly recorded that San Francisco had an average of 24,000 weekly receipts for California cheeses and 300 weekly receipts for eastern cheeses (Sheldon, 1891).

The Steele family, who made their way from Ohio as the Gold Rush boomed, is credited with establishing the first commercial cheese operation in the region in 1856 at Two Rock in Sonoma County (The California Milk Advisory Board, 2013; Livingston, 1994). By some accounts, Clara Steele roped and milked wild cows grazing near their Sonoma home, and using a recipe found in a book, produced her first cheese, cheddar, which she sold through a San Francisco commission house. The immediate success prompted the Steeles to expand their operation to the Point Reyes peninsula, where they started a 6000 acre dairy farm. By 1861 they were the largest cheese producer in California, shipping 640 pounds of cheese and 75 pounds of butter by steamer from the Marin coastal towns of Bolinas and Tomales to San Francisco each day.

As more and larger dairy farms were established in the North Coast, regional production of cheese and butter increased dramatically. Marin and Sonoma County dairy farmers produced the most butter in California by 1860, while Contra Costa and Santa Clara counties, located to the east and south of the San Francisco market, produced the largest amount of cheese. The 1860 Census of Agriculture for California reported that Marin County townships produced 161,350 pounds of cheese and 200,000 pounds of butter (California State Archives, 2013). For years North Coast dairies produced 1,337,500 pounds of butter, or almost 75% of California's total butter production. By 1865, Marin and Sonoma counties produced 450,000 pounds of cheese, making the North coast the state's largest cheese production area (Avery, 2009).

Small dairy farms became common in all parts of the North Coast, including the communities of Tomales, Marshall, Point Reyes, Bodega Bay, Petaluma, and the Olema and Chileno Valley areas. However, soon after a group of San Francisco lawyers, led by brothers Oscar and James Shafter and son-in-law Charles Webb Howard, acquired much of the land in the Point Reyes area, the North Coast area was transformed into the leading dairy region in the entire West. The "Shafter Empire" was established on Rancho Punta de los Reyes Sobrante, which comprises much of what is now the Point Reyes National Seashore in western Marin County.

Prior to the Shafter era, ownership of the Rancho land was under considerable dispute. In 1843, Antonio Maria Osio was granted the land by the Mexican Governor, beginning a series of sales, transfers, and additional land grants that left the ownership unclear. When the United

[37] Young entrepreneurs drove cattle from Missouri to meet the ever-expanding market for beef and milk products. By the end of 1853, 62,000 head had entered the state over the main immigrant roads.

States took possession of California in 1846, rancheros were required to survey the land and clarify ownership in court. The costs of the surveying and legal fees led to selling of a number of the ranchos, most of which were bought by Americans, who often paid less than two dollars per acre (Livingston, 1994). The Shafters came to own Rancho Punta de los Reyes Sobrante after their client, James McMillan, prevailed in a court case concerning rancho ownership and tax liens. McMillan won title to the Ranchos entire 50,000 acres on the peninsula, and promptly sold the property to the Shafters for $85,000.[38]

The Shafters, along with C.W. Howard, established their home dairy ranches on the property, and initially leased most of the land to the Lairds, Steeles, and other dairymen already established in the area. In 1866, they executed their vision of creating a tenant dairy enterprise, subdividing the land into 33 ranches. In 1872, the business partners partitioned the land into six tracts, each with coastal plain and ridgeline ranch areas. C. W. Howard and Oscar Shafter used letters of the alphabet to name their ranches, starting with "A" Ranch at the Point Reyes headlands and moving up to "Z" Ranch at the summit of Mt. Wittenberg. The Shafters bestowed more descriptive names on his ranches, including Sunnyside, Drakes Head, and Muddy Hollow.

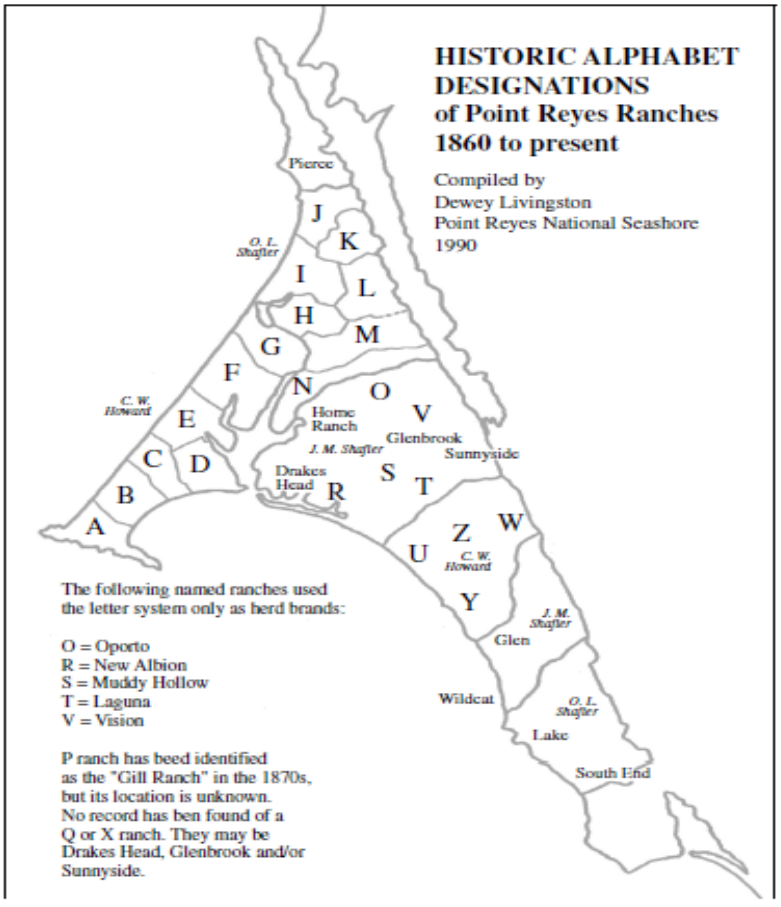

Figure 5. A-Z Ranches. Adapted from "Ranching on the Point Reyes Peninsula: A History of the Dairy and Beef Ranches within Point Reyes National Seashore, 1834–1992" by D. Livingston, 1993, *Historic Resource Study*. Point Reyes Station, CA: National Park Service.

[38] The Bureau of Labor Statistics Inflation Value is estimated to be $1,996,478.28, based on earliest available CPI data (1913).

By 1870, the Shafter brothers and Howard owned 20 dairies; the “empire” they developed eventually expanded to 31 ranches.[39] They employed family members and local residents; and also recruited European dairymen to supervise construction of new dairies and refurbishment of existing ranches. The tenant ranches were operated by Irish, Swedish, Italian-speaking Swiss, and Azore Islands-Portuguese families, who rented the cows ($20-$25 per cow, annually), buildings, and land, but provided their own home furnishings, dairy and farm implements, horses and pigs (California Milk Advisory Board, 2013). The Shafters envisioned creating a more civil society for the nineteenth century Bay Area, refining bachelor ranch hands and educating ranch family children. Chinese, Canadian, Filipino, Mexican and German immigrants all found their chance to get started in America through dairying at Point Reyes (National Park Service, 2013).

In 1862, Samuel Marshall, one of the Irish-born Marshall brothers who drove "pure-blood" Durham cattle from Kentucky to West Marin in 1853, purchased a large tract of land on Tomales Bay. He and his “band of brothers” (Hugh, Alexander, James and David Marshall) are credited with helping to found Marin’s dairy industry and “developing” the shore of Tomales with a hotel and tavern. The buildings were later toppled by the 1906 earthquake (Marin History Museum, 2011).

In 1858, Vermont native Solomon Pierce bought 2,200 acres at Tomales Point from the Shafter operation, the only parcel sold by the law partners. By 1870, his dairy milked 250 cows, and his farm produced other agricultural products as well. His business was held up as the embodiment of a successful, modern dairy operation (Borjes & Chapell, 1986). George and Charles Laird operated a dairy on 3,000 acres of land leased from the Shafters on Tomales Point, at the northern edge of Point Reyes. The Laird Brothers raised 200 cows and produced 35 tons of cheese per year by the early 1860s, making theirs one of the largest dairies in California at the time. The Laird’s cheese captured first place from the Steele’s at the 1859 California state fair and soon after the Laird brothers gained fame for producing a 1,600 pound cheese wheel (Livingston, 1993).

In 1865, Sonoma County dairy farmer Jefferson A. Thompson began producing cheese in Petaluma, which was then the 7th largest inland port on the West Coast. The cheese was transported by horse drawn wagon to the Petaluma River, and taken by the daily steamer ships across the Bay to San Francisco. This cheese, later to be named “Breakfast Cheese,” gained popularity in the saloons, where it substituted for hard-to-get eggs. The Thompson Brothers Cheese Company was housed at what is now the location of the Marin French Cheese Company, making it the oldest continually operating cheese factory in the United States.[40] The company, whose creamery remains at the Hicks Valley Ranch in west Marin County, continued to make fresh cheeses, and began to produce the first European style soft-ripened cheese in the state. The company was initially a farmstead operation, milking its own herds until the Great Depression, when it began supporting neighbors by buying milk.

[39] In a classic example of vertical business integration, in Shafter in 1857 purchased the Monterey, a steamer capable of carrying two tons of cargo, and made on weekly trips to San Francisco from the Limantour Estero, with a stop at Drakes Bay. This is significant because it reduced the price for shipping to 50 cents per hundred pound of cargo, and because the open ocean journey greatly reduced the travel time and distance.

[40] In the early 1900s, the Thompson family organized their cheese business as the Marin French Cheese Company, creating one of California’s first small corporations.

By 1870, the Point Reyes dairies were the most productive in the Northern California region. The Shafter family produced some cheese, but ultimately pursued the goal of producing quality butter in great quantities for the San Francisco market, securing contracts with high-end hoteliers and fine food purveyors. "The grass growing in the fields on Monday is butter on the city tables the following Sunday," as the 1880 History of Marin County reported. By 1880, the demand for the Point Reyes butter was so great that dairies around the area were counterfeiting it, filling empty Point Reyes butter boxes with inferior quality product. In what was likely the first instance of branding to protect the quality and authenticity of a consumer food product in California, Shafter and Howard trademarked their butter and stamped the letters P. R. on each package produced by their ranches (National Park Service, 2013).

The Shafter and Howard families owned most of Point Reyes for 82 years, from 1857-1939. During that time, Point Reyes dairies were more focused on butter production than on cheese production; the “butter rancho” was acclaimed as the largest dairy estate in the world (Livingston, 1994). In 1875, the Marin County Journal reported that the excellent quality of Point Reyes’ butter was due to advantages of the peninsula’s climate:

> coupled with the evident enterprise and liberality of the owners of the land in improvements, and the wide-awake spirit of the tenants in efforts to out-vie each other in the quality of their products have given to the Point Reyes butter a most enviable reputation in the markets. (p. 1)

Despite (or because of) the competition between the ranches, the Point Reyes dairies thrived. Eventually, most of the ranches were sold to tenants. According to Marin County historian D. Livingston (2012), by 1880 most ranches in the county had foreign names on the ranch house porch, and many members of dairy families (e.g., Freitas, Giacomini, Lucas, McClure, Mendoza, Kehoe and Burbank) evolved into leaders in both business and political arenas. Descendants of the Giacomini, McClure, Mendoza, and Kehoe families are dairying today. Good labor was in demand, and the large dairies trained former gold miners as well as Mexican immigrants to work in their operations. Green hands (those with little or no experience) were paid up to $25 per month, and the experienced dairy hands commanded $30 per month or more. Each dairy hired two to five workers, with the large cheese producers such as Lairds, Steele, or Shafters employing up to a dozen workers.

The Northern California dairy industry flourished outside of Point Reyes, as well. The Steele family, thwarted in their efforts to purchase their Point Reyes dairy from the Shafters, purchased a ranch in San Mateo County, where they established the state’s most productive cheese making factory. Transportation remained key to successful dairy businesses. In 1871, James Shafter and other investors incorporated the North Pacific Coast Railroad with the intent of exploiting Sonoma County redwood forests. The railroad was routed through the Tomales Bay area to benefit Shafter’s tenants. The narrow gauge line was built in 1873-74, and opened for traffic in 1875. Terminals were located in San Rafael and Sausalito, where company-owned ferries completed the trip to San Francisco. A depot was built at the future site of Point Reyes Station; within a decade the new town became a center of commerce. The railroad continued north along the eastern shore of Tomales Bay until heading inland to the Russian River Valley in Sonoma County (Dickinson, 1967, pp. 40-44).

The expansion of rail lines to the San Joaquin Valley gave that region access to urban markets in California and other states. The new markets, along with the availability of irrigation for hay land and feed grains, led to the gradual rise in dairying in that region. Other advances set the stage for shifts in regional production. During the 1880s and 1890s, the introduction of the

cream separator, refrigeration, irrigation, the milking machine, and extensive planting of alfalfa transformed California dairying to a modern, scientific industry.

The California State Parks (2005) "Guide to the California Dairy Industry History Collection" explains:

> Dairying in California shifted from a domestic activity to a major industry about 1900. Shortly before that time the centrifugal cream[41] separator, a mechanical device for separating cream from raw milk in large batches, made its appearance in California, and the first commercial creamery in the state opened in Ferndale, California in 1899. The emergence of creameries created a division between production and manufacturing/ marketing operations. Before 1900, California dairying was primarily an integrated endeavor, and included growing feed for the cows, producing the milk, skimming the cream, churning the butter and making the cheese all in one location—the dairy farm. (pp. 6-7)

Figure 6 utilizes Porter's "Diamond tool" to highlight the comparative advantages that enabled Marin and Sonoma cheese makers to prosper during the Gold Rush era.

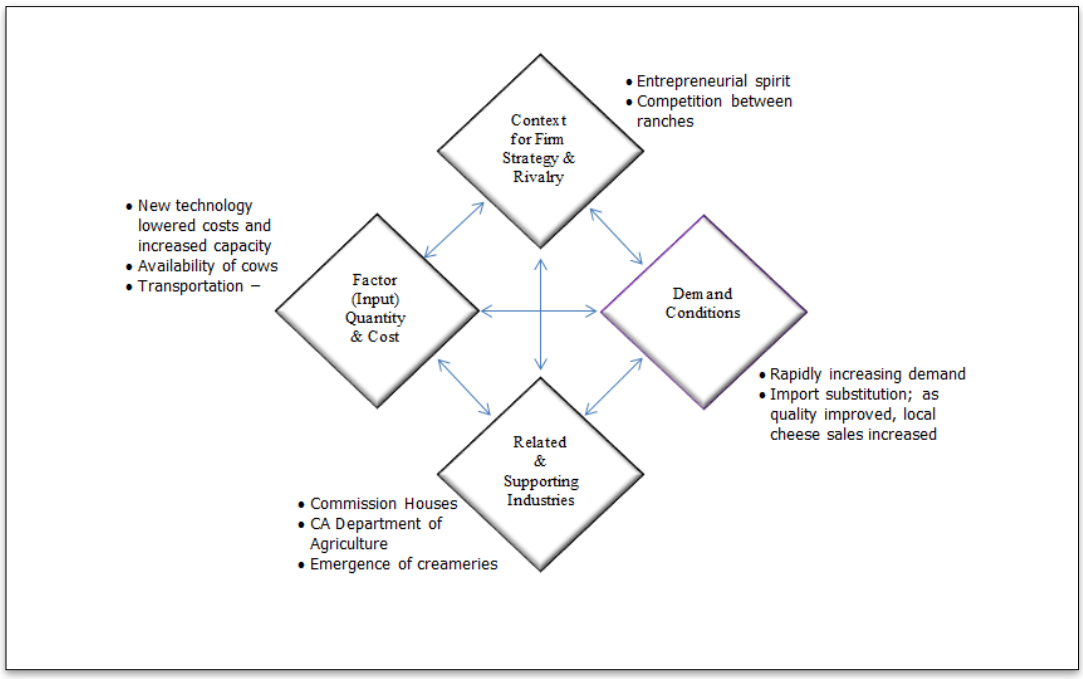

Figure 6. Competitive Advantages of the Gold Rush Period. Author's image. Adapted from "Location, Competition, and Economic Development: Local Clusters in a Global Economy" by M. E. Porter, 2000c, *Economic Development Quarterly*, *14*, 15-34.

Innovations in technology, equipment, and animal genetics included:

- In 1858, the Shafters imported Durham bulls, (also known as milking shorthorns), which led to genetic improvement in cattle stock.
- Rowe cheese making apparatuses, imported in 1861 by the Laird brothers, led to first off-farm cheese production facilities;

[41] The centrifugal cream separator was invented in 1897

- 1874 Lairds brought Jerseys from East to increase butterfat content, which increased the quantity and quality of milk output;
- The Allen churn (1880), cool cellars, and brine barrels extended shelf life, and preserved quality of cheeses;
- Invention of the milk bottle in 1884;
- 1897 hand crank cream separator arrived from Sweden; cut costs by 1.5 cent per pound (20%). The existence and improvements of transportation routes was instrumental in getting cheese to markets.
- In the 1850's the route included stagecoaches to schooners (the Donald, the Cassie-Telfair, the Union star sailed from wharf on Tomales Bay and stopped at Millerton Point, Preston's Point (Livingston, 1993)
- The 1865 wagon road created from San Rafael through the San Geronimo Valley to Rafael Garcia's Rancho near Olema. The road extended to Pt. Reyes in 1867; it took workers two years to build the 2.4 mile road.[42]
- Dairy farmers benefited from the availability of a large labor pool, consisting of former gold-rush miners, and immigrants, primarily from Mexico and China.
- The establishment of Commission houses through which to distribute cheese was a great asset to the dairy industry. The California Department of Agriculture, founded in 1880, provided key institutional support.

3.2 Contemporary Industrial Period and the Depression Years 1900-1940s

The Ferndale creamery generated tremendous investment interest, and Humboldt County led the state in dairy production by 1900.[43] In Monterey County, David Jacks commercialized a popular local cheese, shipping "Monterey Jack" by railcar to San Francisco and other areas. Dairymen began to export cheeses as local production outpaced consumption, with much of the surplus cheese for export coming from Marin and Sonoma Counties. In 1903, the State Dairy Bureau reported 383 cheese makers producing 7.2 million pounds of cheese, a level of production which would not be seen again until 1916.[44] This compares with 1850 production levels of 705 pounds of butter and 150 pounds of cheese, and 16 million pounds and 3.7 million pounds (respectively) in 1880.

The Dairymen's Union of California, led by Louis Tomasini of Marin County, was founded in 1891. The group, renamed the California Dairy Association in 1893, developed quality standards, set benchmark prices, and improved distribution networks. They were instrumental in the creation of the State Dairy Bureau, which would oversee labeling and grading of cheese, protect against imitation products, and inspect dairy operations to verify that they met state health standards. Both the Bureau and the Dairy Association promoted dairy research and education at the state's agricultural colleges, leading to further improvements in productivity and food safety.

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[42] Based on an undated article in the Marin County Historical library archives

[43] By 1890 there were eleven separate creameries operating in the immediate Ferndale area. Ferndale butter was considered the finest in the state, bringing premium prices in San Francisco. Ferndale acquired its first nickname, 'Cream City.' Shortly after 1900 many of the small creameries consolidated into larger creameries. The Central Creamery, located on north Main Street, became the mother plant of the Golden State Creamery, one of the largest in the state. ('Challenge' brand dairy products are from the remaining cooperative creamery, the Humboldt Creamery in Fernbridge.

[44] The California Milk Advisory Board (2013) attributes this change in production to weather and market conditions.

"Dairy fever" persisted into the early years of the twentieth century, but there were new challenges to overcome. The 1906 earthquake led to closure of several dairies located on Inverness Ridge. Pastures were in decline, as the new landowners did not practice the burning that kept native coyote brush and poison oak thickets in check historically.[45] Still, several new cheese businesses opened. The Western Cheese and Butter Company, using milk from Nicasio area dairies, operated at full capacity until 1915, when a fire destroyed the warehouse and cheese inside (Livingston, 1994).

Dairy ranchers across the state struggled during the Depression. California farm income in 1932 sank to just half of what it had been in 1929. The Kraft Cheese Company owned and operated a cheese factory in Nicasio during the depression years, selling it to the Sonoma Mission Creamery in the early 1940s.[46] The Sonoma Mission Creamery, Tomales Bay Teleme Cheese Company, and Valley Ford Cheese Company are among the enterprises started in this period that remain in operation.

Up until the late 1930s, a California dairy producer's livelihood was largely dependent on geography. Those who were able to sell milk for fluid consumption or make quality cheeses enjoyed the highest profits, whereas those who were separated from fluid markets by location or logistics had little recourse but to sell to butter and powder plants at much lower prices. The stress of the Great Depression magnified these difficulties and resulted in the state legislature's passing a minimum milk pricing plan through the 1935 Young Act. Unfortunately, the intent of the Young Act was often circumvented by processors, some of whom required their producer-suppliers to ship "extra" unpaid-for milk on top of contracted volumes, charged them excessive hauling costs, and engaged in secretive rebates, discounts and even outright kickbacks to secure contracts with producers, distributors, and retailers (California Department of Food and Agriculture, 2007).

Nonetheless, California cheese production levels continued to increase during this time, reaching a record high of 16 million pounds in 1940 (The California Milk Advisory Board, 2013). In the years of World War II, however, small scale production of cheese was severely curtailed as the country turned to larger scale food production to increase the food supply. In Marin and Sonoma counties, the internment of Japanese-Americans and relocation of Italian-Americans following the 1941 attack on Pearl Harbor resulted in a shortage of workers for the dairy industry.

[45] The Coast Miwok were the native peoples of Marin and Sonoma Counties. They first settled the Tomales Bay area between 2,000 and 4,000 years ago. Archaeologists estimate that there were about 2,000 to 3,000 Coast Miwok before Spanish settlement. They used fire to manage vegetation.

[46] Tom Vella and and Celso Vivani started the Sonoma Mission Creamery in a defunct Sonoma brewery in 1931. The partnership ended in 1948, with Vella starting the Vella Cheese Company and Vivani opening the Sonoma Cheese Factory.

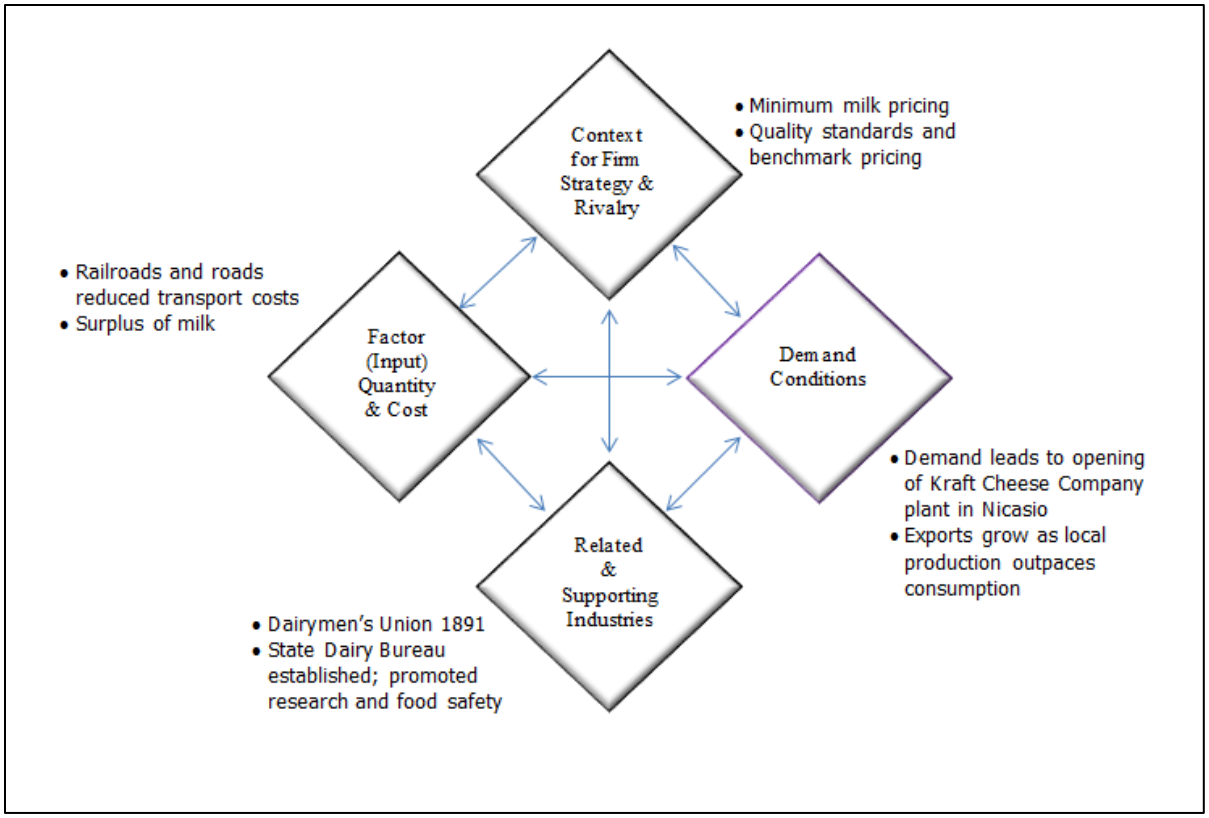

Figure 7. Competitive Advantages in Contemporary Industrial Period and the Depression Years. Author's image. Adapted from "Location, Competition, and Economic Development: Local Clusters in a Global Economy" by M. E. Porter, 2000c, *Economic Development Quarterly*, *14*, 15-34.

3.3 World War II and Post War Era through 1950s

The years following World War II brought dramatic changes to Marin and Sonoma counties, and many small dairy farms dairies shut down or converted to less labor-intensive beef cattle operations. The community creameries consolidated, with the Petaluma Cooperative Creamery serving most of the region (Petaluma Cooperative Creamery, 1913/1953).[47] Gene Benedetti, the founder of Clover Stornetta Farms, explained:

> Well, in 47 there weren't any real large dairies. They were small dairies. They were milking maybe 30 cows at the most, maybe 50, at the very outside. We had one that was milking about a hundred, but that was one. So they were smaller dairies, yes. Of course, as they went out of business, the others got bigger (Bendetti, G. 2001).

At the height of the dairy trade the railroad lines and schooner routes in Sonoma County and the western part of Marin County made these areas the "busier" side of the area.[48] Few expected the isolation to last, particularly as war veterans who had transited through San Francisco enroute to the Pacific theatre relocated their families to the area. The waves of

[47] The 1913 Articles of Incorporation for the Petaluma Co-Operative Creamery list 545 shares of stock subscribed by 24 members on the date of incorporation. The 1949 amendment to the Articles lists 29,292 shares subscribed, with a membership of 1400.

[48] The rail lines and waterways were the main transport routes until roughly 1937, when the Golden Gate Bridge connected East Marin County to San Francisco.

development in the San Francisco Bay area seemed likely to redefine the North Coast dairy industry. Most expected that population growth would drive up the price of agricultural land, and that planned roadways would remove the barriers to urban growth in the farm belt areas. Hart (1991) expounded on this in his work describing farmland protection Marin County:

> And so it became the fashion – even among the ranchers? (sic) especially among the ranchers – to question whether the industry was viable, to anticipate the arrival of Cashout Day. Though many families, deeply attached to the land, had no intention of selling and indeed turned down what seemed, by the old rural standards, to be generous offers, there remained a sense of an approaching end. (p. 9)

The Milk Price Support Program (MPSP), established by the United States Congress as part of the Agricultural Act of 1949 required the Secretary of Agriculture to support the prices received by producers for manufacturing grade milk at between 75% and 90% of parity.[49] This Act created what is often referred to as the nation's first formalized "Dairy Price Support Program."

However, the program encouraged an unprecedented expansion in milk production. Even as the state continued to gain share relative to the nation's milk production, the number of dairy farms in the North Coast counties declined, as did cheese production. The region's small scale producers could not compete with large, industrial model dairies in Central California who, utilizing economy of scale, operated on small margins at the highest possible volumes, driving prices down to a point that bankrupted small volume dairies. The Marin-Sonoma locational advantages were further diminished as milk, cheese, and butter production grew in the central and Southern regions of the state. Bulk truck transportation and inexpensive fuel prices minimized the importance of closeness to the San Francisco area market. North Bay dairy farmers struggled to compete with large, dry-lot production model dairies in the Chino and Central Valley regions.[50] Here larger herds allowed operators to capitalize on economies of scale and dilute their costs of production by milking more cows.[51] By the end of the 1950s, the North Bay occupied a less prominent role in the California dairy industry. Figure 8 illustrates that many of the factors that led to a competitive for Marin-Sonoma dairy ranchers and cheese makers evaporated as milk production expanded in the large Central California dairies.

[49] Parity is defined by an index of the cost of agricultural production based on the period 1910-14, a time when U.S. agriculture had done quite well.

[50] Guthey et al. (2004) notes that, among other factors, federal incentives to reinvest in agricultural production led to development of milk factories in the Chino Valley, while the availability of land and relatively low levels of residential development pressure led to establishment of dairies in the Central Valley.

[51] Recent work by Rodriguez et al. (2009) demonstrates the advantage of larger herds relative to milk production. For example, they found that pooled across all other variables, Holstein herds larger than 1,000 cows had significantly lower total cost of production and larger MNI per cwt. than herds with fewer than 1,000 cows. Herds > 1,000 cows had $1.05 lower total cost/cwt. and $0.74 greater milk net income/cwt. than herds with < 1,000 cows.

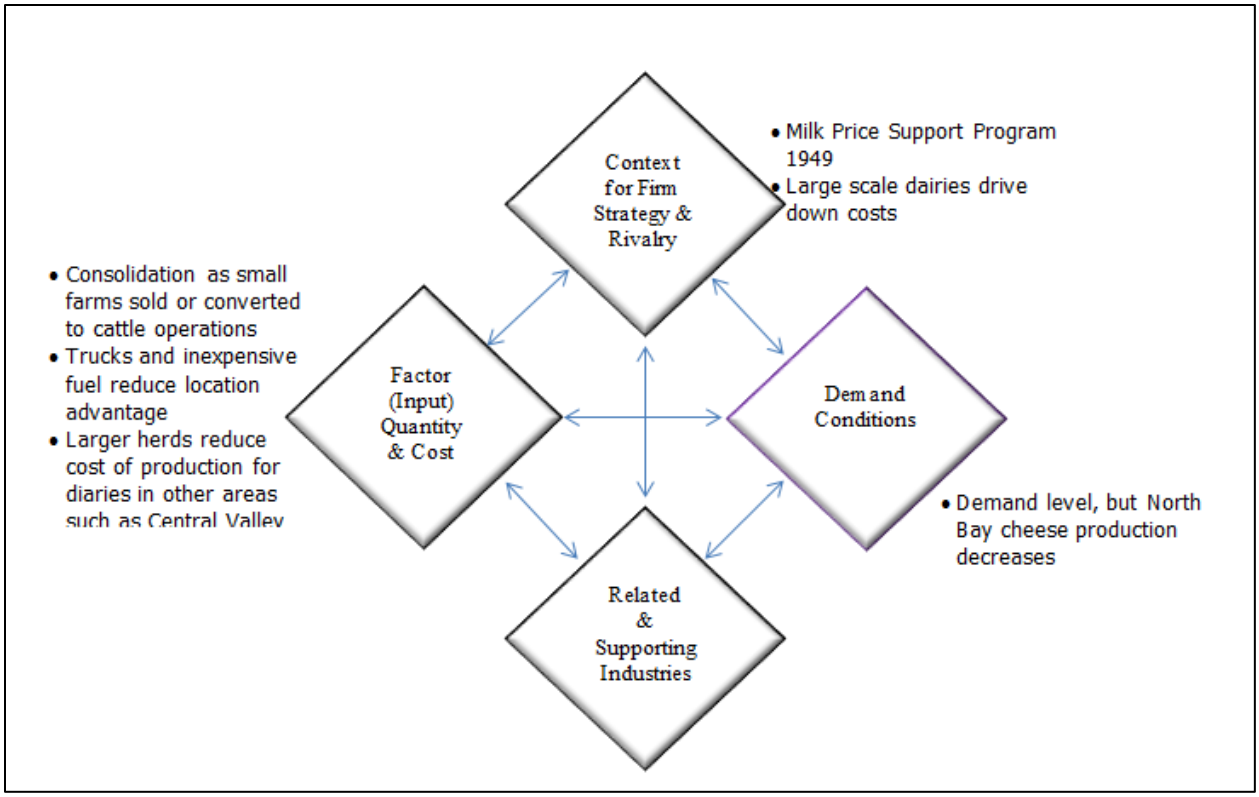

Figure 8. Competitive Advantages in World War II and Post War Era through 1950s.Author's image. Adapted from "Location, Competition, and Economic Development: Local Clusters in a Global Economy" by M. E. Porter, 2000c, *Economic Development Quarterly*, *14*, 15-34.

3.4 Shifting Trajectories for North Coast Dairy Industry 1960s to 1990s

The changing economics of dairy production, along with the intense residential development pressure in the North Coast region, posed a challenge to Marin and Sonoma dairymen as the 1960s began. Advances in dairy herd management, resulting largely from the National Dairy Herd Improvement System, led to a marked increase in milk production per cow in the latter half of the century (see Figure 9).

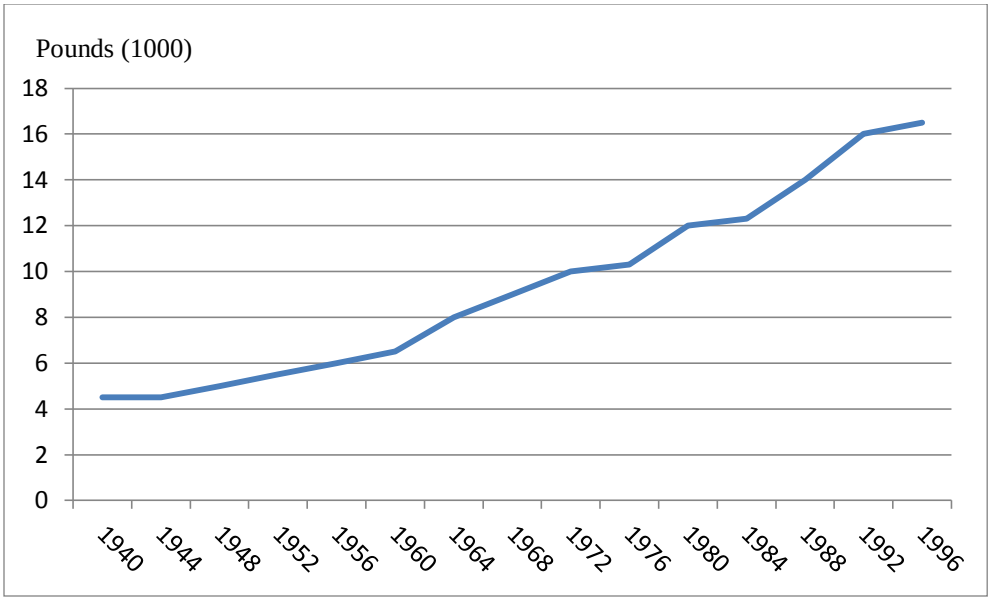

Figure 9. Author's image. Milk Production per Cow: 1940-1995. Adapted from "Milk: Production per Cow by Year, US" by USDA, 2013, *National Agriculture Statistics Service.*

Other developments in herd management and production included:

- Improvements in feed ration efficiencies based on computerized linear program least-cost feed ration formulations (including growth promoting vetraseuticals in the rations);
- The rapid expansion of growth hormone rBgh injections by dairymen;
- Genetic improvements and artificial insemination technology advancements that lead to higher milk production per cow;
- Lower-priced feed resulting from government subsidy programs that encouraged over production of feed grains (corn and grain sorghum).

Large-scale dairies were better positioned to leverage assets to benefit from innovations in dairy technology.

Remarkably, however, Marin and Sonoma Counties took steps to preserve the dairy regions by creating land conservation programs. Guthey et al. (2004) describe three strategies employed to accomplish the preservation of the dairy farms and other agricultural lands:

1. Creation of the Point Reyes National Seashore;
2. Legislative and regulatory actions, enacted on the state and county levels; which linked local planning with agricultural land preservation and public access goals;
3. Purchasing conservation easements on private land.[52]

A locally-inspired effort, the Point Reyes National Seashore (PRNS) was created by Congress in an effort to preserve the Point Reyes Peninsula; most of which had been farmed by the same families for multiple generations (Hart, 1991). The PRNS process was not an easy one: the dairy farmers, concerned that federal acquisition would mean their eventual removal from the park,

[52] Conservation easements are mechanisms to remove development rights from the bundle of recognized property rights under U.S. law. In Marin County, the Marin Agricultural Land Trust (MALT, 2013), a nonprofit entity, uses such easements to prevent the sale of dairy farms and avoid fragmenting the regional agricultural economy. In Sonoma County, the Sonoma County Agricultural Protection and Open Space District (SCAPOSD) a county government program, uses easements to preserve greenbelts, nature reserves, and agricultural lands, including dairies.

initially resisted. A compromise was struck in 1960, with legislation that created the park but allowed agriculture to remain. Even then, the park proposal almost failed. The National Park Service (NPS) expended all funds in its limited land-acquisition budget before acquiring all the acreage designated for parkland.[53] The additional $43 million necessary to complete the park were not appropriated by Congress until 1970 (Livingston, 1994).

The second strategy to protect dairy lands involved public planning, linking agricultural land preservation with environmental and public access goals. Early on, activists organized to thwart Pacific Gas & Electric's 1962 attempt to build a nuclear power plant on Bodega Head in Sonoma County. As more coastal and inland projects were proposed, coalitions formed to push legislation to limit development, and groups began to advocate for (and against) establishment of a planning commission with zoning authority to supersede local jurisdictions. Competing legislation emphasizing local control was also introduced. Substantial lobbying from the real estate and energy sectors, the County Supervisors' Association, the League of California Cities, and many others prevented Coastal Commission legislation from passing.

In 1972, the California Coastal Alliance, a grassroots organization of more than 100 environmental, civic, agriculture, and labor organizations spearheaded the initiative Proposition 20, the Coastal Initiative. The voters of California, by an 800,000 vote margin (55%-45%), passed the Coastal Initiative, Proposition 20, in November 1972. The proposition created six regional commissions and one statewide commission to oversee the use and development of California's 1,000 mile coastline. Members of the regional and state commissions were to be locally appointed in some instances, with a percentage of the appointments filled by the Governor, the State Senate Rules Committee, and the Speaker of the Assembly. The Coastal Commission's four-year interim plan included drafting a long-range plan to guide future conservation and development in the coastal zone using maximum public input.

The Alliance, led by Petaluma-native veterinarian Bill Kortum and executive director Janet Adams, rode herd on the public meetings and drafting of the California Coastal Plan that was submitted to the legislature as a foundation for the California Coastal Act of 1976. While insuring public access to coastal areas for all Californians, the Act protected and conserved agricultural areas as well as sensitive plants, animals and habitats, wetlands, and scenic rural areas. Importantly, it restricted any new development to existing developed areas (Online Archive of California, 2007).

Key Marin players in the public referendum efforts included Ellen Straus, who with her husband Albert owned Straus Dairy in Marin County, and her lifelong friend Phyllis Faber. Faber served on the newly created California Coastal Commission, as well as the boards of the Planning and Conservation League and the League for Coastal Protection, and along with Ellen Straus was co-founder of The Marin Agricultural Land Trust (MALT) —all instrumental in the shepherding the protection of Marin and Sonoma dairy farms. Ralph Grossi, President of the Marin County Farm Bureau during this period, and later as President of The American Farm Land Trust, was also influential in these efforts (Marin County Farm Bureau Annual Meeting Report, 2011).

Agricultural-land protection rose to the forefront in Sonoma County during the general-plan deliberations in the 1970s. The 1978 General Plan emphasized land use as a means of supporting the farm economy, encouraging large parcel sizes, buffers between residential areas

[53] Watt (2002) notes the National Park Service spent its limited land-acquisition budget by1966, having only acquired roughly 15,000 acres within the designated 53,000-acreboundary, partially because it overpaid for its initial ranches, thereby increasing the value of the remaining ranches.

and working farms, and reviewing policies for their effects on the agricultural sector. Goals were established, but until the Sonoma County Farmlands Group, started in 1977 by Bill Kortum,[54] and Jim Sullivan, drafted a farmlands protection initiative in 1980, little attention was paid to implementing language or requirements. The initiative failed to pass initially, but attitudes changed as urbanization increased.

In 1989, Sonoma County Supervisors included a right-to-farm ordinance in the General Plan update, ensuring that farmland protections would be addressed. Significantly, the Agricultural Element included in the update considered farming from an economic perspective more than an environmental or land use position. According to the report issued by the Sonoma County Farmlands Group:

> Programs in the General Plan reflect an orientation toward progressive agriculture: increased emphasis on agricultural marketing, more flexible standards for tourist or commercial operations that support farms, adoption of Right-to-Farm policies, recognition of farmworker housing as a unique problem distinct from other housing issues, reduction of governmental procedures for farm-related permits, and the need for continued involvement in policy implementation by the farm community. (Scarborough & Stegman, 1989, p. 27)

The Sonoma County Agricultural Marketing Program (SCAMP) was also created at this time. Modeled after the wine-makers use of appellation,[55] the project was among the first in the country to promote a "buy-local" program, using "Sonoma Select" labeling to enhance the image and marketability of local products. SCAMP led to establishment of Sonoma County Farm Trails, a program that linked together small farms for purposes of creating tours, "tastings," and other events to improve local sales.

At the local level, Marin County conservationists, determined to preserve open-space and control growth, initially enlisted the assistance of the Audubon Society to protect land piece-by-piece.[56] Eventually, they worked with local political leaders to create a county development plan, known as a "general plan," which linked local planning with nature and agriculture (Guthey et al., 2004). Strict 60-acre-minimum zoning (24.28 hectares) was implemented to stave off developers in the county's rural portions (Baxter, McDonald, & Smart, 1973). Finally, they backed this commitment to agricultural preservation with financial resources during a severe drought and following implementation of new dairy-waste regulations that required updated waste-management systems. To this day, a core component of local planning remains land conservation (Guthey et al., 2004).

Sonoma County voters created planning rules more supportive of open-space preservation through ballot initiatives. Formal efforts to establish urban growth boundaries did not begin until the 1990s, but they were successful in maintaining dairy lands by limiting the sprawl that has impacted agricultural viability in other regions of the state. The third approach to

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[54] Kortum was a long-time political activist in Sonoma County. In 1974, he was elected to the Sonoma County Board of Supervisors, but was recalled in 1976. University of California, Berkeley geographer Richard Walker (2008) discusses Kortum's contributions to the region in "The Country in the City: The Greening of the San Francisco Bay Area," noting Kortum has been "the leading green warrior of Sonoma County and a consistent generator of new ideas and organizations for forty years . . . Kortum has never budged from Coati but he has had an indelible impact on the whole state" (p. 195).

[55] In 1983 the Federal Bureau of Alcohol, Tobacco, and Firearms sanctioned "appellations" to designate exclusive places of origin for wine.

[56] The Marin Audubon Society was established in 1956 as part of the effort to prevent development of houses on Richardson Bay tidelands.

protect the open spaces needed by the dairy industry involved purchasing conservation easements on private land. Conservation easements are mechanisms to separate development rights from the bundle of recognized property rights under U.S. law, transferring those rights to a non-governmental organization (NGO).[57] In 1976, a group of Sonoma Valley residents obtained funds from the San Francisco-based Trust for Public Lands (TPL) to purchase "properties of interest," creating the Sonoma Land Trust (SLT). Since then, SLT has protected nearly 47,000 acres of what the organization deemed "beautiful, productive and environmentally significant land in and around Sonoma County." Of this total, 15% of the easements are farms and ranches (Sonoma Land Trust, 2013).

Marin County citizens joined forces to create MALT. Founded by Phyllis Faber and Ellen Straus, the non-profit MALT was the first farmland trust in the nation, purchasing or accepting donations of easements to prevent the sale of dairy farms and avoid fragmenting the regional agricultural economy (MALT, 2013). MALT receives 10 percent of the acquisition funds of the Marin County Open Space District and has purchased easements on more than 45,000 acres using private and public funds. As of 2012, 11 dairies and six creameries are on MALT-protected land.[58]

In Sonoma County, the Sonoma County Agricultural Preservation and Open Space District (SCAPOSD), a county government program, used easements to preserve greenbelts, nature reserves, and agricultural lands, including dairies. SCAPOSD operates under the authority of the Sonoma County Board of Supervisors, with a citizen's advisory group of local stakeholders providing guidance. SCAPOSD was the first open-space district in the U.S. to be funded by a sales tax. SCAPOSD has used funds generated from a voter-approved quarter-cent sales tax to permanently preserve almost 85,000 acres of Sonoma County open space and agricultural land to date (Sonoma County Open Space, 2006). The first dairy farm protected by SCAPOSD was the 560 acre Burns Dairy near Petaluma in 1993. The most recent Dairy Farm conservation easement acquired was in 2003 when the 800 acre Comozzi Dairy west of Petaluma.[59]

The work of MALT and SCAPOSD were key components in keeping local farmers on the land, and local milk, cheese, and other products available. Both groups accomplished this by buying farmers' development rights and placing a permanent easement on the land that prevents developing or paving over the pastures. The money farmers receive can be used to pay off debt, split the accrued value of the farm among heirs, pay inheritance taxes, or invest in infrastructure.

By successfully choosing to sustain 150 years of dairying tradition through conservation, Marin and Sonoma counties preserved the infrastructure necessary for milk production, and regional conventions – the practices, relationships, and experience of those who participate in the industry (Storper, 1997). Still, California milk production continued to migrate from the North Coast pasture-based dairy farms to the dry-lots operations to the south, and the total farm acreage decreased, as shown in Tables 1 and 2.

[57] Development rights can be sold back, sold again, or extinguished.
[58] MALT staff (personal communication, August 23, 2013).
[59] In the 21st Century both SLT and SCAPOSD have focused on "landscape scale" projects—projects that connect and protect entire watersheds, trail, and wildlife corridors. Agricultural lands of historical significance are still valued, but none have been acquired for almost 10 years.

Table 2
Dairy Farms in Marin and Sonoma Counties 1950-2007

Year	Number of Farms	Number of Cows	Number of Acres
1950	3,088	64,509	1,029,305
1959	1,333	76,233	991,297
1969	465	55,772	842,196
1978	319	44,051	732,648
1987	203	45,777	717,129
1997	166	46,383	720,467
2007	133	41,688	690,455

Note. Adapted from "2007 Census of Agriculture," by USDA, 2007, *USDA National Agriculture and Statistics Survey*.

Table 3
Dollar Values of Dairy Production in Marin/Sonoma, 1950-1999

	Marin County		Sonoma County	
Year	Production Value	Constant Value	Production Value	Constant Value
1950	$8,134,518	$33,758,250	$12,525,290	$51,979,954
1954	$9,504,000	$35,354,880	$15,422,570	$57,371,960
1959	$11,742,294	$40,393,491	$18,178,000	$62,532,320
1964	$9,700,000	$31,331,000	$22,203,000	$71,715,690
1969	$11,187,500	$30,541,875	$27,245,000	$74,378,850
1978	$18,248,500	$27,920,205	$46,985,000	$71,887,050
1987	$27,121,213	$23,866,667	$63,889,500	$56,222,760
1999	$33,879,000	$20,327,400	$91,554,000	$54,932,400

Note. The constant value of dairy production was calculated using 1982-1984 dollars. Adapted from "2007 Census of Agriculture," by USDA, 2007, *USDA National Agriculture and Statistics Survey*.

The rapid escalation of North Coast land values presented challenges for dairy farmers who wanted to remain on their land, as well as for newcomers to get into the business. Proximity to the San Francisco Bay Area employment centers increased population pressure, creating "bedroom communities" throughout the Marin-Sonoma. A 1989 survey of Bay Area residents reported 34% would rather live in the North Coast counties (Associated Press, 1989). Many agricultural lands were worth more as development projects than as working farms. Banks in some cases viewed land as ultimately subject to development, with dairies only the use until the land would be sold, leading loans to be based on development potential rather than cash flow of the business. A dairy farmer, in business through this period explained:

> Prospective dairy farmers or those trying to expand operations could not provide cash flows needed for land purchase or business investment to "pencil out". Conservation easements confounded matters with the banks even more; loans were against the development value of the land, and any purchase or transfer of development rights decreased the value of the collateral securing the loans. (Author interview, 2013)

The decline in the Marin-Sonoma dairy industry was further exacerbated by changes in national agricultural policy. During the late 1970's and early 1980's, the U.S. dairy market grew

seriously out of equilibrium, in large part due to an increase in the minimum federal price support levels. The Food and Agriculture Act of 1977 raised the minimum support level to 80 percent of parity. The market moved quickly out of balance as farmers responded to the higher milk prices with larger herds, and consumers responded with lower purchases. By 1980, the dairy market had large quantities of surplus production and the federal budgetary costs of the dairy programs began to increase rapidly.

The budgetary burden of the large milk surpluses led to new policies, including the Agriculture and Food Act of 1981, which departed from the traditional parity basis for supporting milk prices, and set the support price at the nominal level; and the 1983 Dairy and Tobacco Adjustment Act, which provided for a milk diversion. These programs were not entirely successful; milk production in 1984 declined only 4 percent from the record level of 140 billion pounds produced in 1983. As a result, one component of the 1985 omnibus farm bill was a milk production termination program, in which dairy farmers bid competitively to be paid to voluntarily cease milk production for five years, and slaughter or sell overseas their entire dairy herds. The goal of this "whole herd buyout" was to reduce the U.S. dairy herd by 10 percent, with an associated reduction in milk production. Approximately 10 percent of the existing dairy herd was removed from the market over the period from April 1, 1986 to October 31, 1987. However, between 1980 and 1985, the number of replacement heifers in the aggregate U.S. dairy herd increased, resulting in an increase in total milk production by about 1.5 percent during the paid termination program.

The California Milk Advisory Board (CMAB), an instrumentality of the California Department of Food and Agriculture funded by the state's dairies, was active in research and marketing during this period. Starting in 1985, the CMAB mounted several campaigns in California involving television and radio advertising, as well as newspaper, magazine and outdoor displays that promoted "Real California Cheese". While these advertisements were generally considered effective, the cheese industry in the Marin-Sonoma region was not sufficiently developed during the early years of the campaign for it to be of notable benefit to dairy farmers.

During the 1990s, the downward trajectory of the North Coast dairy industry began to shift for "those with the foresight to identify and guts to make the leap to organic milk production", as one dairy farmer interviewed noted (Author interview, 2013). Further, the "local ecology of production"—a term used by Murdoch et al. (2000) to describe how "traces of local" become incorporated into products through various mechanisms certifying quality—played an important role in the success of North Bay dairies. Local, healthy food free of chemicals and genetically engineered biotechnology was not only in vogue, but expected in the Bay Area consumer market. Transitioning to organic milk production allowed small family farms to redevelop competitive advantage over the larger dairies to the south. Utilization of these mechanisms, including public recognition of quality, provenance, and organic certification, helped North Coast dairy producers to distinguish their "ecology of production" from that of the California industrial dairy model, and represented a definite shift toward the "alternative" North Coast dairy industry of today.[60]

Interestingly, one of the first North Coast dairy businesses to benefit from the distinction of "local" was built around goats rather than cows. Laura Chenel, a native of the Sonoma County town of Sebastapol, was the first person in the U.S. to make French-style goat cheese

[60] Murdoch et al. (2000), further characterize organic certification, public recognition of quality, and provenance as, respectively, "ecological," "public," and "domestic" qualifications.

commercially. After apprenticing in France, she launched her business with a chèvre[61] in 1979. Later, Chenel added other cheeses, including a tome she learned to make from one of her earliest mentors, Ig Vella. Her cheese became a favorite of renowned chef Alice Waters, who heralded Chenel's chèvre as better than the French version, particularly because of its local origin. Chenel's cheese was featured at Water's Berkeley-based Chez Panisse restaurant, where it was celebrated as part of the new, wildly popular California cuisine. Chenel's success allowed her to purchase the historic Stornetta Gold Medal Dairy buildings, which had been home to dairy cows for some 80 years. The demand for her product steadily increased; Ms. Chenel notes sales grew 500% between 1980 and 1990. She attributes growth to an increase in consumer perception of the quality in the cheese, particularly as more attention was given to goat cheese by prominent chefs (Shore, 1993).

The Laura Chenel era would officially end in 2006, when the company was sold to the Rians Group, a French artisan cheese corporation.[62] However, her business model changed over her 20 plus years of operation. A *New York Times* article explains:

> In the late 1990's, Ms. Chenel took a trip to Norway to help out the goat herders there and ended up lending them her goat cheese recipe and methods. As a result, the Norwegians make chèvre, freeze it and ship 700,000 pounds a year to Chenel in blocks, where it gets processed into cheese for the food service company Sysco. In a similar contract deal, the company buys goat cheese from Canada and sells it as Laura Chenel Select to Sam's Club. (Severson, 2006, para. 28)

The Straus Family Dairy, located in Marin County on the eastern shore of Tomales Bay, was among the first to capitalize on the ecological aspects of production, and remains one of the best known "alternative" dairies in California. The Straus family, who had stopped the use of chemical fertilizers in the mid-1980s, found that this and other innovative farming practices alone did not solve their economic plight. Like other small family farms in the region, they faced major hurdles in maintaining their livelihood. Albert Straus (Strauss Family Creamery, 2014), in relating the history of the Straus Family Dairy, explained: "Farming practices that took advantage of large economies of scale changed the price structure for milk in ways that were detrimental, and sometimes adversarial, to family farming and did not reflect the real economic costs of dairy farming" (para. 3). Straus took a radical step: He converted the family farm to organic and founded Straus Family Creamery, the first 100% certified organic creamery in the country, thereby effectively creating the first field-to-bottle infrastructure for organic milk. They linked their milk and their farming practices to both environmental quality and the preservation of the farm, positioning themselves as "the first organic dairy west of the Mississippi" in 1994.

Going organic allowed the Straus family dairy to reflect their personal philosophy regarding stewardship in terms of environmental care, care for animals and quality of life for communities and family farms. As is noted in their current promotional information (Strauss Family Creamery, 2014):

> Albert Straus feels one of the biggest successes of the creamery is that certified-organic family farms in Marin and Sonoma Counties have grown eight times higher in number

[61] Chèvre is the plural form of the French word for goat, originally used to classify all goat cheeses produced in France, but now commonly refers to all soft fresh goat cheeses, regardless of their country of origin

[62] The French company has over 1,300 employees and produces 40,000 tons of goat and cow cheese a year. It specializes in finding small family operations and buying them with the promise to keep the product and philosophy intact. The company owns about a dozen cheese-making operations, but Chenel will be its first in America (Severson, 2006).

> compared to the number of dairies that sell organic milk to Straus Family Creamery itself. The goal was never to grow the creamery business in an unlimited way, but help grow the community of organic dairy farmers by spearheading a viable business model for family farms. (para. 8)

The transition to organic was not easy. Straus developed homeopathic remedies to replace antibiotic use for their cows. The local dairy cooperative refused to process Straus milk; this "forced" the family to open its own creamery. The Federal Land Bank and the Small Business Administration turned down requests for financing the business, so the family paid for it by selling a conservation easement to MALT and by raising private funds. Straus notes:

> When I went organic back in the 1990s, my peers in the local dairy industry thought I had gone crazy. At that time, we all sold milk to a local coop or regional processor, and the price they set did not cover the cost of production. The large processors and coops were not open to innovative farming practices or small-scale artisan dairy production that were necessary to family farms' future survival. It cost me over $100,000 because I did the whole herd at once. You can't market the milk as organic until you finish the transition, and meanwhile your feed costs are close to double. Back then, I had to scramble to even find organic feed. (Author interview, November 6, 2012)

Now, almost twenty years later, the risk seems to be paying off. As another successful North Coast dairy farmer observed:

> Albert is regarded as the pioneer of organics in the region. He's the innovator who blazed the trail that saved dozens of local historical dairies from the path to bankruptcy—those who had the courage to follow his organic model are in business today, while those who did not were forced down the bankruptcy path. (Author interview, May 5, 2013)

Annual sales are estimated at $7.6-$10 million (Hoovers, 2012). The dairy produces certified organic milk, ice cream, cheese, and yogurt under its own label, using its own cows and those of two partner dairy farms in Sonoma County.[63] Straus dairy products are sold in specialty grocery stores in California, in the Pacific Northwest, and in the Rocky Mountains. The Strauses also supply organic milk to local artisan cheese makers. As a testament to their success, 75% of farms in Marin and 68% of all dairy farms in Sonoma are either certified or are in transition to become certified organic, as shown in Table 4.

[63] Straus buys from two partner farms: the Tresch family, which has about 900 cows on two sites totaling 2,000 acres; and the Hughes dairy, with about 150 cows on 200 acres.

Table 4
Certified Organic Dairies in Marin-Sonoma Counties, 2013

	Marin County	Sonoma County
Total Dairies	24	64
Total Organic	17	40.5
Total Conventional	6	20.5
Total Transitioning	1	3
Organic	71%	63%
Transitioning	4%	5%
Conventional	25%	32%
Total	100%	100%

Note. Author's table. Data gathered from the Straus Family Creamery (Personal communication, October 14, 2013).

While the Straus family focused on the ecological aspects of local production, Sonoma County's Clover Stornetta Farms Inc. (Clover) relied on public recognition of quality to meet the challenges presented by industrial-model dairies.[64] A privately owned regional milk processor, Clover's strategy was to create a market niche in dairy products by using cows that were not treated with rBST.[65] This new approach required no changes in the production processes or manufacturing equipment utilized by Clover; rather it demanded changes in the farming practices of their suppliers. North Coast dairy farmers received a cost premium in exchange for agreeing to discontinue the use of rBST. In order to guarantee rBST-free products—and to advance the success of their marketing efforts—Clover developed the North Coast Excellence Certified (NCEC) program for "quality assurance," linking its dairy products to place and to a set of best practices. With NCEC, Clover was able to differentiate itself from other processors by elevating its milk from a commodity to a specialty food, leading to development of a strong base of consumers concerned about food safety. Clover president Dan Benedetti reported that within three years of starting the NCEC the company was experiencing the largest growth in company history (Shore, 1999).

Family-owned dairies were closing at an alarming rate in 1998, the time of the first artisan cheese making seminar at the Creamery in Pt. Reyes. Clearly, incorporation of the "traces

[64] The current Clover –Stornetta Farms operation is a direct descendant of the Petaluma Cooperative Dairy that was founded just over a century ago. In 1975, the entire Petaluma processing plant was destroyed by fire. Two years later, Gene Bendetti and partners Paul Ross, Dan Benedetti, Gary Imm, John Markusen and Bill Van Damm purchased a wholesale distribution business from California Co-op and Stornetta's Dairy in Sonoma. In 1984, they consolidated the operation in Petaluma. In June 1991, they opened a new, state-of-the-art processing plant there. They became Clover Stornetta Farms in 1997.

[65] Recombinant bovine somatotropin (rbST) works the same way as, and is a synthetic version of the protein, bovine somatotropin (bST), resulting in the production of just over one gallon more milk per cow per day. Bovine somatotropin, also referred to as bST or bGH or bovine growth hormone, is a naturally occurring protein hormone found in all dairy cattle. (Modified from information on The Global Dairy Innovation website).

of local" and other indications of quality was proving advantageous for local dairy producers, and was instrumental in keeping many Marin-Sonoma dairy farmers in business despite the volatility of commodity milk markets. The move to organic methods provided opportunities for producers to diversify their revenue streams by developing value-added products from their own milk supply. Others took advantage of the availability of good quality milk to start producing artisan cheeses. Sue Conley, co-owner of Cowgirl Creamery, one of the first artisan cheese businesses in the region, explained:

> Families throughout the area were thinking they might have to give up their dairies after generations of ranching in the region. When we saw them- the dairy farm mainstays in the community, leaders in the agricultural industry such as Straus and the Giacomini's thinking about doing something as renegade as transitioning to organic practices and cheese making, we knew we were doing something significant. They were very bold and innovative; everyone was watching to see what they did. (Southern Sonoma County Life, 2012, para. 9)

Others, including Lynne Devereux, former member of the California Milk Advisory Board and founder of the California Artisan Cheese Guild, agreed, noting: "Small family farms began turning to artisan cheese as a value added product they could develop to keep those family farms in existence," says "We were experiencing a renaissance in the dairy industry" (Shee, 2012).

As the 20th century came to a close, artisan cheese became the dominant product made from milk in the North Coast region. A 1995 California Milk Advisory Board (CMAB) survey of more than 50 leading San Francisco restaurants revealed that none had a cheese course on the menu, or listed artisan cheese as an ingredient. By 2000, nearly half of the restaurants surveyed featured artisan cheeses, with Marin and Sonoma labels dominating the selection. From 1980 to 2000, national cheese production grew 68%, and California's share of total U.S. cheese production grew from 5% to 22% (Dryer, 2006).

Despite, or perhaps as a result of the challenges faced by the North coast dairy industry, many early leaders of the artisan cheese renaissance in the 1970s and early 1980s are still in business today. These include Laura Chenel (1979; sold in 2006), Jennifer Bice and Steven Schack at Redwood Hill Farm (1978), and Patty Karlin and Javier Salmon at Bodega Goat Cheese (1984).

3.5 Growth of the North Coast Artisan Cheese Cluster after 2000

3.5.1 Market Drivers. If the North Coast dairy farmers in the 1990's saw the move to organic production methods and secondary, "value-added" products as a way to stay in business, the new millennium brought confirmation that both changes were good for business.[66] Consumer interest in artisan cheese from the area continued to escalate. The handful of established artisan cheese companies in the region - Vella Cheese Company and Laura Chenel's Chevre, located Sonoma, Marin French Cheese Company and Bellweather Farms Creamery in Petaluma, Cowgirl Creamery and Point Reyes Farmstead Cheese in Point Reyes Station, and Redwood Hill Farm and Creamery in Sebastapol – would soon welcome many newcomers.

The rise in regional cheese production and sales seen in Marin-Sonoma was consistent with the U.S. national trend. Researchers, such as Dyson (2006); Paxson (2012); and Sloan

[66] Nicholson and Stephenson (2006) describe value added as being, "any activity that increases the per unit price received for farm production or any activity that transforms a product into another product that fetches more revenue on the market."

(2004) suggest that in general the growth of artisan cheese and other specialty food markets in the U.S. is attributable to a handful of factors, including:

U.S. Economic Strength. The robust US economy in the 1990's and strong U.S. dollar led Americans to travel to European cities and areas where they were introduced to the way Europeans eat cheese. International exposure to alternative tastes and customs consumers led to increase knowledge of cheese, and requests at retail to purchase artisan cheese. The price differential between European and domestic U.S. cheese equalized; as price points of U.S. artisan cheese became more similar to European varieties, consumers bought more American cheese;

Consumer awareness. The increased visibility and popularity of food-based media, such as food-themed television programs, periodicals, and advertisements stimulated consumer interest in specialty foods, including artisan cheese.

Consumer demand. Consumers demand is ultimately the most important signal for industry growth, and buyers expressed their preference for higher quality food products, in addition to the convenience and low price characteristics they traditionally desired (Sloan, 2004). As a result of this change in consumer expectations, a new benchmark for evaluating products such as cheese was established.

Attention to food production practices and characteristics. As consumers demonstrated greater interest in locally produced and sourced foods, as well as production practices (e.g. organic or conventional), appreciation for artisan cheese grew, often translating to a willingness to pay premium prices.

Consumption patterns. The popularity of high-protein diets (e.g., Atkins, South Beach) may also help explain some of the growth. Many consumers, in effort to reduce their carbohydrate intake, used cheeses as a high-quality protein supplement.

The CMAB's extensive public relations program is credited with nurturing the growth of California's nascent artisan and farmstead cheese industries. The program, deigned to increase the number and types of cheeses produced in the state, encourage California dairy farmers to consider cheese making, while also seeking to improve awareness among chefs, food writers, specialty grocers, and other 'food influential" (Greenwald, 2004). A number of cheese makers interviewed as part of this study recall this effort. Peggy Smith, co-owner of Cowgirl Creamery, noted:

> The California Milk advisory board helped a lot in the early years. They targeted campaign money toward small cheese production. They pulled that back now, but they had a huge part in the early success. Cheese became an accessible food, one that people could explore the way they explored wine. People learned to taste. (Author interview, October 2, 2013)

3.5.2 Market Growth. While consumption of cheese clearly increased after 2000, direct data on production and sales volume of North Coast artisan cheese are not available. California, like other states and the federal government, does not differentiate between artisan and "specialty" cheese.[67] The Agricultural Marketing Resource Center, while attributing the rise in cheese consumption, in part, to growth in specialty, artisan and farmstead cheeses, defines specialty cheese as follows:

> Specialty cheese is a value-added product of high quality and limited quantity. Some of the unique qualities of this cheese include having an exotic origin, distinctive processing,

[67] Wisconsin is the only state to track specialty cheese production separate from its commodity cheese production

> extraordinary packaging or unusual use and channel of sale, with particular attention paid to natural flavor and texture profiles. Specialty cheeses may be made from all types of milk and may include flavorings, such as herbs, spices, fruits and nuts. To be regarded as a specialty cheese, annual production cannot be more than 40 million pounds. (Geisler, 2011, p. 1)

Artisan and farmstead are defined in a similar manner as inn the American Cheese Society Cheese Glossary (2011):

> The word "artisanal" or "artisan" implies that a cheese is produced primarily by hand, in small batches, with particular attention paid to the tradition of the cheese maker's art, thus using as little mechanization as possible in the production of the cheese. These cheeses may be made from all types of milk and may include various flavorings. Farmstead cheese is defined as an artisan cheese that is produced on a farm using only milk from the farm's herd or flock. The milk cannot be obtained from any outside source. Farmstead cheeses may be made from all types of milk and may include various flavorings. (para. 1)

Complicating tracking artisan cheese production data further, data about cheese made from goat or sheep milk is not released.[68] However, despite the lack of differentiation in consumption and production metrics for artisan, farmstead, and, specialty cheeses, data demonstrate rapid growth in the specialty cheese product category. In California, this product class grew by 4% annually from 1996-2000 (Ellerby, 2010). By 2005, specialty cheese accounted for 11% of the total cheese processed in California (Dryer, 2006). Consumption rates in the U.S. increased dramatically as well, as shown in Table 5.

Table 5
Consumption of specialty cheese and total consumption of cheese in the U.S.

Types of cheese consumption	1994	2003	Growth
Total cheese consumption (million pounds)	7,000	8,800	1800 (+26%)
Specialty cheese consumption (million pounds)	420 6% of total	815 9% of total	395 (+94%)
Total cheese consumption per capita (pounds)	26.6	30.6	4 (+15%)
Specialty cheese consumption per capita (pounds)	1.6	2.8	1.20 (+75%)

Note. Adapted from "Real California Milk" by the California Milk Advisory Board, 2004.

By the mid-2000's, Marin-Sonoma artisan cheese producers were, by most accounts, at the forefront of what Carlos Petrini, one of the founders of the Slow Food movement, refers to as America's "renaissance" of cheese making (Petrini, 2007, p. ix). Membership in the American Cheese Society (ACS) reflected this trend. Founded in in 1983 as a grassroots organization by

[68] Paxson (2012) reports that the U.S. National Agricultural Statistics Service does not release production data on goat or sheep milk cheese because producers are so few that release of this information might compromise proprietary information for the largest facilities.

Dr. Frank Kosikowski of Cornell University, the organization slowly expanded to include small-scale and home cheese makers, retailers, academics, and cheese enthusiasts, and began to feature competitions and workshops for members and the public. The membership rolls ballooned from just over 400 members in 2001 to 1200 by 2009, with most of the growth occurring since 2004. (Reed, Butler, & Rilla, 2011) At the same time, competition entries increased from 762 cheeses to 1,327 cheeses. The ACS, now a fully self-managed organization, serves as a central resource for the American artisan cheese industry, providing the cheese community with educational resources and networking opportunities.

In 2005, Marin-Sonoma cheese makers led the effort to start the California Artisan Cheese Guild to support and promote artisans making cow, goat and sheep's milk cheeses. The guild provided some of the first comprehensive statewide marketing efforts for small artisan cheese makers; the California Milk Advisory Board promotes only cow's milk cheese.
The variation in our climate and geography — even ethnicity — allows us to have a lot of different varieties, says Lynne Devereux, a Guild representative. From Northern to Southern California, each of the regions has a distinct style that's starting to develop.

Initially, the North Coast revival of producing artisan cheese for commercial purposes was prompted, to a large extent, by the desire to capture value within the dairy industry. Growth and market conditions prompted more North Coast dairy farmers and specialty food entrepreneurs to initiate small-scale artisan and farmstead cheese operations. Business conditions remain a key factor in the continued growth of the industry. However, as will be discussed, the motivations of North Coast cheese makers today are as varied as the cheeses they produce.

4. The Current Status of the Marin-Sonoma Artisan Cheese Cluster

4.1 Description of the Cluster

It is useful to examine the spatial extension of the Marin-Sonoma artisan cheese cluster. As shown in Figure 10, the cluster is located in the North San Francisco Bay region of California. The cluster benefits from proximity to the large population centers of San Francisco and Oakland, but maintains it rural character. Marin County, with a population of 252,409, and a land area of some 828 square miles, has a population density of 300 people per square mile. The larger Sonoma County, with 483,878 people across 1575 square miles of land, is less densely populated, with 270 people per square mile (U.S. Census Bureau, 2010).

Figure 10. Location of the Marin-Sonoma Artisan Cheese Cluster. Adapted from "Bay Area Map," by D. Bornstein and J. Bornstein, 2014, *The Law Offices of Bornstein & Bornstein*.

In 2013, over 22,000 acres in Marin and Sonoma are in dairy production.[69] Total animals, including dairy cows, goats, and sheep, number approximately 16,623. While the vast majority of milking animals are Holstein cows, 23% are dairy goats, and 4% are dairy sheep (Rilla, 2011 p.8). As seen in Table 6, agriculture is an important component of the regional economy.

[69] This number includes both farmstead dairies and creameries and the 22 dairies that sell to Clover Stornetta (Rilla, 2011, p. 8).

Table 6
Agriculture in Marin County

	Marin County	Sonoma County
Average size of farms:	593 acres	182 acres
Average value of agricultural products sold per farm:	$169,396	$165,857
The value of livestock, poultry, and their products as a percentage of the total market value of agricultural products sold:	84.40%	24.43%
The percentage of farms operated by a family or individual:	71.65%	82.65%
Average age of principal farm operators:	58 years	57 years
Average number of cattle and calves per 100 acres of all land in farms:	23.51	13.01
Milk cows as a percentage of all cattle and calves:	29.11%	39.20%

Note. Adapted from "Marin County, CA" by City-Data.com, 2013a, and "Sonoma County, CA" by City-Data.com, 2013b.

Milk is California's highest-grossing agricultural product, and generated $6,924,121 in total sales in 2008 (California Department of Food and Agriculture, 2010). While wine grapes replaced milk as the leading agricultural product in Sonoma County as far back as 1987, dairies remains vital to the North Bay economy. Eyler (2012) demonstrates that costs of production are typically higher for North Bay dairy farmers than dairy industry benchmarks for California overall, suggesting that there is an opportunity increase profitability by processes that add value to fluid milk. Apparently, dairy farmers and others in the area agree. In just over 10 years, the number of licensed North Coast artisan and farmstead cheese businesses more than doubled (Figure 11).

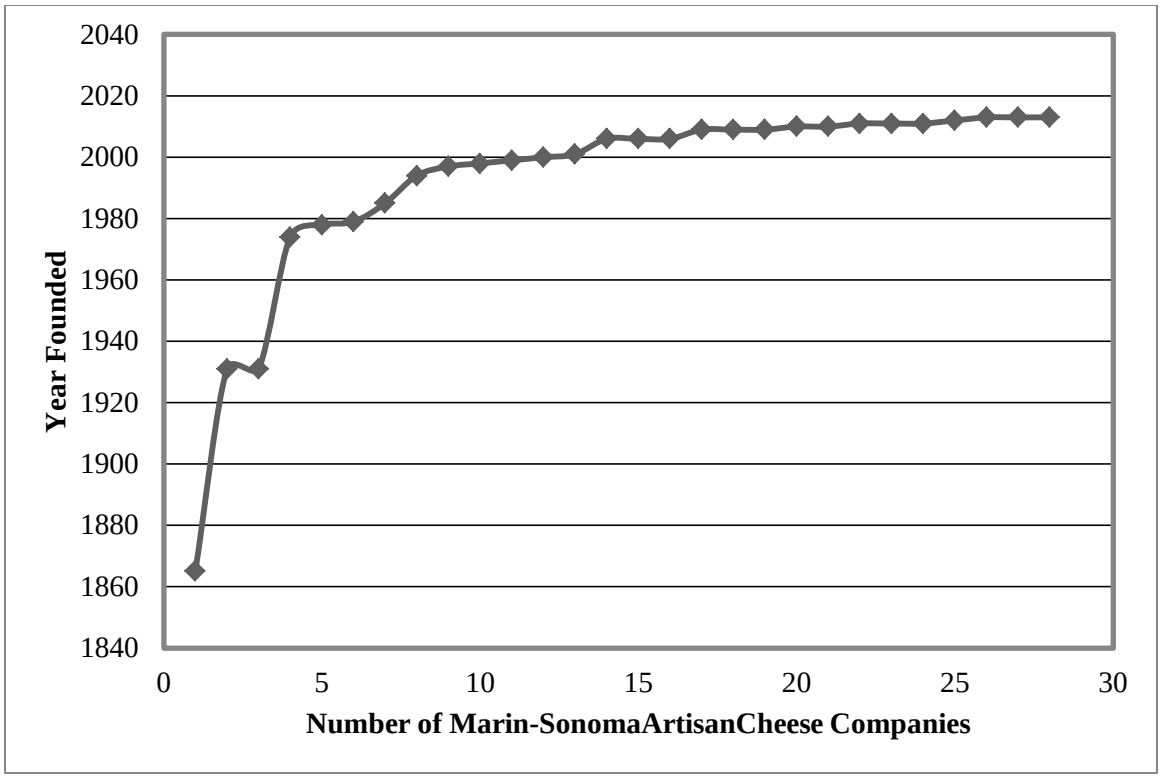

Figure 11. Currently Operating Marin-Sonoma Artisan Cheese Companies. Author's image. Adapted from "Visit a Cheesemaker" by California's Artisan Cheese, n.d., and CACG (personal communication, November 6, 2013.

These businesses are core elements of the cluster, but, as addressed earlier, clusters are more than a number of firms bunched together in a location. A review of Porter's work on cluster theory offers some important points from which the analysis of Marin-Sonoma Artisan Cheese industry can begin.

Early in his career, Porter moved beyond explanations offered by agglomeration phenomenon and network concepts regarding advantages gained by firms that group in space. He proposed that the linkages and competitiveness arising from spatial proximity of businesses created a favorable economic environment, known as a "cluster":

> Clusters are defined as geographic concentrations of inter-connected companies and institutions in a particular field. Clusters encompass an array of linked industries and other entities important to competition. They include, for example, suppliers of specialized inputs such as components, machinery, and services, and providers of specialized infrastructure. Clusters also often extend downstream to channels and customers and laterally to manufacturers of complementary products and to companies in industries related by skills, technologies or common inputs. Finally, many clusters include governmental and other institutions - such as universities, standard-setting agencies, think tanks, vocational training providers, and trade associations - that provide specialized training, education, information, research, and technical support. (Porter, 1990, p. 3)

In much of his work about clusters, Porter uses a simple, flow-chart type diagram to illustrate the vertical and horizontal linkages inherent in clusters. (See, for example, his diagram

of the California wine cluster presented previously). This type diagram lends itself readily to Marin Sonoma artisan cheese cluster as well, as is illustrated in Figure 12.

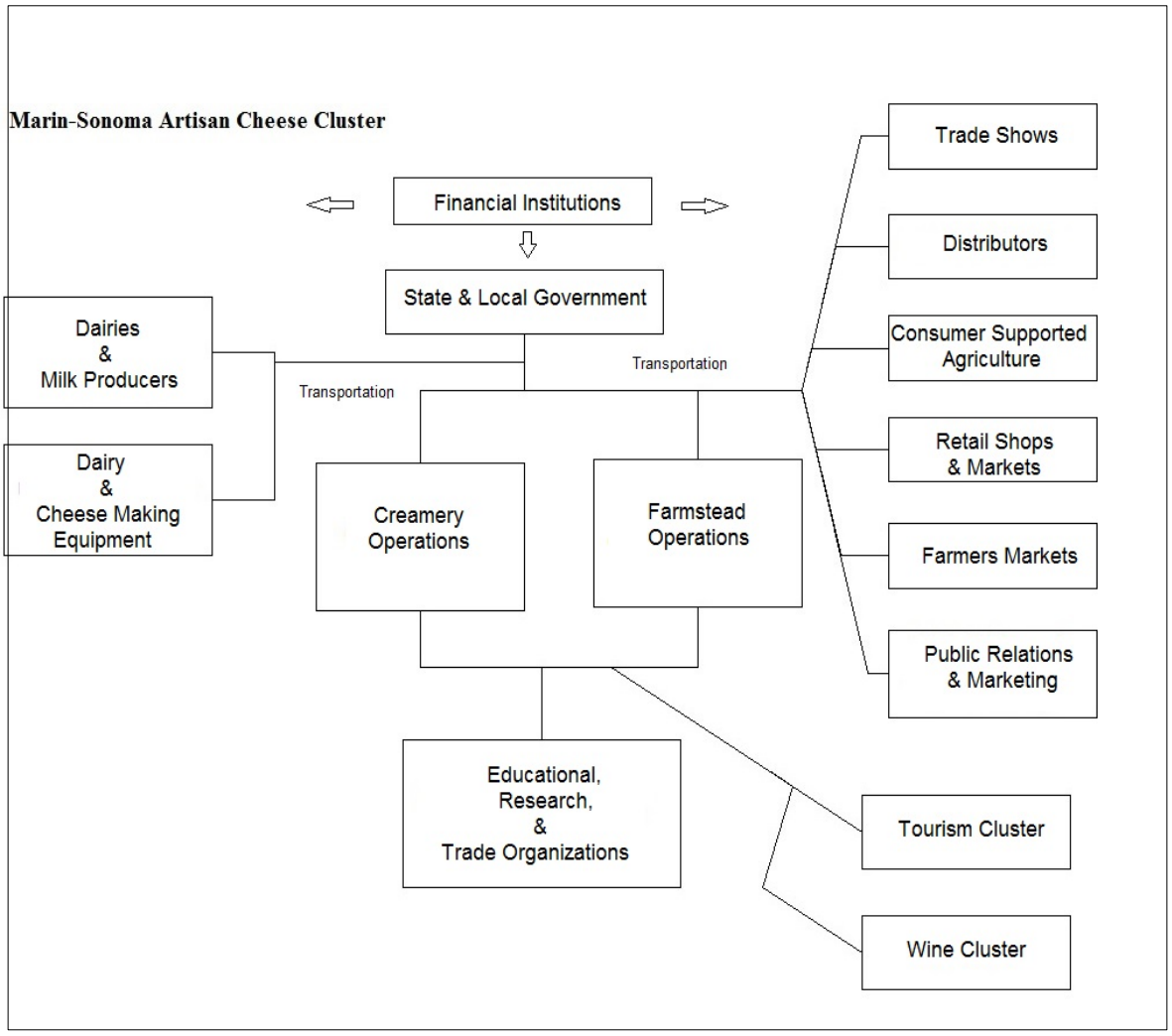

Figure 12. Author's image. The Marin-Sonoma Artisan Cheese Cluster, 2014.

As is shown above, the Marin-Sonoma Artisan Cheese cluster consists of various agents that are interrelated. The diagram illustrates the horizontal and vertical linkages across industries and institutions that impact competition and collaboration within the cluster. The relationships and interactions between participating firms and institutions distinguish the cluster from a simple agglomeration of firms; the active sharing of knowledge and infrastructure costs, for example, lead to transaction efficiencies and innovations.

While the types and quality of interactions between the various cluster agents are instrumental in the development and sustainability of the cluster, consideration of the entire array of linked firms and institutions and markets - the individual components depicted in the cluster

diagram- is critical in understanding the working of the cluster. To facilitate discussion of these components, they are grouped into four categories.

1. The dairies and milk producers.
2. Cheese production firms, including owners, cheese makers, and employees.
3. Supporting Institutions. This group includes governmental and other institutions—such as universities, trade association, standard –setting or regulatory groups—that provide training, technical assistance, research, information, or other support.
4. Distribution. This includes all facets of the channel from cheese maker to consumer—direct sales paths, intermediaries such as cheese brokers, distributors, cheese mongers, retail sales outlets, and shipping/freight.

4.2 Dairies and Milk Producers

"You can make bad cheese out of good milk, but you can't make good cheese out of bad milk" was an oft heard refrain delivered by people interviewed for this research. All agreed that the dairies Marin and Sonoma counties produce some of the best milk available. "We are lucky to have some superb sources of milk. I think the salt air, great grass and conscientious animal husbandry practices going on out here make for good cheese", explains Michael Zilber, general manager of Cowgirl Creamery (Rogers, 2009).

To make one pound of cheese, it takes about 10 pounds of cow's milk, or seven pounds of goat milk, or five pounds of sheep milk. Marin-Sonoma farmstead producers use milk from their own animals to make cheese, while other artisan cheese makers purchase milk, predominately from local dairies.[70] Rilla (2011) reports that in 2011, 54% of Marin-Sonoma county artisan cheese makers supply their own milk, 23% supplement their own milk by buying from other dairies, and 23% do not operate a dairy and purchase all of their milk for cheese production from local or regional dairies.

At present, there are 90 dairies in Marin and Sonoma counties, with many of them supplying milk to cheese makers in the cluster. Of these, at least 30 have transitioned to organic. There are seven goat dairies with commercial cheese operations, with herd sizes ranging from 18 to 1,600 milking does with a mean herd size of 400. In addition, five creameries purchase goat milk to supplement their own production from at least 16 local and regional goat dairies (four do not own their own dairy herds) that supply creameries but are not in the cheese production business (Rilla, 2011). There are at least eight sheep dairies in California, with one located in Marin County and four in Sonoma County.

Dairy businesses in Sonoma and Marin counties employ almost 600 workers. These firms generate or help to generate over $19 million of revenues and an additional 31 jobs for Sonoma and Marin county businesses for every 100 people employed at dairies, as well as generate over $768 thousand in state and local tax revenue (Eyler, 2012, p. 34).

[70] The California Department of food and Agriculture (CDFA) requires those who purchase milk to make cheese commercially to have a California State Milk Handlers license.

Table 7
Marin-Sonoma Counties Dairy Employees 1995-2011

Marin-Sonoma	1995	2000	2005	2010	2011
Dairies	127	104	97	87	88
Employees	595	616	654	513	574
Wages (Thousands)	$9,221	$12,109	$15,150	$13,931	$16,663

Author's image. These data include dairy businesses that generate fluid milk as a final product, and do not include other businesses, such as cheese making, that exist as a separate business within the dairy. Adapted from "Overview – Labor Market Information" by State of California Development Department, 2010, *State of California* and "State and Metro Area Employment, Hours, & Earnings" by Bureau of Labor Statistics, 2013, *United States Department of Labor*.

Today, even with some 90 dairies in Marin and Sonoma counties, the availability of milk for artisan cheese production is limited. Most of the small dairies are under contract with the large dairy distributors, selling their milk directly to firms and cooperatives such as Straus Family Creamery, Organic Valley, or Clover Stornetta Farms. (See figure 13). In some instances, (e.g. Organic Valley), the milk is pooled; while others (e.g. Straus Family Creamery) are able to keep the milk from each "contributing" dairy separate. As one cheese maker explained:

> We know where the milk for each cheese we make comes from. That is a big help in maintaining a consistent product. There is seasonal difference, of course, but we basically know the milk profile, and build the cheese around it. (Author interview, September 19 2013)

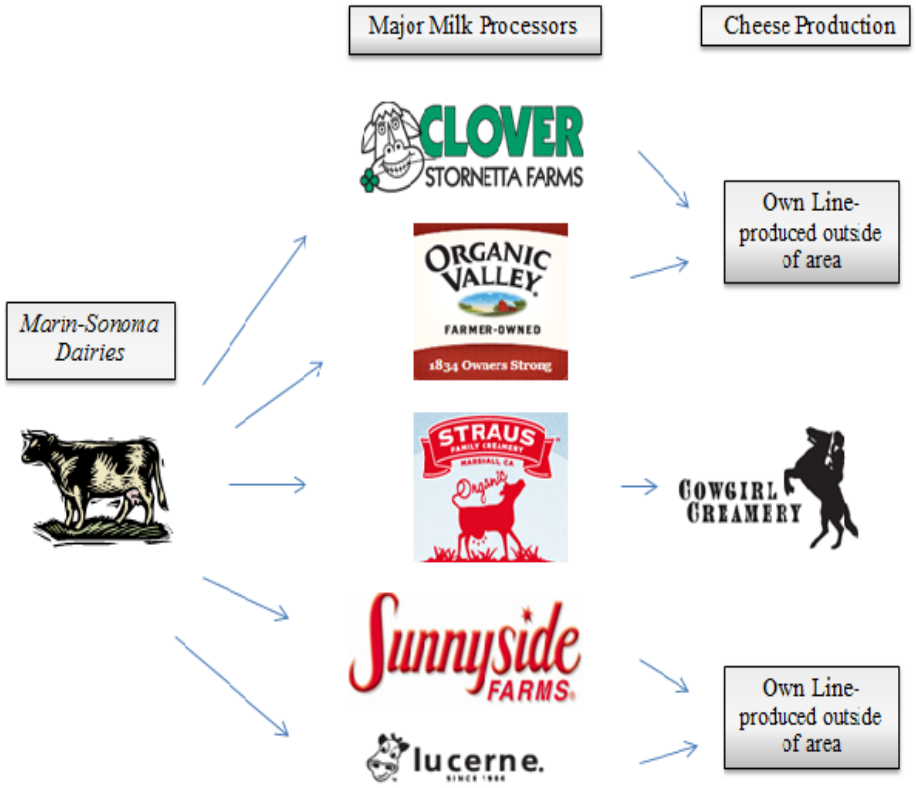

Figure 13. Marin-Sonoma Cow Milk Suppliers. Author's image. (Example).

In farmstead cheese production, the milk animals, dairy, and creamery are co-located on the farm or ranch. Nonetheless, cheese makers must cover seasonal declines in milk when their animals are not lactating. Rilla (2011) noted that 54% of Marin and Sonoma county artisan cheese makers supply their own milk, 23% supply but supplement their own by buying from other local dairies, and 23% do not operate a dairy and purchase all of their milk for cheese production (p. 16).

The markets competing for North Bay milk are indicative of the region's high quality of milk, as well as the growing demand for organic dairy products. However, a number of cheese makers interviewed for this research noted that the system of milk pooling and market contracts make it difficult for small artisan cheese makers to secure an adequate supply of local milk. The milk supply numbers reported by Rilla (2011) remain largely unchanged in 2013, though because

of the seasonality of milk, the "bag and freeze" method (animals are milked and surplus milk immediately frozen for later use) is now reported as typical of farmstead operations. Several interviewees advised that a growing number of cheese businesses purchase frozen milk from Canada, Idaho, Wisconsin, and other areas to supplement their own supplies, or that which they are able to purchase locally.

Marin-Sonoma dairy farms have long existed in an uncertain environment in which milk prices and production costs fluctuate, making business difficult. University of California Davis dairy economist Leslie Butler postulates that the biggest challenge facing local organic dairy farmers is how to pay the feed bill.

> Right now, feed costs are 50 to 60 percent of the total costs of milk production, and right now, those feed costs are very high—and that isn't even the bad news. There's only so much organic alfalfa and corn out there. It isn't easy to find. Eventually, as growers understand there's a solid market that can grow, there'll be more sources of feed. But for now, what's available is expensive and sometimes hard to find. And the cost of transporting only adds to the expense. (Meagher, 2012, para. 28)

Interestingly, firms that deliver a key input—milk—to the artisan cheese cluster are adding cheese making to their business plans.

> There's a great cheese making story inside your [organic milk] story. More important, from a dairy standpoint, the new emphasis on cheese making is giving dairy families another outlet for their milk and, adding value. The fact that there are more people making cheese is a good thing for dairies. In some cases, dairies have looked at how they want to remain viable, and shifting or adding cheese making has been very positive. (Meagher, 2012, para. 14)

Marin-Sonoma dairy farmers and cheese makers obtain services and supplies from an extensive group of professionals and industries. For example, local veterinarians are essential for keeping animals healthy; local contractors and architects have designed and built many of the cheese making facilities; grains and feed for animals are generally purchased from local suppliers. Most dairy farm equipment is manufactured outside the local area, though it is often purchased from local dealers. The "major" equipment utilized in the cheese making process (e.g., vats, tanks, molds, and presses) is sourced from Europe; no U.S. firms currently manufactures this specialty equipment.

4.3 Cheese Production

Although computers and automation play a role in some aspects of today's artisan cheese making, most producers in the Marin-Sonoma cluster combine handcrafted tradition and their own recipe to craft small batches of cheese. Paxson (2012) explains:

> Here is a deceptively basic recipe for making cheese: Heat milk, sour it by adding bacterial cultures to convert milk sugar (lactose) to lactic acid; add an enzyme (such as rennet) to help coagulate the fermenting milk. Once the milk has set into a gel-like substance, use long blades to cut the curd into pieces and release the watery whey, drain, salt, and pack the curd into molds (p. 3).

Table 8
2013 Marin-Sonoma Artisan Cheese Production Summary

	Lbs. of Cheese	Cheese Varieties	Retail Price/lb.	Years in Business
Total	8,488,500	93	N/A	N/A
Average	92,476	4	$16.95	10.5 years
Range	1,230-3,200,000	1-9	$7.00- $39	<1-148 years

Still, the art of cheese making is to blend the skills needed for production with a distinct expression of the characteristics of the animal used for milk, the pasture or feed, the climate, and the terroir. Industry experts, such as Gordon Edgar (2010), cheese buyer for San Francisco's Rainbow Grocery and author of *Cheesemonger: A Life on the Wedge*, suggest that in terms of quality, cheese from the Marin-Sonoma region is "world class."

In Marin and Sonoma counties, 29 artisan cheese firms are currently producing some 90 varieties[71] of cheese, totaling more than 8 million pounds of cheese annually (Table 8).[72] This represents a mere 3% of California's annual production of specialty cheeses, which, according to some, demonstrates the opportunity for growth in Marin-Sonoma artisan cheese production.[73]

Much like winning a European competition put California wine "on the map", cheese from the Marin-Sonoma cluster was propelled into the limelight when the Marin French Cheese Company Rogue et Noir Triple Cream Brie took first prize at the 2005 World Cheese Awards in London.[74] Lynne Deveraux of the California Artisan Cheese Guild explained: "When Marin French won, it was the equivalent of when Napa Valley chardonnay won" (Rogers, 2010, p. 1). Now, the cluster has a map of its own to guide tourists and cheese connoisseurs (Figure 14). Ellie Rilla, who along with Vivian Straus is credited with shepherding the map from concept to reality, explained: "With small family dairy farms continuing their rapid decline, with an average yearly loss of five per cent, the map encourages the sale of local products and by extension supports the agricultural community (Starkman, 2011. P. 2)."

[71] According to author Laura Werlin (2007), there are eight basic styles of cheese.
[72] Based on Rilla (2011) and author interviews conducted in 2013.
[73] Comment offered by participant in the California Cheese Guild "Trade Day" event for distributors on October 4, 2013.
[74] The 1976 "Judgment of Paris", wine tasting competition that resulted in California wines taking top honors is known in wine circles as a pivotal point for the California wine industry.

Figure 14. Sonoma-Marin Cheese Trail Map. Adapted from "Explore the Sonoma Marin Cheese Trail" by California's Artisan Cheese, 2013, *A Project of the Marin Economic Forum.*

Popular media, such as *The New York Times*, refers to the Marin-Sonoma region as the "epicenter of the lively California artisanal cheese movement", noting: "The cheeses are all made primarily by hand, in small batches, and in keeping with cheesemaking traditions — hence the artisan designation — and most are also classified as farmstead, meaning they are made on a farm with milk from its own animals" (Hall, 2013, para. 2). While interviews conducted as part of this research indicate at least 14 of the 29 artisan cheese makers produce at least some of their cheese using milk from their own animals, many of these producers utilize milk from other sources as well. Some cheese makers blend milk from a variety of sources and animal types. Table 9 identifies Marin-Sonoma "farmstead" or "artisanal" cheese producers, as characterized on the Sonoma-Marin Cheese Trail map.

Table 9
Marin-Sonoma Artisan Cheese: 2013

Name	Established	Location	Cheese Characteristics
Achadinha Cheese Company	2001	Petaluma	Goat; Farmstead
Andante Cheese	1999	Petaluma	Cow & Goat; Farmstead
Andre Artisan Cheese	2011	Valley Ford	Sheep; Artisan
Barinaga Ranch	2009	Marshall	Sheep; Farmstead
Bellwether Farms	1990	Petaluma	Cow & Sheep; Artisan
Bleating Heart Sheep Cheese	2009	Sebastopol	Cow & Sheep; Artisan
Bodega Artisan Cheese	1985	Bodega	Goat; Farmstead.
Bohemian Creamery	2006	Sebastopol	Cow & Goat; Farmstead
Cowgirl Creamery	1997	Pt. Reyes Station	Cow; Artisan
Delice de la Valle	2006	Berkeley/Sonoma	Cow & Goat; Artisan
Gypsy Cheese Company	2013	Valley Ford	Cow & Goat; Artisan
Laura Chenel's Chevre	1974	Sonoma	Goat; Artisan
Marin French Cheese Company	1865	Petaluma	Cow & Goat; Artisan
Matos Cheese Factory	1979	Santa Rosa	Cow; Farmstead
Nicasio Valley Cheese Company	2010	Nicasio	Cow; Farmstead
North Bay Curds and Whey	2011*	Valley Ford	Cow & Sheep; Artisan
Point Reyes Farmstead Cheese Co.	2000	Pt. Reyes Station	Cow; Farmstead
Pugs Leap Farmstead Cheese	2010	Petaluma	Goat; Farmstead
Ramini Mozzarella	2012	Tomales	Water Buffalo; Farmstead
Redwood Hill Farm and Creamery	1978	Sebastopol	Goat; Artisan
Sonoma Creamery	1931	Sonoma	Cow; Artisan
Spring Hill Cheese	1998	Petaluma	Cow; Farmstead
Tomales Farmstead Creamery	2013	Tomales	Goat & Sheep; Farmstead
Two Rock Valley Goat Cheese	2006	Two Rock	Goat; Farmstead.
Valley Ford Cheese Company	2009	Valley Ford	Cow; Farmstead
Vella Cheese Company	1931	Sonoma	Cow; Artisan
Weirauch Farm & Creamery	2011	Petaluma	Cow & Sheep; Farmstead

Note. Adapted from "Visit a Cheesemaker" by California's Artisan Cheese, n.d.cheesetrail.org/visit-a-cheesemaker and author interviews, 2013.
*recently closed

There is considerable disagreement among the 35 cheese producers and others interviewed as to the proper interpretation and application of the terms "farmstead" or "artisanal." For example, although every respondent agreed that "farmstead" operations required owning and milking animals, the group was evenly divided as to whether farmstead operations could supplement their own milk with milk from other sources. In some cases, the amount of

cheese produced was dependent upon the amount of milk available from animal stock, while other cheese makers opted to purchase milk to keep production levels up.

Most interviewed concurred that the term "artisanal" should be reserved for cheese that is not "industrial"—meaning, as Paxson (2012) suggests:

> made more by hand than by machine, in small batches compared to industrial scales of production, using recipes and techniques developed through the practical knowledge of previous artisans rather than via the technical knowledge of dairy scientists and industrial engineers. (p. 128)

However, there was little agreement as to how qualifiers such as "small" should be defined. "It's all about intention", suggested one cheese maker, while another noted that any size production model could be artisan if the cheese makers relied on "skill over technology". Others, discussing cheese making as a "balance of art and science" or "a way to transform a living medium into a life-sustaining work of art" noted that the ability to create a cheese that reflected the terroir was more important than whatever technology was used to achieve the particular flavor and quality (Author interview, October, 2013).

Regardless of how "farmstead" or "artisan" is applied, all of those interviewed agreed that producing cheese in the Marin-Sonoma region required a passion for the work as well as the product. "It's a way of life, not a job", said one new cheese maker, while many of those who added cheese production as a way to boost dairy farm revenues remark that it affords them a way to sustain their farms and lifestyles.

A long-time farmstead cheese maker added: "I wouldn't deny that some of the large operations we see today are artisan", suggesting that skill and acumen of the cheese maker, and not necessarily the business owner, is key to distinguishing "artisan" from "production" cheese.

Area cheese producers report that the extraordinarily high land values, high costs, and slim margins associated with making cheese in the North Bay lead are challenging. "It's easy to make a small fortune making artisan cheese here if you start with a large fortune", joked one long time cheese maker. Another observed: "The Marin model is a couple with one off-ranch income, and one running the cheese operation. It's a lot of hard work."

A small-scale (less than 8,000 pound per year) cheese maker explained:

> We're actually small business owners as much as cheese makers, so figuring out how big you can be without giving up your own values is more important than figuring out where the artisan cut-off is. If you make too much cheese, you have to hire help. Too little and you can't pay the bills. (Author interview, November 2013)

Peter Dixon, a nationally recognized cheese consultant, advises that cheese makers need to produce in excess of 10,000 pounds of cheese annually before moving beyond a "Mom and Pop" operation. Most Marin-Sonoma cheese makers operate beyond this scale.

Rilla's (2011) extensive survey of the North Bay cheese making operations showed more than 330 people employed in the industry, with a majority (303) working full-time and 29 part-time. Those interviewed for this study (n=35) confirmed that these numbers have grown slightly to approximately 350, as new cheese makers added employees and established operations expanded. Skilled cheese makers are "golden", as one producers expressed. "If you don't make the cheese yourself, you have to hope you can hire someone who can balance the art and science—and that's not easy today with all the competition from other areas of the country." (Author interview, November 14, 2013)

Several cheese producers noted that wages for all workers in cheese production were rising. With wages ranging from $9.75 to more than $30.00 per hour for production workers,

Marin-Sonoma cheese workers may be considered to be in the lower range for average salaries in the area.[75] Employees, referred to as "crew members" by many producers, perform tasks such as pumping milk from vats into processing equipment, adding coagulants and other ingredients to make cheeses; agitating curd; draining whey; cutting and packaging cheese for shipping; as well as a variety of marketing, promotion, sales, and management functions. Interestingly, the California Cheese Guild has conducted a number of training sessions in Spanish to accommodate the needs of many "crew members" who are non-native English speakers. Exact employment figures are unavailable; most cheese producers estimated that, overall, 50-75% of those employed the Marin-Sonoma cheese production are Hispanic. With Marin County population 11% Hispanic, and Sonoma County at 21%, this demographic group is over-represented in the artisan cheese industry (Center for Economic Development, 2010).

4.4 Supporting Institutions

The Marin-Sonoma area encompasses diverse supporting agencies and institutions, with universities and trade organizations from other areas providing additional expertise and assistance. Various groups and organizations offer specialized training, education, information, research, and technical support to local cheese producers, as shown in Table 10.

[75] The California Budget Project calculates that in 2010 a self-sufficiency, or 'living wage,' for Sonoma County was $14.24 an hour, and $25.21 for Marin County.

Table 10

Institutions Supporting the Marin-Sonoma Cheese Cluster

Type	Services Provided
Educational	
College of Marin	The Artisan Cheese making Certificate Program, started in 2010, trains beginning cheese makers in the art and science of making artisan cheese. Through lectures and hands-on workshops with experienced cheese professionals, students gain the knowledge and skill needed to identify, evaluate, and produce artisan cheese. This program is developed in collaboration with the California Artisan Cheese Guild and UC Cooperative Extension.
Cal Poly San Luis Obispo	The Cal Poly Dairy Science Department is one of the best in the nation. Housing its own dairy herd and also home to the Dairy Products Technology Center and the Cal Poly Creamery, many Marin-Sonoma Dairy owners and farmers are Cal-Poly alum. The Dairy Products Technology Center Offers a variety of courses relevant to artisan/ farmstead cheese makers, covering basic cheese making skills and science, food safety, and "global cheese technology". Cheese makers from around the country travel to San Luis Obispo to participate in the weekend courses.
University of California, Davis	The University of California, Davis has long maintained active departmental programs in dairy production and dairy foods processing research, teaching and extension education.

Type	Services Provided
Educational	
University of California Cooperative Extension (UCCE)	Dairy and cheese producers throughout the Marin-Sonoma region rely on UCCE for information, leadership, program development, and research. The Beginning Farmer and Rancher Program taught agriculture and business skills to increase economic viability for local agricultural production. UCCE staff helps with various artisan cheese events, educational and training seminars, and other activities. UCCE has produced a number of publications, reports, and books related to the Marin-Sonoma cheese industry. The Grown in Marin program promotes artisan cheese.
The Cheese School of San Francisco	The Cheese School offers classes designed to equip participants with the knowledge they need to procure, sell, care for and serve premium cheeses at a professional level. Cheesemongers, distributors, chefs, and others who support the Marin-Sonoma cheese cluster participate in these classes. The school also hosts events to benefit the California Artisan Cheese Guild.
Trade Organization	
California Artisan Cheese Guild (CACG)	Founded in 2006 by Marin-Sonoma County cheese makers, the CAGG is an organization designed to support and encourage the California cheese making community. This is accomplished by supporting the on-going education of cheese makers and consumers, sharing resources, and celebrating the art and dedication to quality cheese. The CASG also offers events for consumers and trade associations. They host the annual California Artisan Cheese Festival. The CASG also produces the Sonoma-Marin Cheese Trail Map.

Type	Services Provided
Trade Organization	
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American Cheese Society (ACS)	Founded in 1983, the ACS provides the cheese community with educational resources and networking opportunities, while encouraging the highest standards of cheese making focused on safety and sustainability. Membership in the ACS is available to anyone involved in the trade or simply passionate about American-made specialty and artisanal cheeses. Many Marin-Sonoma cheese makers count among the 1200+ are members. The ACS annual conference features cheese competitions, awarding honors to the best cheese from around the world.
Governmental	
County Boards of Supervisors	The respective County Boards of Supervisors support agricultural preservation and encourage product diversification as a means to increase agricultural viability, as described in the Sonoma County General Plan and the Marin Countywide Plan.

Type	Services Provided
Governmental	
County Planning	Cheese and dairy producers consistently mentioned county business and building permits and as a main constraint, calling for greater streamlining of the permitting process. Marin County has an Agricultural Ombudsman to assist local producers.
California Department of Food and Agriculture (CDFA)	State licenses are required to operate a plant and the receiving, processing, or manufacturing of milk products. Local producers note that "getting to know your inspector" is important for a successful cheese business.

Notably, many of those interviewed for this research mentioned one or more of the institutions and organizations described above as important both to the success of their business and their personal sense of satisfaction. A new cheese business owner expressed:

> I knew I had to come to a place where there was a community of cheese makers to support me, and help me. The Cheese Guild offers that, plus it provides a venue for us to learn and grow together. Cheese making can be a lonely profession. But it's not just a social outlet; the CACG offers training that keeps us cutting edge and competitive. (Author interview, September 22, 2013)

Educational institutions provide multiple benefits to cheese producers as well. Many of the current cheese makers completed cheese making courses at California Polytechnic State University, San Luis Obispo (Cal Poly), and most participate in various trainings offered by the CACG. As the industry has grown, the CACG education committee, led by Sue Conley, Maureen Cunnie, and Lynn Giacomini Stray lobbied to start the Artisan Cheese Certificate Program at the College of Marin. Modeled after the Vermont Institute for Artisan Cheese, the program has provided training and education to a number of employees of area artisan cheese firms. A Marin cheese maker, who has hired graduates of the program, said:

> The program served as a valuable source for me for finding students who were interested in cheese and who were looking for employment in cheesemaking. I asked instructors to keep an eye out for good students who she would recommend as employees and their recommendations helped me to find the employees I was seeking. The general overview of cheese that they acquired in the classes was valuable as a foundation on which I could teach them the specifics of working with my cheese. (Author interview, October 14, 2013)

The Cal Poly cheese making courses have been filled to capacity each semester offered. According to Laurie Jacobson, outreach specialist for the Cal Poly Dairy Products Technology Center: "Usually, the classes get sold out about a year in advance. They come from all across the country," she said. Jacobson continued:

> Pretty much any person making farmstead cheese in California has come to one of our farmstead courses. We started doing the new course, Dairy Science and Technology Basics for the Artisan/Farmstead Cheesemaker, because people were coming to the Cheese Short Course I class and it wasn't meeting their needs . . . The farmstead class

covers some of the issues that smaller cheese makers face. We get a lot of people that are sheep's milk, goat's milk people. It's just a totally different crowd than the Short Course I.

Cal Poly also offers a 10-week cheese making course to students, and encourages students entering the workforce – especially those in chemistry, microbiology, marketing and engineering— to consider the cheese industry (Mantle, 2007). Still, many of the cheese makers interviewed described their formal coursework as the "science" part of their education, and move on to apprentice stints at artisan cheese operations in California, Vermont, France and Italy.

Despite the efforts of educational institutions, most employees at Marin-Sonoma artisan cheese companies learn their craft on- the-job. Licensing is required to guarantee workers' knowledge of health laws, and their skill in handling equipment.

Marin and Sonoma County agencies, along with the California Department of Agriculture, are a source of both great challenge and assistance to the cheese producers. Inspectors and permit-processing staff are generally regarded as "having a wealth of knowledge about the industry" and "doing their best to help us out", although most artisan cheese business owners acknowledge the importance of "getting the right inspector" (Author interviews, October 2013). Gianaclis Caldwell (2012b), an Oregon cheese maker and educator, prepared this flow chart to illustrate the complexity of the permitting process for California cheese makers, which she called "one of the more permit heavy states."

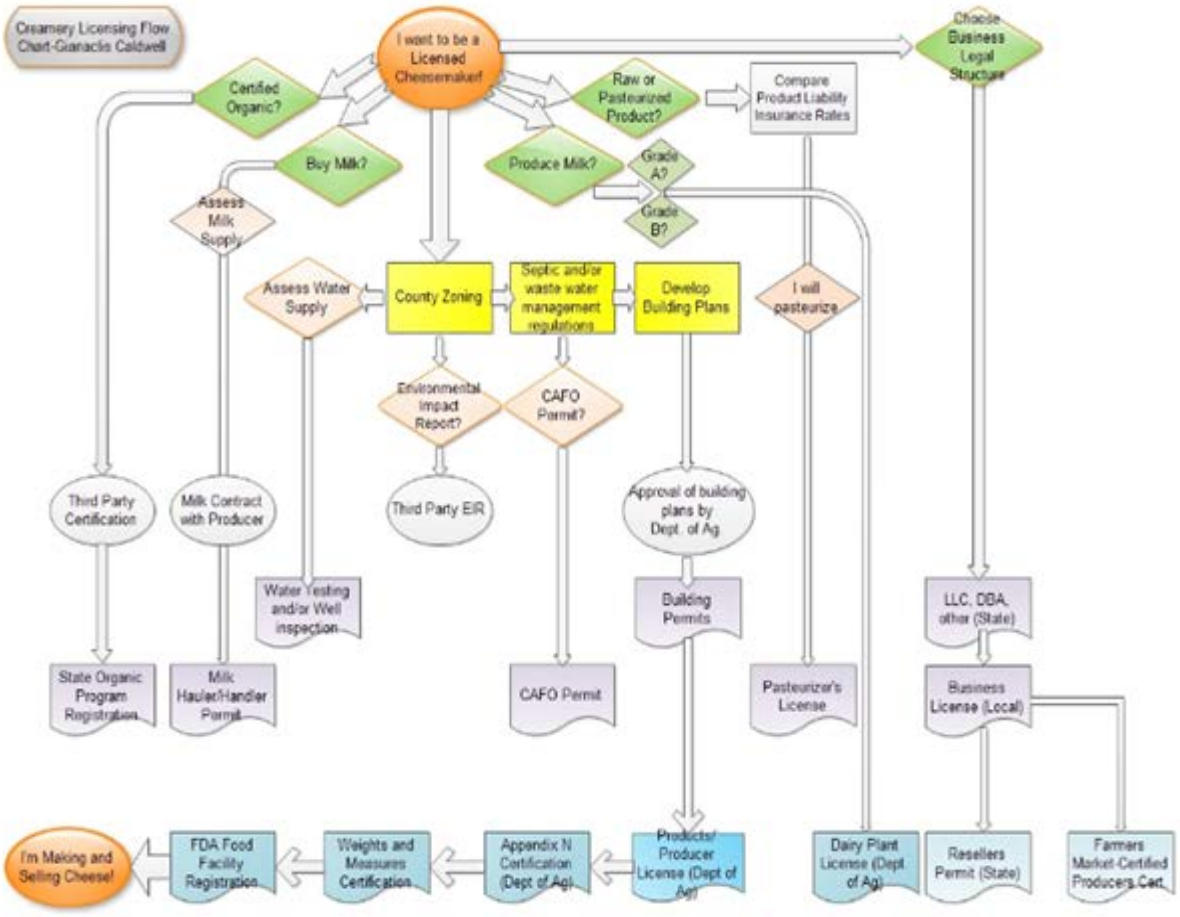

Figure 15. Steps to Licensing a Creamery for Artisan Cheese Firms. Adapted from "FlowChart – Steps to Licensing a Creamery for Artisan Cheese Firms," by G. Caldwell, 2012a, *Mastering Artisan Cheesemaking*.

Related businesses and industries—particularly those involved in wine and agritourism[76], are vital links in the Marin-Sonoma artisan cheese cluster. The Marin Convention and Visitors Bureau, the Sonoma County Visitors Bureau, and many wineries promote artisan cheese, giving cheese makers a way of supplementing income and raising awareness about agriculture and rural life.

The financial institutions that provide capital for cheese plant development and business expansion are critical to industry growth and sustainability. Although more than half of the business owners interviewed (n=20) for this research "self-funded" their enterprise, others received financing from standard bank loans, US Department of Agriculture (USDA) grants and loans, a Whole Foods revolving loan program, and loans or gifts from friends and family. Several cheese business owners spoke about the critical role of the Marin Agricultural Land Trust (MALT) and the Sonoma County Agricultural Preservation and Open Space District

[76] The University of California Cooperative Extension defines agritourism as "any income-generating activity conducted on a working farm or ranch for the enjoyment and education of visitors.

(SCAPOSD), as they used proceeds from the sale of agricultural conservation easements on their land to fund operations.

Seventy-two percent of the farmstead cheese start-ups sold agricultural conservation easements on approximately 9,000 acres in the two counties and used some of the funds to help capitalize their transition (Rilla, 2011). "Those who already have land have a huge advantage", mentioned one established cheese producer.

> A lot of new people come in here with a lot of resources, and that helps, but they aren't making more land. That's why preserving the agricultural land we do have is so important to the future of this industry. (Author interview, October, 2013)

4.5 Cheese Sales and Distribution

The benefit of the Marin-Sonoma location goes well beyond *terroir*. "We make our cheese right next door to one of the best markets for artisan cheese in country," exclaimed one cheese maker. "This area is very interested in food". This interest translates into a boom not only in cheese production, but in places where the "passionate locavores" of this area (and others) can purchase cheese.

There is a plethora of cheese-related businesses in the Marin-Sonoma "market", which extends from the counties throughout the San Francisco Bay area, and recently, a number of distributors who market area cheese throughout the U.S. and other countries. According to Peggy Smith of Cowgirl Creamery: "When we first started distributing cheese, we had a product mix of 65% European cheeses, and 35% from this area. Now that has flipped."

Others interviewed note that "selling our cheese is the easy part. Getting it to the customer and still preserving our margins is a challenge. If you're in the retail space, you have to get the buyers interested in your cheese to get shelf space. If you work with a distributor, you have to figure out who deals with your type cheese, and what markets they access. You have to be able to provide a consistent supply. It's never as easy as it looks."

Artisan producers in the Marin-Sonoma area sell cheese in one of four ways: direct retail to customers (farmers' markets or through internet/mail order sales); direct wholesale to retailers (specialty shops, food co-ops, restaurants); indirect wholesaling through distributors (to supermarkets or retail shops), and through private labeling. Private labeling involves the cheese producer selling wholesale to a retailer, which brands the product with its own label. (Paxson, 2012, p. 85). Few Marin-Sonoma artisan cheese makers sell their product for private labeling, although those who do see an opportunity for growth in this sector. Several others expressed an interest in doing so if they can increase their production levels.

All of those interviewed used a variety of sales approaches to get their cheeses to market and capture as much of the retail price as they could. The smaller cheese makers (making less than 10,000 pounds yearly) depend more on farmers markets and wholesale distributors, while larger operations are able to sell to specialty markets, local grocers, and large national chains such as Whole Foods. A number of cheeses are available through mail order, with Federal Express and other "overnight" shipping companies extending the reach of local to customers as far away as New York and Florida.

There is universal agreement among all key informants that the Marin-Sonoma artisan cheese industry will continue to grow. Some, particularly those who distribute cheese, observe that sales of artisan cheese are increasing both in the San Francisco Bay area and nationally, attributing the increase to education and concern about the food additives and safety. "Consumers are more and more aware of the importance of knowing where your food comes

from, and are willing to pay a premium for taste and quality", explained a long-time distributor. "It's all about being able to tell the story of the cheese through marketing, through labeling, through certification; the customer wants to trust the product. Organic, no-rBST, kosher, "Real California Cheese stickers- these all help sales."

By all accounts, the Marin-Sonoma artisan cheese cluster is thriving. Clearly, part of what is driving this industry is the producer's consumption of the intangible benefits of the cheese-making lifestyle. A long-time producer sums it up:

> Milk supply and regulatory issues are our biggest challenges. Food safety is a big concern, and I think regulations are going to be more stringent moving forward. It might get harder and harder to be profitable as a small producer, where you have to do it all, from managing the business end to making cheese. It's perhaps not as romantic a business as people think; it's hard work, and you can't make a living selling 500 pounds of cheese a month. But I don't think people here want to go the corporate route; I don't see anybody building their business for that. People here love the land, and the life. Being part of this community of cheese makers is incredible. (Author interview, November 3, 2013)

5. Analysis of the Marin-Sonoma Cheese Cluster

Cheese making has been an important part of the history, culture, and economy of the Marin-Sonoma County region since the days of the California Gold Rush of 1848. Richly endowed with productive land for dairying and entrepreneurs eager to supply the San Francisco Bay areas' growing demand for high quality foods, the North Bay is home to one of the fastest growing artisan cheese production areas in the U.S.

The naissance of the Marin-Sonoma artisan cheese industry need not be described in terms of the effects of a cluster or agglomeration of cheese makers; an explanation in terms of a move to produce a value-added product given the existing milk supply and markets is simpler. However, Porter's work on clusters provides a framework through which to assess how the regions *comparative* advantages—the opportunities presented by *terroir*—are enhanced by the *competitive* advantages found here—that is, ability of firms to innovate, raise productivity, cooperate, and create and market exceptional artisan cheeses. Porter holds that the spatial proximity of the firms and related businesses and institutions within the cluster creates a favorable economic environment that surpasses the benefit of location alone.

As detailed previously, Porter utilizes a "diamond model" to suggest how clusters are more than agglomeration economies. The four corners of the diamond depict four drivers through which strengths (or weaknesses) of the regional cluster can be assessed (Figure 16). An analysis of the Marin-Sonoma artisan cheese cluster relative to those drivers follows.

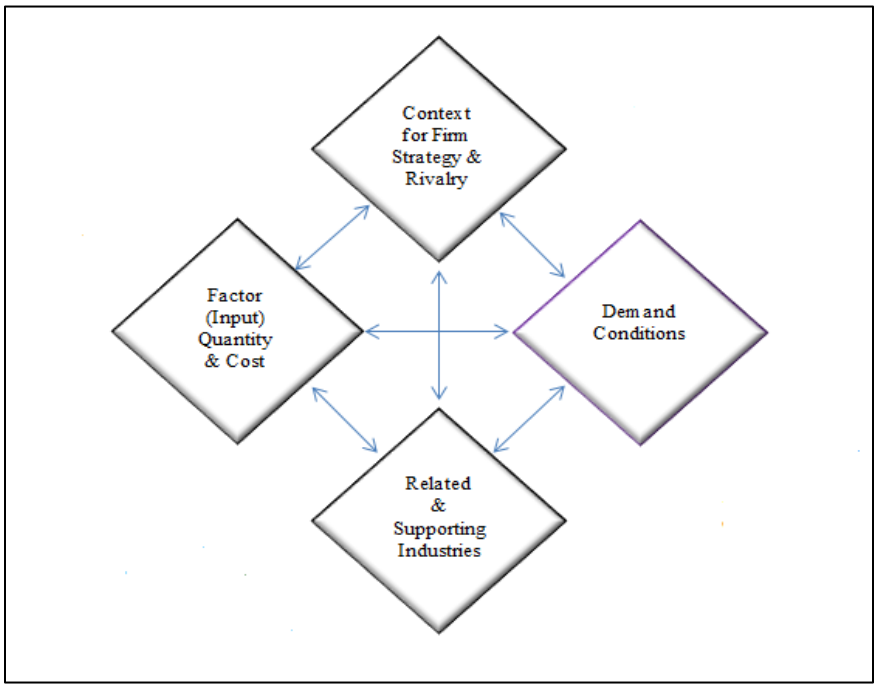

Figure 16. Porter's Diamond of Competitive Advantage. Author's image. Adapted from "Location, Competition, and Economic Development: Local Clusters in a Global Economy" by M. E. Porter, 2000c, *Economic Development Quarterly*, *14*, 15-34.

5.1 Context for Firm Strategy, Structure, and Rivalry

The Context for Firm Strategy, Structure, and Rivalry refers to the norms, rules, and incentives governing the type and strength of local rivalry. This includes attitudes toward competition, market institutions, the degree of local competition, and other cultural and historical factors affecting how firms do business with each other, their workers, and the government. These conditions are dynamic; when strong local rivalry develops, successful firms innovate and differentiate.

In the Marin-Sonoma Artisan Cheese cluster, the competitive structure is marked more by cooperation than by competitiveness. Whether that spirit will evolve as the industry matures is unknowable; at present, the cheese makers interviewed report that producing enough cheese to satisfy market demand is a greater challenge than selling their lot. San Francisco Bay area specialty retailers describe "price point" as a bigger hurdle than surplus. One cheese monger, explaining that "we have lines all day long", added: "even here, once it's over $30 a pound, it raises a few eyebrows." A distributor noted that while business has increased rapidly in the past five years, "shelf space is getting tougher to find" as the industry grows throughout California and the U.S. Still, most shared sentiments expressed by Bob Giacomini, a Marin dairy farmer, who, with his four daughters, started Point Reyes Farmstead Cheese Company in 2000: Quoted in a 2003 issue of *Grown in Marin*, a publication of the University of California Cooperative Extension, Giacomini says:

> We are going to get more cheese-makers. How many more I don't know. But the main thing now is bringing people together. And if we can work together, not overproducing, with each of us in our own niche categories, then we can preserve this thing for everyone. The farmstead foods' philosophy is spreading throughout the whole country, and we have a unique opportunity. (What goes 'round, comes 'round, para. 3)

The competitions, workshops, and camaraderie offered by the American Cheese Society and the California Artisan Cheese Guild serve as ways for Marin-Sonoma cheese makers to receive both recognition and advice. "It's a life-altering event to go home with the gold at one of the big competitions," confided one cheese maker who has accomplished that feat on more than once occasion. "But the exposure, the networking, seeing what others are doing, finding new markets; it's a serious contest but win or lose you learn so much." (Author interview, September, 2013).

Porter (2000c) maintains that true interrelationships and collaboration are hallmarks of clusters. The CACG fosters these interactions. A longtime cheese maker explains:

> We're a community in which all the cheese makers in the guild help each other a lot. What kind of vats should you buy for your aging rooms? What kind of floors did you get? For a first-time cheese maker, these are expensive decisions to make. Here, we really help each other with all of these decisions. (Author interview, November 7, 2013)

The interrelationships extend beyond the cheese makers. Cluster members talk about the importance of their relationships with milk suppliers, retailers, other area merchants, and customers. "When the store owner thinks of you as a friend, they make sure they take the extra steps to represent your cheese well, pay you on time, and let you know if there are any issues," observed one cheese business owner. "They tell you story and that makes all the difference. People feel a lot better about paying the extra premium to support your creation when they know your values and the care you take with cheese making."

Whereas Porter et al. (2004) suggests that firms and regions that compete successfully on a domestic level gain a competitive advantage internationally, few Marin-Sonoma artisan cheese

makers express interest in serving a global market. “With all the government supports for European cheeses, there’s little reason to think we could offer competitively priced products”, notes one cheese business owner. “Sure, it might be a little ego boost to have the French buying our cheese, but really, we’re happy to supply our own local market.”

Porter (2000c) notes that, “Ultimately, rivalry also must evolve from cost to include differentiation. Competition must shift from imitation to innovation and from low investment to high investment in not only physical assets but also intangibles (e.g., skills, technology)” (p. 24). The Marin-/Sonoma artisan cheese cluster appears to be moving in this direction, as evidenced by a number of firms upgrading cheese making facilities, hiring of experienced cheese makers, and the ever-growing variety of cheeses produced.

5.2 Factor Conditions

Whereas traditional trade theories define factor conditions as land, labor and capital, Porter’s (1990) factor conditions refer to the basic inputs and resources that allow competition to take place. He distinguishes between human resources, physical resources, knowledge resources, capital resources, and infrastructure. While many factor conditions of other U.S. cheese making regions (e.g. Wisconsin or Vermont) match or exceed those found in the Marin-Sonoma region, the proximity and ease of access to the highly developed consumer markets of the San Francisco Bay area markets is significant.

That these markets seem to appreciate the Marin-Sonoma *terroir*—in terms of the tastes produced and “local-ness” is advantageous, as the majority of artisan cheese produced in the North Bay is sold in this area. In France, where much of the cheese making is regulated according to the Appellation d'Origine Contrôlée (AOC)[77] system, terroir demarcates the typicity of the geographic origin of the cheese produced in each region. The human cultural each of area is also assumed to contribute to the uniqueness of the regions cheeses. Marin-Sonoma artisan cheese makers, like many of their U.S. peers, broaden the concept of *terroir* to include not only the material and microbial characteristics of their individual farms, but as a way to convey the values, principles, and practices they apply to their craft. In this way, *terroir* becomes a quality label and distinguishes Marin-Sonoma artisan cheese from “industrial” cheese, yielding social capital and a higher price per pound.

The Marin-Sonoma transportation routes have improved greatly since the schooner and railroad days in the late 1800’s. The local road system can manage the demands of milk trucks and cheese-tasting tourists. The basic transportation infrastructure, including highways, ports, and distribution outlets is improving, though cheese firms of all sizes acknowledge that an aggregating and marketing hub, working with existing distributors located along the Highway 101 corridor would be “great if it would pencil out.” Many of the smaller operations, with shipments too small for a refrigerated truck, pack cheese in ice chests for daily or weekly runs to local restaurants, retailers, and customers. Some contract with new, “local-foods” delivery companies to fulfill their cheese orders. “It’s more efficient, in terms of time, money, and marketing, to use that service,” notes a new cheese maker.

Many cheese makers expressed the need for additional affinage facilities and training. In cheese terms, affinage describes the ageing and maturing of cheese. It is during this period of time that flavor and texture development take place. Each cheese has a set of unique

[77] Paxson (2012) explains that under this system, certain agricultural products may be manufactured or sold under registered place-names—Camembert de Normandie, for example—only if production occurs within designated geographical areas and complies with specific methods, recipes, grazing practices, etc.

requirements for temperature, humidity, and treatments (such as washing, brushing, or turning) that, combined, will ensure its proper development. The Affineur is the person who ages cheeses. (American Cheese Society). While several cheese plants have expanded their affinage areas, a common aging facility would be beneficial to the smaller producers. A study assessing the feasibility of forming a local cheese aging cooperative was completed in 2004 by former UCCE Dairy Advisor Barbara Reed (Reed et al. 2004), but the plan was never implemented.

There is no formal institute dedicated to the advancement of the Marin-Sonoma cheese cluster, but those supporting institutions noted earlier, such as the College of Marin, Cal Poly, UCCE, CDFA, CMAB, and other agencies, including USDA Rural Development, contribute to local research, training, and education. Information is readily available from dairy and cheese programs located in other states as well; the Vermont Institute of Artisan Cheese and the Wisconsin Dairy Artisan Research Program have provided information and instruction to many Marin-Sonoma cheese makers.

Porter (2000c) claims "To increase productivity, factor inputs must improve in efficiency, quality, and (ultimately) specialization to particular cluster areas." (p. 20). The factor inputs in the Marin-Sonoma artisan cheese cluster certainly achieve this. As the industry matures and sales increase, these inputs are likely to lead to continued innovations in practices and facility upgrades.

5.3 Demand Conditions

Demand as a factor explaining business success is not new. Linder (1961) first introduced it as a way to explain intra-industry trade. He hypothesized that countries with similar per capita incomes would have similar spending patterns. Porter (1990), however, focuses more on differences in demand than on similarities. In his view, the sophistication of home country buyers—their standards in terms of product quality, features, or production methods—shapes the firms response. Firms must continually innovate and upgrade their competitive positions to meet the high standards of their customers.

The "home" area for the Marin-Sonoma cheese cluster, which extends throughout the entire San Francisco Bay area, is considered by one cheese monger to be "the best cheese market in the country, with apologies to New York." Some 200 restaurants, specialty shops, grocers, and wineries feature cheese made by one or more of the 30 "local" artisan producers.

Marion Nestle, Professor in the Department of Nutrition, Food Studies, and Public Health and Sociology at New York University and author of a number of books about food and food politics, explains:

> The Bay Area food movement has evolved to what it is today: a vibrant community of highly diverse groups working on highly diverse ways to produce better quality food and promote a more just, healthful, and sustainable food system—for everyone along the entire system of what it takes to produce, transport, sell, prepare, serve, and consume food (as cited in Fairfax et al., 2012, p.i).

Over and over, the cheese makers and cheese sellers interviewed for this project explained the importance of their "story" in marketing cheese in this area. As one the Marin farmstead producers expounded:

> We are local, and our production methods, how we treat and maintain the land, how we are keeping agriculture alive in this beautiful place matters to our customers. Of course taste and quality matter, but they could buy French cheese, or Vermont. They are making a conscious choice to support us. And their support enables us to make a living, make

better cheese, and invest in the land. It's a virtuous cycle. It would be hard to make it without customers who are willing to pay that little extra for quality and stewardship of the land. (Author interview, December, 2013)

Local demand also can reveal segments of the market where firms can differentiate themselves (Porter, 2000c). Local producers offer a wide variety of cheeses, and some add value by offering tastings, recipes, holiday and gift packaging, cheese making classes, or tours of their facilities. Porter holds that in a global economy, the quality of local demand matters far more than does its size. By either measure, the demand factors present in the Marin-Sonoma cheese cluster form the basis for sustainable competitive advantage.

5.4 Related and Supporting Industries

Some (see Smit, 2010; Teece, 1996) view the introduction of the related and supporting industries as a separate determinant of competitive advantage as one of the most important contributions of Porter's Diamond Model of Competitive Advantage. Porter (1998c, 2000c), building on Marshall (1920), holds that the related and support industries of a cluster provide advantages such as the readiness of a labor pool, and the availability of related materials and other inputs, (e.g. consultations) at lower costs. Geographic concentration of the related firms may lead to knowledge spill-over[78] as well, creating an environment in which learning, innovation, and productivity can flourish.

As indicated earlier, the businesses and professionals that provide materials and support to the Marin-Sonoma artisan cheese clusters are varied and extensive. Whether upstream (e.g. dairies) or downstream (e.g. retailers), personal relationships create linkages that are deeply rooted in the local community and economy. Knowledge is shared freely and regularly. "There are so few of us still that we run into each other and interact all the time. There are very few secrets, and, really, I can't think of anyone who would not share information. We're in this together. If I have a question, I just pick up the phone", explained a cheese maker whose business is "small, but growing".

By most accounts, knowledge transfer in the Marin-Sonoma cheese cluster occurs at the firm level as well as between individuals. For example, several distributors note sharing information on best practices, new markets, pricing, or milk availability with smaller cheese makers. The CACG facilitates workshops and trainings to bring businesses, cheese makers, and trade partners together to exchange information about the industry, health and safety, new technologies. The cluster benefits from knowledge gained in the related wine industry, as well. "They've been through all the marketing, distribution, and tourism issues before. They know who the contacts are," notes a cheese producer who sells her product directly to a local winery.

The presence of local suppliers and distributers reduces transaction costs for the cluster, though, as in the case of milk, supplies are not always adequate to fill the needs of cheese makers. Most interviewed see this as a situation that will become more rather than less challenging in the future; "they're not making any more land", explained a dairy farmer. Although the weather makes it possible to graze animals for more months of the year in the Marin-Sonoma area than other artisan cheese centers, such as Vermont or Wisconsin, the stocking rate (the amount of land necessary to support each dairy animal) here is lower than in

[78] According to Fallah and Ibrahim (2004), spillovers are the unintentional transmission of knowledge to others beyond the intended boundary. At every possible interaction, there is a potential for knowledge exchange. If knowledge is exchanged with the intended people or organizations, it is "knowledge transfer", any knowledge that is exchanged outside the intended boundary is spillover.

other areas. Here, 10 acres will support only 1 cow/calf pair, or 5 sheep in average rainfall years. The current drought conditions make even this rate difficult to sustain.

With the seasonality of cheese making and the high costs of producing cheese in the Marin-Sonoma area, artisan firms find labor supply to be a challenge. Many of the larger producers have long-time employees, providing benefits and "trying to pay a living wage, because that's important to us." Some cheese makers and employees move between firms, bringing their experience and expertise, but with just over 300 employees, the labor pool benefits attributed to clusters are not strong. Most Marin-Sonoma artisan cheese businesses are family-run and operated. "I'm the cheese maker, the accountant, the dishwasher, the marketing manager, and customer service", laughed one producer. "Margins are slim and the work is hard but I love it."

5.5 The Diamond of Competitive Advantage

Porter (2000c) views the four diamond model determinants— Firm Strategy, Structure, and Rivalry, Factor Conditions, Demand Conditions, and Related and Support Industries— as essential components of an interactive system. In his words,

> A cluster is the manifestation of the diamond at work. Proximity, arising from the co-location of companies, customers, suppliers, and other institutions, amplifies all of the pressures to innovate and upgrade. The presence of a well-developed cluster provides powerful benefits to productivity and the capacity to innovate that are hard to match by firms based elsewhere (p. 21).

When viewed from the perspective of the Diamond Model, the Marin-Sonoma artisan cheese cluster enjoys competitive advantages in each of the four areas. It functions as an interconnected system whose whole is more than a sum of its parts. Measured by productivity, innovation, new business formation, financial viability, and ability to honor personal lifestyle choices, firms in the cluster are largely successful.

Porter (2000c) found the influences of the cluster on competition depend, to some extent, on personal relationships, face-to-face communication, and networks of individuals and institutions that interact. He notes these relationships are far from automatic, suggesting the existence of a cluster makes such relationships more likely to develop and become effective.

The strength and history of personal relationships, and the omnipresent spirit of cooperation found within the Marin-Sonoma cheese cluster raise some question as to whether these relationships developed as a result of the cluster, or whether the cluster developed because of the personal connections. Porter (2000c) goes on to explain "Formal and informal organizing mechanisms and cultural norms often play a role in the functioning and development of clusters" (p. 21). Still, the generations of ranch families and dairy farmers who are integral to the cheese cluster clearly interacted personally and professionally long before artisan cheese making attained the levels of success it now enjoys. "10 years ago, cheese was a value-added product for dairymen," says fourth generation dairy rancher. Now you don't have to own an animal, or a farm. As long as you have outside income, you can be a hobby cheese maker. It's all fine, but it's really not the same as being a farmstead producer" (Author interview, October 14, 2013).

If many of the personal relationships and connections that enrich the artisan cheese businesses predate the growth of the cluster, what then is the impact of the geographic colocation of firms and institutions? Certainly, artisan cheese producers benefit from the Marin-Sonoma infrastructure, the presence of dairies, and the institutional support in terms of training, education, and research. However, several artisan cheese making firms located outside the

Marin-Sonoma county area appear benefit from the cluster, vis-à-vis the California Artisan Cheese Guild (CASG). Artisan cheese producers in Humboldt and Mendocino Counties, for example, utilize many of the same distribution channels as Marin-Sonoma producers, and are present at many of the same trainings and cheese events. A Utah company is a member of CACG, and many members interact with other cheese makers across the country via internet user groups or email. Many Marin-Sonoma cheese makers maintain close contact with cheese makers in other states and countries.

Terroir and territory are important in competitions, festivals, and marketing, it seems, but artisan cheese makers connect as much through values and models of production as geography. Few cheese makers, whether in Marin-Sonoma or another locale, can have economically viable businesses if producing cheese "primarily by hand, in small batches, with particular attention paid to the tradition of the cheese maker's art, and thus using as little mechanization as possible", as described by ACS. Paxson (2012) suggests there is a dynamic tension between being "too big" and "not big enough" in entrepreneurial economies, in which many Marin-Sonoma artisan cheese makers participate. Divisions and distinctions, when they exist, are based more on size and scale of the cheese operation than geography.

In the Marin-Sonoma artisan cheese making region, the value of the cluster lies as much in the in complementarities—a relationship or situation in which two or more different things improve or emphasize each other's qualities—as in improvements resulting from competition. Porter (2000c) outlines some important complementarities that are applicable to the Marin-Sonoma region, such as:

Complementary products for the buyer. In the Marin-Sonoma artisan cheese cluster, for example, the customer's experience is affected not only by the appeal and quality of particular cheese, but also by the quality of restaurants in which it is served, the "Cheese Trail" tourism experience, the various cheese festivals, and the availability of product in grocers and specialty shops, farmers markets, etc., as well as the ability of cheese makers to deliver fresh, safe cheeses. Different parts of the cluster are mutually dependent. The co-location of firms within the cluster helps "brand" the area, leading (perhaps) the consumer to associate the region with high quality cheeses and non-industrial production methods.

Marketing complementarities. The presence of a numerous cheese making firms in Marin-Sonoma offers efficiencies in joint marketing (e.g., firm referrals, trade fairs, and the Cheese Trail map). Based on the amount of coverage given the Marin-Sonoma as a premier chees region in popular media, industry experts and customers have come to appreciate the area as an artisan cheese center. A local cheese monger pointed out that "Made in Marin/Sonoma" labeling is associated with a high quality cheese, and commands a higher price per pound than cheese made in other areas of California (Author interview October 14, 2013)

Complementarities due to a better alignment of activities among cluster participants. Marin-Sonoma cheese makers, business owners, and employees can coordinate training events, transportation routes, and linkages with suppliers, customers, and regulatory groups. "If there's a workshop, or one of us has a cheese safety issue, or a sick animal, we can let everyone know quickly", explained a sheep chees maker. "We're never really operating in a vacuum."

The concentration of artisan cheese making firms in Marin-Sonoma Counties is beneficial for the individual firms as well as the region overall. "Keeping the land in agriculture, protecting the open space, and doing what we love is what we all want out here", declared a self-described "original member" of the artisan cheese cluster. "We tried to do it with dairy cows but

the numbers you can't make it without value-added. Cheese works; as long as we don't get greedy, there's enough business to go around. We'll see what happens when this generation moves on. Some have already sold out, gone corporate. It's hard work, but it's a great life." (Author interview, October 15, 2013).

6. Conclusions

This research was directed toward two main objectives: to develop data characteristic of Marin-Sonoma artisan cheese cluster, and to explore the viability of encouraging similar cheese clusters in other rural regions of California as an economic development strategy.

The data collected provide ample evidence that the co-location of artisan cheese firms, along with the businesses, professionals, and institutions that support them, is advantageous to the various actors in the Marin-Sonoma artisan cheese cluster. However, the benefits extend beyond the convenience of a common geography, or access to subsidies or resources available to a particular industry sector. The cluster concept focuses on the linkages and interdependence between direct competitors (horizontal relationships) as well as suppliers, users, and associated firms and institutions (vertical relationships). Cluster members compete and co-operate, moving between their roles as small business owners and craftspeople, but seemingly firmly rooted in their position as community members.

The Marin-Sonoma artisan cheese cluster evolved from—and maintains close ties to—the region's dairy industry. Interviews with 34 subjects who participate in the cluster, including cheese makers, long-time dairy farmers, distributors, buyers, shop owners, cheese experts, and customers, highlighted the importance of the dairy history in understanding the basis for growth and success of North Bay artisan cheese firms. Cheese it not only a "value-added" product for dairies; it's a livelihood for many who maintain the values of land stewardship and the love of producing high quality, good tasting, simple food.

The application of Porter's (1990) framework is useful in understanding the forces that lead to success in the Marin-Sonoma artisan cheese cluster. Porter emphasizes that the strength of the four determinants identified in the Diamond Model correlate with competitive advantage of the cluster. While each of the four conditions is robust within the Marin-Sonoma region, the sophistication of the demand for the "local" artisan cheeses in the San Francisco Bay area, the mild yet foggy "dairy heaven" climate, and the premium placed on keeping the land in agricultural production set the North Bay cheese cluster apart from other areas known as artisan cheese centers. These conditions are reviewed in Table 11.

Table 11
Marin-Sonoma Cheese Cluster: Competitive Advantages and Challenges

Strengths	Challenges
High levels of cooperation	Maintaining cooperative character if resources (milk, employees, cheese making facilities, etc.) are threatened due to supply limits or increased number of cheese businesses.
Vigorous levels of competition spurring innovation and high quality	Industrial cheese producers entering "artisan" market; fewer or less-discerning customers.
Unique cheeses and product differentiation	Changing consumer demand; limited milk sources limiting ability to differentiate.
Climate	Drought or other environmental issues that reduce pasture land and limit local milk supplies; land-use changes that reduces available range or number of dairy farms.
Dairy farms to supply local milk	Land use changes that result in fewer dairy farms; loss of pastures or agricultural land.
Large local (SF Bay Area) markets, and network of distributors, providing access to non-local markets	Increasing number of local, national, and international companies in market. Price supports and lower transportation costs that lower price for imported cheeses.
Tourism and promotion. Established marketing campaigns, cheese cluster map, and renowned wine cluster driving tourism and product sales	Funding for marketing no longer available; wine cluster diminishes.
Non-market values that benefit small, local, quality producers	Changing values, or price/ production method sensitivity

Strengths	Challenges
Institutional support	Loss of key educational/training programs due to budget constraints; changes to county programs that provide tax funds for open space preservation and cheese industry promotional materials.
Reputation for Safety; compliance with Hazard Analysis and Critical Control (HACCP) guidelines	Post-process environmental contamination; costly and complicated changes in HACCP requirements or standards
Adequate (though not optimal) availability of capital for entrepreneurs and business owners.	Increased business costs; less capital available.

Porter (2000c) notes that many, if not most, new businesses are formed in existing clusters rather than in isolated locations. This appears to hold true in the Marin-Sonoma region; the majority of California artisan cheese firms are located in this area, and 7 of 9 of the most recent firms to begin artisan cheese production are located here. This is likely because, as Porter points out, the inducement to entry often is greater within the cluster because there is better information about opportunities. Individuals with knowledge of the cluster are more likely to perceive gaps in products, services, or suppliers to fill. Several new cheese makers noted that they located their business in Marin-Sonoma because they saw an opportunity, and realized the support and guidance from other area cheese makers would greatly enhance their chances at success.

The demand for Marin-Sonoma artisan cheese is greatly enhanced by the established agro-tourism in the region. There is great synergy between area wineries and cheese producers, as local cheeses are often served at wine tasting rooms, and local wines featured at artisan cheese retail shops. “Farm-to-fork” tours are common in the area, as consumers visit farms to gain a better understanding of the origins and process of growing and cooking foods produced in the region. Public perception of the region as an “artisan cheese cluster” has value in much the same way as designation of a wine region; it drives tourism and consumer expectation of a quality product. However, given that most Marin-Sonoma cheese production sites are not open to the public, the spatial proximity of the various distribution outlets, where tastings are generally held, may be as important as the co-location of the cheese makers themselves.

Even with the extraordinary opportunity the San Francisco marketplace present, there are significant barriers to entry in the Marin-Sonoma cluster. Despite their familiarity with the cheese and diary business models, local financial institutions were “reluctant”, according to an owner of a smaller firm, to finance a business with slim margins and substantial upfront costs. A 2011 guide to building a farmstead or artisan cheese business, written by the UCCE advisors, estimates that the costs for developing a modest cheese making facility in California to be in excess of $500,000, not counting land. Some local artisans report building their facility for as

little as $75,000 to $100,000, but it required “creative” designing and re-purposing a variety of structures. (Reed, Butler, & Rilla, 2011).

Financing is one of the most challenging obstacles an entrepreneur has to overcome when starting a business. Most new businesses require at least a small amount of seed money to get off the ground, and look to financial institutions or investors for assistance. However, the emergence of the artisan cheese cluster in the Marin-Sonoma region was not, for the most part, dependent on outside funding. The ability to “self-fund” new businesses or invest personal funds for business expansion and growth is one of the key features that makes the Marin-Sonoma cheese cluster unique and likely difficult to replicate in other areas.

The Marin-Sonoma artisan cheese cluster has served as a catalyst for regional economic growth. Whether the cluster model should be pursued as a strategy to achieve economic performance in other rural regions of the state remains in question, and requires further study. This research establishes that incidence of spatial clustering of artisan cheese firms in Marin-Sonoma, but shows no evidence of efforts to promote clustering as a part of a prescriptive regional development policy.

In the course of this research, several established Marin-Sonoma cheese makers and distributors suggested that individual cheese firms might be economically viable in other rural regions of the state, provided they “can easily access large markets, like Sacramento, Los Angeles, or San Diego”. They noted there is still room for growth in the artisan cheese markets, but none foresee another “cluster” of cheese business developing in California. One cheese business owner expressed doubts:

> Sure, new producers are making cheeses in other areas, and some are doing very well. Differentiation is key. Most regions can only support a few specialty businesses like this without diluting the market. Lots of small producers have started up recently—not so much here, but in other states—only to find out that they margins are extremely slim and the work is physically demanding. (Author interview, October 3, 2013)

The sharing of assets and knowledge observed in the Marin-Sonoma artisan cheese cluster contributes greatly to the success of all firms, and helps reduce transaction costs. The knowledge has been developed over a great many years, however, and it seems unlikely that these reciprocal benefits could be readily replicated in another region. In practice, many of the productivity and innovation advantages of clusters rest on spillovers and externalities that involve public entities. While government can motivate, facilitate, and provide incentives for collective action by the private sector, Porter (2000c) concludes that government should reinforce and build on established and emerging clusters rather than attempt to create entirely new ones. (p. 26).

During this research, cheese producers and other key informants discussed the how government—in particular, state and federal agencies, such as the USDA, might best enhance prosperity within the Marin-Sonoma Artisan Cheese Cluster, or promote growth of other California cheese clusters. Ideas were as varied as the types of cheeses produced, including:

1. Regional designations, similar to wine districts or American Viticultural Areas (AVA), based on unique characteristics of the Marin-Sonoma (or other) cheese making practices, production methods, or ingredients. “Local” products would in this way be protected, with branding and marketing to identify and distinguish products from the region. Marcus Benedetti, president and chief executive officer of Petaluma-based Clover Stornetta Farms suggests: “They need an appellation-like aspect. Bay Area consumers like it that they were grown and raised in

the North Bay, versus in the Midwest or Central California, and that gives [North Bay products] a leg up"(Quackenbush, 2013, p. 1).

2. Establishment of programs that utilize geographical indications (GI) to protect agricultural products based in particular areas of geographic origin. Two GI types are currently utilized by the European Union: Protection of the Designation of Origin (PDO); and Protection of Geographical Indication (PGI). PDO and PGI designations bring attention to the quality and characteristics of specific products, allowing producers to command a higher price while shielding them from competition by imitation or low-quality goods (Babcock & Clemens 2004). In this way, rural livelihoods are enhanced.

However, while many of those interviewed for this project were aware of the EU protections on some cheeses, few believed the EU approach would be viable in the Marin—Sonoma region. "Customers assume a high quality product when they think of Marin or Sonoma, but they also appreciate the unique attributes the cheese maker brings out in each wheel. We're creating a living food here, not just producing something that tastes the same no matter who in the area makes it. Besides, small cheese makers don't have a steady supply of milk from the area." (Author interview, January 6, 2014).

3. Mandatory HCCAP and other safety training for all cluster participants to ensure high standards and reduce risks to the cluster. "Food safety is the next big thing", explained a longtime cheese maker. "One recall or problem could put all of us out of business." (Author interview, November 9, 2013).

4. Streamlining of permits, regulations, and business licensing requirements. "It took us almost two years to get the licenses, permits, certifications, inspections, and approvals just to start making cheese", noted one new artisan cheese producers. Luckily, the county planning and inspector helped me through it, or I would have been totally lost. The (Agricultural) Ombudsman is great but we need a permitting process that makes sense" (Author interview, November 9, 2013).

5. Establishment of a regional affinage facility. The need for additional space to age cheese was a commonly held priority. Some expressed interest in combining affinage with a tourism or education center. In 2013, Cornell University partnered with Wegmans Food Markets to create an affinage program, featuring some of NY's best artisan cheese makers. The University of Vermont has a similar program with the Vermont Institute of Artisan Cheese. "Something like that would be a great draw here, and would give us a place to have classes, do tastings, and improve our products". (Author interview, November 9, 2013)

6. Increased emphasis on research, development of technologies, and education, and training to benefit artisan cheese producers, workers, and consumers. Wisconsin's Dairy Business Innovation Center (DBIC) and the Master Cheesemaker Program at the University of Wisconsin, Madison were referenced as the types of programs needed in the Marin—Sonoma area.

7. Low-cost financing and increased availability of capital to assist entrepreneurs and established businesses. Many cited the cost-of-doing business in Marin-Sonoma area as "prohibitive".

8. Assistance with formation of milk purchasing co-ops to allow small producers to collectively guarantee and contract for milk purchases.

Interestingly, no one interviewed recommended support in the form of direct subsidies. One respondent suggested that the requirements, stipulations, and record keeping associated with government "assistance" made it "worse than no help at all", adding "All we need is a level

playing field, and a way to keep big ag interests from running us all out of business" (Author interview, October 23, 2103).

What, then, is the role of policy makers and practitioners—economic development professionals or government agency staff—in promoting the artisan cheese cluster in Marin-Sonoma or any other California region? Artisan cheese businesses are providing a living for many in the North Bay area, and bringing millions of dollars into the economy through industry employment, tourism, and sales. As an industry, it is far more profitable than fluid milk production, adding value to the regions struggling dairy industry.

The spatial pattern of the cluster did not, however, emerge from planning or economic development policy. It arose by capitalizing on opportunities, the interaction of many firms and individuals, and lifestyle considerations of those who desired to remain in the dairy business, as well as newcomers with entrepreneurial spirits and the passion and commitment to work hard to produce a quality product.

Marin-Sonoma artisan cheese producers benefit from access to public goods, such as industry research, public education programs, industry standards and associations, and regulations constraining individual behavior that may damage collective interests. Public policies that support these goods and services, such as programs promoting local products, tourism, or job training, may be helpful to artisan cheese producers in all areas.

The Marin-Sonoma artisan cheese cluster is defined by relationships between people and the natural environment; the dairy farms that dot the landscape and give cheese makers access to local milk are as vital to the sector as sharing of knowledge about marketing and distribution. Support for policies and programs that develop and maintain those relationships may be the most important contribution public and private interests can make to ensure cluster performance and growth.

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