

# Can Marshall's Clusters Survive Globalization?

Giulio Buciuni  
Gary P. Pisano

Working Paper 15-088



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Giulio Buciuni

University of Venice Cà Foscari

Gary P. Pisano

Harvard Business School

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## **Abstract**

It is widely presumed that in today's globalized economy, the value of geographic clustering of manufacturing industries is no longer valuable. Manufacturing is represented as a highly mobile "commodity" that can be sourced from anywhere in the world where factor costs are favorable. This paper re-examines this assumption, and suggests that not all manufacturing is highly mobile. We suggest that manufacturing sectors should be viewed along a continuum from highly mobile to highly "sticky". Manufacturing clusters can decline for two completely different reasons. The first is a change in technology that reduces the value of co-location (stickiness). This tends to lead to the decoupling of design and production activities and to a broad geographic diffusion of manufacturing. The second is a shift in the relative comparative advantage of clusters located in one region versus another. Under this scenario, geographic concentration is still valuable, but the center of production activity can shift from one location to another. The paper then analyzes how firm supply chain strategies impact stickiness and the survival manufacturing clusters.

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Giulio Buciuni  
University of Venice Cà Foscari

Gary P. Pisano  
Harvard Business School

FIRST DRAFT

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### I. Introduction

The migration of manufacturing industries from one place to another has been happening since the Middle Ages. The past century and the past few decades in particular have witnessed a number of dramatic mass migrations of manufacturing. New England was one of the world's largest textile producers at beginning of the 20<sup>th</sup> century—today, it has no textile mills. In 1985, 75% of semiconductor manufacturing capacity was located in either Japan or the US (Maher, Mowery, and Simcoe 2002). By 2009, the US and Japanese share had shrunk to 40%, while Taiwan, Korea, China, and other Southeast Asian countries accounted for 50% of production capacity.<sup>1</sup> Driven by falling trade barriers and the opening of once closed markets (like China, India, Eastern Europe and Russia), declines of long established manufacturing clusters in the US and Europe have occurred in industries as diverse as apparel, automobiles, bicycles, chemicals, consumer electronics, furniture, shoes, sports equipment, shipbuilding, and steel. Migration also occurs within countries. In the US, manufacturing had historically been concentrated in the so-called “manufacturing belt”, running approximately from the upper Midwest to the northeast (Krugman, 1991). Today, the southeastern US—once dominated by cotton and tobacco—has emerged as the new industrial heartland. Overall, the potent forces of globalization have lead some to question the future viability of Marshallian industrial clusters (e.g. De Marchi and Grandinetti, 2014).

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<sup>1</sup> By 2009, the Japanese share had fallen to 25% and the US share to 14%; Taiwan had grown to 18%, Korea to 17%, and China to 9%. *Manufacturing and Technology News*, February 12, 2012, vol 17, no 3. “US Becomes Bit Player in Global Semiconductor Industry.”

Mass manufacturing migration is such a prominent part of the globalization discourse that it is easy to forget that a surprising amount of manufacturing actually stays put (some of it for quite a long time). Tuscany has been a leading center of high quality wool fabric and luxury apparel production since the 13<sup>th</sup> century Goldthwaite (2009); Faber-Castell has produced pencils in Germany since 1761; guns have been manufactured in Springfield, Massachusetts since the late 1700s. Boeing first began producing airplanes in Washington state in 1910, close to its current plant in Everett. Despite its well-publicized woes and the rise of foreign transplant operations in the southeast, the Detroit region is still the largest producer of cars and trucks within the United States.<sup>2</sup> Harley Davidson has been producing motorcycle engines in the Milwaukee area since 1903. Like the US, Europe's industrial base has long been concentrated in a 'manufacturing belt'—running from southern Scandinavia through Germany's Ruhr Valley and Eastern France through the northern half of Italy.

Despite the global shift in manufacturing from developed to developing countries, and the growing international fragmentation of production, certain types of manufacturing activities remain entrenched in specific locales or industrial districts. Not only do these manage to survive in a globalizing economy, but they also prosper and remain the loci for innovation development (e.g. Breznitz and Buciuni, forthcoming). Manufacturing clusters, at least in some contexts, appear to be surviving globalization (Markusen, 1996). This trend is not occurring in all manufacturing sectors alike, nor is it involving all the firms competing in a given manufacturing industry. The existence of both across-industry and within-industry variance suggests room for further analysis and triggers a challenging question: *When and why do some manufacturing clusters survive globalization?*

The answer matters for several reasons. First, it will help us understand the extent to which lower barriers to trade pose real or imagined threats to specific industries in specific locations. Second,

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<sup>2</sup> <http://www.detroitchamber.com/economic-development-2/chamber-initiatives/michauto-universal-name/the-auto-industry-in-michigan/>

it sheds light on the potential for manufacturing to return to places that have previously de-industrialized. Recently, there has been a spate of optimistic predictions about the re-shoring of manufacturing to the US. Such prognostications are predicated on the assumption that manufacturing capabilities are highly mobile, and that manufacturing moves quickly with changes in factor cost changes. Finally, managers needing to make long-term commitments toward supply chain configurations can be helped by understanding how location matters to manufacturing performance.

This paper is organized as follows. Section II provides some high level trends on the organization and locus of production globally. Section III examines various types of global supply chain configurations and how they influence the organization of production across geographies. We examine more closely what exactly it means for a supply chain to be “global.” Using a simple framework that distinguishes between “concentration/dispersion of supply chain activities” and “distance from end markets”, we identify four basic types of global supply chain configuration. We discuss the properties of each, and the implications for manufacturing mobility/stickiness. Section IV provides a comparative case study analysis of four ‘industrial districts’ in Northeastern Italy, all located within approximately 45 miles of one another. The varying patterns of evolution and performance of each region enables us to draw some preliminary conjectures about the factors driving manufacturing mobility/stickiness. We end the paper with a discussion of potential management and policy implications, and open questions for further research.

## **II. The Global Organization of Manufacturing: Aggregate Evidence**

How has the geographic face of manufacturing changed over the past few decades? There is plenty of anecdotal evidence about the globalization of manufacturing supply chains (e.g Gereffi, Humphrey and Sturgeon, 2005). We hear all the time about companies who have shuttered plants in the US or Europe and moved production to China or Eastern Europe. Critics complain

that Apple enjoys huge profits in the US but does no manufacturing there. A drive through the industrial heartland of advanced industrial countries (the American mid-west, the British midlands, Germany's Ruhr Valley, Northern Italy's manufacturing districts, etc.) will reveal no shortage of long-abandoned factories. The impression is that places like the US and some parts of Europe have already entered the post-industrial era. But what do the data say?

It has become common in both academic and policy circles to equate the relative strength or weakness of US manufacturing with the percentage of GDP associated with manufacturing. Andrew Liveris, author of *Making It in America*, for instance, laments the decline of US manufacturing and draws the following comparison between the US and Germany: "The German government has a keen sense of the importance of manufacturing, and has made investment to support the sector, even as they transition their economy. That's why manufacturing makes up 20% of the German economy, but only 11 percent of the US economy. And it's why in the race for a competitive long-term future, German is far ahead of the pack."<sup>3</sup>

The problem with the much cited "manufacturing as percentage of GDP" figure is that it really does not tell us much about the amount of manufacturing happening in an economy. The actual figure being cited is the percentage of GDP attributable to *manufacturing sectors* like automobiles, apparel, and vehicles. Before globalized supply chains, the domestic output of a manufacturing sector, say cars, was largely generated by manufacturing activities, and thus the overall share of GDP from manufacturing sectors was a reasonable proxy for the amount of manufacturing taking place in the economy. However, with the rise of global supply chains, it is not uncommon for companies in the manufacturing sector to do R&D in one place (say the US) and to source production from a foreign location. Because the profits which flow back to the enterprise become part of the value added of the domestic economy, it is entirely possible for manufacturing activity to decline (due to say offshoring) while value added of a sector increases. This is going to be

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<sup>3</sup> Liveris, page 6.

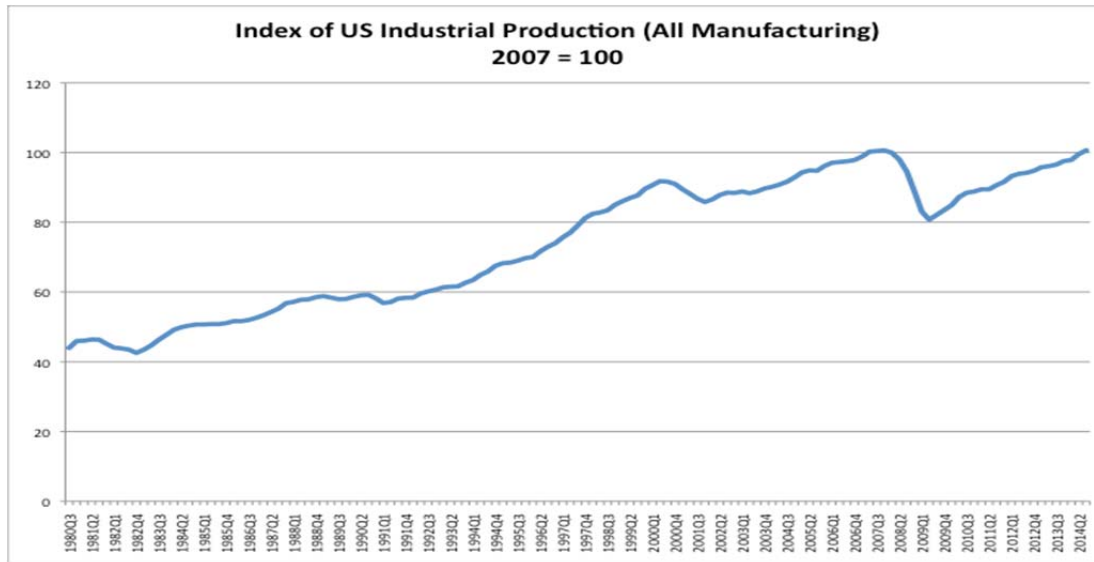
particularly true in sectors where intangibles, like intellectual property, are a significant source of value.

To get a read on actual production taking place, we need to look specifically at industrial production data assembled by the Federal Reserve (for a description see <http://www.federalreserve.gov/releases/g17/current/>). These data are based on surveys conducted by the Bureau of Labor Statistics of individual establishments and are derived specifically from physical counts of production. The advantage of these data is that they tell us something about the amount of physical production in the US economy. The downside is that physical units are difficult to compare across sectors, and thus we can not compare absolute production levels across sectors or between manufacturing sectors and services. Industrial production data (at the overall economy and at the sector levels) are indices.

Figure 1 below shows the overall trend in industrial production between 1980 and 3Q/2014 (the data are reported every quarter, but for visual clarity the X axis 'ticks' only the 3Q of each year).



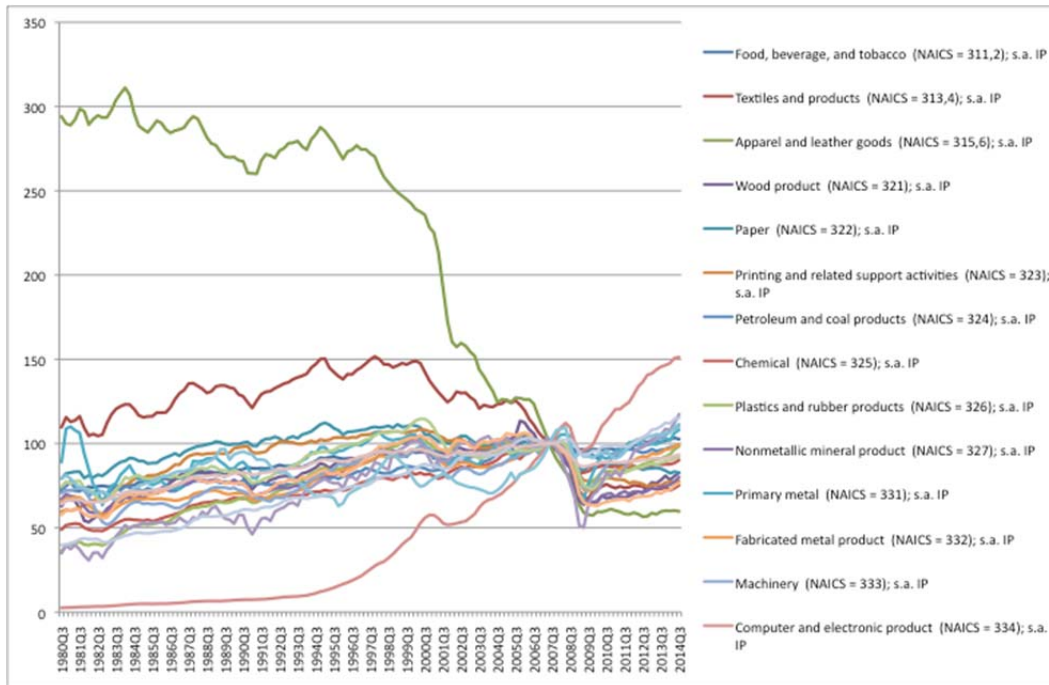
**Figure 1 Overall Trend in US Industrial Production Since 1980**



Source: US Federal Reserve, Industrial Production and Capacity Utilization – G.17.

This chart makes clear that overall manufacturing in the US economy has not declined. Between 1980-2014, the index of total production increased by a factor of approximately 2.5 (approximately the same multiple as overall US GDP growth). The percentage decline of manufacturing sectors relative to total GDP is largely due to the increase in both private and government services, rather than a decline in total manufacturing activity. However, this aggregate economy-wide measure masks significant cross-industry variation in the growth (decline) of industrial production (see Figure 2).

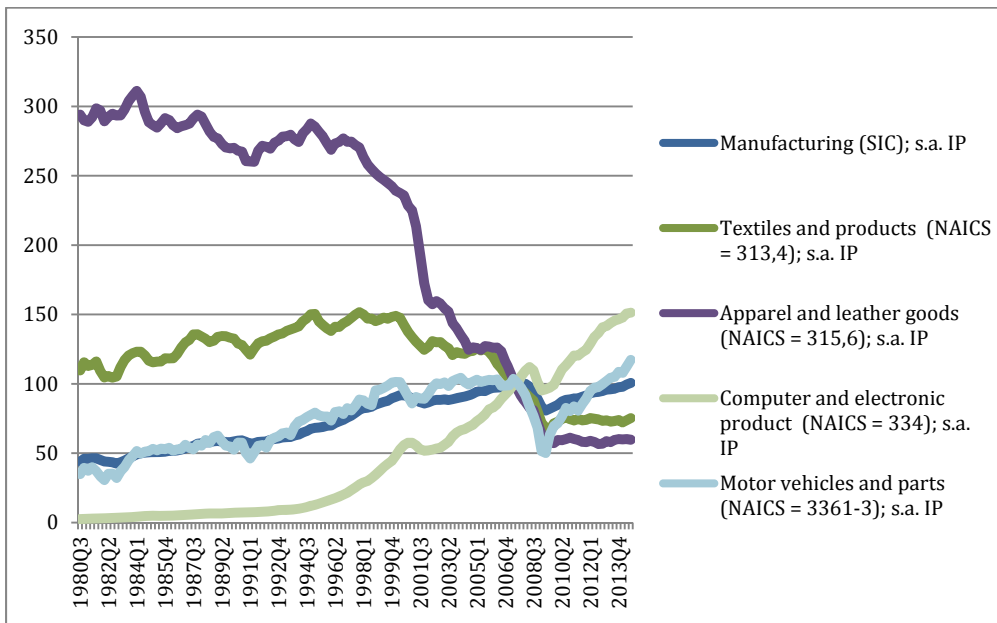
**Figure 2: Industrial Production Indexes by Sector (1980-2014)**



Source: Federal Reserve, Industrial Production and Capacity Utilization. G.17

Roughly speaking, the growth patterns of US manufacturing fall into 4 categories: absolute decline (textiles; apparel and leather goods); stagnant/weak growth (e.g. food and beverages, wood, primary metals, fabricated metals, furniture, and aerospace); average growth (chemicals, plastics, machinery, and motor vehicles), and hyper-growth (computer and electronic products). Additional visual clarity of these differences can be viewed in Figure 3 that isolates a select subset of sectors.

**Figure 3: Selected Sector Industrial Production Indices**



Such turbulence at the sectorial level should not be surprising. One of the attributes of a dynamic economy is the ability to re-allocate resources across sectors in response to changes in factor costs, productivity, and demand. In addition, this is a time of dramatic institutional changes in the global economy reducing barriers to trade. The dramatic declines of textile and apparel production coincide with the approval of the WTO Agreement on Textile and Clothing (Uruguay Round) that went into effect January 1, 1995.

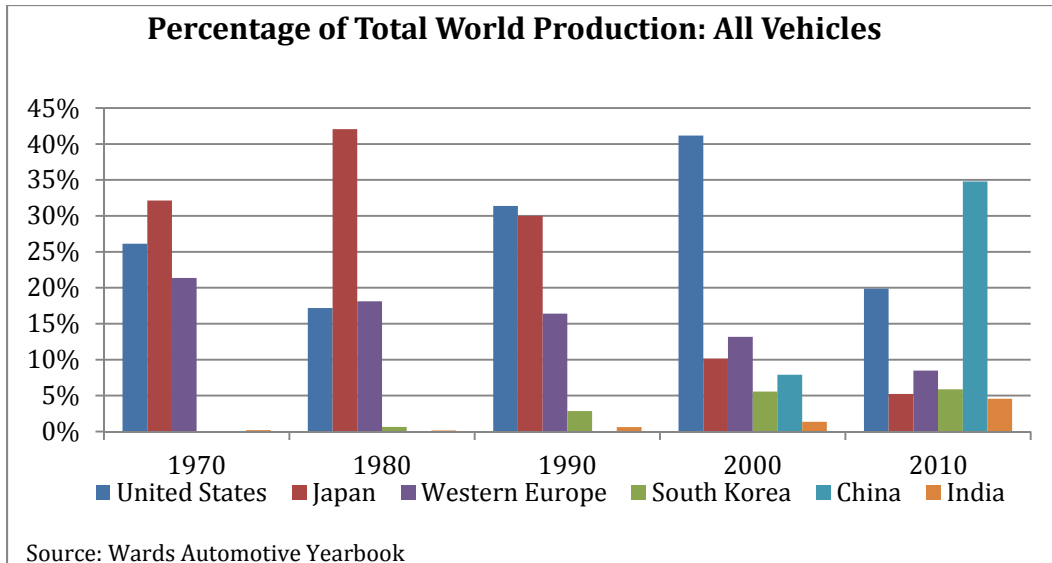
In absolute terms, these data provide a mixed picture. The familiar lament that the US no longer manufactures is clearly overblown; that said, growth in manufacturing has occurred in only a relatively narrow band of sectors and product areas. Unfortunately, more disaggregated data are not available to further probe within sector differences, but at least, anecdotal evidence suggests significant within sector differences (product level). Intel, for instance, maintains a very large domestic manufacturing capability in microprocessors, but the vast majority of memory chips are now produced outside the US. Even in mature sectors hit hard by foreign competition, like furniture, we see the emergence of specialist producers that continue to thrive based on innovation and customization (Buciuni, Coro, and Micelli 2014). Based on case study evidence,

Pisano and Shih (2012) document a number of specific technological capabilities that left US shores over the past two decades.

A clearer picture of manufacturing mobility would emerge with international comparisons of production output. Unfortunately, such data are not available across countries on a comparable basis (there is data on gross output and value added of 'manufacturing' industries, but these data do not isolate the value created by *production activities per se*, and other contributors to value added or gross output (such as R&D). Industry-specific data is perhaps the best way to glean insights about how manufacturing capabilities have diffused across countries over time. Some of the best available data come from the automobile industry. Figure 4 below depicts the changing shares of global auto production by country since 1970 as reported in Ward's Automotive Yearbook. Note, these data include all production in a country from both domestic and foreign owned factories. Also, we have included data on both passenger vehicles and trucks/buses given the increasingly blurry distinction between large passenger cars and trucks (e.g. pick-up trucks, sport utility vehicles are classified as trucks).

Several trends are apparent. The first is the relative decline, and then rebound of the US-based production. Two underlying factors drove this trend. The first was the rapid growth of the small truck/sport utility vehicle market in the US. The second was the establishment of American manufacturing plants by a number of foreign producers beginning in the late 1980s and continuing through the early 2000s (Toyota, Honda, Nissan, VW, BMW, Mercedes, etc.). The second trend is the decline of Japanese auto production—this was largely due to the decline of the Japanese market (following the crash of 1997) and a shift toward foreign direct investment by major Japanese automobile companies. And finally, in the latest period, we see the emergence of China as a major producer (virtually all production for domestic consumption). The 2010 data for European and US production are almost certainly severely impacted by the Great Recession of 2008-2010.

#### **Figure 4 Geographic Distribution of Vehicle Production**



A deeper look at individual companies reveals how heavily globalized vehicle production has become via foreign direct investment. By 1998, most major auto companies (top ten US, European, and Japanese producers) had expanded production outside their home regions. However, even then, just about all did the majority of their production inside their home region (North America for US producers, Western Europe for European producers, and Japan for Japanese producers). According to data compiled by the OICA (<http://www.oica.net/category/production-statistics/2013-statistics/>), Toyota, for instance, built 68% of its vehicles in Japan; GM and Ford both built 66% of their vehicles in North America. By 2013, Toyota built 41% of its vehicles in Japan; Ford built 51% of its vehicles in North America; GM's North American production volumes had fallen to 34% of its global total (in contrast, GM's production in China alone accounts for 33% of its global production by volume). While Ford built 4.4 million vehicles in North America in 1998, by 2013 it produced only 3.1 million (still a sizable figure in absolute terms). GM experienced a similar reduction in North American vehicle production between 1998-2013.

The case of semiconductors has both similarities and differences from the pattern of global expansion found in autos. There has been a modest decline in the global share of US production (from approximately 30% in 1985 to approximately 25% today), but since the overall market is

much bigger, the absolute value of semiconductor production in the US is significantly higher today than it was in 1985.<sup>4</sup> Like the auto industry, US companies have broadened their global footprints (Intel, for instance, has plants in the US, Ireland, Israel, and China). However, a significant chunk of the increasing share of Korea, Taiwan, and China as semiconductor producers was driven by the emergence of “home-grown” companies (like TSMC and UMC in Taiwan and Samsung in Korea) rather than by foreign direct investment of US or Japanese companies.

The aggregate data presented above and the specific examples of autos and semiconductors paint a more complex picture of the global manufacturing landscape that is often portrayed in popular discussions of globalization. The oft-decried de-industrialization of America is a more nuanced phenomenon. There is absolute and deep decline in some sectors (e.g. apparel, textiles, shoes); stagnation in others; and modest growth in some (e.g. automobiles) and explosion growth in at least one (computers and electronics). And in sectors like autos and semiconductors, we see both domestic growth in absolute terms and a decline in relative global share terms. The decline in relative global shares suggests that manufacturing capabilities are mobile. They diffuse to and take root in new geographies over time. Yet, the persistence of many types of manufacturing in places of origin (like Detroit for automobile) suggests, at the same time, a certain degree of “stickiness”. Once a manufacturing capability takes hold somewhere, it tends not to leave (and once it leaves completely, it likely does not come back).

How can this paradox be explained? There are two general perspectives to explain the location of economic activities (including, of course, manufacturing). The first is rooted in traditional trade theory and emphasizes the role of factor prices and technology ‘endowments’ of different locations. Such a perspective helps to explain why certain types of manufacturing have moved from high-wage developed countries to the US to low wage developing economies. It is also being used more recently to predict a large-scale return of manufacturing to the US. In a recent

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<sup>4</sup> Authors’ estimate based on annual percentage of revenue from North America of leading semiconductor equipment provider (Applied Materials). Source: Applied Materials 10-K report, 2014.

report on US manufacturing, for instance, the Boston Consulting Group (BCG) (2011) optimistically forecasts that due to a combination of rising wages in China and falling (real) wages and energy costs in the US, America is likely to experience a surge of “re-shoring”. Traditional factor cost analysis, however, assumes that the relevant technological and human resource capabilities required for production are geographically mobile. That is, it assumes away stickiness. Moreover, traditional analyses ignore the fact that any given manufacturing industry is never an island, but is instead part of supply chains featuring other distinct industries. The location choices of any specific (say auto parts) industry depend partly on the choices of complementary upstream (e.g. metal castings, machinery) and downstream industries (auto producers). This suggests that the relevant unit of analysis for considering manufacturing location issues is not the isolated industry, but the supply chain.

A contrasting perspective to traditional trade theory is provided by theories of economic geography. Whereas trade theory is “distance free”, economic geography is all about how distance matters. The first theory of geography and location in economics dates back to Alfred Marshall (1890). One of his (many) interests lied in explaining the tendency of firms from the same industry to cluster in the same location (e.g. textile firms clustering in Lancaster, England in the late 19<sup>th</sup> century). Marshall theorized three reasons why firms from the same industry would tend to locate close to one another: 1) Labor market pooling (e.g. a textile firm has an easier time finding workers with relevant skills in places where other textile firms operate); 2) Common infrastructure (firms in the same industry tend to require similar specialized infrastructure like access to water, rail networks, universities, etc.); 3) Spillovers (cross-firm learning is higher across firms from the same industry). More recent work in the field of economic geography has extended the notion of “agglomerating forces” to include increasing returns, transportation costs, and demand (Krugman 1991). Theories of agglomeration have been used to explain the presence of a wide range of industrial clusters, from Italian industrial districts and Dutch flower industry to Silicon Valley and the Boston’s biotechnology sector (e.g. Sabel and Piore 1984,

Porter 1990 to mention but a few).

Agglomeration economies are driven by the costs of distance. In today's economy, the relevant costs increasingly have to do with knowledge flows and coordination. That is, suppliers and buyers cluster geographically because they need to exchange knowledge or coordinate their activities. The impact of distance on the costs of transmitting knowledge and coordination depend on the nature of knowledge and information. The advantage of co-location (in terms of faster, more efficient knowledge exchange and coordination) increases as know-how becomes more tacit and as the interfaces between adjacent activities become less modular (Teece 1976, Pisano 1996, Pisano and Shih 2011). This suggests that geographical clustering will tend to occur in industries characterized by less mature, more tacit knowledge bases. Technology is often taken as a given in both traditional trade theory and agglomeration theory, but recent evidence that distance can also influence technology choices of firms. Fuchs and Kirchain (2010), for instance, find evidence in the opto-electronics industry that U.S. firms that off-shored production were forced to use less advanced product designs than those which kept production in the US. This was caused by the different underlying capabilities of suppliers in each location. This finding implies that firms do not necessarily choose the optimal technology first and then adapt their sourcing location strategies, but in fact, may be doing the reverse: they are choosing sourcing locations and then adapting their technology to fit those constraints.

There is nothing inconsistent with theories of location based on factor costs and those based on agglomeration. They represent forces pushing and pulling in the opposite direction. Factor price differentials in a global economy are a centrifugal force, pushing manufacturing from one location to another. Agglomerating forces are centripetal, pulling manufacturing back to existing clusters. Geographic stickiness of manufacturing depends on the relative strength of agglomerating forces relative to factor cost differentials. A big enough difference in costs may well lead companies to forgo the value of being inside an existing cluster. A firm may break away from the cluster, and in so doing, lay the seeds for a competitive cluster to form in a new location. As Krugman (1991)



points out, once a cluster begins to erode, it can collapse relatively quickly due to the (negative) consequences of increasing returns.

Most discussions of agglomeration and trade take place at the “industry” level (in varying degrees of disaggregation, 2 digit, 3 digit, 4 digit, NAICS). This is a helpful assumption. However, in reality, production in any given industry typically takes place in multiple linked stages, not all of which are from the same industry classification. Take for instance the production of automobiles.

Automobiles are assembled from a diverse array of parts, including fabricated metal products (e.g. the bodies, understructure, etc.), precision-machined parts (e.g. engines, etc.), molded plastics (bumpers, trim), semiconductors, electronics, fabrics (interior), chemicals (adhesives, paints, etc.), glass, and advanced materials (to name just a few). Moreover, a broad range of equipment is used to not only assemble the final vehicle, but also to make the various kinds of parts. To complicate matters further, many of the capabilities and processes required to make any given component are shared with other industries. Precision machining used to make engine parts is also a capability required for the production of aircraft, medical devices, scientific instruments, industrial equipment, and many other products. Clustering is much more complicated than, say, automobile companies locating near each other. Supply chains cross industry lines. Pisano and Shih (2012) referred to such shared supply chains and knowledge bases as “industrial commons” and cite several examples. Firms may choose to locate near others who are not necessarily in the same “industry”, but draw from common knowledge bases and capabilities. Advanced display producers (like the type used in high definition TV or smart phones) and semiconductor producers tend to cluster in the same regions in Asia because both utilize similar underlying process technologies and the same capital equipment suppliers.<sup>5</sup> This suggests that agglomeration forces may operate at the capability level, rather than at the industry level.

The multi-stage, multi-sectorial character of supply chains suggests that specific industry “clusters” may get divided geographically. For instance, it is possible to have some stages of production

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<sup>5</sup> Pisano and Shih, 2012, page 50

clustered in one place (say, close to raw materials), with other stages clustered elsewhere (say, close to end markets). An industry can thus be both locally clustered and globalized at the same time. Posed differently, a 'global supply chain' can be consistent with local clustering. We explore this issue in greater detail in the next section.

### III. The Structure of Global Supply Chains

The mantra that supply chains have become "globalized" has pervaded both popular and academic writings on competition and operations. Implicitly, this often meant to convey that distance has become irrelevant. Companies are putting their own manufacturing operations and choosing suppliers in locations that offer the best total cost of production and enable them to serve a broad patch of growing markets. A stereotypical picture of today's 'global' supply chain is provided in the opening lines of a Deloitte Touche & Tohmato (2003) report on global supply chains: "Imagine trying to design, source, manufacturing, sell, and deliver a new product rapidly for a new potentially lucrative market given today's realities: your suppliers are located in North America, Europe, and China; your customers are in the US, Europe and Japan; your factories are in Brazil, Europe, and North America; and your development engineers are in Europe, India, and North America."<sup>6</sup> The report then goes on to point out that this predicament is not unusual.

Unfortunately, such sweeping generalizations that "supply chains are global" obfuscate more than they clarify because, in reality, there are various ways in which a supply chain can be global (or local). Here are two salient dimensions along which supply chain "structure" can be characterized:

1. **Geographic concentration:** The degree to which the various production steps constituting the supply chain are geographically proximate to each other (concentrated) or are geographically dispersed.

2. **Location Relative to Market:** The second dimension is the degree to which the supply chain is geographically proximate to the end market.

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<sup>6</sup> Deloitte, Touche & Tohmato (2003) "The Challenge of Complexity in Global Manufacturing." Page 1. [https://www.deloitte.com/assets/Dcom-Shared%20Assets/Documents/SupplyChainSurvey\(1\).pdf](https://www.deloitte.com/assets/Dcom-Shared%20Assets/Documents/SupplyChainSurvey(1).pdf)

### *Geographic Concentration*

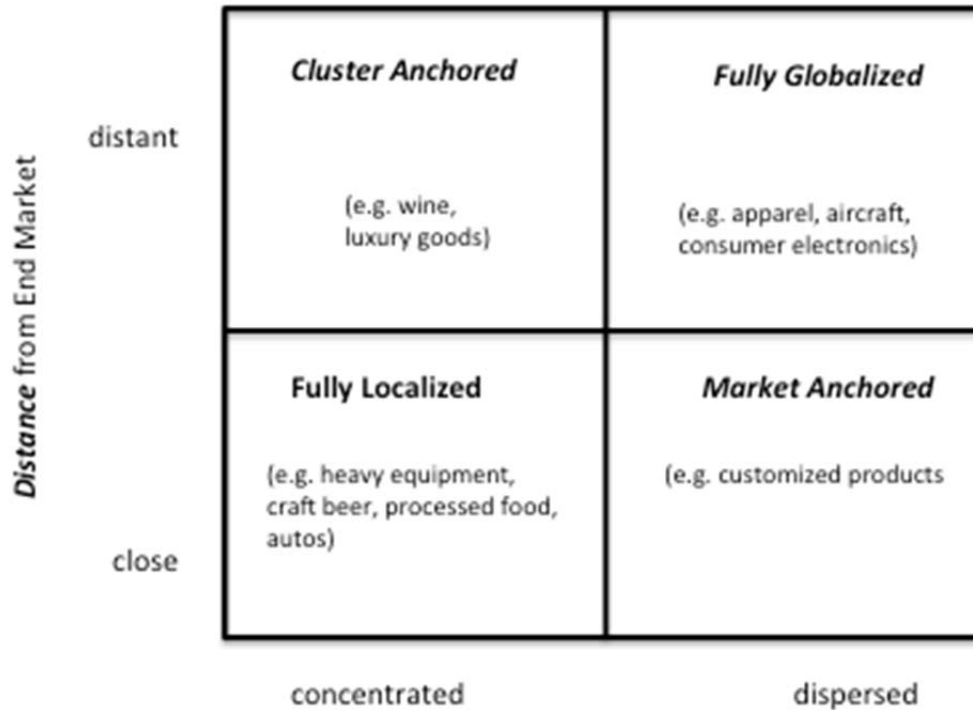
In some supply chains, there are benefits of having these various stages and activities geographically close to one another. Consider the production of wine. There are four basic stages of production: growing grapes, producing the wine (fermentation), aging, and bottling. Typically, these are all performed in very close proximity. Strong agglomerating forces drive geographic concentration of the supply chain. Now consider the semiconductor supply chain: the design of chip may be done in the US; the production of the “chip” wafer may be done in, say, Taiwan, then sent to Malaysia for cutting and packaging. (That same chip may then be sent to Europe where it will be used as a component in automobile production). This would be an example of a geographically diffused supply chain where agglomeration economies are low across stages of production (but, each stages of production—chip design, wafer production, packaging, etc. tends to be located relatively close to other companies carrying out similar production).

### *Location Relative to Market*

This dimension refers the benefits of having production activities geographically close to end markets for the product. A simple way to think about this construct is the desired distance between the final production stage (e.g. assembly) and the location of end market demand (weighted by market size). For instance, the Apple iPhone is assembled in China, but sold throughout the world, suggesting a relatively low degree of desired production-market co-location. In contrast, bulky products (like heavy construction equipment), cement, and beer are often produced relatively close to final markets due to the high costs (and time) involved in transporting the product.

We can put these two dimensions together to create a simple 2x2 matrix delineating 4 archetypal supply chain structures. See Figure 5.

### **Figure 5: Configuration Options of Supply Chains**



***Geographic Concentration of Intermediate Stages of Supply Chain***

Note, the examples are designed to suggest tendencies rather than to be illustrative of ‘pure types.’ For instance, automobiles are categorized as “fully localized” not because all production occurs close to markets, but because in the past decades, auto manufacturers have moved to putting assembly plants closer to markets and to locating suppliers close to their factors (but obviously, not all their suppliers are local). Similarly, craft beer is certainly not all distributed locally; but in reality, most craft beers achieve a significant share of their market share within a few hundred miles of their brewery (some even closer). And, many locate their brewers close to the key raw material: high quality water (while buying hops from distant places). Another caveat is that we may expect to see differences across companies within the same industry. For instance, in the apparel industry, companies like VF Brands pursue fully globalized strategies, while Zara has generally tried to cluster suppliers and final apparel production geographically to facilitate quick response (Pisano and Adams 2009).

In general, ‘fully globalized’ supply chains tend to appear in industries producing complex products with a highly diverse array of underlying components—such diversity diminishes the

likelihood that all those components are optimally produced in a specific region. Supply chain diffusion also requires a fair degree of modularity between component designs, which lessens the need for suppliers to engage in face-to-face communication for coordination. Finally, global supply chains tend to thrive when there are high scale economies of final production and the final product can be relatively cheaply (quickly) transported to end markets around the world. An iPhone is excellent example of a product produced through a fully globalized supply chain. The iPhone is composed of a highly diverse array of components (memory chips, logic chips, power supplies, displays, casing materials, etc.). These originate from the US, Korea, Taiwan, Italy, France, Inner Mongolia, and China. Since iPhone has a high value to weight ratio, transportation costs to end markets are insignificant in final assembly location and thus Apple centralizes production in China (where it has access to a massive labor force).

Market anchored supply chains geographically separate final production from component production (like global supply chains), but put final production close to end markets. This occurs where there is a low value to weight ratio of final products (thus making proximity to geographic markets efficient), where scale economies of final production are small (relative to market size), and where different end markets require different products (or require high levels of customization).

Full localized supply chains contain both final assembly and a significant share of the supply chain in the same region as end markets. Localized supply chains are surprisingly resilient today. Localized supply chains tend to arise where there are strong economies of co-location of supply chain activities due to perishability of intermediates (as one finds in food) or due to company strategies emphasizing quick response (e.g. JIT supply chains in the auto industry). Localized supply chains require either production processes with very low scale economies (e.g. craft beer) or massively large markets to overcome the fixed costs of establishing an entire supply chain and final assembly in a given market (e.g. automobiles).

Finally, cluster anchored supply chains tend to arise for products where specific regions have strong competitive advantage in multiple stages of production (or where there are agglomeration economies across stages of production), but where there is global demand for the product. This advantage may be due to natural resources (e.g. shale gas in the Dakotas), climate (e.g. wines), historically embedded skills and infrastructure, or a strong national brand association with certain products (“Made in Italy” for fashion and luxury goods, “Made in Germany” for automobiles, “Made in France” for perfumes, “Swiss Made” for timepieces, etc.). Beyond national brand reputation effects, close coordination between all diverse elements of the supply chain are important for driving desired quality characteristics. Such supply chains have global reach in that end products are shipped around the world, but the production is heavily rooted in local networks of suppliers.

This framework provides a lens through which to understand the decline (or rise) of specific clusters. Clusters can decline for two basic reasons. First, other competing clusters can gain an advantage in terms of cost, quality, responsiveness to the customer needs, etc. Thus, for instance, a big reason for the decline of the textile-apparel cluster in Massachusetts during the 20<sup>th</sup> century was the rise of lower cost textile-apparel cluster in the Southeastern US. Such cluster-versus-cluster competition can be seen in today’s auto industry (e.g. the Michigan auto cluster competes with auto clusters from around the world, including one in the southeastern US). A second reason clusters may decline, though, is that agglomeration economies can dissipate due to changes in technology, competitive dynamics, or institutional changes. For instance, until the mid-1990s, the textile-apparel supply chain in the US was heavily localized (cotton from US fields was woven into cotton fabric in American mills and then cut and sewn into garments in US factories). After implementation of the WTO agreement reducing barriers to trade in this sector, textile-apparel supply chains rapidly globalized. Toyota, like other auto companies, has evolved from a heavily cluster based producer (with operations heavily concentrated around Toyota City Japan) to a market anchored producer (as it moved *final assembly* operations to major markets like the US) and then finally to a fully localized producer (as it created local supplier bases to serve its assembly operations). Mass production furniture evolved from fully localized structures

to fully globalized structures (e.g. IKEA).

This raises the question why some clusters are able to survive “inter-cluster” competition and why some clusters also resist changes to supply chain restructuring. In the next section of this paper, we examine these issues with detailed case histories of four clusters located in northeastern Italy.

#### **IV. Why Some Clusters Thrive in the Face of Globalization**

In this section, we compare the recent histories of two pairs of clusters all located within a 50km radius of northeastern Italy: 1) sport shoes (Montebelluna) and women’s fashion shoes (Brenta Riviera) 2) chairs (Manzano) and furniture (Livenza). Italy is well known as an economy organized around industrial districts (clusters). It is thus an ideal laboratory in which to investigate the competitive dynamics driving cluster survival or decline. We chose this particular region because it is one of Europe’s most industrialized regions (Eurostat 2014) and home to numerous Italian industrial districts that have been heavily impacted by global competition. These four clusters—sports shoes, women’s fashion shoes, chairs, and furniture—offer four very different patterns of response and performance, despite being from the same region (this allows us to hold constant or ‘region-specific’ factors—such as wage changes, workforce shifts, taxation, etc.—that might influence cluster performance).

##### ***A Tale of Two Boots***

Separated by just 50 kilometers, the Montebelluna and Riviera del Brenta have long represented Italy’s most prominent loci for the development and manufacture of two specific types of shoes: professional sport shoes, including ski boots and hiking boots (Montebelluna) and women’s luxury leather shoes (Riviera del Brenta). The production pole of Montebelluna developed thanks in part to its proximity to the Dolomites; in the late 1800s, local artisans began producing hiking shoes for mountain enthusiasts. During the 1900s, production expanded to other athletic shoes, including sneakers and ski boots. During the 1980s, Montebelluna gave birth to numerous globally

renowned sport brands, like Tecnica, Nordica, Lotto, Diadora, and started drawing investments from major international brands like Nike and The North Face.

Like Montebelluna, the beginning of the leather shoe production in Riviera del Brenta dates back to the late 1800s, when a handful of artisanal laboratory settled down in the town of Stra (just south of Venice). Similar to the majority of the Italian industrial districts, the Riviera del Brenta flourished in the second half of the 1900s thanks to the growing domestic demand for consumer goods items and strong exports to Germany, France, and the US.

While the origins and development of these two production hubs share significant similarities, the way they adapted to the global economy over the past decade followed divergent trajectories. On the one hand, lead firms in Montebelluna started offshoring production to lower cost economies (first in Romania, later in China) while focusing on R&D, marketing and distribution; R&D became decoupled from production. In the Riviera del Brenta, not only did production of leather shoes remain stable, the region became a magnet for investments from several global fashion brands like Armani, Prada, Dior, Louis Vuitton. It is estimated that 90% of women's luxury shoes (priced approximately \$500 and above) are produced in the Riviera del Brenta. Not only does the region manufacture shoes, but producers typically undertake a significant amount of R&D and engineering there as well.

The distinct global supply chain strategies pursued by these two sets of lead firms had different effects on both the competitiveness and the size of the local production systems. This divergence is corroborated by data on the number of establishments and jobs from 2006 to 2012 in Montebelluna and Riviera del Brenta that we analyzed from the ISTAT. In order to gather detailed and accurate statistics of two very specific production hubs, we examined data from single municipalities<sup>7</sup> for a number of selected ATECO codes – the Italian equivalent of the U.S. NAICS

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<sup>7</sup> For each of the four production hubs, we created a list of municipalities that we deemed relevant in terms of their economic contribution to the specific regional industry we took into account. Single municipalities were selected thanks to historical data on employment and production activity that we obtained from several institutional sources, including Confindustria (the Italian association of manufacturing firms) and different labor unions.



code. The ATECO codes we considered in the analysis are ATECO 152 (shoes production – which we used for both the Montebelluna and Riviera del Brenta productions) and ATECO 3230 (fabrication of sport equipment – which we only used for the Montebelluna cluster). The decision to focus on the 2006-2012 period was dictated by the availability of data from the ISTAT. However, this time frame allowed us to include in the analysis data from before the 2007 crisis (i.e. 2006-2007), whose effects were not visible in Italy until 2008, as well as data for the years after the deepest part of the crisis.

Data for the ATECO 152 shows a substantial decline in the number of jobs in the Montebelluna area between 2006 and 2012. The size of the local workforce fell by 15% percent over this time frame (from 5283 to 4508 employees). This downsizing was particularly sharp between 2008 and 2009 in coincidence with the financial crisis break out. During these two years almost 1000 jobs were laid off. The effects of the economic crisis on the size of the local workforce are also visible in Riviera del Brenta: a total of 472 workers were laid off between 2006 and 2008, accounting for 7% percent of the total workforce. However, in the Riviera del Brenta, employment growth accelerated over the three-year period 2010-2012 (an increase of 200 jobs or 10% growth of the overall Riviera del Brenta workforce). In contrast to sport shoe firms, shoe firms in the Riviera del Brenta continued to produce locally and seldom switched to foreign suppliers.

The divergence of the two production hubs is even more evident if we focus on the fabrication of sport equipment (ATECO 3230), Montebelluna's most distinctive activity. Between 2007 and 2012, the number of workers employed by local manufacturing firms decreased by 52% percent, moving from 910 to 432 employees. The sharpest downsizing occurred between 2009 and 2011 (during which time, employment in the Brenta area increased by 10%).

The decline of production in Montebelluna is relatively easy to explain in the terms of our framework above. The structure of the supply chain shifted from cluster-based to fully global. This shift was enabled by characteristics of the production process and market. Athletic shoe

production and ski boots are high volume processes utilizing relatively unskilled labor.

Component production—like soles or the outer casing of the boot—utilize molds, which once produced can be shipped anywhere. The modularity of shoe technology and the high degree of process codification enables lead firms to outsource production to lower cost regions like Slovakia, Romania, and China.

However, what seems to be harder to explain is why leather shoes manufacturing remains so much anchored to the Riviera del Brenta region. While true that such shoes are produced in smaller volumes using relatively highly skilled workers, such characteristics are by no means a guarantee against cluster decline. Italy has witnessed the decline of other similar districts in the face of global competition, including fine glass (Murano), upscale fashion clothing (Biella), design leather sofas (Puglia-Basilicata), and professional bicycles (Veneto). Accordingly, our question is not why production in Montebelluna has gone or whether it would ever come back, but rather why Riviera del Brenta has managed to retain the bulk of manufacturing locally and has even increased its competitive advantage compared to other footwear industrial regions in developed economies, like the U.K., Portugal, and Spain.

To effectively tackle such a challenging question, we focused on the global supply chains of upscale leather shoes and addressed the strategies of the lead firms operating in the Riviera del Brenta. By doing so, we narrowed the focus of our analysis from an industry to a firm-level perspective. In addition to providing us a finer grained spectrum of the actual dynamics underlying the evolution of the Riviera del Brenta region, focusing on lead firms' supply chain strategies allowed us to include in the analysis factors from both the local and global environments.

Our tentative hypothesis from our field research highlights the importance of what we will call a “knowledge integrator” (KI). A KI represents a type of firm that connects different forms of knowledge from distinct geographical contexts in an integrated supply chain. By exerting a direct

control over the entire supply chains, a KI is able to coordinate and integrate distinct forms of knowledge that are essentials in sustaining the firm competitive advantage, as well as the competitiveness of its supply chain partners.

In the case of the Riviera del Brenta, the two main types of knowledge at stake are the production know-how of skilled workers and suppliers and the design ideas conceived by global designers. While these two categories are today tightly connected, and they indeed thrive on a continuous exchange of knowledge. The KI integrates these two bodies of knowledge by having access to both the designers and the skilled work force and suppliers. This clearly emerges in the case of Alpha (a pseudonym), a globally renowned fashion brand which has been developing and manufacturing its upscale female leather shoes in Riviera del Brenta since the late 1990s. Headquartered in Milan, Alpha set up a production branch in Riviera del Brenta in order to take advantage of the local availability of skilled labor force. In addition to improving its production capabilities, the establishment of the Riviera del Brenta production branch allowed Alpha to foster its innovation capabilities. Local skilled workers play a crucial role in “translating” the design sketches conceived by global designers in actual prototypes, which represents the basis for any product innovation. While this sustains the competitive advantage of Alpha, it permits local suppliers to constantly advance the state of the art of their production know-how, hence remaining ahead from foreign competitors catch up. As much as global designers need skilled workers to translate their drawing into real artifacts, the Riviera del Brenta production system needs to continuously improve its production capabilities by dealing with challenging and heterogeneous requests from global designers. The KI keeps the local ecosystem dynamic, constantly challenging it to develop new capabilities. Fundamental in this process is the role of Alpha, since it works as a connecting platform for the different agents that participate in its global process of value creation. Without Alpha’s knowledge-integrating function, producers from the Riviera del Brenta would struggle to keep pace with the ever-changing fashion trends and would miss the opportunity to challenge and stimulate their distinctive production capabilities.

Knowledge integrators currently operating in Riviera del Brenta are typically global brand-name firms, a category which comprises both Italian and foreign companies. Some of these companies were founded in Riviera del Brenta, some others joined the district over the past decade. External firms settling down in Riviera del Brenta brought investments and created new jobs, above all in the prototyping and manufacturing functions. Furthermore, and perhaps more importantly, their presence allows local players to be inserted into global processes of value creation, thus improving their production knowledge and advancing the edge of their competitive advantage.

### ***Going Global to Stay Local—The Cases of Seats and Furniture***

Like the Montebelluna and Riviera del Brenta manufacturing areas, the origins of the Livenza (furniture) and Manzano (chairs) hubs date back to the late 1800 when the first shops were established by local artisans. The early development of both areas was sustained by the proximity to strategic sources of raw materials: woods from the Alps (Livenza<sup>8</sup>) and wild canes from the Northern Adriatic lagoon (Manzano), which were used to manufacture woven seats. The two industrial areas grew remarkably between the 1960s and the 1990s, thanks to the boom of the domestic construction industry and the growth of foreign markets. Sustained by the devaluation of the domestic currency (the Italian Lira) and the production flexibility of regional production systems, exports to Germany, the U.K. and the U.S.A. during the 1980s marked the beginning of the internationalization of the furniture industry in Northeast Italy. As of the mid 1990s, one third of the chairs sold in the world were manufactured in the Manzano industrial region (Lombardi, 2013). Twenty years later, the production of chairs in Manzano has essentially almost disappeared.

The industrial data we gathered from the ISTAT indicates that the number of workers employed by Manzano chair producers decreased by 44% between 2006 and 2012, moving from 7744 to 4372 employees. Data for the most important ATECO code for furniture production (ATECO 310 - fabrication of furniture, including case goods, chairs, and upholstered items) reveal how the

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<sup>8</sup> Livenza is actually the name of the river through which local woodworkers sourced woods from the neighboring mountains.

downsizing of the local employment base primarily occurred in manufacturing-related activities. In this precise ATECO code, the size of the local workforce decreased by 43% with a total of 2764 jobs laid off in only seven years.

The downsizing of the Manzano cluster is even more evident when we compare the evolution of this production hub to the other major regional pole for furniture production: the Livenza cluster. Located just sixty kilometers away, the production of case goods in the Livenza area remains one of the key activities for the local economy and is home to numerous innovative firms, including IKEA's largest European supplier. While severely confronted by the effects of the economic crisis, which is still affecting Italian furniture producers, the size of the Livenza furniture hub measured by employment remained stable between 2006 and 2012. The number of local workers involved in the ATECO 310 moved from 17553 to 17257. With approximately 300 layoffs registered in seven years, furniture production in the Livenza region proved to be resilient to both the drastic downsize of the domestic demand and the increased global competition.

How can the production of two similar items within the same geographical region follow such different trajectories? And what allowed the Livenza area to maintain local manufacturing activities alive while the neighboring chair production in Manzano was losing ground to foreign competitors?

We found answers to these questions in the analysis of the global supply chains of local lead firms. As in the Riviera del Brenta, our field research suggests that the competitiveness of the Livenza industrial hub has been sustained by the presence of a firm playing the role KI who form a bridge between local manufacturing knowledge and global knowledge from demanding buyers and designers and heterogeneous customers. This process is best depicted by the case of Beta (a pseudonym), IKEA's European largest supplier and a strategic partner of the Swedish company. Beta is a manufacturing company located in the heart of the Livenza area that has been producing wooden furniture components (e.g. panels) for forty years. Before 1998, Beta

was a small company (approximately 20 million euros in sales). In 1998, Beta first began supplying IKEA based on an innovation production process for making high quality laminated woods. Beta's sales increased twentyfold over the next 15 years (Beta is now the second largest furniture company in Italy).

The tight cooperation established with Ikea encouraged the company to improve the efficiency of its production system and enhance its prototyping and innovation competencies. In addition to fueling the company's learning process, Beta's internationalization remarkably impacted on the competitiveness of the entire Livenza industrial region. In fact, Beta is still tightly linked to the local environment as it relies on some twenty specialized local suppliers and constantly hires workers from declining companies or from the local "Scuola del Mobile", Italy's oldest professional school for furniture makers. Beta sits at the intersection between global and local supply chains – namely between IKEA and small specialized suppliers operating in the Livenza area. As in the case of Alpha, Beta is responsible for connecting global sources of design knowledge to local sources of manufacturing and technical know how, which are often difficult to codify and therefore not accessible for global players like IKEA.

While being recognized as the Livenza's largest furniture company, Beta doesn't represent the only knowledge integrator in the region. IKEA works with two other major companies in the Livenza, who pursue a similar knowledge integration function. The Livenza furniture hub is also home to many other smaller brand-name firms that compete in the global marketplace – mainly by exporting their products to foreign markets. While marked by different business models – these companies manufacture and sell final goods under their brand name – the role played by these firms in the Livenza resembles that of Beta. On the one hand, they establish and manage complex relationships with global designers and interior decorators – which are both their customers and their first source of design inputs – while, on the other hand, they coordinate and marshal a local network of highly specialized suppliers. In addition to feeding the whole local

supply chain, knowledge integrators constantly stimulate regional suppliers to enhance their production know how in order to meet the heterogeneous requirements from global customers.

As much as knowledge integrators contribute to foster the performance of the Livenza region, the almost complete absence of this type of firms has undermined the competitiveness of the Manzano industrial hub. Despite being celebrated by local policy makers and entrepreneurs as the chair capital of the World as late as the mid-1990s, the failure of this local industry reflects its incapacity to produce knowledge integrators. Born as OEMs, local chair producers never updated their business models and failed to move from being mere chair manufacturers to becoming knowledge integrators. While Beta remarkably invested in new production technology to meet and even anticipate the challenging requirements from IKEA, or other Livenza's brand-name producers invested in developing relationships with global designers, chair producers in Manzano kept working as OEMs for larger global buyers. Once wooden chairs went out of fashion and other materials – above all plastic – entered the market, global buyers turned to suppliers specializing in different production process. The absence of knowledge integrators prevented the Manzano chair hub to understand the emergence of new trends in the final market and therefore to adapt existing production logics to new manufacturing paradigms. The importance of knowledge integrators is confirmed by the fact that the largest and most successful company in the Manzano area is a company that managed to complete this transition. Charlie (a pseudonym) is a manufacturing firms specialized in the production and sale of contemporary furniture, including chairs and tables. Unlike the vast majority of local firms, Charlie has been significantly investing in distribution and retail over the past three decades. This strategy allowed the company to develop a global network of retail stores, which ultimately connect the company to interior designers and customers in general. While moving “downstream”, and therefore establishing a permanent dialogue with the final market, Charlie maintained a stable presence in the Manzano area where it develops and produces customized products either in-house or through specialized suppliers. As in the Alpha and Beta cases, it is the company's ability to integrate and manage different forms of knowledge that ultimately sustains its competitive advantage in the global

marketplace and the overall capacity of a mature industrial region to adapt itself to the ever-changing nature of international competition.

Other research on other Italian industrial districts has echoed similar themes. Lorenzoni and Ornati (1989) were among the first to highlight the key role of “leading-firms” in orchestrating the technical and operations of smaller sub-contractors inside Italy’s industrial districts. In a later study of Italian districts producing shoes, leather goods, clothing, and furniture, Lazerson and Lorenzoni (2008) found that the most successful lead firms in the district were generally focusing on building distribution and marketing capabilities in global markets, even while shifting a growing share of production outside the local districts. They were, in the words of Lazerson and Lorenzoni, ‘escaping the manufacturing cage.’ Lazerson’s and Lorenzoni’s “leading firms” share in common with our knowledge integrators a connection to the market. However, as the case of Beta (furniture) shows, access to the market does not necessarily have to occur through direct integration, but may well be achieved via partnerships with existing multi-nationals (such a strategy comes with obvious transaction cost hazards). And unlike Lazerson’s and Lorenzoni’s “leading firms”, our knowledge integrators are deeply focused on building local manufacturing capabilities through collaboration with and investment in local suppliers.

The contrast between “leading firms” (who focus on accessing markets) and “knowledge integrators” (who attempt to connect global markets with local clusters) is also illustrative of how different supply chain strategies may impact cluster performance. The strategies of sport shoe firms in Montebelluna followed closely the “leading firms” model presented by Lazerson and Lorenzoni (1999). They focused on design and marketing, while outsourcing production to low cost locations; the manufacturing cluster atrophied not because another cluster became more competitive, but because the supply chain shifted from cluster-anchored to global (through the actions of firms). In contrast, in both Riviera del Brenta and Livenza, knowledge integrators have thus far played a key role in both accessing global markets and deepening capabilities inside the local manufacturing cluster. Whether manufacturing is geographically sticky depends, at least in part, on whether firms make it that way.



## **VI. CONCLUSIONS**

Can clusters survive globalization? The analysis contained in this paper suggests if agglomeration forces are strong enough, we should still expect to see supply chains that cluster geographically. Tacit knowledge, complex coordination requiring fast adaptation between suppliers-buyers along the supply chain (such as one see with JIT systems), and the need for frequent face-to-face problem solving, all create a cost of distance. These forces protect existing clusters, but they by no means guarantee the survival of a specific cluster. Agglomerating forces, like factor costs, are dynamic. As technologies and processes mature, knowledge may become more standardized and codified, reducing the advantage of close proximity between players along the supply chain. In some instances, firms pursue strategies specifically to reduce agglomerating forces to enable a more competitive, global sourcing strategy. This was the case in the Montebelluna sports shoe district in Italy. Lead firms focused on designs and processes that enabled the supply chain to be disaggregated.

But even where agglomerating forces persist, an existing cluster can still be destroyed by the emergence of a new, competitive cluster elsewhere in the world. This is not a new phenomenon. Perhaps the most recent example occurred in the consumer electronic industry. The US and Europe in the post-war period fostered strong consumer electronics clusters (specifically television, radio, and stereo equipment). As the technology matured, and market growth stagnated in the 1960s, US firms began to outsource some component production to Japan (at first) and other parts of Asia (later). Eventually, Japan, Korea, and China developed their own strong consumer electronics clusters that achieved a competitive advantage over the American and European clusters. The US and European clusters declined not because co-location became unimportant, but because new stronger clusters beat them.

Our study is highly preliminary and clearly more work needs to be done to understand the dynamics of cluster rise and decline, and cluster-cluster competition. Our case studies offer some illustrations of how clusters in one specific region have risen and declined, but more cross-sectional, longitudinal analysis of large data sets are needed. Creating such a data set would be a big step forward, and we hope in our future work to tackle this challenge.

Our implications for policy and management at this stage can only be very tentative given the preliminary nature of the work. While offering all the usual caveats, we believe our analysis highlights a number of issues for policymaker and managers to consider. The first is that cluster decline is not an inevitable consequence of globalization. Manufacturing can be sticky geographically. However, given global competition, manufacturing capabilities cannot be static. Investment in process know-how, infrastructure, worker skills, and other critical elements of the local 'industrial commons' (Pisano and Shih 2012) are essential for any cluster to remain vibrant. Access to a strong cluster can be a source of advantage for firms with global market access. Preserving the industrial commons supporting the cluster may not only be good for the local economy, but can be a competitive advantage for the firm as well.

Second, once an industrial commons has eroded and a supply chain has disaggregated, it is very difficult to rebuild. Currently, there is discussion in US policy circles and in some US companies about the importance of "rebuilding" American manufacturing. Various cities and regions (including Detroit) have launched local manufacturing initiatives. Detroit is now home to several social entrepreneurs who are trying to rebuild the manufacturing base there through manufacturing start-ups (e.g. Shinola Watch Manufacturing). Our analysis suggests that such initiatives require two things to be successful. The first is access to a large market (fortunately, for US based firms, the US market is often large enough to achieve the necessary threshold). The second though is a local base of suppliers and skilled workers who *together* provide a unique set of capabilities. The power of the cluster is in the integration, not in the separate pieces. Government policies should be careful not to focus on "local" manufacturing in contexts in which

the required capabilities are not local. A good example is the US Federal Government's current National Institutes of Manufacturing Initiative, which seeks to establish focused manufacturing "hubs" in a variety of regions, each focused on a specific type of manufacturing process (e.g. 3D printing in Youngstown, Ohio). Considering that the capabilities in many new manufacturing technologies are highly diffused geographically, it is a mistake to use these institutes to build local manufacturing networks. Local only has an advantage in the face of deeply embedded knowledge and high agglomeration forces.

As we saw from our case studies, the preservation of a cluster is not completely exogenously determined by changes in factor prices or by changes in technology. Firm strategies make a difference. In particular, knowledge integrators are needed to build a bridge between global market access and local embedded knowledge. Early writings on clusters (e.g. Sabel and Piore 1984) focused on the internal cohesion and deeply embedded social ties. But our case studies along with those of Lazerson and Lorenzoni (1999) suggest the opposite: to survive, clusters cannot be insular. They need to be externally focused on global markets and be open to technology and innovation from elsewhere. Bringing this global focus to the local cluster is the critical job of the knowledge integrator.

## REFERENCES

- Breznitz, D. and Buciuni, G. (Forthcoming), "Alfred Marshall Alive and Well? The Rise and Evolution of Innovative Manufacturing Districts in a Globalizing Economy," in D. Audretsch, A. Link, and M. Walshok (eds). *The Oxford Handbook of Local Competitiveness*, Oxford University Press: Oxford, UK.
- Buciuni, G. Coro', G. and Micelli, S. (2014), "Rethinking Manufacturing in Global Value Chains. An International Comparative Study in the Furniture Industry." *Industrial and Corporate Change*, 23(4), 967-996.
- De Marchi, V. and R. Grandinetti (2014), "Industrial Districts and the Collapse of the Marshallian Model: Looking at the Italian experience." *Competition and Change* 18(1), 70-87.
- Deloitte Touche Tohmatsu (2003), "The challenge of complexity in global manufacturing. Critical trends in supply chain management". Deloitte Touche Tohmatsu: London, UK.
- Eurostat (2014). "Eurostat Regional Yearbook". European Commission.
- Federal Reserve Statistical Release (2015), "Industrial Production and Capacity Utilization - G.17." March 16<sup>th</sup>, 2015.
- Fuchs, E., and Randolph K. (2010), "Design for location? The Impact of Manufacturing Offshore on Technology Competitiveness in the Optoelectronics Industry." *Management Science* 56 (12), 2323-2349.
- Gereffi, G., J. Humphrey and T. Sturgeon (2005), "The Governance of Global Value Chains." *Review of International Political Economy*, 12(1), 78–104.
- Goldthwaite R. (2009), *The Economy of Renaissance Florence*, The Johns Hopkins University Press: Baltimore.
- Krugman, P. (1991), *Geography and Trade*. MIT Press. Cambridge, MA.
- Lazerson, M. and G. Lorenzoni. (1999), "Resisting Organizational Inertia: The Evolution of Industrial Districts." *Journal of Management and Governance* 3, 361-377.
- M. Lazerson and G. Lorenzoni (2008) "Transforming Industrial Districts: How Leading Firms Are Escaping the Manufacturing Cage" in S. Cropper, M. Ebers, C. Huxham, and P. Smith Ring (eds.) *The Oxford Handbook of Inter-Organizational Relations*
- Lorenzoni, G. and O. A. Orati (1989), "Constellations of Firms and New Ventures." *Journal of Business Venturing* 3(1) 41-57.
- Liveris, A.N. (2011), *Making it in America. The Case for Reinventing the Economy*. John Wiley & Sons: Hoboken, NJ.
- Macher, J., Mowery, D. and T. Simcoe (2002), "E-business and the Semiconductor Industry Value Chain: Implications for Vertical Specialization and Integrated Semiconductor Manufacturers". *Industry and Innovation*, 9, 155-181.

- Markusen, A. (1996), "Sticky Places in Slippery Space: A Typology of Industrial Districts."  
*Economic Geography*, 72 (3), 293-313.
- Marshall, A. (1890), *Principles of Economics*. Macmillan: London, UK.
- McCormack, R. (2010), "U.S. Becomes a Bit Player in Global Semiconductor Industry".  
*Manufacturing and Technology News*, 17 (3).
- Porter, M. E. (1990), *The Competitive Advantage of Nations*. Free Press: New York.
- Piore, M. J. and C. F. Sabel (1984). *The Second Industrial Divide: Possibilities for Prosperity*.  
Basic Books: New York.
- Pisano, G. P. (1996), "Learning-before-doing in the Development of New Process Technology."  
*Research Policy* 25 (7), 1097-1119.
- Pisano, G. P. and P. Adams (2009), "VF Brands: Global Supply Chain Strategy." Harvard  
Business School Case, no. 9-610-022. Harvard Business School Publishing, Boston, MA.
- Pisano, G.P. and W. C. Shih (2012), *Producing Prosperity. Why America Needs a Manufacturing  
Renaissance*. Harvard Business Review Press: Boston, MA.
- Sirkin, H., Zinser, M. and D. Hohner (2011), "Made in America, Again. Why Manufacturing Will  
Return to the U.S." The Boston Consulting Group, Boston, MA.
- Teece, D. J (1976), *The Multinational Corporation and the Resource Costs of Technology  
Transfer*, New York: Ballinger Publishing Company.