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GLOBAL VALUE CHAINS

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Executive Summary

In this paper, we study the connections between global value chains (GVCs) and the location of economic activity. GVCs exist when production is disaggregated into constituent activities and geographically dispersed. They incorporate all the activities related to producing a good or service and delivering it to the end user. The fragmentation of GVCs into constituent activities is of particular interest to the advanced economies like the U.S., due to its high wage rates and relative openness. Multinational enterprises (MNEs) typically exert the greatest control over GVCs, orchestrating where activities are performed, and who performs them.

Activities within GVCs may be placed in two broad categories – standardized and specialized. Standardized activities involve repetitive, commoditized processes that can be performed by many firms using limited knowledge-based resources, and create a relatively small share of overall GVC value. They include activities such as large-batch manufacturing and bulk finished goods assembly. In contrast, specialized activities are non-repetitive and creative, and capture a disproportionate share of overall GVC investment and value. Business services are particularly important forms of specialized activities and are associated with high per capita income generation, new industry emergence, and regional competitiveness. They are typically knowledge-intensive activities that include high technology and professional services (e.g. R&D, engineering services, information technology, logistics, accounting, advertising, and marketing). In this paper we highlight the contextual, structural, and functional aspects of GVCs, the role of business services as critical GVC components, and the implications for policy makers. We illustrate the nature of value creation within GVCs in two dramatically different case studies. At one extreme we examine two giant commercial aircraft manufacturing firms and at the other we study a small high technology firm in Southeast Pennsylvania.

We begin by describing the trends that have changed the nature of international trade and the characteristics of GVCs in fundamental ways. Technological advances over the past several decades, particularly in the areas of communications, IT, and transportation, have made it possible to divide business processes into increasingly finer slices. Previously inseparable activities throughout the value chain can now be disaggregated, modularized, and relocated to a wide range of locations. Orchestrating MNEs re-integrate the outputs of these activities. Over the last two decades these firms have seen a huge expansion in the list of location choices in terms of where to place activities (or source them from) and face fewer limitations in terms of selecting the most efficient global location. Additionally, the rising sophistication of infrastructure and other resources in emerging market economies ensures that high-knowledge activities can increasingly be undertaken in many locations there.

These trends have transformed the global economy from a world of "trade in goods" to

one dominated by "trade in activities", creating both challenges and opportunities for firms in advanced market economies. Firms must now identify and concentrate on the *activities* in which they have competitive advantage, rather than final products. While the resulting reconfiguration may result in the migration of product assembly to lower cost locations, it creates opportunities for small- and medium-sized enterprises (SMEs) in the U.S. to participate meaningfully in the global economy. Local SMEs are integrated into GVCs based on the value their specific activities provide relative to competitors. The ability to perform specialized, knowledge-intensive activities increases the share of value SMEs and their locations capture from GVCs.

Structurally, GVCs consist of components that are immobile (locations) and mobile (firms). Clusters are important geographic concentrations of economic activity that are resilient in retaining large shares of MNE investment, even as GVC activities are dispersed globally. Subsidiaries of MNEs often take on important roles, orchestrating 'nested' higher and lower order GVCs to provide complex inputs and new competencies for the MNE group as a whole. However, should their contributions to the GVC diminish, they are at risk of 'subsidiary isolation', and their activities may be consolidated and relocated.

Firms and locations enhance their attractiveness to MNEs and increase their share of GVC value capture by building competencies in general purpose activities (GPAs). These activities are characterized by a substantial, fungible core of expertise that is complementary to industry specific or operational knowledge in a wide range of contexts. GPAs include the high wage, knowledge-intensive business services described above, and their employment is largely composed of scientists, engineers, and creative professionals. GPAs span multiple industry verticals and are at lower risk of downturns in any one industry, and flourish in large but diverse (i.e. urban) environments. One of our case studies highlights the cross-industry applicability of customized design and technology integration services.

Understanding the nature and function of GVCs is extremely important for policy makers. Commonly used outcomes metrics, industry measures, and the accounting practices of firms themselves tend to aggregate the contributions of individual activities and distort the view of local value creation on which policies and assessments are based. Both insourcing (foreign firms bringing activities to the local economy) and offshoring (moving local activities to a foreign location) can benefit a high knowledge, high wage economy like the U.S., enabling firms to (a) increase the local concentration of high knowledge, high wage jobs; (b) control costs by sourcing low skill inputs from low wage locations; and (c) maintain cutting edge, innovative outputs by sourcing components from global technology leaders. Policies makers cannot dictate the emergence of local orchestrating firms, but can put in place conditions that support existing activity clusters and increase the likelihood that they retain or enhance their position in GVCs. In contrast, policies that hinder local firms' participation in GVCs and restrict the relocation of standardized, low-value activities ultimately harm the U.S. economy and should be resisted.

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Introduction

Value chain analysis is an innovative tool that views the economy in terms of activities instead of its constituent industries and firms (Mudambi, 2008). The value chain approach analyzes, at the sector level, each link in the 'chain of activity' — from the ideation of a product or service to its post-use disposal.[1] A value chain for any product or service consists of a number of inter-linked activities extending from upstream R&D, to raw materials and component supply, production, and delivery to buyers, and often beyond that to disposal and recycling. When these activities are disaggregated and dispersed across national borders, a global value chain (GVC) exists. GVCs incorporate all the geographically-dispersed activities related to producing a good or service and delivering the good or service to the end user. Modern value chain analysis enables us to pinpoint the relative contributions to value creation associated with each activity. This approach helps us to understand that as far as a geographic location is concerned, success in terms of creating prosperity is based on the activities performed in the location rather than the identity of local firms or industries. In particular, specialized knowledge-intensive activities such as R&D, product design, and marketing are critical to GVCs and are consequently the most valuable activities in a location both in terms of per-capita income generation and new industry emergence.

GVCs are an integral part of international trade and have existed as long as there have been trade relations between countries. Since the Second World War, the global economy has been growing more economically integrated, nudged by organizations like the GATT and its successor WTO. Worldwide trade in goods has grown at about 6% annually over the period.[2] However, it is now widely recognized by international trade theorists, economic geographers and international business scholars that the nature of international integration is changing in fundamental ways. As activities, tasks, and their related profits are increasingly dispersed across firm and national boundaries (Kenney and Florida, 2003; Mudambi, 2008; Seppälä, 2013), the global economy is transforming from one dominated by "trade in goods" to one dominated by "trade in activities", operationalized by GVCs. This type of trade is especially important for advanced economies like U.S due to the high level of complexity underlying much of their economic activity and their relative openness to international trade.

Economic Trends Impacting Global Value Chains

Two important trends have arisen over the last few decades that have changed the characteristics of GVCs in fundamental ways. First, technological advances, especially in the areas of communications, information technology, and transportation, have made it possible to dissect business processes into progressively finer slices. Complex activities can be

[1] Value chain analysis can be traced to early work focused on disaggregating the individual business firm into its constituent activities with the objective of identifying its sources of competitive advantage (Porter, 1985). The firm-centric focus of this work has been extended and generalized in recent years to analyze the overall creation of value.

[2] UNCTADStat, accessed March 28, 2012.

disaggregated, modularized, relocated to a wide range of geographic locations and then reintegrated by the orchestrating firm, with fewer limitations on placing activities within (or sourcing them from) the most efficient global location. Activities and the users of the outputs of activities can be separated both in time and space.[3] Firms are now able to reconfigure themselves in very basic ways so they can outsource activities deep in the heart of their operations with surgical precision and focus on activities where they have superior competencies. For example, it is now routine for firms to outsource functions involving sensitive information like payroll, pensions and accounts receivable (Metters, 2008). Through such "fine slicing", firms are able to specialize in increasingly narrow niches, which need not even be contiguous in the value chain (Mudambi, 2008). This makes it crucial for the firm to identify and concentrate on process activities in which it has competitive advantage, since these are the basis of the firm's core competencies that enable it to generate rents (Hamel and Prahalad, 1990). The robustness of modern information technologies also allows firms a great deal of latitude in terms of the geographic location to which these outsourced activities relocate (Mithas and Whitaker, 2007); some of these activities are knowledge-intensive and create a great deal of value for the locations in which they are eventually undertaken. The importance of fragmented production and intermediates trade has been widely documented in academic research (e.g., Baldwin, 2006; Dedrick, Kraemer and Linden, 2010; Ernst and Lim, 2002; Gereffi, 1999; Grossman and Rossi-Hansberg, 2008; Pyndt and Pedersen, 2006; Storper, 2009).

Second, the number of locations where such activities can be undertaken has risen dramatically over the last two decades, with the increasing sophistication of infrastructure and other resources in a wide range of emerging markets from China and India to Mexico and Turkey. GVCs today are truly global within industries ranging from apparel (Gereffi, 1999; Smakman, 2003) and shoes (Pyndt and Pedersen, 2006), to electronics (Ernst and Lim, 2002), pharmaceuticals (Dunlap-Hinkler, Kotabe and Mudambi, 2010) and commercial aircraft (Kotha and Srikanth, 2013). The activities associated with even the simplest products like T-shirts today span a large number of countries (Rivoli, 2005). As the characteristics of locations change[4], there may be changes in the optimal location of value chain components (offshoring decisions) as well as the boundaries of the firm and its control strategy (outsourcing decisions). By 'mapping' a GVC from start to finish based on the activities performed, strategy makers can better understand where they can capture greater value within their spheres of influence.

Improvements in technology and logistics together with the wider range of feasible locations for business activities imply that the optimal configuration of global innovation,

[3] Teleradiology is a typical example of this trend. X-rays and MRI scans can be performed at the patient site in the U.S., transmitted via secure electronic link and read in India, with the results transmitted back to the originating site (Pollack, 2003; Levy and Yu, 2006).

[4] Changes can occur through policy (e.g., the lowering of trade barriers), technology (e.g., the availability of web-based software for remote coordination) or resource availability (e.g., an increasing availability of local skilled labor).

production, and distribution systems has been changing. The general trend of this change is widely accepted, although different aspects have been highlighted by scholars from different disciplines using their own specific lenses. Thus, international trade economists focus on the shift from trade in final goods to trade in intermediate goods (Antràs, Garicano and Rossi-Hansberg, 2006; Grossman and Rossi-Hansberg, 2008). Economic geographers highlight the rise of dispersed systems of production (Gereffi, 1999; Ernst and Lim, 2002; Mudambi, 2008). International business scholars stress the increasing sophistication in production and innovation systems of multinational firms, so that even their subsidiaries often orchestrate global networks (Feinberg, 2000; Cantwell and Mudambi, 2005).

The changing nature of GVCs creates both challenges and opportunities for firms in advanced market economies. One potential drawback is the loss of product mandates, as firms reconfigure their operations to specialize in activities rather than products. However, disaggregation and dispersion of GVC activities creates two important opportunities. First, trade in activities enables small and medium sized firms with specialized skills to participate meaningfully in the global economy. Second, the unbundling of production creates the need for highly specialized knowledge-intensive business services in IT, logistics management, engineering services, software, insurance, and finance. Many smaller firms develop expertise in these areas stemming from their participation in GVCs and in regional trade blocs such as NAFTA.

The Structure of Global Value Chains

GVCs consist of mobile and immobile components. Firms, which include multinational enterprises (MNEs), their subsidiaries, and local small and medium enterprises (SMEs), are the mobile components, while the geographic locations in which activities take place are the immobile components. MNEs are network firms that tap into resources from multiple locations and "combine the comparative advantages of geographic locations with their own resources and competencies to maximize their competitive advantage" (Mudambi and Venzin, 2010). MNEs typically exercise the greatest degree of control over the GVC, orchestrating the activities that are performed, where they are performed, and who performs them. MNEs also capture a large percentage of the value that is created, and have a large influence in determining the value apportioned to other participants in the GVC.

MNE subsidiaries are located, relocated and often have their mandates changed in response to corporate strategy and location characteristics (Benito, 2005; Cantwell and Mudambi, 2005; 2011). It is important to recognize that while corporate headquarters typically controls the orchestration of the overall product or service, orchestration itself occurs at various levels. Complex inputs like sub-assemblies or value-added services are themselves the outputs of GVCs that are "nested one inside the other, like Russian dolls" (Mudambi, 2008: 714). These lower order GVCs are often orchestrated by MNE subsidiaries that have sophisticated mandates to create new competencies for the MNE group as a whole. Such "competence-creating" subsidiaries undertake either local orchestration or local high

knowledge activities, or both, thereby ensuring the local capture of a significant share of GVC value creation. However, subsidiaries that contribute less value to the higher order GVC become increasingly isolated within the MNE and are at higher risk of consolidation and relocation.

Local SMEs are integrated into higher and lower order GVCs based on the value their specific activities contribute relative to competitors. The ability to perform specialized, knowledge-intensive activities increases the share of value SMEs can capture from the GVC. Quality, dependability, volume, traceability, and speed of delivery are among the elements that orchestrators take into account when evaluating SMEs for the assignment of activities.

Locations where activities take place are inherently immobile, and clusters are the most important locations of GVCs. The attractions of these agglomerations of economic activity for firm location have been studied at least since Marshall (1920). While MNEs relocate activities in response to the changing external environment, clusters have been more resilient than non-cluster locations in retaining their valuable local activities. They are the so-called "sticky places in slippery space" (Markusen, 1996). For instance, Sturgeon et al. (2008) document that even as the Big Three U.S. carmakers declined, the Detroit cluster remained a dominant node in the global auto industry and even grew in terms of the number of knowledge-intensive firms and high knowledge activities performed in that location.

Orchestration of Global Value Chains

There are two roles that firms can play within a GVC: orchestration and specialization. Orchestration, typically performed by MNEs, involves configuring and reconfiguring the structure of the GVC to capture the most value from disaggregated and dispersed global production activities. Orchestrators are the key players within any GVC, exercising the greatest degree of control over what gets done, where it is done, and who does it. These decisions are driven in large part by policy, technology, and resource availability factors that impact the characteristics of geographic locations. As noted above, the innovation and production systems of MNEs have advanced to the point that even their subsidiaries often have sophisticated mandates to orchestrate lower order GVCs, to produce complex inputs and new competencies for higher order GVCs (Feinberg, 2000; Cantwell and Mudambi, 2005; Mudambi 2008). Such sophisticated MNE subsidiaries have also been called "flagship firms", a term that recognizes their role as local hubs of innovative and creative networks (Rugman and D'Cruz, 1997). These mandates also generate spillover effects that benefit the local and regional suppliers to a competence-creating subsidiary, who can maintain operations in close proximity to their customer (Seppälä and Kenney, 2013).

Subsidiary Isolation

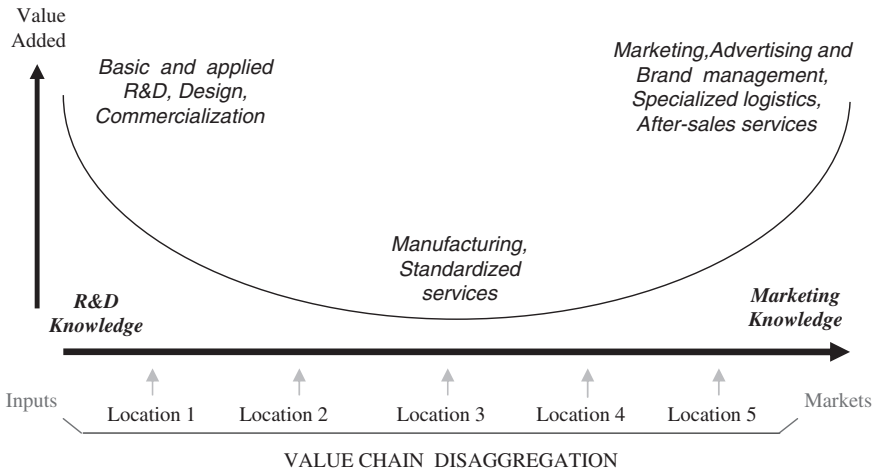
As they reconfigure their GVCs to capture increasing value, orchestrating firms are consolidating and eliminating duplication at the same time as they are expanding (Mudambi, 1998). As some subsidiaries evolve to higher order capabilities and mandates, this often

comes at the expense of other subsidiaries that see their mandates restricted, minimized or rolled back. It has been shown that knowledge-intensive MNE subsidiaries are less vulnerable to downsizing and more robust in terms of maintaining their mandates (Feinberg, 2000). Subsidiaries that lose out in this intra-MNE competition for influence tend to be those that are locally focused with limited participation in GVCs, and are increasingly isolated from the worldwide activities of their corporate group (Monteiro, Arvidsson and Birkenshaw, 2008). Such subsidiaries that are focused solely on local market servicing have been referred to as "miniature replicas" (Blomstrom, 1986; Birkinshaw, 1996). Because of their limited participation in GVCs and isolation within the MNE, these subsidiaries are at greater risk for consolidation and relocation.

Specialization within Global Value Chains

Orchestrators engage the core knowledge and expertise of local SMEs to perform specific, value-creating activities in the GVC. At the most general level, activities may be classified as 'standardized' or 'specialized'. All GVCs contain standardized and specialized activities, and these differ significantly in terms of their contribution to value creation, a good measure of local direct and spillover benefits (see Figure A). Standardized activities are repetitive, low value-adding commoditized activities that can be performed by many firms using limited knowledge-based resources. Examples include bulk finished goods assembly and large-batch production of components and products with relatively simple and/or stable designs. Specialized activities, on the other hand, are the most valuable activities in a location both in terms of per-capita income generation and new industry emergence. It has been documented that the locations where these activities are located capture the lion's share of the overall value created within the GVC (Dedrick et al., 2010). These high-value activities are typically associated with the intangible components of the product or service (Mudambi, 2008), and are directly or indirectly related to R&D knowledge (at the upstream end of the GVC) or marketing knowledge (at the downstream end). It is important to recognize that in this context, specialization refers to extent of non-repetitious knowledge deployed; the creation of new knowledge at the upstream end of the GVC is an obvious example. As local firms and locations increase their capabilities to perform specialized knowledge-intensive activities, their ability to make unique contributions to the GVC, attractiveness to orchestrators, and thus potential to capture GVC value also increase.

FIGURE A: The "Smile" of Value Creation
(from Mudambi, 2008)



It is also important to recognize the symbiotic nature of the orchestrator on the one hand and the firm performing a specific activity on the other. This relationship is not unlike that between a conductor and an individual musician in a symphony orchestra. While the conductor has the key role in the form, shape, and quality of the music, the importance of each musician depends on the piece being played, so that an oboist may take on great importance in the playing of an oboe concerto, while having much less importance in a piano composition. Similarly, while the orchestrating MNE always plays a crucial role, the importance of firms undertaking specialized activities depend to a great extent on the nature of the GVC in which they participate. For instance, the role of advertising agencies is far more important in a GVC associated with a brand-intensive product like running shoes than in that of a generic commodity product like bulk sugar.

One specialization strategy that local firms and locations can pursue to increase their participation in multiple GVCs is to focus on performing high-value activities that can be applied in a variety of contexts. By building competencies in such "general purpose" activities that span industry verticals, local firms and locations can benefit from economies of scale and protect themselves against the risk of downturns in any one industry.

General Purpose Activities

The crucial importance of so-called "general-purpose technologies" is now widely recognized. Historic examples of these iconic technologies include the steam engine, the electric motor and semiconductors. They are characterized by "pervasiveness, inherent potential for technical improvements, and innovational complementarities" (Bresnahan and Trajtenberg, 1994: 83), so that they give rise to increasing returns-to-scale. They are

associated with discontinuous shifts in economy-wide (and even worldwide) technology trajectories and growth rates.

We can apply this perspective to GVCs to identify what we may call "general-purpose activities" (GPAs). Such activities span multiple industry verticals so that core innovations have wide-ranging effects, and are characterized by increasing returns to scale. Management consulting, advertising, accounting, design, and information technology are all examples of GPAs in that they are able to service multiple industry verticals with a given set of in-house resources. The same design agency may design automobiles, home appliances, and aircraft parts while the same advertising agency may plan campaigns for soft drinks, washing liquids, and breakfast cereals.

A GPA consists of a substantial, fungible core of expertise that is applicable to wide variety of contexts through a relatively modest application interface. The key property of a GPA is the complementarity of its large fungible core expertise with industry specific or operational knowledge in each context. This complementarity means that innovations in any contextual application can be fed back and applied to a wide range of other contexts. For instance, accounting services serve as a GPA within the GVCs of virtually all firms. The general accounting expertise of the service provider constitutes the fungible core knowledge that is combined with the industry specific knowledge of the client firm's accountants or finance personnel in order to produce annual reports and other essential filings. Examples of GPAs also abound in manufacturing. In the pharmaceutical industry, platform drugs are used as pedestals upon which a wide range of range of pharmaceutical products are designed and developed. The production of the platform serves as a GPA and by combining it with various supplements a range of specific drugs can be formulated. In other words, the platform is a constituent part of the GVCs of several different drugs. Our case study below further illustrates the cross-industry applicability of two specific GPAs, customized design and technology integration services. [5]

As GPAs span a range of industry verticals, firms and locations that specialize in these activities can participate in a wide range of GVCs, minimizing their overall economic risk exposure. The fungibility of the core expertise associated with GPAs means that they tend to be knowledge-intensive activities and contribute disproportionately to local value creation. Hence, the extent and sophistication of GPAs in a location is an important predictor of the extent of value capture within the local component of GVCs. Moreover, activities in general and GPAs in particular tend to be spatially clustered. By most measures, the extent of such clustering is increasing, in spite of advances in IT and communications (Mudambi and Swift, 2012). GPAs that span industries require concentrations of economic activity in order to

[5] These contexts can be geographical as well as industrial. Hence most of the so-called "frugal innovations" in emerging markets are applications of well-known GPAs in new geographical and cultural contexts. Examples include mini-refrigerators in India (Ramamurti, 2009) and direct digital X-ray scanning machines in China (Williamson and Zeng, 2009).

achieve critical mass. Unlike specialized activities that thrive in industry-specific Marshallian clusters, GPAs flourish in large but diverse economic environments. In other words, while the growth of specialized activities requires agglomeration economies (Romer, 1986), GPAs require the diversity of economic activity that comes with urbanization (Jacobs, 1969). Hence policies which enable healthy urban milieus to flourish lead to the emergence of "creative cities" that are crucial components of the high value-creating knowledge economy (Cohendet, Grandadam and Simon, 2010).

Business Services

From the foregoing discussion, it is clear that many GPAs involve high knowledge business services. These services are heavily reliant on specialized knowledge, and their employment is largely composed of scientists, engineers, and creative professionals. Service activities are associated with particularly high wage rates, underlining the correlation between knowledge-intensity and local value capture.

Typically, business services are decomposed into technology-intensive services (those that predominantly use scientific and technological knowledge) and professional services (those that mainly use knowledge related to business operations). The former consist of R&D services, engineering services, computer services, and the like. The latter comprise legal, accounting, management consulting, marketing services, and so on. These services either supply products that are themselves composed of information and knowledge, or use their specialist knowledge to produce services to facilitate their clients' own activities. In both cases, their output is largely composed of intangibles (Lev, 2001). Business services firms usually operate in the business-to-business space; however, in recent years the public sector and even non-profits are becoming important clients. In some cases there is significant household demand as in the case of legal and accounting services.

Business services form a critical component of the process of value chain disaggregation. In the past two decades, these sectors of the economy have continued to outperform most other sectors, and have accordingly attracted a good deal of research and policy attention (e.g., Muller, 2001; Leiponen, 2005). One of main drivers of the growth of these services is the fact that firms are increasingly able and willing to outsource them; in the past, the true magnitude of these activities was concealed since most of it was hidden within large firms. This outsourcing has fueled the expansion of specialist firms undertaking these services as GPAs, expanding their deployment of core knowledge and reaping economies of scale to serve a wide range of industry verticals. Further, many business services are highly dependent on IT, which is itself another important class of GPA. IT is also a fundamental component of economy-wide intangibles (Lev, 2001).

Specialized Manufacturing

Distinct from the assembly of mass-produced finished goods and large-batch standardized manufacturing activities described earlier, specialized manufacturing includes non-repetitive

high knowledge activities. Firms that undertake such activities are able to capture a substantial share of GVC value. For example, the production of precision machinery products was previously characterized by long product life cycles and minimal innovation. Many of these products now have short life cycles and are high technology, information- and design-intensive goods (Seppälä and Kenney, 2013). Specialized manufacturing firms, such as the firm described in our case study below, require and retain high-skill, high-knowledge workforces that can quickly adapt products and processes to meet frequently changing, small-batch production schedules for high-technology products.

Policy Assessment Issues

While public policies are invariably designed to spur business activity and increase the prosperity of local economies, optimal policy is very sensitive to the desired outcomes. One important policy issue that has not received adequate attention is the importance of the metrics to assess policy outcomes. Most inward investment agencies (IIAs), whose mandate is to retain the local operations of firms and to attract new ones, still tend to use headcount employment as the primary metric. It is common to see the local activities of firms measured in terms of "jobs created" or "jobs saved" (Giumon and Filippov, 2007; UNCTAD, 2008, especially Table 2, p.23). This approach has serious weaknesses, since it has been shown that policies that are successful in maximizing headcount employment are often radically different from those that promote local knowledge-intensive activities (Mudambi and Mudambi, 2005; Guimon, 2009).

Also, standard industry measures of economic activity are increasingly misleading as measures of the level of local technological sophistication and value creation. A good way to illustrate this point is to recognize that industry data lumps all the activities associated with particular end products (e.g., apparel or automobiles) into a single category, often an industrial classification (SIC or NAICS) code. However, while automobiles are more complex products than apparel, not all the activities underlying the automobile GVC are knowledge-intensive, while some activities underlying the apparel GVC are. Thus, the activity of design from the apparel GVC typically involves considerable knowledge and value creation, while assembly line activity from the automobile GVC involves relatively little. Apparel is a "buyer-driven" GVC, where the activities of design and marketing are extremely sophisticated and involve a great deal of knowledge (Gereffi and Memedovic, 2003). In contrast, the assembly of automobiles from completely knocked-down (CKD) kits typically involves little knowledge, especially when the assembly plant has limited local sourcing arrangements (Sturgeon and Gereffi, 2000).

Accounting policies and transfer pricing mechanisms of firms themselves can also distort the true picture of the locations and activities that create the most value in GVCs. Internal invoicing systems, profit center selection, and consolidated financial reporting by parent corporations may arbitrarily and paradoxically attribute value creation to subunits and activities that add relatively little value to the overall product, as revealed by Seppälä and

Kenney (2013). Their case study examined a European precision machinery MNE in which final assembly operations in Asia were viewed as generating the most value, despite evidence that the majority of the finished good's overall value from R&D, design, and software development was added in the production of a critical subassembly in Europe. The perception of the Asian unit's superior profitability was more a function of the accounting system in place than the reality of the firm's operations.

Such distorted managerial perceptions can be reinforced by corporate tax rates. The relatively low rates of corporate taxation in Ireland have led many non-EU (and even many EU-based) MNEs to locate their European headquarters there so as to report their continent wide profits in this relatively low tax jurisdiction (Barry and Kearney, 2006). These effects are also observed in U.S., whose relatively high corporate tax rates have led many MNEs to minimize their reported levels of U.S.-generated profit, so that official value-added statistics often under-represent the contribution of U.S. knowledge-based activities to GVCs.[6]

Future Trends and Implications for Policy Makers

On the basis of the foregoing analysis, we posit that understanding the nature of GVCs is extremely important for policy makers. In particular we emphasize that a location's prosperity is based on its integration with the global economy, which is driven by the indispensability of local activities to GVCs rather than the identity of local firms or industries. Below we highlight and summarize some critical implications of this theoretical survey that are particularly relevant for policy.

Advances in technology and an increasing number of feasible locations for business activities imply that the optimal configurations of global innovation, production and distribution systems are constantly evolving. Faced with the increasing flexibility and mobility of MNEs, location-focused policy makers find themselves in competition with their counterparts in other locations as they attempt to retain extant value creating activities and to attract new investment. This places an enormous amount of importance on attracting and retaining high-skilled labor. There are both theoretical reasons as well as empirical evidence to believe that upgrading of local capabilities is a crucial part of maintaining and increasing a location's share of the high value activities of GVCs (Humphrey and Schmitz, 2002; Boileau and Sydor, 2011). In particular, upgrading is most important in specialized, knowledge-intensive activities which are critical to GVCs and are the most valuable activities in a location both in terms of per capita income and new industry emergence. The upgrading of capabilities also implies that standardized activities that contribute less value to GVCs, and thus dilute the overall value of local value activities performed, should be extracted and outsourced to the more suitable global locations.

[6] The case of GlaxoSmithKline, which agreed to pay $3.4 billion to the IRS to settle claims that it underpaid U.S. taxes by under-reporting U.S.-generated profits (Matthews and Whalen, 2006), is one of many high profile examples.

Our analysis of GVC structure implies that there are two ways in which a specific location can participate in GVCs. The first way is through being the home location for orchestrating MNE firms and their competence-creating subsidiaries. Orchestration itself is a high knowledge activity and many other high knowledge activities require proximity in order to function optimally (Bathelt, Malmberg and Maskell, 2004). This implies that hosting GVC orchestrators will serve to 'magnetize' a host location, i.e., attract additional knowledge-intensive firms. Thus, hosting MNE headquarters is often associated with a number of other high knowledge activities. However, MNE headquarters' locations are driven, to a large extent, by home country effects and path dependency; more importantly, these locations rarely change.

Attracting and retaining competence-creating MNE subsidiaries is a promising route for policy makers. It has been shown that the probability of increased investment into extant MNE subsidiaries in a location is significantly greater than investment by new entrants (Mudambi, 1998). Further, MNE subsidiaries with wide mandates are less vulnerable to subsidiary isolation and downsizing. As the sophistication of the local activities undertaken within the MNE subsidiary increases, the local share of total GVC value creation rises. This suggests that the best course for policy makers is to focus their efforts on what has been called "after-care" (Young, Hood and Peters, 1994), i.e., working to facilitate extant MNE subsidiaries' efforts to win more sophisticated mandates from their parents. It is equally important for policy makers to recognize isolated MNE subsidiaries. The relative paucity of intra-MNE trade of such units means that they are unlikely to contribute to MNE-wide competencies. This limits their ability to attract favorable attention from corporate headquarters (Bouquet, Morrison and Birkenshaw, 2009) and places bounds on their capacity to increase local value added, since they are not integrated in the GVCs of their parent MNEs.

The second manner in which a location can participate in a GVC is through hosting specific activities. As discussed, specialized knowledge-intensive activities capture a disproportionate amount of GVC value. This means that policy makers must pay particular attention to the local availability and development of the inputs into the innovation (Lundvall, 2007) and creative systems (Florida, 2002) of GVCs. The likelihood that particular activities will be placed in a particular location depends on a congruence of policy makers' efforts with the nature of the local resource pool. There is evidence that in sectors like bioscience, the presence of local research universities is an important factor in a location's attractiveness to knowledge-intensive firms (Cooke, 2005). The case of Ireland in the 1980s and 1990s provides an illustration of successful industrial development policy based on low corporate tax rates combined with local resource strengths, i.e., the availability of a skilled English-speaking labor force within the large and lucrative European Union market (Barry and Kearney, 2006). The success of such efforts leads to the creation of a critical mass where further growth of MNE and associated local investments in a specific activity becomes self-perpetuating. This implies that policy makers should follow a two-stage strategy in a

successful program of MNE investment attraction. The first stage consists of "targeting" the most appropriate MNEs relative to high knowledge activities that are feasible given the local resource base. The second stage consists of "tailoring" a set of policies that are most appropriate for the desired activities and the firms that will perform them. Business services and other GPAs are particularly important high knowledge activities for host locations, as they capture a substantial share of GVC value, and are applicable to a range of industries.

In summary, the following implications emerge from the GVC approach:

- Policy makers cannot dictate the emergence of locally based orchestrators. However, they can put in place conditions that support existing activity clusters and increase the likelihood that they retain or enhance their position in GVCs. This includes resisting the temptation to implement policies that restrict the relocation or offshoring of standardized, low value-adding activities which can crowd out and dilute the concentration of local knowledge-intensive activities.
- It is important to distinguish between knowledge-intensive activities, knowledge-intensive firms and knowledge-intensive industries. Fine-slicing of GVC activities implies that policy makers need to keep their focus on the local activities performed rather than the identity of local firms or industries. It does not help the local economy to retain knowledge-intensive firms if they offshore their high wage knowledge-intensive activities.
- The importance of business services and other GPAs for local value capture points to the importance of diverse and dense clusters of economic activity, typically found in urban centers. GPAs are constituents of many industries and sectors, generate high value and income, and are relatively immune to economic downturns. Business services like engineering, IT, law, accounting, and management consulting are important examples of GPAs and typically grow and specialize in direct proportion to the scale of overall economic activity in their location. Hence, policies that encourage the location and growth of economic activity in population centers leading to increased and healthier density can enhance the competitiveness of a location.
- Policy makers should recognize the inherent limitations to commonly-used policy assessment tools, industry-level data, and accounting practices that can obscure the nature of value-adding activities and the locations in which value is created.

Industry Analysis: Commercial Aircraft Manufacturing

We have described how the fine-slicing of innovation and production systems that comprise GVCs, and the growing willingness and ability of MNEs to place activities within (or source them from) the most efficient locations, has transformed the global economy from a "trade in goods" to a "trade in activities". The competitiveness and prosperity of local firms and economies are driven by the ability to increase their participation in GVCs, and in particular by attracting and retaining MNE investment to provide high value, knowledge-intensive inputs to the GVC. Global sourcing decisions by MNEs include inshoring (bringing activities that were once conducted by foreign subsidiaries back to the MNE's home operations) and offshoring (moving local activities to a foreign location). Both inshoring and offshoring can benefit a high knowledge, high wage economy like the U.S., by enabling firms to (a) increase the local concentration of high knowledge, high wage jobs; (b) control costs by sourcing low skill inputs from low wage locations; and (c) maintain cutting edge, innovative outputs by sourcing components from global technology leaders. Policy makers can influence both the quality of a location's resource base and the ability of firms to reconfigure their activities, and thus play an important role in the global sourcing decisions of MNEs.

GVC theory explains why enacting policies that hinder local firms' participation in GVCs ultimately harm the U.S. economy, including its export activities. Conversely, policies that target increased investment into the U.S. by foreign MNEs and enable U.S. firms take advantage of global sourcing opportunities to design and build superior products can greatly benefit the U.S. economy. To illustrate, we now consider the GVC for commercial aircraft manufacturing, which is dominated by two MNEs: Boeing and Airbus. Commercial aircraft manufacturing is part of the broader aerospace industry (NAICS 3364), which generated over $118 billion in U.S. exports and a trade surplus of nearly $80 billion in 2012. The top five export markets for aerospace in 2012 were China, Japan, France, the United Kingdom, and the United Arab Emirates.[7]

The Boeing Company[8] is the largest exporter in the U.S. – and is also one of the largest importers of foreign products and services, receiving nearly 3,200 import shipments each month. Boeing is the largest aerospace firm in the U.S., produced $82 billion in revenues in 2012 (30th on the 2013 Fortune 500 list) and employs nearly 175,000 full time employees worldwide, 80% of whom work in nine U.S. states. In 2012, 54% of Boeing's revenues were generated from sales outside the U.S., up from 50% in 2011 and 41% in 2010. The

[7] U.S. Department of Commerce, International Trade Administration website (http://www.trade.gov/mas/manufacturing/OAAI/build/groups/public/@tg_oaai/documents/webcontent/tg_oaai_004024.pdf, accessed 5/10/13).

[8] Data from The Boeing Company financial statements and website (www.boeing.com, accessed 5/10/13).

commercial aircraft division generates the largest share of the firm's revenues (60% in 2012, up from 53% in 2011 and 49% in 2010).

Boeing's latest commercial airliner (the 787 Dreamliner) is a breakthrough product, which extends the technological frontier in terms of flying distance and fuel efficiency. The 787 is the first passenger aircraft to extensively use composite materials, which reduces the weight of the airplane and enables the latest version (787-9) to carry up to 290 passengers 8000-8500 nautical miles while using 20% less fuel. Other current aircraft models (each with multiple versions) include the 737, 747, 767, and 777. In the first four months of 2013, the company delivered 181 commercial aircraft to customers around the globe, the majority of which were 737s (139 units). During this period the company received orders from U.S. and foreign customers for 260 new aircraft, including 42 of the new 787s.

Beyond the technological breakthroughs from materials used, the 787 project also represents a breakthrough in the approach used to design, build, and finance new products. In 1996, the newly-appointed CEO Phil Condit directed the company to become less of a raw manufacturer and more of a large-scale systems integrator, orchestrating a more dispersed set of design and production activities throughout the GVC. Industry observers noted that Boeing was seeking to transform its identity from a "wrench-turning manufacturer into a master planner, marketer, and snap-together assembler of high tech airplanes" (Newhouse, 2007). To build its commercial jetliners, the company has always relied on a strong supplier network, but the new focus expanded the network to include more than 1,200 direct suppliers located in the U.S. and abroad. As a large-scale systems integrator, the company focuses on coordinating the design and development efforts of a large and diverse group of largely non-U.S. partners (Kotha and Srikanth, 2013).

For example, a major subcontractor of Boeing is Xian Aircraft Company (XAC) in China, with which the Seattle-based company has worked since 1988. For the 737, XAC produces vertical fins, horizontal stabilizers, and forward access doors. For the 747-8, XAC builds wing parts, including the inboard flaps, the single largest piece of aircraft structure that Boeing purchases from China. Boeing also contracts with plants in Xian, China for aluminum and titanium forgings. To build the 787, Boeing decomposed the activities to produce various major (and minor) components and sections of the plane, and outsourced the production of these subassemblies to suppliers in the U.S. and around the world. In all, Boeing's global network includes fifteen Tier 1 suppliers, with six of these tasked with the production of large structural sections.

By orchestrating the global network of firms supplying subassemblies from the U.S., Asian, European, and Australian suppliers, Boeing receives the high-value inputs from global technology leaders that it reintegrates into its cutting-edge, innovative products. Mike Bair, the first 787 program manager, observed that the supplier selection strategy was driven by the need for access to intellectual property, and the need to reduce market risk. The

underlying objective was to get "the right, and the smartest, people in the world to help design this plane" (Kotha and Srikanth, 2013: 47). They note that Boeing has received "the best of the best" in its strategy to source inputs from partners outside of the U.S., thereby raising the quality and competitiveness of its products.

Airbus[9] is the commercial airliner division of EU-based EADS Group, which has 133,000 employees in 170 locations worldwide. Airbus employs 59,000 employees and uses a network of 1500 subsidiaries and suppliers in 30 countries to design, produce, and assemble its aircraft. In the first four months of 2013, the company received orders for 493 new commercial aircraft (including 459 units in the A320 family) and completed 202 deliveries.

Like Boeing, its arch-rival in the commercial aircraft market, Airbus also employs a global sourcing strategy to improve the competitiveness of its products. The fine-slicing of value chain activities, driven by advances in transportation, logistics, and information technologies, allows Airbus to place activities within (or source them from) the most efficient locations around the globe. For its operations, the company seeks the highest quality inputs – many of which are obtained in U.S., the country that supplies the most components to Airbus's operations. Airbus is the number one export customer in the U.S. aerospace industry, creating high-value manufacturing jobs around the country. Airbus aircraft are equipped with U.S.-manufactured parts and components throughout, while the production of its aircraft also relies on tooling, material, and services from American companies. The company utilizes more than 300 US suppliers in more than 40 US states, supporting more than 226,000 American jobs. Many of these jobs are high wage, knowledge-intensive positions that provide spillover benefits to the communities surrounding the supplier location. For example, in 2010 Spirit AeroSystems (headquartered in Wichita, KS) opened a new 500,000 square foot production facility in Kinston, NC to manufacture the composite center fuselage panels for the Airbus A350 XWB.[10] These sections are then shipped to Airbus facilities in France, for assembly with other fuselage components. In Pennsylvania, Airbus's suppliers include General Ecology, Inc. (Exton), Lord Corporation (Erie), Materials Science Corporation (Horsham), and SPS Technologies (Jenkintown), providing adhesives, composites, fasteners, water purification systems, and design services. The U.S. supply chain includes such prominent companies as Alcoa, Eaton, GE, Goodrich, Hamilton Sundstrand, Honeywell, Northrop Grumman, PPG, Pratt & Whitney, and Rockwell Collins.

The amount of investment by Airbus into the U.S. economy is substantial. In 2012 alone, the company spent over $13 billion in the U.S., marking the fifth consecutive year spending in the U.S. topped $10 billion. Since 1990, Airbus has spent $140 billion in the U.S., where approximately 42% of its aircraft-related procurement occurs. Its U.S. operations include a headquarters in Herndon, VA and six main centers for design, manufacturing, logistics, and

[9] Data from EADS Group financial statements and website (www.eads.com, accessed 5/10/13); Airbus website (www.airbus.com, accessed 05/10/13).

[10] Spirit AeroSystems, Inc. website (www.spiritaero.com, accessed 5/10/13).

training. In May 2013, the company announced plans to expand its facility and workforce at its airframe design and engineering center in Wichita, KS. In perhaps the biggest investment into the U.S., the company began construction in April 2013 on a $600 million facility in Mobile, Alabama that will perform final assembly of Airbus's best-selling A320 family of aircraft. In addition to the construction and support jobs it will generate for Mobile and surrounding communities, the new facility will employ 1,000 or more highly skilled workers when assembly begins in 2015.

Alabama officials anticipate significant economic benefits, as each job at the Airbus plant is expected to create four new jobs in the region. Airbus Chief Executive Fabrice Bregier has stated that the U.S. is a leading source of the high technology inputs that allows the company to stay competitive. The new plant in Mobile, Alabama allows Airbus to obtain the highest quality inputs for its aircraft, and build closer ties with its suppliers and customers in the U.S. market. (Michaels, Ostrower, & Pearson, 2012).

Case Study: Cybertech Inc.

To ground the concept of GVCs and their importance to the U.S. economy we now examine Cybertech Inc., a privately-owned mid-Atlantic firm that provides customized electronic printing devices and controllers for manufacturing and service applications. In the context of our preceding discussion, Cybertech (CBR) is a small, high-technology MNE that performs specialized knowledge-intensive manufacturing activities, outsources standardized low value activities, and orchestrates and operates within the GVCs for multiple products and services. The firm was founded in 1989 by its current president and two partners, all of whom had worked in a similar business prior to starting CBR. The firm currently has eleven full time employees, and operates out of an 8,000 square foot facility in a 65-acre industrial park that includes 52 other businesses. In 2012, CBR generated total revenues of approximately $1.6 million. Using inputs that are sourced globally, the firm produces and sells its customized goods and services primarily to customers throughout the United States, with some direct sales to the United Kingdom. However, CBR's high technology outputs are often the critical components in its clients' products, which are shipped to Canada, Europe, the Middle East, and South America. This provides a quick and simple illustration of how industry data can be misleading when it lumps the activities associated with particular end products into a single product category or industry code, which fails to reveal the complexity, geographic reach, and importance of local firms' activities in the global economy.

Specifically, CBR designs and builds custom printers, peripheral equipment, and electronic process controllers for use in various types of service and manufacturing machinery. The company's specialized high-knowledge activities include the design, manufacture, and assembly of circuit boards, printer components, wiring harnesses and interfaces, and equipment housings; custom development of process control software; and related sales and service. Printing systems designed by CBR are based primarily on thermal printers (the

output of a separate GVC) which provide specific cost and performance advantages over impact and laser printers. Typically there is little or no standardization or repetition in customer orders, or in the activities CBR performs to process and fulfill them; in most cases, customers require a specialized printing or equipment control application that is new, difficult to articulate, and involves integration with and within other manufacturing or processing equipment. CBR consults extensively with each customer to translate their unique, abstract requirement to a workable design and ultimately, the installed custom solution. CBR's products and technologies are used in multiple industry verticals, including toll road ticket and receipt kiosks and product packaging and labeling equipment. Increasingly, CBR's sales are to customers in the healthcare and pharmaceutical industries seeking compliance with legal documentation requirements.

Industry Verticals

CBR's products are used in multiple industries, but the lion's share of its current revenues is from one major vertical: toll road equipment. CBR supplies 80% of toll booth ticket and receipt printers in the U.S., directly as a manufacturer of toll booth units and indirectly as a supplier of the components and control equipment to other manufacturers. Despite an acknowledged threat to future demand in this area from the growing use of electronic/paperless toll systems (e.g. E-ZPass), the need for printer-based solutions is expected to continue for some time.

A key point to note is that CBR's specialized activities and thus its growth prospects are not exclusively linked to any particular industry. Their substantial fungible core of expertise in designing and building customized print systems and process controllers (a general purpose activity) can be applied in wide variety of contexts, minimizing their overall risk exposure from any particular industry. In other words, if an industry vertical involves machines or print processes in some way, CBR can add value to that GVC through its specialized, high-knowledge activities. For example, despite its extensive experience in the toll road equipment industry, CBR's products and services are increasingly in demand throughout the healthcare value chain to improve efficiencies and produce legally defensible documentation of medical services. Undertaking a GPA enables CBR to move from a mature or declining GVC (the toll road equipment industry) to a growing one (healthcare).

Some examples of the company's various healthcare applications include customized printers and software for surgical tray sterilizing equipment, controllers and label printers for unit dose strip packaging of pharmaceuticals, and process controllers for automated syringe-filling devices. In these applications, CBR supplies specialized, knowledge-intensive components and services to equipment manufacturers, who in turn sell their products directly to drug and medical equipment manufacturers, distributors, and healthcare service providers. In this respect, CBR is a miniature orchestrator, organizing a lower order GVC (for packaging equipment components) that is nested within a higher order GVC (packaging equipment) which is itself nested within the highest order GVC of the pharmaceutical

industry. Another example of CBRs contribution to nested (i.e., "Russian dolls") value chains is their creation of a complex controller subassembly for high speed, pneumatic labeling machines used in the food processing industry (Mudambi, 2008). As these examples illustrate, CBR's competitiveness is rooted not only in its experience in a particular industry or product (e.g. toll road printers), but in its ability to apply specialized, context-neutral, general purpose technological expertise across a range of industries. This capability protects the company from downturns in any one particular industry, and provides opportunities for future growth in other areas, including industries that have yet to be created.

Value Creating Activities

CBR performs a broad range of specialized, knowledge-intensive activities, beginning with the translation of a customer's abstract printing or process control requirement into a more concrete project description. Once the overall project framework is developed and approved, the project engineering team will produce the specifications of the equipment, activities, and process controls needed. Design and manufacturing of circuit boards and wiring harnesses, custom metal fabrication, software development, assembly, and testing follow. Shipment and/or installation, and customer acceptance typically complete the project, although in many cases customers will request upgrades for additional functionalities that were not envisioned when projects were initiated. As noted above, these specialized knowledge-intensive GPAs are not limited to any particular industry.

CBR generally does not manufacture the components used in its products, given the low margins and low value added from in-house production. Instead, the firm relies on an extensive network of suppliers located primarily in Asia from which these commodity inputs are easily and inexpensively obtained. Inventories of raw materials and components are maintained by a purchasing manager with extensive knowledge of the global supply chain used by CBR. By sourcing these commodity components globally (offshoring of low value-adding manufacturing to more efficient global locations), CBR concentrates its knowledge-intensive activities and increases the overall value it captures from the GVCs in which it participates.

Inputs and Supply Chain

The physical components used in CBR's products fall into six main categories: printheads, cutters, semiconductors, circuit boards, motors, and chassis materials. These components are purchased from firms in the U.S. and elsewhere, but are predominantly manufactured in Asia.

- **Printheads** are ceramic-based components purchased from a small number of Japanese firms, such as Mitsubishi, AOI Electronics, TDK, and Kyocera, but are primarily manufactured in China.
- **Cutters** are purchased from Japanese firms, and are still primarily made in Japan.
- **Semiconductors** are obtained from a large number of suppliers, and sourcing depends on the subcategory. Approximately 90% of the main processors used in

CBR products are purchased from a single source (STMicroelectronics, N.V.), which manufactures the chips in Asia and Europe. Other chips ("the nuts and bolts stuff") are commodities obtained through distributors at the lowest price; the brand doesn't matter as long as the specifications are correct and functionality is reliable. These chips are sold by multiple brand name companies including U.S.-based Fairchild Semiconductor and Texas Instruments, but are primarily made in Asia.

- **Circuit Boards** are purchased from various distributors and are manufactured outside the U.S.
- **Motors** come in different types and are sourced by different firms. CBR's products are now designed to use step motors which offer cost and performance benefits over DC motors. Previously, DC motors were purchased from Ohio-based Globe Motors which shifted production to facility in Mexico, and then later shifted production back to the U.S. CBR discovered that step motors (primarily manufactured in China) provide their clients with a better motor for their applications at a better price; the company has accordingly designed the more expensive, less effective DC motors out of its products.
- **Raw steel, aluminum, and other chassis materials** used by CBR's in-house machine shop are purchased as commodities from multiple suppliers.

Marketing

CBR's sales are primarily generated through word-of-mouth advertising and repeat business from its existing customers, but are significantly aided by the company's consulting expertise described above. The firm's website provides basic company information, general product and service descriptions, FAQ's, and links to contact the firm for sales and technical inquiries. CBR had tried direct mail and similar forms of advertising in the past, but found it difficult to target any particular audience for their highly customized products. They also tried to gain business by participating in tradeshows, but concluded that these were little more than opportunities for observing and being observed by the competition ("friendly spying") which provided little in the way of new sales. New sales are often related to extending or upgrading prior projects, but in some cases customer requests come from out of the blue; new customers may have opened a piece of legacy equipment and saw CBR's name inside, or a current customer with a new technology problem will ask "I wonder if CBR can do that?"

HR / Organizational Structure

As with many small firms, CBR has a flat organizational structure in which all employees are able, and at times required, to perform multiple tasks. However, there are some critical tasks (e.g. project consulting, circuit board design, metal fabrication) that are performed by only one or two employees, a vulnerability recognized by the owners. The specialized knowledge required for each task combined with the lean operation presents difficulties in finding new employees with the technological skills in the local labor pool that can quickly contribute to the business. Once hired, however, the employees quickly learn the specialized activities of

the business, adding back to the knowledge base of the region. And, despite the high pressure environment, the firm has a family atmosphere and is an "exciting and fun place to work".

In summary, our analysis of commercial aircraft manufacturing and case study offer a glimpse into how and why firms and locations can prosper from increased and targeted participation in GVCs. Cybertech's focus on performing highly specialized knowledge-intensive activities that are applicable to a wide-range of industries and sectors is the key to its survival and continuing global competitiveness, and the associated spillover benefits it provides to the local economy. Boeing and Airbus, like the orchestrating MNEs in other industries, distribute the value chain activities and source inputs from the most efficient global locations. Sourcing decisions – which include both inshoring and offshoring of activities - allow MNEs to produce technologically advanced products while creating significant economic benefits for the locations that attract the high value, knowledge intensive activities of the GVC. Through their influence on the characteristics of a location's resource base, its attractiveness to MNEs, and the ability of local firms to optimally configure and reconfigure their activities, policy makers play a crucial role in the prosperity of their region and in shaping the global economy.

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