



Hidden Innovation: A Reconsideration of 'Old Economy' Industries within 'New Economy' Regions

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Abstract

This article will explore the role of 'old economy' manufacturing sectors in 'new economy' technology regions of advanced industrial economies. In the early 21st century, attention has increasingly shifted away from protectionist concerns about loss of manufacturing industries in regional and national economies. Attention has instead focused on globalization and the offshoring of a wide array of service and technology-oriented industries and jobs. Yet, what is missing in this paradigm shift is an examination of the critical role that manufacturing sectors play in these 'new economy' regions, by spurring innovation spillover and generating economic and employment multiplier effects. This article will review the literature pertaining to linkages between advanced technology regions and more traditional, blue-collar industrial production industries. In conclusion, the article calls for broadening the current focus on job loss in the highly skilled service and technology sectors to an integrated vision of production, knowledge and service sector activity.

1 'Old' and 'New' Economies Defined

In order to explore the connection between advanced technology regions and more traditional, blue-collar production industries, it is useful to critically examine theoretical and empirical literature in economic geography and other disciplines. The article is organized into five sections as follows: first, the terms 'old' and 'new' economies are clarified and defined, followed by a historical overview of literature on the importance of manufacturing. A third section explores past and current debates on the spatiality of manufacturing in a global era; the discussion then turns to contemporary discussions on the service industries and jobs. Finally, the article calls for moving beyond the production/service dichotomy by outlining an integrated vision of production and services.

The term 'old economy' is employed herein to refer to those traditional, blue-collar production industries and occupations that were the mainstay of a stable, post-World War II era of Fordist mass production (Harvey

Table 1. Characteristics of old and new economies.

	Old economy	New economy
Economy	Stable National	Dynamic Regional and global
Geography	Dispersed employment and production	Agglomeration of employment and production; clusters
Period	Early–late 20th century	Late 20th century
Industry	Manufacturing Mechanization Capital/labor Firms compete	Informational services Digitization Innovation/knowledge Alliances and collaboration
Workforce	Full employment Job-specific skills	Workforce adaptability Broad skills and lifelong learning
Governance	Regulation	Assistance with firm innovation

Source: adapted from Atkinson and Gottlieb (2001, 4); Harvey (1990, 177–179); Peck (2003, 139, 586); Phelps and Ozawa (2003).

2003; Piore and Sabel 1984). It also refers more broadly to the era of late capitalist development beginning in the early 20th century, wherein mechanization and industrial production emerged as the most prevalent form of economic activity in mature regions, having eclipsed a nascent industrial era from mid to late 19th century (Phelps and Ozawa 2003).

Meanwhile, the phrase ‘new economy’ connotes the emergence of a post-industrial era, particularly emphasizing those knowledge and learning regions wherein digitized Information and Communication Technologies (ICT) are most successfully produced and disseminated. This era is characterized by innovation, knowledge, and collaboration between firms (Florida 2002, 2005; Gertler 2004; Lundvall and Johnson 1994; Thrift 2006). Terms that have been employed to describe the characteristics of the old and new economies are outlined in Table 1 above.

Emerging in the context of an increasingly deregulated and marketized post-1973 US economy, the beginning of the ‘new economy’ era really took off with the growth of ICTs in the 1990s. A body of literature emerged variably articulating this era as embodying a ‘space of flows’ liberated from territoriality (Castells 1996) and characterized by ‘post-modern hyperspaces’ (Jameson 1991). A litany of like-minded terms were conjured (cyberspaces, network society, informational societies) that heralded the emergence of ICT as a radical innovation in a neo-Schumpeterian sense.

However, the ‘newness’ of the ‘new economy’ phenomena is dismissed by others as urban cliché (Boyer 2004; Smith and Marx 1994; Thrift

1996). Thrift notes the history of electronic telecommunication technologies as ‘evolutionary rather than revelatory’, noting that:

[W]ith gestation periods, the essential architecture of the computer was first articulated in 1837 . . . with the basic mathematics of digitalization theorized in 1928. Indeed if one were to conceptualise these developments as starting with the physical exploration of electromagnetic phenomena one could say that they had been coming on-stream for the better part of two centuries or even four. (Thrift 1996, 2)

Disputing a popularly held view that ‘technology “drives” history, a number of historians of science argue instead that technologies are social products that are not autonomous from societal controls’ (Smith and Marx 1994). Put another way, ICTs are ‘merely the latest in a series of innovations which, since the early nineteenth century, have affected corporate management’s ability to manage and transmit information’ (Boyer 2004, 119).

Hence, the analytical categories of ‘new’ and ‘old economies’ have been delineated and challenged across a range of academic disciplines, ranging from cultural to economic geographers (Harvey, Phelps, Thrift) to sociologists (Castells, Jameson) and historians of science (Smith, Marx, et al. 2000) cited above. However, the use of these terms is slippery at best, and employed with caveats against technological determinism. At least, philosophically, the ‘newness’ or distinctiveness of the post-industrial ‘new economy’ is not clearly disentangled as a separate entity from its predecessor and counterpart, the industrial ‘old economy’.

2 Historical Perspectives on Manufacturing Matters

Because it has historically been an integral part of advanced industrial economies, the ‘old economy’ manufacturing sector has long been regarded as a fount of productivity and innovation, and as offering an opportunity for decent-paying and rewarding jobs (Bluestone and Harrison 1982; Fingleton 1999; Jacobs 1961, 1969, 1985, 2005; Melman 1988; Rosenberg 1963, 1969; Sabel and Piore 1984; Cohen and Zysman 1987). On the other hand, a more recent concern has been that this sector has shed jobs in the past three decades; and that there are higher paying, knowledge- and service-oriented jobs to be had in the new economy (Gilder 1990; Oliner and Sichel 2000a,b; Reich 1992; Ramaswamy and Rowthorn 2000).

‘Blue-collar’ employment in advanced industrial regions of North America and Western Europe began to decline in the 1960s and 1970s as mass production activity spawned by World War II and New Deal economies gave way to a service-based and financial capital economy (Harvey 2003; Sabel and Piore 1984). In the face of such decline, studies emerged establishing the importance of linkages between remaining ‘old economy’ manufacturing sectors, innovation, and cities. Authors who

considered such connections notably include urbanist Jane Jacobs, whose observations regarding manufacturing presence in urban economies span four decades (Jacobs 1961, 1969, 1985, 2005). In her earlier work, Jacobs (1969) traced the history of the Minnesota Mining and Manufacturing Company's ('3M') evolution from mining to office products, rising from its humble origins as a 'small and obscure company comprised of two proprietors and a few workers engaged in digging, crushing, sorting and selling sand' (Jacobs 1969, 52–53).

Past writings, most notably those of Nathan Rosenberg (1963, 1969), also include analysis of innovation and creativity linkages between earlier technologies and later inventions throughout US history. In contrast to the sequences of parallel and unrelated activities in pre-industrial societies, Rosenberg argued that modern problem-solving, product development, and innovation occur in what he calls a process of 'technological convergence':

What is important here is an historical sequence in which the need to solve specific technical problems in the introduction of a new product or process in a single industry led to exploratory activity at a vertically 'higher' stage of production . . . This convergence exists throughout the machinery and metal-using sectors of an industrial economy. (Rosenberg 1963, 423, 426)

In other words, once a particular problem was solved for a particular industry, the solution became available to technologically related industries. A major historical example of the process of technological convergence is the production of firearms in the latter half of the 19th century which would spawn the later development of sewing machines, watches and typewriters. Relatedly, from the 1850s through the 1870s, the technical requirements of the sewing machine industry played a major role as a source of machine tool innovations, out of which grew the vast boot-and-shoe and men's and women's ready-to-wear clothing industries (*ibid.*, pp. 428–429).

In the last quarter of the 20th Century, mass assembly production practices in industries ranging from automotives to semiconductors increasingly shifted to more flexible, 'just-in-time' methods that proved to be even more amenable to processes of technological convergence. Sabel and Piore (1984) have described this shift as a 'second industrial divide', one that articulated the promise of revitalizing crafts production in an otherwise knowledge and service-based economy, and that resulted in the creation 'new industrial districts' found in the declining city centers of advanced regions. Comprised of a geographical cluster of complementary firms often working collaboratively, industrial districts have been lauded for improving the competitive performance of individual firms (Sabel 1989; Scott 1998). This notion of a second industrial divide held the promise for what Luria and Rogers (1999) would later describe as 'high road' jobs – those skilled, well-paying, often unionized jobs with career mobility opportunities.

Other scholars in the 1980s and 1990s were considerably less optimistic. Concerned about the loss of a manufacturing base, 'deindustrialization theorists' promoted the sector as essential to overall economic productivity and the retention of decent paying and rewarding jobs. They argued that manufacturing was crucial to US economic health for four principle reasons. First, it created the demand for many portions of the service sector (Cohen and Zysman 1987; Fingleton 1999). Second, manufacturing traditionally offered more high-paying jobs than the service sector (Fingleton 1999). Third, a strong manufacturing sector has tended to improve trade balances (Bluestone and Harrison 1982; Cohen and Zysman 1987; Fingleton 1999). Fourth, a virtuous circle of innovation, job growth and productivity occurred when a healthy manufacturing sector is coupled with a healthy high-technology sector (Cohen and Zysman 1987; Melman 1988; Tyson 1992).

3 The Globalization of Manufacturing

3.1 THE GEOGRAPHY OF INDUSTRIAL PRODUCTION: DISPERSION OR AGGLOMERATION?

Despite such compelling benefits of manufacturing, the fact that manufacturing activity has diminished in mature economies is not in dispute. For example, manufacturing and construction comprised 35% of the US employment in 1960. By 2004, only one-sixth of jobs were in such goods-producing industries, with five-sixths in services (Blinder 2005, 4). What is more controversial in the literature is establishing an understanding of both what manufacturing remains, and its spatial and business reconfiguration.

A popular mantra that contrasts with the earlier set of 'deindustrialization' theories has been that manufacturing does not matter in a post-industrial society, and that there are higher-productivity employment opportunities to be had in an increasingly volatile global economy (Gilder 1990; Oliner and Sichel 2000a,b; Reich 1992; Ramaswamy and Rowthorn 2000). Such claims have basis in neoclassical economic approaches pioneered by Adam Smith (1776), which explain away the demise of manufacturing in advanced regional economies as a natural process of equilibrium market forces.

Following from this logic, the 'crowding out' of manufacturing by foreign competition, high rents and labor costs is a natural and inevitable process. A case in point is the UK's past comparative advantage in textile manufacturing, which then moved to New England, only to have comparative advantage shift once again to the southern United States, and then to Latin America (Blinder 2005; Bonacich and Appelbaum 2000; Sabel and Piore 1984). Current comparative advantage in apparel, and a host of other types of manufacturing resides in China and other less developed countries, and hence the current controversy around

what were formerly 'American jobs' (Blinder 2005). Among the most vocal challengers of the comparative advantage thesis include those regions and their workers who have found themselves with eroding wages, or else laid off by plant closures and relocation to overseas locales, and for whom re-training and placement in new trades prove to be difficult if not impossible (Bluestone and Harrison 1982; Clawson 2003).

3.1.1 Empirical Evidence for the Spatial Dispersion of Manufacturing

A contemporary body of work emphasizes the role of economic globalization in hastening further spatial dispersion of manufacturing activity (Borrus and Zysman 1997; Gereffi and Koreniewicz 1994; Lester 2003; Phelps and Ozawa 2003; Phelps and Waley 2004; Sturgeon 2002; Zysman 2002, 2003). The global re-organization of industrial production has been associated with the global re-organization of commodity chains (Gereffi and Koreniewicz 1994), the exploitation of new labor forces (Bonacich and Appelbaum 2000), and the development of global production networks based on regional and transnational institutions (Saxenian 1994, 2002).

Within such a New Economy paradigm, only a minimal threshold of local production is required by original equipment manufacturers for product design and prototyping, with the bulk of routine production irrelevant to high-technology development. The emergence of modular production networks has been noted, with a focus on US lead firms' reliance on spatially dispersed suppliers, and an increased adherence to industry standards, to reduce costs and risks (Lester 2003; Sturgeon 2002).

Authors such as Borrus and Zysman (1997) describe the phenomena of modular mass production as one wherein scale production can be spatially separated from innovation, yielding increased cost cutting and time savings. Zysman (2003) examines the place of manufacturing in a new digital economy, and concludes that worthwhile production activity is distinguishable from 'grimy', less relevant blue-collar manufacturing. The real issues in a digital era, Zysman notes, surround competitive advantages based on processes of manufacturing and production re-organization, as exemplified in the transformation of the consumer electronics industry. Such advantages are based on a new model of competition that Borrus and Zysman (1997) have labeled 'Wintelism' (a combination of Windows and Intel) wherein competition between firms is fought over product and market standards. Within such struggle, control over production matters within the firm, but geography of where production actually happens does not.

Sturgeon (2002) bolsters the latter point through examples of dis-agglomerated production organized along a mass modular structure, in sectors ranging from apparel to hard disk drives. He describes and theorizes the emergence of a distinctly 'American' form of modular production networks as US-led firms increase their reliance on spatially dispersed

suppliers, rapid ramp-ups of technology, and an increased adherence to industry standards, to reduce costs and risks.

Other scholars who note the disagglomerating forces of international economic integration point to more complex economic, political, and cultural factors than the more straightforward technological story told by Borrus, Zysman and Sturgeon. For example, Phelps and Fuller (2000) describe the productivity and success of a local Welsh affiliate of a multinational enterprise in producing generators in a greenfield site, initially employing workers in two assembly halls (*ibid.*, p. 236). Opportunities for further investment and hopes for an expanded employment base were dashed, however, by a 'black box' of intra-firm dynamics and local agencies' influence. Citing entrepreneurial and allegedly subversive efforts on the part of the multinational enterprise subsidiaries in other localities (in Germany, Mexico, and Spain) to win multinational enterprises' attention, the Welsh subsidiary saw their chances of further investment sullied by others' actions to 'massaging of figures relating to costs and efficiencies by other plants' (*ibid.*). The Welsh example is one example of what Harvey (1990, 2001) has described as the logic of a 'spatial fix' wherein capital is continually relocating geographically in order to maintain its profitability and to take advantage of cheaper costs elsewhere.

Schoenberger (2000) moves even further beyond fixed technological and cost considerations, by analyzing the spatial and temporal strategies employed by firms within the production function. For instance, the Japanese mass production system of prioritizing waste elimination contrasted markedly with the US Fordist practice of producing as much as possible. Hence, machine idle time became more tolerable, while worker idle time was anathema, an exact reversal of US systems of temporal values (*ibid.*, p. 328). The Japanese form of time management in turn alters spatial arrangements: in a just-in-time production system, machines are grouped in a 'U' around a single worker rather than strung out on a line one machine to a worker. Schoenberger notes that such distinct industrial practices do not 'naturally' flow from a culture: they arise from real historical-geographical processes and circumstances (*ibid.*, p. 329). Schoenberger's observations regarding the differences in management of space and time bolster the observation that production has become spatially dispersed under globalization. Insofar as industrial agglomerations in old manufacturing 'cores have not kept up with spatial-temporal practices adapted elsewhere, they are surpassed in production by innovative new clusters'.

3.1.2 Evidence of Agglomeration in Industrial Production

While acknowledging the internationalization of the organization of production, a contradictory body of work points nonetheless to the enduring advantages of established localities and concentrations of expertise. Geographers and urban planners consistently point to the entrenched advantages of various agglomerations, from the dominance of a few global

cities in international finance to the specialization of wine-producing regions (Ernst 2003; Gereffi and Koreniewicz 1994; Harrigan and Venables 2004; Henderson et al. 2002; Sabel 2001; Sabel and Piore 1984; Yeung 2007). Such concepts as industrial districts (Sabel and Piore 1984) and business clusters (Porter 2000) underscore the continued relevance and power of agglomeration and of localities. For all intents and purposes, the two terms are synonymous, yet the latter are a more updated variant that situates such districts within a larger geographic backdrop.

Clusters are a geographically proximate group of interconnected companies and associated institutions in a particular field, including product makers, service providers, suppliers, universities, and trade associations (*ibid.*). Business clusters comprise the heart of global production networks (Henderson et al. 2002) and commodity chains (Gereffi and Koreniewicz 1994). The latter two terms are processes by which individual clusters or regions are rapidly becoming internationalized, and increasingly dependent on international linkages to import key inputs and to export outputs. Such external linkages cover both tangibles like materials and machinery, and intangibles like finance and knowledge. And yet, conventional theories of collocation versus the ‘flattened world’ of dispersed production are deeply divided. The resolution of this debate may have less to do with a ‘winning side’, as in the need to go beyond broad generalizations and to examine sector-specific, case-by-case characteristics of supplier–customer relations.

In contrast to the dispersion argument and reminiscent of Rosenberg’s earlier production–innovation thesis, Ernst’s studies (2003, see also Ernst and Kim 2002) in the early 21st century illustrate the continued necessity of collocating innovation with production in sectors such as chip design, where engineers work side-by-side with foundry workers. Ernst notes that developing countries in Asia are becoming more capable of moving up the technology ladder of advanced manufacturing, managerial, and research and development activities. Ernst’s observations suggest a geographical ‘collocation of innovation’, as spatial and social proximity is important ingredients in the processes of knowledge production and innovation. This ‘collocation thesis’ directly suggests the important roles played by manufacturing workers in problem solving and tinkering within the R&D process (Ernst 2002, 2003; Rosenberg 1963) as well as the benefit to designers and engineers observing the production process.

Providing further empirical evidence on the Asian newly industrializing economies, Yeung’s (2007) recent fieldwork in the electronics industry reveals an analytical framework of ‘triangular production’ underpinning the success and spatial agglomeration of Asian electronics suppliers to global lead firms such as Dell and Hewlett-Packard. Such a triangular production involves (i) the triad of appropriate business strategies; (ii) favourable global production networks; and (iii) supportive home bases (encompassing state-led intervention), which together allow these supplying firms to compete in the global economy. Yeung (2007) concludes that

there is 'a strategic coupling when these three elements are complementary and mutually reinforcing' (pp. 4–6).

Agglomeration and collocation is likewise a feature of North American advanced manufacturing technologies, based on the findings of Gertler's (1995, 7–11) fieldwork in Canadian firms that combined postal surveys, plant visits and interviews in four of Ontario's manufacturing sectors (aerospace and automotive parts; electrical and electronic parts; fabricated metal products; and rubber materials industries). The study found that spatial proximity and distance mattered: when queried, more than half the firms opined that collocation of original equipment manufacturing customer and (supplying) producer in the same region was important, with the top reason being proximity to service and spare parts (*ibid.*, p. 10), along with enhanced flows of information and communication. Moreover, plant visits and intensive interviews revealed that intensive interactions with manufacturing customers allows producers a competitive advantage eliminating the hassles of time zone differences, border and tariff hassles, challenges in translating technical terms, and the like (*ibid.*, p. 11).

In some contexts, then 'modularity' annihilates the role of space, while in others 'collocation' rescues the importance of geography. Moreover, the growing vertical disintegration of some firms means that simple descriptions of the spatial division of production do not capture the increased complexities of global supply chains. The decision-making processes in setting prices, standards and quality, and in the organization of production at each point along the supply chain are no longer coming from a 'top-down' command and control directive but are negotiated at multiple stages in the supply chain node. Indeed, the contemporary global production networks of firms like Hewlett-Packard, Siemens, or WalMart, who source the majority of their products from branch plants or supplying vendors, might aptly be described as increasingly 'vertically fragmented'. They contrast sharply with Alfred Chandler's model of the modern corporation, a la Ford's River Rouge plant or IBM of the 1970s, where all primary and subsidiary operations and materials reside within the company. In summary, the forces of dispersal and agglomeration of production activity can no longer be diagrammed in the simple hierarchical relations of old; in this era of globalized production, the relations of production and vertical fragmentation are increasingly complex, hidden, and difficult to model or to generalize.

3.2 REGIONAL IMPACTS OF MANUFACTURING DECLINE

With the growth of trade in manufacturing and services, a wide-ranging body of literature points to the ways in which manufacturing increasingly became less attractive for regional and national economies and their workers (Bardhan et al. 2002; Castells 1996; Froebel et al. 1980; Theodore and Peck 2002).

The spatial logic of globalized production and services has meant a vast spatial reconfiguration of employer–employee relations since the publication of Froebel and colleagues' volume (1980) in the Marxian tradition articulating a 'New International Division of Labor' (NIDL). In that core–periphery system of First World–Third World, the 'NIDL' was the result of multinational and state-restructuring of production while in search of a vast reserve army of Third World labor; a strategic response to the continuous imperative of the accumulation in capitalism. Increasingly, however, the boundaries between economic development and growth in core and periphery have blurred, as have distinctions in production and innovation in the manufacturing process.

Various commentators on the newest round of employment reconfiguration differ in emphasis and outlook on the social and spatial configuration of this reconfiguration of cores and peripheries. Castells (1996) focuses on the role of information-based production and competition in the formation of the 'knowledge economy' encompassing interdependence, asymmetry, and regionalization; and marked by selective inclusiveness and exclusionary segmentation (i.e. occupational, industrial, education systems). The growth of such bifurcation has been particularly bleak for workers in mature regions. For instance, a high percentage (40%) of total job growth in the temporary staffing industry work is comprised of blue-collar manufacturing jobs in the American Midwest (Theodore and Peck 2002). The structural reasons underlying the expansion of the demand for temporary, flexible work began in the 1980s. These included cost suppression and a determined search for enhanced workplace flexibility, both factors paramount to corporate strategy in an era of surge in gross domestic product coupled with strong international competition.

Describing the regional decline of manufacturing in the UK context, Phelps and Waley (2004) note the local economic and political ramifications of the actions by one multinational enterprise, Black and Decker, to close its plants in outlying Wales. Despite the many concessions to corporate headquarters of the local subsidiary, and the intervention of local authorities, Black and Decker nonetheless sought a 'spatial fix' by relocating elsewhere. The authors suggest that the tendency is toward continuing international integration to continue, and note that local 'tactics of resistance' are limited in their ability to moderate these powers.

Meanwhile, Bardhan and colleagues' (2002) empirical work on foreign outsourcing by California firms challenges conventional notions of international trade theorists regarding comparative advantage and the zero-sum games of trade. They do so by focusing on one aspect of globalization, the substitution of American unskilled in-house labor with foreign intermediate inputs. Despite the cyclical nature of data, the process of decreasing demand for blue-collar labor through foreign outsourcing is continuing in the high-tech manufacturing downturn and hence, trade plays a role in rising labor market inequality. Although Bardhan and colleagues state that the

blue-collar jobs in manufacturing that were exported abroad have gone for good, they also point out that new technologies are adding to the demand for production labor and creating new kinds of blue-collar jobs.

4 Contemporary Focus on Exportable Service Industries and Jobs

The geographical and historical fate of manufacturing provides instructive insight for the early 21st century phenomenon of job offshoring in the more highly skilled service and production sectors that have arisen as a consequence of the new technologies. Consequently, academic attention and public policy debates have come to focus predominately on exportable professional service occupations (Blinder 2005, 2006; Florida 2002, 2005; Kroll et al. 2004; Samuelson 2004). However, much of the current literature pertaining to the rise of a services economy altogether overlooks or even dismisses the linkages between old and new economy sectors. Implicit in new economy claims of service ascendancy and manufacturing irrelevance, is the notion that technology ‘drives’ history (Smith and Marx 1994), and has diminished the importance of manufacturing.

Economist Blinder weighs in on the offshoring question, but distinguishes exportable jobs from those that are likely to stay by focusing on what he terms ‘impersonal service’ jobs:

Thanks to electronic communications and globalization, the future is likely to see much more offshoring of jobs in what I have called the impersonal services, that is, services that can be delivered electronically over long distance with little or no degradation of quality. (Blinder 2005, 30)

Blinder’s is at heart a simple supply-and-demand logic, one wherein changing trade patterns will keep most personal service jobs at home (chauffeurs, teachers) while many jobs producing goods and impersonal services (medical transcribers, accountants) migrate overseas. Moreover, as more workers in advanced regions seek employment in personal services, wages will decline. Blinder goes on to say that, despite the political controversy and media attention, ‘little of this service-sector offshoring has happened to date’, but may eventually lead to a ‘Third Industrial Revolution’ (ibid.).

Meanwhile, Florida (2005) echoes Blinder’s concerns about the offshoring of service jobs, but his research differs by focusing primarily on the most highly skilled of white-collar occupations in what he terms the ‘creative industries’, and on urban quality of life issues. Florida lauds those cities with enough cultural attractions, diversity and tolerance to attract such a ‘creative class’ of professionals. Drawing from personal experience, Florida cites the creativity of work done by high-end hair salonists that, despite lower pay and fewer benefits, he establishes as a more rewarding and creative endeavor than what he contrasts as the mundane work by blue-collar machinists (Florida 2005, 4). However, Florida is remiss in promoting a nation of designers, and sellers of services and neglects the

importance of proximate ‘old economy’ manufacturing activities (as discussed above) identified by Rosenberg and others. Most importantly, Florida does not address the importance of innovation linkages between problem solving, product development, and innovation – what Rosenberg earlier termed a process of ‘technological convergence’.

In other words, Florida portrays a false dichotomy between ‘old’ and ‘new’ economy industries and occupations. Florida’s devaluation of machining work does not consider the importance of Dieter Ernst’s ‘collocation of innovation thesis’, resulting from contemporary studies of the chip industry, wherein engineers work side-by-side with foundry workers in designing and producing parts. Such a dichotomization of old and new also cannot adequately account for Gertler and Vinodrai’s findings in the design sector, which revealed that over a fifth (21%) of the Ontario design workforce is employed in the manufacturing sector (Gertler and Vinodrai 2004, 13). Indeed, Gertler’s (1995) earlier work had illustrated the importance to local advanced manufacturing producers of ‘being there’ in the same region as their users.

5 An Integrated Vision of Manufacturing and Services

We live in an era where the lines between successive modes of production are blurring. We have traced the origins and uses of the terms ‘new’ and ‘old’ economies, and through the contributions of a wide range of social scientists, have noted that the use of such binary analytical categories are slippery at best. Geographers, including Yeung, Waley, Thrift, Schoenberger, Phelps, and Henderson et al., add important empirical evidence and added analytical understandings of the nexus between ‘old’ and ‘new’. Their studies provide nuance and understanding to the otherwise intractable question of whether global forces have given rise to a further ‘flattening’ of industrial production in space and time, or whether in fact agglomeration and clustering is the defining characteristic of our global era.

Contrary to the view that technological forces drive the spatial dispersion of production, we have explored instances throughout history of the synergistic effects of innovation and industrial production (Jacobs, Rosenberg, Ernst, Gertler and Vinodrai). These studies, moreover, illustrate concrete ways in which demarcations of activity into ‘old’ and ‘new’ economies are false. More understanding and insight is needed, then, into the intertwined nature of information systems, organization, and production/manufacturing processes. Hence, I propose broadening the current focus on job loss in the highly skilled service sectors to an integrated vision of industrial production, knowledge and service industries in an advanced economy.

The most pressing questions are thus, which specific kinds of manufacturing occupations have the best potential to remain in advanced industrial regions, and what are the mechanisms by which workers will

be trained and prepared for these jobs? Although generalizations have been made herein about the important role of skilled manufacturing in advanced regions, important details have yet to be explored or worked out. Rigorous empirical studies of specific manufacturing activities (e.g. tooling, machining, welding, foundry, fabrication, and assembly work) and their contributions to 'new economy' industries (biotechnology, computer, renewable energy technologies, nanotechnology, semiconductor, and transportation) are lacking in the literature. I believe that addressing this gap is an important starting point if we are to effectively address the overlapping roles of manufacturing and production in what have otherwise been characterized as knowledge and service-oriented, advanced industrial regions.

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