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**TECHNOPOLIS: HIGH-TECHNOLOGY INDUSTRY AND REGIONAL DEVELOPMENT IN SOUTHERN CALIFORNIA.** Allen J. Scott. Berkeley CA: University of California Press, 1993, xiv. + 322 pp. (Hardcover). \$35. ISBN 0-520-08189-7.

*Technopolis* seeks to extend Allen Scott's theory of flexible production agglomerations to account for the growth of high-technology industry and the broader regional development of Southern California. While providing a wealth of useful empirical information on high technology in Southern California, the book ultimately fails in its larger quest. The reason is simple. The high-technology industries of Southern California cannot be shoe-horned into the conceptual framework of disintegrated but highly-interconnected small-firm networks. The book's own empirical and historical analyses document the role of huge transnational corporations, defense contractors, the federal government, and the military-industrial complex in casting the region's fortunes. Furthermore, the analysis of high-technology industry, while important in its own right, can tell us only a limited amount about the broader processes of regional growth and development of Southern California, since high-technology industry accounts for just a small share of the region's overall economic base.

*Technopolis* draws upon Scott's earlier work and seeks to refine and test the theory of "geographically agglomerated economic growth." To do so, Scott provides an eclectic blend of two intellectual traditions. The first is his reading of transaction cost economics associated with Oliver Williamson. Scott argues that agglomerated networks of small producers represent a form of industrial and spatial organization which is well attuned to harnessing the efficiencies that stem from external economies of scale and scope. Such networks are thus coming to replace older forms of large vertically integrated, mass-production industrial organization. The end result is the spatial clustering of smaller and more technologically advanced producers, leading in turn to higher rates of innovation and productivity. The second and more fundamental element of Scott's conceptualization is derived from the theory of industrial districts associated with Marshall, Beccatini, and his collaborators in Italy, and Piore and Sabel. In Scott's view, geographically concentrated "flexible production systems" comprised mainly of dense, transaction-intensive small-firm networks represent both capitalism's cutting edge and a more general growth model for capitalist development.

The problem is that the high-technology industries of Southern California only weakly fit the model, as Scott's own historical and empirical analyses make clear. The book explores the industrial and spatial organization of five key high-technology sectors, but only three of these—electronics, printed circuit boards,

and medical devices—bear any resemblance to small-firm flexible production networks. The other two—aircraft and missiles and space, which account for two-thirds of the regions's high-technology jobs—are clearly dominated by and structured around large firms and huge government institutions. Southern California's aircraft industry is organized around large producers like General Dynamics, Lockheed, McDonnell Douglass, Northrup, and Rockwell. The missile industry is organized around a combination of large producers and large government funded facilities. Moreover, both the electronics components and printed circuit board industry are tied in many respects to these two sectors, making up pieces of the broad manufacturing infrastructure of subcontractors and suppliers from which these larger *prime contractors* draw.

Furthermore, as Scott's well documented chapter on the historical development of Southern California high-technology documents, the origins and early evolution of this entire complex are mainly a function of the World War II and Cold War mobilization decisions of the federal government. It was war-time expansion and strategic decisions of large producers and the Defense Department—and not the natural evolution of organic industrial districts—which led to the "vast expansion of outsourcing networks" during the 1940's [p. 60]. And, to this must be added the enormous public investment in military bases, testing facilities, highways, and other forms of infrastructure, which propelled much of the region's overall growth. Far from being a constellation of self-organizing, disintegrated small-firm industrial districts, the Southern California technopolis is the product of huge levels of government spending and the strategic actions of both government agencies and large businesses to construct the broad technological, manufacturing, and physical infrastructure required for the production of crucial military hardware.

These empirical realities lead Scott to attempt to broaden the conception of flexible production networks to include larger and more powerful actors. His primary vehicle for doing so is the concept of the "system house," which he uses to describe Southern California's large, R&D intensive military and aerospace producers. According to Scott, these large system-house producers are really flexibly specialized small producers in disguise. Or, in his own rather convoluted description, these systems houses constitute "latent flexible specialists that have been unable to escape from the force of internal economies of scope. That is, in the absence of the various synergies holding their many and differentiated parts together, they would fragment into networks of smaller, more specialized producers with greater ease of entry into and exit from different producer markets." In other words, if they weren't already large firms, they might be small firms.

The conflict between theoretical construction and empirical reality is the source of a fundamental conceptual confusion that runs through the entire book. In some places, Scott insists upon the primary nature of small-firm networks, writing that high-technology industries "tend to disintegrate into transactions-intensive complexes of many small producers forming dense and multifaceted production agglomerations" [p. 31]. But, in others, he hedges, suggesting that flexible production systems can include "a wide assortment of intermediate cases," such as "the Southern California technopolis where a number of large integrated aerospace producers (i.e. systems houses) are caught up in dense networks of small and disintegrated firms." [p. 21]. And, in still other places, he backs off almost entirely, writing that: "as with high-technology industry in Southern California, large establishments frequently function as mainsprings of development and growth over long periods of time" [p. 53]. Adding to the confusion is the fact that the term *technopolis* is never sufficiently developed and defined.

*Technopolis* purports to be about the broad process of regional growth and development. If this is the case, there are reasons to question the book's exclusive focus on high technology as the fulcrum of the Southern California economy. As Scott's own statistics attest, high-technology industry comprises but a small, six percent share of the Southern California's total employment base. While high-technology employment in Southern California grew from 315,000 in 1964 to nearly 470,000 by 1988, it has fallen off considerably in the early 1990's. Southern California is much more an economy of services trade and government, than one defined by high technology. Yet, these sectors are scantily even mentioned.

The picture for regional development in Southern California high technology and otherwise—is not entirely bright. As *Technopolis* makes strikingly clear, Southern California-style high technology is no utopia for workers. The chapter on electronics assembly workers, which is the high point of the book, documents the onerous conditions and hierarchical divisions of labor under which such workers toil. Workers in Southern California's high-tech factories face unstable and precarious labor market conditions, having neither union representation nor job security. Turnover is high, and wages low—just six dollars per hour on average. The workforce is dominated by Hispanic and Asian Americans, and more than 50 percent of all workers in Scott's sample reported that they were not U.S. citizens. The work process is organized in simple, routine tasks, and shows little evidence of the team-based work organization, continuous improvement or quality schemes or other aspects associated with high-performance work places. The conditions of this low wage female and ethnic workforce provide perhaps the most chilling indictment to the Southern California model of high-technology

development. Yet, Scott makes virtually no attempt to square these crucial facts with the broader theory of flexible production agglomerations.

*Technopolis* also fails to probe in sufficient depth the social and economic tensions which rock the region. Southern California is by all accounts experiencing deep and fundamental problems brought on by a combination of defense cutbacks, chaotic labor markets, an unravelling social fabric, and burgeoning social, environmental, and economic problems. Recent years have seen large and increasing numbers of both domestic and foreign-affiliated manufacturers abandon the region for more stable business climates elsewhere, for cheaper Third World Labor, and under the weight of the state's crushing command-and-control regulatory bureaucracy. The region is a striking example of the "brazilianization of America," with fenced-off defense complexes and high-technology factories, the gated and guarded complexes of the truly wealthy—in the midst of growing poverty, escalating violence, frightening ghettos, and increasing despair. In fact, Southern California's defense producers appear to be restoring profitability through mergers, combinations, down-sizing and re-engineering, while the region's social fabric continues to unravel. Probing this disjuncture between technological competitiveness and social decline is crucial to gaining deeper understanding of contemporary capitalism in Southern California and American writ large.

The final sections of *Technopolis* provide a brief excursus into regional development policy. Here, Scott suggests that Southern California can restore its conditions of growth, through collective (read "government-sponsored") efforts to stimulate entrepreneurship and build new institutions to support disintegrated small-firm networks. To this end, he recounts a veritable grab-bag of 1980s economic development fads—publicly sponsored R&D and technology transfer, new vocational education and apprenticeship programs, incubator-like entities to provide support services, industrial modernization and networking initiatives, science and technology parks and government-supported venture capital programs. And, he places great hope in the region's shaking initiative to develop an electric car industry. Running through all of this is the naive notion that government-supported institutions can restore cohesion and stimulate collective action within small-firm industrial networks. If the districts really represented capitalism's cutting edge, why would they need such extensive help from government to shore them up? There is little in the historical record to inspire confidence here. Recent evaluations indicate that the performance of these types of economic development programs is poor. Other studies document that firms do not consider them valuable, no do they care to participate. And, there is a growing realization that such government-supported efforts frequently amount to costly boondoggles promoted by a growing cadre of public sector

entrepreneurs. For these and other reasons, states and regions are scaling back on just the types of programs Scott advocates.

It is here that *Technopolis* is its most revealing. The theory of flexible production agglomerations has not only reached a theoretical impasse; it has little more to offer economic development policy than a rehash of what professionals have been already doing for years. The time has come to move beyond descriptions of industrial districts, flexible production, and agglomerated production complexes, and to get on with the task of building broader theories of why geography, place, and proximity continue to matter in an increasingly knowledge-intensive and global age of capitalism. Only then will we have the capacity to create new strategies, policies, and tools for building more advanced, productive, and sustainable regions in the United States and around the world.

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