University of Pennsylvania
ScholarlyCommons

Departmental Papers (City and Regional Planning) Department of City and Regional Planning

6-1-2001

Information Technology and Urban Labor Markets in the United States

Laura Wolf-Powers
University of Pennsylvania, lwpowers@design.upenn.edu

Reprinted from *International Journal of Urban and Regional Research*, Volume 25, Issue 2, June 2001, pages 427-437.

NOTE: At the time of publication, the author Laura Wolf Powers was affiliated with Rutgers University. Currently, she is a faculty member of the School of Design at the University of Pennsylvania.

This paper is posted at ScholarlyCommons. http://repository.upenn.edu/cplan_papers/46
For more information, please contact repository@pobox.upenn.edu.

Information Technology and Urban Labor Markets in the United States

Abstract
The technologies that now dominate the production of goods and services, especially in advanced industrialized countries, have irrevocably changed the dynamics of the demand for and return to labor. Employment in technology-intensive occupations such as computer programming and network technology has increased at double the rate of US non-farm employment overall since the mid-1990s (US Department of Commerce, 2000), and thousands of other jobs in offices, factories and retail establishments demand technological infrastructures unneeded ten years ago. The ability to manipulate information, and to service and maintain the delivery systems by which information travels among users, has become increasingly linked to earning power. This is particularly true in cities. According to Rondinelli et al., the basis of urban economic development is now 'a technology- and knowledge-based system of production and services' (1998: 83) and those without the skills to participate in this system are confined to secondary, futureless roles in urban economies.

Comments
Reprinted from *International Journal of Urban and Regional Research*, Volume 25, Issue 2, June 2001, pages 427-437.

NOTE: At the time of publication, the author Laura Wolf Powers was affiliated with Rutgers University. Currently, she is a faculty member of the School of Design at the University of Pennsylvania.

This journal article is available at ScholarlyCommons: http://repository.upenn.edu/cplan_papers/46

International Journal of Urban and Regional Research Volume 25.2 June 2001

Information Technology and Urban Labor Markets in the United States

LAURA WOLF-POWERS

Introduction

The technologies that now dominate the production of goods and services, especially in advanced industrialized countries, have irrevocably changed the dynamics of the demand for and return to labor. Employment in technology-intensive occupations such as computer programming and network technology has increased at double the rate of US non-farm employment overall since the mid-1990s (US Department of Commerce, 2000), and thousands of other jobs in offices, factories and retail establishments demand technological infrastructures unneeded ten years ago. The ability to manipulate information, and to service and maintain the delivery systems by which information travels among users, has become increasingly linked to earning power. This is particularly true in cities. According to Rondinelli *et al*., the basis of urban economic development is now 'a technology- and knowledge-based system of production and services' (1998: 83) and those without the skills to participate in this system are confined to secondary, futureless roles in urban economies.

Information technology has had a major impact on the geography of work, the competition among places (Moss, 1987; Brotchie *et al*., 1995; Massey, 1995; Atkinson, 1998; Graham, this issue),[1] and the characteristics of urban labor markets. This article focuses on the skill dimension of IT's impact on urban labor markets, exploring the implications of a 'technology and knowledge-based system of production and services' for the prospects, not of places, but of the people who work in them. In doing so, it dwells primarily on the US context, where people-oriented policies, particularly education and workforce development, have assumed a newly prominent role in public and academic conversations about urban vitality. In advanced urban economies, scholars and policy-makers argue, measures conventionally pursued to attract firms — tax incentives, urban infrastructure, mega-projects focused on drawing tourists or convention-goers — are increasingly less effective, because human capital, not physical capital, has become the twenty-first century's key competitive advantage (Clarke and Gaile, 1998; Rondinelli *et*

1 Different cities play different roles in the spatial division of labor which information technology has helped to bring about: some are command posts specializing in high-end export services; some are new high-tech research centers in formerly 'second-tier' US cities like Austin, Texas; and some are new growth poles abroad such as Andra Pradesh in India (Markusen *et al*., 1999; Eischen, 2000; Oden and Larsen, 2000). Rampant job growth in and migration to lower-order 'service export' enclaves from Jacksonville, Florida, to Dublin, Ireland, to Bali, Indonesia, suggest that a city can specialize in in-bound telemarketing or software code-writing the way it might once have specialized in steel or textiles (Arnold, 2000; Cowell, 2000; Uchitelle, 2000). This switch from industrial to functional specialization has had a major impact on opportunities for workers.

© Joint Editors and Blackwell Publishers Ltd 2001. Published by Blackwell Publishers,
108 Cowley Road, Oxford OX4 1JF, UK and 350 Main Street, Malden, MA 02148, USA.

al., 1998; Mathur, 1999; Weinstein and Clower, 2000). Thus, policies to attract desirable workers, in addition to policies aimed at increasing the skill level of the existing workforce, have gained priority among economic development planners. Traditional distinctions between 'people policy' and 'place policy' at the state and local level can be said to have collapsed. Although applicable to all cities where information technologies permeate workplaces, a discussion of workforce development policy as an urban policy is particularly relevant to the United States, where local officials bear responsibility for education and workforce preparation in ways that their counterparts in other countries do not. After reviewing the literature on technology's impact on the demand for and returns to work in US cities, this article examines different types of local policies designed to attract, retain and develop labor assets and discusses the advantages and limitations of these policies. Even though the IT revolution has strengthened the link between labor assets and place vitality, I argue that researchers should be skeptical that local labor and human capital strategies have wholly transfigured place policy in the US economy, or that they have the capacity to do so. Reasons for this skepticism include the vibrancy of international markets for skilled labor, a fragmented US workforce development system, and the simple fact that, in the absence of institutional change, the majority of new jobs created in the 'knowledge economy' will continue to be low-status and low-paid.

Skill and the city

An exploration of IT's impact on the demand for skill must begin with an analysis of secular economic trends. Since the early 1980s, growth in the US economy has been powered by the domestic sale and export of IT-related hardware and software, by domestic sale and export production of information 'content' such as entertainment, and by domestic sale and export of advanced services (legal, financial, consulting) in which information technology is a key input. Beginning in the mid-1990s, Internet applications and content became additional growth drivers. Advanced services, entertainment and Internet content, in particular, are urban-based industries, employing thousands of creative, ambitious people in the cores of major US cities, some of which have captured considerably more activity than others. Such indicators as the registration of dot-com domain names and rental rates for downtown commercial space suggest that new media and e-commerce jobs have concentrated industrial district-style in the central cities of first-tier commercial entrepôts (Moss and Townsend, 1997; *Crains New York Business*, 2000; Kellerman, 2000; Zook, 2000a) and to some extent in fast-growing so-called 'second-tier cities' such as Raleigh-Durham, North Carolina, and Austin, Texas.[2] Reasons for the clustering likely include what scholars have called 'innovative milieus' (Storper and Scott, 1992; Storper, 1997): proximity to film, arts and theater enterprises; the preference of creative young employees for city living; the key role played by informal social contact; and proximity to venture capital firms (Zook, 2000b). Despite some signs of dispersal, urban IT clusters, particularly agglomerations of firms producing creative material, mark a trend toward the spatial reconcentration of job opportunities in the urban core.

2 The core cities of New York, Los Angeles and San Francisco have more commercial Internet domain names registered in them than the next twelve most domain name-populous cities combined (Zook, 2000a), and while domain name registration does not correspond one-to-one with business activity, the ascendancy of 'Multimedia Gulch' in San Francisco, 'Silicon Alley' in New York and 'Hollywood.com' in the Hollywood and Santa Monica districts of Los Angeles County strongly suggest that Internet content production and e-commerce are city-center phenomena. Thus, while much IT 'talent' works in office parks in the edge cities of second-tier metropolitan areas, there appear to be some segments of the sector whose labor pool thrives not simply in urban areas but specifically in the dense, capital-rich atmospheres of older central business districts.

© Joint Editors and Blackwell Publishers Ltd 2001

What sort of job opportunities these are, however, is another matter. Demand for labor in the US economy has been skewed toward the top and bottom extremes of the wage/skill spectrum for the last decade (Appelbaum and Albin, 1990; McDonald and Sirianni, 1996; Howell, 1999), especially within cities (Sassen, 1991; Fainstein *et al*., 1992; Sassen, 1998). In part, this reflects declining labor demand in old-line, unionized urban manufacturing, where many workers commanded middle-class wages in the postwar period.[3] It also stems, however, from technology-induced labor-market segmentation in conventionally urban-based service industries such as banking, insurance and telecommunications. In banking and insurance, executives, adopting computer-based technology, have hired more managers, upgraded some routine clerical jobs into more autonomous semi-professional or technical positions and downgraded many formerly mid-level clerical positions into low-paying service jobs (Baran, 1985; Pollard, 1995). In telecommunications the pattern is slightly different, with increased skill and autonomy demanded on the technical (infrastructure maintenance and installation) side of the business and skilled clerical and customer-service jobs converted into low-paid, low-status positions with the advent of such technologies as voice recognition software (Keefe and Batt, 1997; Batt and Strausser, 1998).[4] In all these sectors, and in the labor market generally, the elimination of positions in the middle of the job ladder has increased within-industry wage dispersion and limited opportunities for mobility (Noyelle, 1987; Cappelli *et al*., 1997; Herzenberg *et al*., 1998). In addition to technology-driven polarization in white-collar industries, Sassen argues, researchers should consider as part of the same phenomenon the profusion of low-paid urban retail and service workers who maintain the living and working environments of the highly paid urban elite (see also Piore, 1980). Many of these workers are immigrants: affluent New Yorkers, for example, get inexpensive manicures and facials from first generation Asians and eastern Europeans, have their offices vacuumed by Poles and hire Caribbean-born nannies to care for their children.

The IT workforce itself (workers in IT-producing sectors and workers in IT occupations in other industries) also exhibits tendencies toward segmentation. Demand for IT workers overall has greatly increased with the penetration of computer networks, the Internet and other digitized products into workplaces and homes. Workers in IT occupations totaled 7.4 million, or 6.1% of all US workers, in 1998, their numbers having grown by 28% since 1994 (US Department of Commerce, 2000). There is a gap, however, between employers' demand for high-skilled, high-paid employees such as systems analysts, computer programmers and copy writers and their demand for lower-status IT workers such as computer operators. This demand gap is reflected in earnings disparities, which vary from city to city depending on labor supply and the segment of IT production in which a given metropolitan area specializes. Much-publicized labor shortages at the higher-skilled end of the IT spectrum have had employers petitioning Congress to allow further immigration of technical workers from other countries, a subject that will be dealt with later in this essay. The main point here is that within IT itself, polarized labor

3 While manufacturing has certainly shed workers, the shrinking manufacturing sector may be in part an artifact of classification patterns. According to Current Population Survey data, close to a third of temporary employees work in manufacturing, but because their employer is a labor broker or temporary help supply agency, they are counted as service-sector workers (Cohany, 1996). Workers who are employed in manufacturing and warehousing jobs via temporary help firms are at the low end of the earnings distribution (see Peck and Theodore, 1998). It seems clear that low-paid, labor-intensive manufacturing continues to be a source of employment for many in the United States, even if workers' presence remains hidden because of sectoral classification issues or as a result of their undocumented immigrant status. In these cases, however, a manufacturing job does not lead to middle-income status.

4 Telecommunications customer service is also less and less of an urban-core-based activity, as companies have discovered the cost savings realizable by moving call-center facilities to the peripheries of urban areas.

© Joint Editors and Blackwell Publishers Ltd 2001

Table 1 *New York Metropolitan Area* employment 1979–97, by job quality segment*

Total Employment (in thousands)			Independent Primary (%)			Subordinate Primary (%)			Secondary (%)		
1979	1989	1997	1979	1989	1997	1979	1989	1997	1979	1989	1997
3,890	4,810	5,130	28.8	39.5	39.2	35.0	28.3	24.2	36.5	32.2	36.6

* New York, NY PMSA (5 boroughs), Bergan-Passaic, NJ PMSA, Newark, NJ PMSA, Nassau-Suffolkm NY PMSA, Jersey City, NJ PMSA.

Source: Compliled by Kimberly Gester from PUMS 1980, PUMS 1990 and 1997–98 Current Population Survey merged outgoing rotation groups data, using job classification developed by Gittleman and Howell (1995).

markets are quite pronounced. In contrast to vertically integrated goods and services industries of the past, the industry is fragmented. Training programs provided by employers and internal labor markets that formerly provided bridges between entry-level positions and higher-paying jobs no longer exist. Individuals who are not 'plugged in' to informal social networks and occupational communities have difficulty building careers (see Benner, 2000). The changes wrought over time by these forces in a single metropolitan labor market — New York's — are shown in Table 1, compiled by Gester (2000) using a classification scheme developed by Gittleman and Howell (1995).[5] So-called Independent Primary occupations — relatively high-paid professional jobs for which specific vocational preparation is required — increased their share of total jobs in the region by over 10% between 1979 and 1997. In Subordinate Primary occupations, which include well paid blue-collar jobs and moderately well paid sales and clerical positions, employment share declined by over 10% as well as decreasing in absolute terms. About the same proportion of New Yorkers worked in Secondary occupations (which include lower wage blue-collar jobs and jobs in retail, building maintenance, childcare and other labor-intensive services) in 1997 as in 1979. Another recent study, focusing on the five boroughs, found an even more pronounced hourglass shape, with job growth at both the top and the bottom of the income distribution and decline in the middle, along with a widening earnings gap between rich and poor (Greenhouse, 2000).[6] In the urban milieu, technology appears to be exacerbating labor segmentation, increasing demand both for professional and for low-status service and production workers. As Sassen observes, however, 'the labor markets associated with a given set of technologies can, in principle, vary considerably and contain distinct mobility paths for workers' (1998: 142). Technology has not autonomously created labor market dualism; rather, it has been a resource and decision factor for corporate managers operating in specific

5 Gittleman and Howell (1995) conducted a cluster analysis of 621 potential jobs (defined by occupation and industry — craft production workers in the aerospace industry, e.g.) that resulted in three 'segments' — Independent Primary, Subordinate Primary and Secondary — and within each segment, two more fine-grained 'contours'. Segments are used here; the jobs within each one are distinct from each other in terms of earnings and benefits, skill requirements, working conditions, employment status and institutional setting. This schema enables a much more accurate assessment than industry or occupational analysis by itself, since it permits the researcher to identify the interactions between industrial and occupational restructuring and their ramifications for particular social groups.

6 This was a report released on 2 October by the Working Group on the New York City Low Wage Labor Market, a task force of economists who contended that: 'Despite the strong pace of private-sector job growth, an alarming number of families in New York City are unable to earn enough to achieve an acceptable standard of living'. According to the report, workers in New York who earn more than $75,000 posted an average wage increase of 65% from 1989 to 1999, while the wages of those earning less than $25,000 dropped 2.2%.

© Joint Editors and Blackwell Publishers Ltd 2001

social and political contexts.[7] In the US, this is a context in which legislators have authorized the deregulation of major industries, in which employers increasingly pursue outsourcing and casualized labor arrangements as a way of cutting costs, and in which organized labor's ability to represent workers effectively has weakened.[8] The growth, respectively, of high-paying cognitive jobs and low-wage, dead-end jobs is not the inevitable outcome of technological change: it is one possibility among many.

The policy response

As knowledge-intensive goods production, information-rich transactions and information itself come to form the backbone of the US economy, urban competitiveness appears to rest on the ability to maintain labor advantages — either labor advantages that harmonize with cost advantages (this would be the case in a city like Jacksonville, Florida, where land and housing are inexpensive and salaries and wages relatively low, even for skilled workers) or labor advantages that are so great as to offset high costs (as would be the case in New York or San Francisco). Consequently, economic development officials are turning their attention to labor and workforce development policy with more interest than in the past. Rankings of cities by publications such as *Fortune* and *Sprint Business* increasingly use workforce educational attainment as a ranking criterion for urban competitiveness, or indirectly deal with workforce issues by examining cities' potential to attract and hold skilled managers and professionals (see Weinstein and Clower, 2000). Clarke and Gaile claim 'a new urban hierarchy … based on the geography of human capital' (1998: 199) and argue that local policy initiatives must center on developing human capital resources. Municipal and county economic development policy takes a variety of paths toward this goal. The first is akin to conventional business attraction policy, and operates on the assumption that labor, like capital, is mobile and can be coaxed into migrating — not by greenfield sites and airports, but by safe neighborhoods, good schools or downtowns. Whatever form these quality of life improvements take, officials who facilitate them capture people who create value in a local economy. It is not entirely clear whether this set of policies is aimed directly at workers or indirectly at companies; a long-running debate in regional economics centers on the question of whether growth in employment opportunity lags behind population growth or the other way around (see Clark, 1983).[9] At any rate, measures of this sort can be seen as smokestack-chasing in a different guise, with workers, rather than factories, as the prize. While incumbent residents benefit from amenities improvements, this approach, with the significant exception of public school reforms, does nothing to improve the labor market prospects of the poor and low-skilled, and the effect of public school improvement may be muted by metropolitan residential segregation.[10] In fact, just as local development policy may be designed to attract skilled people, it may be fashioned to repel residents who are not considered valuable to a region's human capital profile.

7 Appelbaum and Albin note, for example, that alternative ways of organizing work and employee training in the insurance industry could lead to a larger number of 'multi-activity, integrated and responsible jobs' (1989: 264).

8 As Moss remarks in an article about the introduction of alternative methods of waste water management in Berlin: 'Large technological systems, such as electricity or telecommunications networks, cannot be understood solely in terms of their technological components but as complex systems which link material technologies with organizations, institutional rules, and cultural values' (2000: 65).

9 The importance of defense firms' location in non-traditional industrial spaces, for example, was a factor in the population resettlement, and particularly the migration of scientists and engineers, from the Northeast and Midwest to the South and West during the second world war and the cold war (Markusen *et al*., 1991; Campbell, 1993).

10 Part of the dilemma here is that most metropolitan areas are balkanized into rich and poor communities, with little economic redistribution of wealth or opportunity among them, even in good economic times (see Hill and Wolman, 1997).

© Joint Editors and Blackwell Publishers Ltd 2001

A second strategy involves a labor-oriented approach to nurturing and growing vibrant industry sectors. This is a people-centered twist on the sector or cluster strategy under which local officials use regional economic analysis to identify dynamic clusters of firms and then target those clusters for investment and other assistance (see Bacheller, 2000). Because production processes in information-intensive industries tend to be project-based rather than firm-based, and because labor is so key to these processes (Christopherson, 2000), the logic is that a crucial part of any sectoral development strategy is a focus on the needs and behavior of that sector's workforce. Rather than aiming to attract skilled workers from other places, policy-makers using this approach develop strategies to address the needs of key professionals already working in their cities. A recent study of new media workers in New York City, for example, concludes that these employees' lives, and consequently the competitiveness of their sector, would be enhanced by training opportunities, stronger professional associations, and extra-firm structures for health insurance and other benefits — all things that could be influenced by city and regional policies (Batt *et al*., 2001). A variation on this approach is recommended by Markusen (2000), who argues that officials can develop competitive advantages by targeting occupations rather than industries for policy assistance. The idea is to create or enhance existing milieus of innovation, inducing talented people to develop attachments to places.

A third approach goes directly to the development of human capital, which, according to economic theory and an increasing amount of policy rhetoric, suffers from underinvestment (see Clarke and Gaile, 1998; Mathur, 1999). Here the logic is that with the shrewd employment of resources in the K-12 and community college systems, along with federal employment and training dollars (recently consolidated in the Workforce Investment Act of 1998), local officials can develop human capital in place, wedding the goals of economic competitiveness and poverty reduction. Place-based efforts to develop human capital for the information economy can both address the needs of marginalized groups and promote economic growth. Such efforts include partnerships between community colleges and employers (Fitzgerald, 1998), sectoral training initiatives involving labor unions and/or community-based organizations (Parker and Rogers, 2000), efforts to build career paths for disadvantaged workers in the highly fragmented IT sector (Alssid, 2000; Chapple and Zook, 2000), and the Community Technology Centers mentioned by Servon and Nelson in this issue. With unemployment low, employers' interest in productive workers seems to be coinciding with the objectives of local governments that want to link central city residents with living-wage jobs. For policy-makers, the chance to focus on education and training, particularly training connected with the fostering of networks and job ladders, creates an opening for equity planning in the knowledge economy.

Challenges

But while the project of building local human-capital resources to revive cities and offer opportunity to the disadvantaged may be possible in the good times, researchers and policy-makers are in error if they view it as an uncomplicated harmonizing of 'competitiveness' policy with anti-poverty efforts. The human capital strategy, like any strategy pursued in a political environment, is fraught with contradictions. Several barriers are particularly significant. First, while IT advances have made labor more important to local economic development, they have also helped create national and international markets for specialized workers that may deter employers from developing local talent. As Sassen points out, a system to permit the 'circulation' of skilled executives and advanced service workers has emerged, and it is completely detached from conventional immigration policy (1998: 15). The H1-B Visas issued to high-skilled

© Joint Editors and Blackwell Publishers Ltd 2001

workers from other countries are non-immigrant visas, and there has been enormous industry pressure on Congress to increase the annual cap on the number issued.[11] The H1-B program is criticized on many grounds, including its argued effect of draining productive workers from other economies, but one of its major domestic effects is to reduce the sense of urgency about building human capital in place.[12]

A second barrier to human capital development strategies in the knowledge economy is the fragmented nature of federal, state and local funding for education and job training, as well as the extreme paucity of such funding. Government leaders in the US, aggressively informed by a market ideology, have always been loath to link labor-market policy to economic policy at the national level, and in the instance of job training, the tendency to minimally fund a plethora of discrete and disconnected local initiatives rather than planning comprehensively is especially evident (see Weir, 1992; Mueller and Schwartz, 1988). The Workforce Investment Act (WIA), passed by Congress in 1998, is intended to resolve some of these problems, but even under WIA, federal and state funding streams, regulations and performance standards for various employment-related efforts remain separate, making local program integration a challenge (Teegarden and Baran, 2000). An understanding of the connection between workforce development and long-term growth has spurred elected officials in some places, such as Seattle and San Francisco, to design region-wide workforce development systems that bring multiple institutions together, combine training with human services and economic development, and engage the involvement and energy of employers (Alssid, 2000; Fitzgerald, 2000). Isolated instances of workforce development for poverty reduction are overshadowed, however, by the pursuit, in the wake of 1996's welfare reform law, of a 'Work First' approach, which focuses single-mindedly — and in many cases punitively — on reducing welfare rolls by moving people into jobs, regardless of the quality of those jobs and regardless of the opportunities they might provide for escaping poverty. Connected with the 'Work First' dilemma is the fact that low-wage jobs greatly exceed high-wage jobs in the information economy. A focus on skill development as the primary policy strategy in the current climate implies a belief that human capital deficiencies at the low end of the labor market — combined with an IT-induced growth in demand for skill at that same end of the market — are responsible for the growth in wage inequality in the US over the last two decades. In other words, workers at the bottom are doing poorly because there has been a shift in demand, driven by computerization, that favors high-skilled over low-skilled workers. But, as Howell (1999) argues, empirical evidence for the 'skill-biased technical change' argument is weak. Low-skilled work has been increasing at the same or greater rate than high-skilled work — as shown above, it is jobs that place people in the middle of the income distribution that have become more scarce, and the reasons for this are institutional as well as technological. Changes in skill requirements are not the only driver of social inequality in the US economy, so human capital strategies on their own will not reduce poverty. Better primary education, more effective transitions from school to work, and retraining for people with obsolete skills are essential. But also needed are institutional and political strategies that increase the return to work that is currently low wage and change the institutional bargain between employers, workers and government in ways that favor low-wage workers.

11 A law signed by President Clinton in October 2000 increased the number of H-1B visas to 195,000 for each of the next three years, starting with the fiscal year that began 1 October. The previous cap had been 107,500 for that fiscal year and 65,000 in subsequent years.

12 The federal government is addressing this issue somewhat: fees from H-1B Visas, which have recently increased from $500 to $1,000, are used by the Department of Labor to fund training in high-tech occupations for displaced and disadvantaged workers.

© Joint Editors and Blackwell Publishers Ltd 2001

Conclusion

With business investment in information-processing equipment and software accounting for nearly a fifth of GDP growth in recent quarters (Bureau of Economic Analysis, 2001), information-intensive industries and occupations promise to persist as forces shaping the nature of work and economic opportunity in the United States. The morphology of cities and the size of commuter sheds will continue to shift in response to the requirements of emerging IT industries. Some IT firms will continue clustering in center-city industrial districts while others, as the product cycle progresses, will disperse into the hinterlands or relocate to lower cost places around the world. Technology will also continue to change the nature of jobs and skill requirements.

In this context, the impact of the human capital policies now being enthusiastically touted in US cities — particularly those targeted at the disadvantaged — will depend on many factors. One such factor is the ability of local officials to simplify the workforce development system at the local level, synthesizing diverse funding streams, connecting programs previously operating in isolation from one another and focusing not simply on job placement, but on career mobility for clients. Another factor is the future performance of the US economy, which is in some doubt as of this writing. In a time of slack labor demand, employers may lose interest in working with city and non-profit programs. Yet another factor is the ability of competing places — from Tampa, Florida, to Andra Pradesh, India — to attract and develop labor assets in ways that change firms' locational calculations and disrupt in-place workforce development efforts before they have had a chance to succeed. Finally, the backdrop created by state and national governments will be crucial to the success of cities' efforts. Support extended to or withdrawn from training organizations and public universities, the impulse to solve labor shortages by granting H1-B Visas or by financing domestic high-tech training, the legal and regulatory parameters surrounding employee participation and collective bargaining — all of these variables converge to form the stage on which local human capital policies are attempted.

Laura Wolf-Powers (annalaur@eden.rutgers.edu), Department of Urban Planning and Policy Development, Rutgers University, 33 Livingston Ave., 3rd Floor, New Brunswick, NJ 08901, USA.

References

Alssid, J. (2000) *Building an IT workforce system*. Presentation at 'Demystifying the Digital Divide: A Conference Series Exploring Community and Economic Development in the Digital Age', Part 1, Federal Reserve Bank of New York, 9 November.

Appelbaum, E. and P. Albin (1989) Computer rationalization and the transformation of work: lessons from the insurance industry. In S. Wood (ed.), *The transformation of work?*, Unwin Hyman, London.

—— and —— (1990) Shifts in employment, occupational structure and educational attainment. In T. Noyelle (ed.), *Skills, wages and productivity in the service sector*, Westview Press, Boulder, CO.

Arnold, W. (2000) An oasis for programmers in Bali. *The New York Times* Business/Financial Desk, 13 October.

Atkinson, R.D. (1998) Technological change and cities. *Cityscape* 3, 3.

Bacheller, J.M. (2000) Comment on state-level economic development in New York: a strategy to enhance effectiveness. *Economic Development Quarterly* 14, 5–10.

Baran, B. (1985) Office automation and women's work: the technological transformation of the insurance industry. In M. Castells (ed.), *High technology, space and society*, Sage Publications, Beverly Hills.

© Joint Editors and Blackwell Publishers Ltd 2001

Batt, R. and M Strausser (1998) *Labor market outcomes of deregulation in telecommunications services*. Proceedings of the 50th Annual Meeting of the Industrial Relations Research Association, 3–5 January, Chicago, Illinois.

——, S. Christopherson, N. Rightor and D. Van Jaarsveld (2001) *NetWorking: work patterns and workforce policies for the new media industry*. The Economic Policy Institute, Washington, DC.

Benner, C.C. (2000) *Navigating flexibility: labor markets and intermediaries in Silicon Valley*. PhD dissertation, Department of City and Regional Planning, University of California, Berkeley.

Brotchie, J.R., P. Hall, P. Newton, M. Bath and E. Blakely (eds.) (1995) *Cities in competition*. Longman Australia, Melbourne.

Bureau of Economic Analysis (2001) Gross Domestic Product, 4th Quarter (final). News Release, 29 March.

Campbell, S. (1993) Interregional migration of defense scientists and engineers to the gunbelt during the 1980s. *Economic Geography* 62, 204–23.

Cappelli, P., L. Bassi, H. Katz and D. Knoke (1997) *Change at Work*. Oxford University Press, New York.

Chapple, K. and M.A. Zook (2000) *Promising futures: promising practices in information technology training for disadvantaged adults*. Paper presented at the Association of Collegiate Schools of Planning Annual Conference, Omni Hotel, Atlanta, GA, 2–5 November.

Christopherson, S. (2000) Why do national labor market practices continue to diverge in a global economy? An institutional perspective on the persistence of difference. *Economic Geography* (forthcoming).

Clark, G. (1983) *Interregional migration, national policy, and social justice*. Rowman and Allanheld, Totowa, NJ.

Clarke, S.E. and G.L. Gaile (1998) *The work of cities*. University of Minnesota Press, Minneapolis.

Cohany, S. (1996) Workers in alternative employment arrangements. *Monthly Labor Review* 119.10, 31–45.

Cowell, A. (2000) From backwater to boom town: Dublin is a magnet for technology and young people. *The New York Times* Business/Financial Desk, 31 October.

Crains New York Business (2000) Space grabbers: leasing for the second quarter, by top industries in New York City. *Crains New York Business* 7–13 August, 53–4.

Eischen, K. (2000) *National legacies, software clusters and institutional innovation: the dichotomy of regional development in Andra Pradesh, India*. Paper presented at the Association of Collegiate Schools of Planning Annual Conference, Omni Hotel, Atlanta, GA, 2–5 November.

Fainstein, S., I. Gordon and M. Harloe (1992) *Divided cities: New York and London in the contemporary world*. Blackwell, Cambridge, MA.

Fitzgerald, J. (1998) Is networking always the answer? Networking among community colleges to increase their capacity in business outreach. *Economic Development Quarterly* 12, 30–40.

—— (2001) Job centered economic development: an approach for linking economic and workforce development. In J. Fitzgerald and N.G. Leigh (eds.), *Implementing economic development: strategies and cases for regeneration*, Sage, Thousand Oaks, CA.

Gester, K. (2000) *Immigrants, jobs and the New York labor market*. Paper presented at the Milano Graduate School Graduate Student Symposium, 19 May, New School University, New York, NY.

Gittleman, M. and D. Howell (1995) Changes in the structure and quality of jobs in the United States: effects by race and gender, 1973–1990. *Industrial and Labor Relations Review* 48, 420–40.

Greenhouse, S. (2000) Low-wage jobs leading gains in employment. *The New York Times* Metropolitan Desk, 1 October.

Herzenberg, S.A., J.A. Alic and H. Wial (1998*) New rules for a new economy: employment and opportunity in postindustrial America*. Cornell University Press, Ithaca, NY.

Hill, E.W. and H.L. Wolman (1997) City-suburban income disparities and metropolitan area employment: can tightening labor markets reduce the gaps? *Urban Affairs Review* 32, 558–82.

Howell, D. (1999) Theory-driven facts and the growth in earnings inequality. *Review of Radical Political Economics* 31, 54–86.

Kellerman, A. (2000) Where does it happen? The location and consumption of web information. *Journal of Urban Technology* 7, 45–61.

Keefe, J. and R. Batt (1997) Technology and market-driven restructuring: United States. In H.C.

© Joint Editors and Blackwell Publishers Ltd 2001

Katz (ed.), *Telecommunications: restructuring work and employment relations worldwide*, ILR Press, Ithaca, New York.
MacDonald, C.L. and C. Sirianni (1996) The service society and the changing experience of work. In C. L. Macdonald and C. Sirianni (eds.), *Working in the service society*, Temple University Press, Philadelphia.
Markusen, A. (2000) *Targeting occupations rather than industries in regional and community economic development*. Paper presented at the Association of Collegiate Schools of Planning Annual Conference, Omni Hotel, Atlanta, GA, 2–5 November.
——, Y.S. Lee and S. Digiovanna (eds.) (1999) *Second tier cities: rapid growth beyond the metropolis*. University of Minnesota Press, Minneapolis, MN.
——, P. Hall, S. Campbell and S. Dietrick (1991) *The rise of the gunbelt: the military remapping of industrial America*. Oxford University Press, New York.
Massey, D. (1995) *Spatial divisions of labor*. 2nd edn., Macmillan, London.
Mathur, V. (1999) Human capital-based strategy for regional economic development. *Economic Development Quarterly* 13.3, 203–16.
Moss, M.L. (1987) Telecommunications, world cities and urban policy. *Urban Studies* 24.
—— and A. Townsend (1997) Tracking the Net: using domain names to measure the growth of the Internet in U.S. cities. *Journal of Urban Technology* 4, 47–60.
Moss, T. (2000) Unearthing water flows, uncovering social relations: introducing new waste water technologies in Berlin. *Journal of Urban Technology* 7.1, 63–84.
Noyelle, T. (1987) *Beyond industrial dualism*. Westview Press, New York.
Oden, M. and D. Larsen (2000) *Growth and change in second tier high tech cities: growth and intra-regional distribution of high tech service industries*. Paper presented at the Association of Collegiate Schools of Planning Annual Conference, Omni Hotel, Atlanta, GA, 2–5 November.
Parker, E. and J. Rogers (2000) Sectoral training initiatives in the U.S.: building blocks of a new workforce preparation system? In P.D. Culpepper and D. Finegold (eds.), *The German skills machine: sustaining comparative advantage in a global economy (Policies and institutions, Vol. 3)*, Berghahn Books, New York and Oxford.
Peck, J. and N. Theodore (1998) The business of contingent work: growth and restructuring in Chicago's temporary employment industry. *Work, Employment and Society* 12, 655–74.
Piore, M. (1980) *Birds of passage: migrant labor and industrial societies*. Oxford University Press, London.
Pollard, J.S. (1995) *Industry change and labor segmentation: the banking industry in Los Angeles 1970–1990*. PhD dissertation, Department of Urban Planning, University of California, Los Angeles.
—— and M. Storper (1990) A tale of twelve cities: metropolitan employment change in dynamic industries in the 1980s. *Economic Geography* 72, 1–22.
Rondinelli, D.A., J.H. Johnson Jr. and J.D. Kasarda (1998) The changing forces of urban economic development: globalization and city competitiveness in the 21st century. *Cityscape* 3, 71–105.
Sassen, S. (1991) *The global city: New York, London, Tokyo*. Princeton University Press, Princeton, NJ.
—— (1998) *Globalization and its discontents: essays on the new mobility of people and money*. The New Press, New York.
Storper, M. (1997) *The regional world: territorial development in a global economy*. Guilford Press, New York.
—— and A. Scott (1992) The geographical foundations and social regulation of flexible production complexes. In J. Wolch and M. Dear (eds.), *Territory and social reproduction*, Allen and Unwin, London.
Teegarden, S. and B. Baran (2000) *The promise of the Workforce Investment Act: a guide for state and local policy makers*. Progressive Policy Institute, Washington, DC.
Uchitelle, L. (2000) Renewed corporate wanderlust puts a quiet brake on salaries and prices. *The New York Times* 24 July, A1.
US Department of Commerce (2000) *Digital economy 2000*. Office of Policy Development, US Department of Commerce, Economics and Statistics Administration.
Weinstein, B.L. and T.L. Clower (2000) *Technology, workforce and the Dallas-Fort Worth business climate: a review and critique of recent assessments*. Report prepared for the North Texas Commission, Center for Economic Development and Research, University of North Texas.

© Joint Editors and Blackwell Publishers Ltd 2001

Zook, M.A. (2000a) The Web of production: the economic geography of commercial Internet content production in the United States. *Environment and Planning A* 32, 411–26.
—— (2000b) *Grounded capital: venture capital's role in the clustering of Internet firms in the U.S.* Paper presented at the Association of Collegiate Schools of Planning Annual Conference, Omni Hotel, Atlanta, GA, 2–5 November.

© Joint Editors and Blackwell Publishers Ltd 2001