

Information-Based Global Economy and Socioeconomic Development: The Case of Bangalore

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Information technology is at the core of the current process of economic globalization. New areas of the world and new regions within countries are experiencing growth by entering the information age as manufacturers and users of information technology. However, often growth and decline take place simultaneously within the same region due to the tension that results from participation in global operations and the local socioeconomic context of the region. India presents a major case study of this tension, which we describe through a study of the region of Bangalore. The description reveals that the region faces pervasive forms of asymmetry between those who can participate in the global information economy and those who cannot. We argue that these internal disparities will ultimately affect capitalist development and discuss some issues of relevance to planners and policymakers concerned with the twin processes of globalization and local regional development.

Keywords Bangalore, developing countries, globalization, information technology, socioeconomic development

Over the last 20 years, a host of academics, politicians, and industrialists have declared the arrival of the information age. The idea that advanced industrialized countries might be moving to a postindustrialized society first took hold in the United States in the 1960s against a context of increasing prosperity and automation. The main proponents of this approach supported a historical model of development in the leading economies based on shifts in the composition of output and labor from agriculture to manufacturing to services to information activities (Bell, 1973; Porat, 1977; OECD, 1981). Many writers tried to quantify the extent of progress countries were making toward achieving an information economy by counting the number of people employed in information-related occupations, which was defined in various ways. On the whole, there was agreement that the 20th century had witnessed a shift of one-third to one-half of the population within leading economies into occupations that deal with information (Beyers, 1989; Kling, 1990). Change in employment was considered to be one factor in the wide variety of phenomena associated with the information society. Other factors included the diffusion of information technology within society, the expansion of institutions dedicated to the creation and manipulation of information, and the growth in universal public information services (Katz, 1988).

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Certainly by the 1980s, the "information society" concept described a revolution generated by technological advances that would transform the world from its traditional boundaries of nation states into a global society based on competition and on information exchange and manipulation (Angell, 1995). These technological advances have allowed leading economies to produce information processors and control apparatus to increase the productivity and quality of their products and services (Dicken, 1992). These features have given transnational companies (TNCs) distinct advantages in global competition and the potential to dominate smaller markets in developing countries. Leading the pack are the very producers of microelectronic products that not only supply the needs of TNCs, but also supply the products needed by third-world enterprises that intend to compete in the worldwide multi-billion-dollar microelectronics market. The result of these trends has been a restructuring of the international division of labor most visible in the shift of labor-intensive production toward regions and nations that were hitherto peripheral. At the same time, there has been a dramatic increase in the activities of the informal sector both in the core and periphery of the global system (Dunning & Norman, 1987; Enderwick, 1989).

Most accounts of globalization in the information age have tended to examine the phenomenon from the perspective of a few economically advanced countries. For example, studies have been conducted on the nature of new emergent organizational forms, institutional development, and the geographic relocation of industrial activity (Miles & Snow, 1986; Lash & Urry, 1994). In terms of the impact on developing countries, some writers are concerned that economic globalization will increasingly marginalize poorer nations from policymaking regarding the diffusion and exploitation of information and communications technology (Hamelink, 1994; Harris, 1996). They argue that the restructuring of capitalism that occurred in the advanced economies during the 1970s and 1980s did not occur in the majority of developing countries where the information revolution occurred at the same time as industries were striving to achieve technical efficiency. As a result, many information technology initiatives that have been undertaken both in the public and private sectors in developing countries have faced difficulty in improving productivity and effectiveness (Odedra, 1990; Madon, 1994a).

It is claimed that the information revolution that is taking place has far-reaching consequences for the future of cities and regions in the world. For example, Castells and Hall (1996) argue that "technopoles" have increasingly become a major feature of the new industrial landscape in advanced economies as cities and regions emerge as hubs integrating the global information economy. However, their analysis offers little insight into the socioeconomic impact of globalization on these technology hubs. Moreover, they fail to recognize that this type of urban-regional transformation is increasingly diversified around the world. While Western Europe is witnessing the maturity of its metropolitan areas with stagnant or even negative rates of growth, cities in most developing countries are experiencing an urban explosion as they face a new degree of exposure to global socioeconomic forces. The dispersion of these economic activities in developing countries does not follow any uniform pattern but tends to contribute to agglomerations of industries and services in and around focal points in urban sites (Sassen, 1994). Some parts of the developing world are consequently much richer than others as they rush to compete for the status of being the host location for major institutional players (Harris, 1996). Some writers praise the willingness among developing countries to live with massive regional variation in socioeconomic performance (Appleyard, 1995). Others have cautioned that such massive and growing internal disparities mean that developing countries have to cope with a vast territory that is becoming increasingly peripheral from the major processes that fuel economic growth (Avgerou, 1996).

The work of Castells (1986, 1989, 1996) is often cited as an important theoretical contribution to understanding the impact of information-based globalization on urban-regional processes. Castells developed a framework to describe the context of globalization in terms of the restructuring of capitalism and the emergence of a new mode of sociotechnical organization that he calls the informational mode of development. The basic elements of his framework are summarized in Table 1. Fundamental to Castells's thesis is the fragmentation of cities due to globalization. While the dual city is a classic theme of urban sociology, Castells argues that there is a new form of urban dualism on the rise, one specifically linked to the increasing differentiation and segregation of labor in two equally dynamic sectors of the growing economy---the formal economy comprised of knowledge-intensive activities and the labor-based informal economy.

While the focus of Castells's empirical research is the United States, the generalizable hypotheses resulting from his analysis have been used to examine the effects of the twin processes of capitalist restructuring and informationalism in other cities and regions of the world (Cohen, 1987; Salih & Young, 1987). Cohen's (1987) study shows how Mexico's diverse and extensive links to both world and national economies have enabled more balanced socioeconomic development within the country. In contrast, in Salih and Young's study of the city of Penang, Malaysia, the highly skewed process of indigenous development is due to the fact that the city has forged links with the world economy at the expense of links to its own local economy. However, these studies focus on the eco-

Table 1
Basic elements of Castells's framework

Restructuring of capitalism	1. Internationalization of economy with capital movements, labor migration, penetration of markets. 2. Weakening of organized labor in favor of capital. Dramatic increase in informal economy due to lower wages and social benefits. 3. Change in pattern of state intervention away from welfare activities toward capital accumulation (deregulation, privatization). State support for high-tech industries.
Informational mode of development	1. Use of computers to improve productivity in organizations. Trend toward decentralization and integration enables new actors to enter the global marketplace. 2. Segregation between permanent high-level knowledge workers (decision-makers) and flexible manual labor, which is adapted to the convenience of management. 3. Government control and manipulation of information flows but informed by the values and dynamics of society.
Urban-regional transformation	1. High demand for knowledge workers conflicts with institutional capacity to produce such skills. 2. More reliance of organizations and labor on the global economy and less on the social context of location.

conomic impact of globalization on regions in the developing world and tell us little about the growing social malaise and internal disparities that also have impact on these areas.

From a regional perspective, South Asia offers an interesting example of these growing internal disparities. Larger countries in the region like India and Pakistan are in a good position to use their extensive resource base to channel capital into selected high-technology sectors, thereby allowing the development of chosen areas. Hence, the response of many countries in contemporary South Asia has been to expand the production of high-technology goods in selected regions of the country in order to grab a place in the restructured international market and to guarantee adequate foreign exchange. This selected development of certain regions in South Asia brings with it major problems of social inequality. However, the literature tells us little about the extent of such internal disparity and its impact on socioeconomic development within the region.

The scope of this article is to contribute in this direction by describing how the process of globalization is affecting life in the city of Bangalore, which is the capital of Karnataka state in South India. Contrary to popular literature about Bangalore as an informational miracle, the scope of this article is to provide a more balanced view of its success by highlighting the unequal impact of globalization on the region. While acknowledging that cities respond differently to globalization trends according to local circumstances, we confine our analysis to one single location, in the belief that improving understanding of phenomenon in one context is an essential precursor to understanding them across more than one context (Lee, 1989). Hence, the findings from the study of Bangalore can be generalizable to other settings on the basis of being confirmed by additional studies that test them against the empirical circumstances of those settings. The argument we make is that the polarization that is taking place in the region of Karnataka, whereby the majority of the population are excluded from participating in the gains of the information age, is of long-term disadvantage not only in terms of local socioeconomic development but also in terms of global capitalist development. The second section briefly reviews the nature of the information society that exists in India. The third section describes the global processes that have contributed to making Bangalore the silicon valley of South Asia, and at the same time have impacted the local functioning and dynamics of the city and the region. This description is based partly on secondary data sources including central and state government reports and journal articles, and partly on interviews with government personnel, and community workers during July 1995. The final section of the article discusses the main issues that arise from the findings. We organize the discussion in terms of the elements in Castells's framework and discuss issues that are particularly relevant for understanding the impact of information-based globalization on developing countries.

India Enters the Information Age

India has the world's largest urban population, with projections for continuing growth to around 300 million urban dwellers by 2001 (Gilbert & Gugler, 1992). The shift in population to towns and cities has resulted in shifts in economic activity from primary to secondary and tertiary sectors. In India, the primary sector's share of gross domestic product (GDP) dropped from 60% in 1951 to less than 40% in 1981, and the productivity of workers in urban areas rose faster than rural workers (Sita & Chatterjee, 1989). This process of rapid urbanization in India has occurred at a time when India has been taking steps toward becoming part of the information-intensive global economy. As noted in the *Economist* (1996), "there are parts of the Indian economy that are skipping right over the

second industrial age and straight into the information era." As part of this process, in August 1991, India changed the provisions of the Foreign Exchange Regulation Act to allow 51% foreign investment equity in major industries. This move, reversing a 15-year period of import substitution policies, basically signaled a willingness to subsume internal development goals within the emerging trends toward participating in the global economy. Many foreign information technology companies began to establish themselves in India and to rely increasingly on Indian expertise to design, build, and test complex software applications for the global market, leading to a rapid increase in the number of information-related jobs in the economy (NASSCOM, 1995).

Regarding institutions dedicated to the creation and manipulation of information, no single entity exists for formulating national policies and strategies for the information technology sector. The government, through the Department of Electronics, the Ministry of Commerce, the National Informatics Centre, and various industry associations, provides broad support for the sector. There are a limited number of institutions devoted to informing, educating, and supporting business users on managing information technology in their organizations. These organizations articulate the interests of users, help diffuse technology in their sectors, and provide channels for information and experience sharing among the business community (Hanna, 1994).

The impact of the information age on the usage of information within Indian society at large remains highly biased in favor of the main cities and professional workers. In general, public libraries are concentrated in the main cities of India as shown in Table 2 (*World of Learning*, 1995). In college and university libraries, book collections vary in quantity and quality depending on the status of the institution. For example, in 1995 the University of Delhi had a book-to-user ratio of 1:10, while Anna University in Tamil Nadu had a ratio of 1:37, and the Aligarh Muslim University in Uttar Pradesh a ratio of 1:54 (*World Guide to Libraries*, 1995). By the late 1980s, automation of academic libraries was only beginning in most institutions, and today only a handful of universities have online access. Specialist libraries and documentation centres for professionals have benefited from relatively greater investment and integration with telematics. In India, there are over 1100 of these centers in which online databases coordinated through international agencies are available in digital or hard-copy form. For the general public, information booths have been set up in all district development agencies providing data on various economic and social activities (NIC, 1991). However, these centers are mainly frequented by students, rather than by local inhabitants.

In terms of the diffusion of telecommunications in the country, India has extremely low availability of services, especially in rural areas (Hanna, 1994). In addition to the high (and unmet) demand for regular telephone services, there is a growing demand for many specialized and intelligent services to enable companies (and government agencies) to transfer data. Table 3 indicates the various public network projects running or on the threshold of being commissioned in India, their objectives, medium, functions and number of users. However, in the main, these services suffer from overloading, poor performance, and high cost. As a result, large corporate users are setting up private networks (Heitzman, 1992). A dual structure therefore exists whereby specialized networks and advanced data services are increasingly forged ahead and developed for business needs, perhaps for technology enclaves, while the goal of basic universal services and other social objectives assume a secondary place.

The most important characteristic of the information infrastructure in India appears to be the inequality of its development. There is a distinct bias toward establishing access to information for urban inhabitants and for the business community at the expense of the

Table 2
Public libraries in India

Name of public library and location	Volumes	Periodicals
Sheth Maheklai Jethabhai Pustakalaya, Ahmedabad	144,000	---
Municipal public library, Ajmer	42,000	85
Public library, Allahabad	60,000	—
Public library, Amreli	32,000	---
Pandit Motilal Nehru municipal library, Amritsar	42,000	109
British Council library, Bangalore	40,000	120
State Central library, Bangalore	207,000	410
Central library, Baroda	234,000	—
Bharatiya Vidya Bhavan, Bombay	75,000	27
Baghbazar reading library, Calcutta	38,000	—
Delhi public library, New Delhi	700,000	---
Government public library, Delhi	68,000	—
Hardinge municipal public library, Delhi	68,000	—
P. Tandon library, New Delhi	56,000	106
State Central library, Hyderabad	248,000	—
Sumer public library, Jodhpur	38,000	—
Amir-ud-Daula government public library, Lucknow	105,000	38
Archarya Narendra Dev, Lucknow	77,000	146
Connemara public library, Madras	372,000	—
Nilgiri library, Ootacamund, Madras	40,000	—
Central state library, Patiala	68,000	130
Khuda Bakhsh oriental public library, Patna	80,000	830
City general library, Pune	30,000	—
State central library, Shillong	160,000	---
Dwarka Dass library, Simla	30,000	—
District library, Tezpur district, Assam	30,000	—
Trivandrum public library, Trivandrum	185,000	—
Jaikrishna public library, Uttarpara district	30,000	—
Saraswati Niketanam Subroi Mahal, Vetapalem district, Andhra Pradesh	32,000	—
Ram Mohan Free library, Vijawada district, Andhra Pradesh	31,000	—

Note. Compiled from the *World Guide to Libraries* (1995).

rest of the country. Within this national scenario, the next section describes the twin processes of rapid integration of Bangalore within the global information society, and urban-regional transformation within Karnataka state.

Bangalore—Internal Disparities of a City Caught up in the Information Age

A distinctive feature of most cities in the developing world is the fragmented character of their spatial organization. During the colonial period, this fragmentation was a direct consequence of the need to separate the European population from the indigenous (Balbo,

Table 3
Telecommunication network projects in India

Network	Provider	Objective	Services	Number of users
RABMN	DoT	Satcom for remote users	Messaging	300
INDONET	CMC	IT for all	E-mail, file	600
I-NET	DoT	Reliable datacom	E-mail, file	1200
GPSS	VSNL	Overseas datacom	E-mail, file	630
NICNET	NIC	MIS for govt	E-mail, file	450
ERNET	DoE	Datacom for R&D	E-mail, file	85
BANKNET	RBI	Interbank datacom	File transfer	254
SAILNET	SAIL	Datacom for SAIL	File transfer	Major SAIL sites
OILCOMNET	OCC	Datacom for oil sector	Messaging	Major oil centres
SOFTNET	DoE	Promotion of software exports	All types	n/a
ICNET	ICNET	Value added services	E-mail, databases	25

Note. From NASSCOM (1995).

1993). The few decades that have elapsed since the end of colonialism have not been sufficient to transform the fragmented city into an integrated one. In fact, it appears that the nature of fragmentation has shifted to one based on participation in the information-intensive global economy by a core elite, and nonparticipation by the masses.

Bangalore presents a case study of this type of fragmentation. It is the fastest growing city in India (ranked fifth in the country) with a population rising from 1.66 million in 1971 to 2.92 million in 1981 (a 76% growth rate), and a projected population of 3.8 million by 2000 (Heitzman, 1992). At the turn of the century, Bangalore was a provincial town in Southern Karnataka that had evolved from a medieval temple/fort center and a colonial military encampment. Industrialization until the 1940s centered around textile manufacturing. The city's emergence as a center for information technology stems from decisions in New Delhi shortly after independence to locate strategically sensitive industries well away from borders and coastlands. Bangalore was therefore an obvious place to base the Indian air-force base and other public-sector institutions, which promoted the establishment of a number of universities, institutions, and colleges providing engineering and scientific training (Holstrom, 1994).

Between 1951 and 1971, there was a marked correlation between industrial development and accelerating population growth, with figures doubling during the 20-year period. By the 1970s, the occupational profile of the city showed the distinctive patterns of an emerging information society with 10.5% of the population in professional positions, 16.5% in clerical jobs, and 45% in production of which around half were in electrical fields (Singhal & Rogers, 1989). By the late 1980s, Bangalore included 375 large- and medium-scale industries and had 3000 companies employing 100,000 people in the electronics industry alone. The city contained up to 10,000 small industries and 8 large industrial parks (Premi, 1991).

Bangalore now plays a prominent role in international electronics, telecommunications, and information technology, contributing almost 40% of India's production in high-technology industrial sectors (hardware, software, telecommunications) (*The Ob-*

server, 1995). The availability of highly skilled technicians, relative political and social stability within the state, the absence of labor conflicts, and an efficient banking network have meant that almost every big player in the information technology scene has its place there. Among indigenous high-technology companies that have established themselves in Bangalore are Wipro Systems (one of the largest Indian hardware and software vendors), Infosys Technologies, and Sonata Software. These, in turn, have been followed by a galaxy of multinational information technology companies attracted by the temperate climate of the city. These companies have adopted varying strategies to gain competitive advantage through offshore software outsourcing using local programmers and satellite links to design and produce customized packages. Some of these transnational companies (TNCs) like Digital Equipment, IBM, and British Aerospace have formed joint ventures with existing Indian players (NASSCOM, 1995).

Many of the high-tech companies in Bangalore are growing by more than 50% per year and are employing increasing numbers of graduates. For example, Siemens Communications, set up 18 months ago to build software for the group's digital switching systems, already employs 250 people and plans to grow its workforce of software engineers to 1000 by the end of the decade (*Observer*, 1995). The increasing demand for highly skilled "knowledge" workers threatens to outstrip the potential of local institutes in Bangalore to produce such skills, and many of the high-tech companies are having to recruit their workforce from other cities. In recent years, an increasing number of specialized small-scale workshops have been established to supply the high-technology industries. These workshops, most of which are characterized as being in the informal sector, recruit an increasing number of semiskilled migrant workers and help to bridge the gap between the demand and supply of labor.

To capitalize on its emergence as a popular location for software research, Bangalore has established a software technology park at Electronics City, just three-quarters of a mile out of the city. Hundreds of acres of research laboratories are occupied in the park by the likes of IBM, 3M, Motorola, Sanyo, and Texas Instruments. Companies that locate within the park are insulated from the world outside by power generators, by the leasing of special telephone lines, and by an international-style work environment. Bangalore is also in the throes of constructing a new upmarket international information technology park in the suburb of the city. The \$250 million project, due to open in 1996, is a joint venture between the government of Karnataka, a Singapore consortium, and the Tata Group. The project aims to integrate advanced work facilities with recreational and residential activities in a single location. The 56-acre complex has already attracted international attention, and thousands of enquiries regarding investment opportunities in the park have flooded in from the United Kingdom, North America, Europe, and Hong Kong. In parallel with the launching of this new park, a new international airport is also being funded by the Indian Tata Group and Singapore International Airlines, which is intended to provide a boost to industrial activity in Bangalore, in particular to the electronics and software industries (*India Today*, 1995).

Increasingly, the presence of a sizeable modern industrial sector has brought prosperity to the city and has given its central parts a cosmopolitan outlook. Measured in terms of expensive restaurants and pubs, boutiques, shopping plazas, and other signs of available purchasing power in the context of Western behavior patterns, a middle class is strikingly present in the central parts of the city and in other expensive areas beyond the center. A similar indicator of prosperity is the boom in the construction industry catering for the upper segments of the housing market and for commercial use. Cheap real estate

has been one of the reasons why entrepreneurs prefer this city to the choked or very expensive cities like Bombay (*Observer*, 1995).

For all the preceding reasons, today Bangalore is conceived internationally as a prosperous and modern Indian city. But this label is misleading. At least three more characteristics have to be added to portray the reality of the situation. First, there exists gross inequality between groups of different socioeconomic status within the city of Bangalore and the region of Karnataka. Second, extreme poverty prevails among many inhabitants in the city. Third, there is an acute problem of civic deficiency both in Bangalore city and in the state of Karnataka, together with poor access to information outside the capital. These three characteristics are described in the remainder of this section.

First, contrary to the international reputation earned by Bangalore, the advent of the information age has yet to make a dent in the overall economic picture of the state, which remains primarily an agricultural state. Out of a total population of almost 50 million people, around 76% live in rural areas, and there is a high incidence of rural poverty in these areas (GOI, 1990). For example, 95% of the rural poor population in Karnataka have an annual family income of less than \$102 (Nicoll, 1995). A sizeable share of the increase in the population of Bangalore city is related to migration. Many households of predominantly landless agricultural laborers and marginal farmers have been pushed out of their native rural villages by lack of means to survive and have been forced to move to Bangalore to find employment in the informal sectors as unskilled laborers. Tension has escalated within the city of Bangalore with the vast influx of migrant laborers from other Indian states, mainly from neighboring Tamil Nadu. These Tamil migrants seek menial jobs in construction and pose a real threat to local poor inhabitants, as witnessed in the violent anti-Tamil riots of 1991.

Foreign high-technology companies are largely responsible for the rampant wage inflation in Bangalore, particularly among experienced technical staff. For example, these companies typically offer remuneration of about \$395 a month, growing to triple the salary over 3–4 years. These discrepancies have led to social tension between the state government in Karnataka, which is committed to supporting the influx of multinational companies into the state, and the lobby of farmers and agricultural workers who are against the establishment of high-technology multinational fast-food chains within the state. The latest of these attacks was recently launched against the KFC (Kentucky Fried Chicken) chain by a lobby of Karnataka farmers (Nicoll, 1995).

Second, although poverty could be claimed to be of nationwide concern, in Bangalore the problem is more acute. In terms of absolute numbers, the poor easily predominate over the middle classes and professionals. While the share of urban inhabitants living in huts without access to infrastructure facilities is relatively small in Bangalore (10%) in contrast to other Indian metropolises (25–30%), there has been an exponential growth in this share over the last decade. The condition is continuously deteriorating both in terms of an increase in new slum areas and in terms of an increase in the population density of existing slums (de Wit, 1992). The discrepancy in habitat conditions between the rich and the poor inhabitants is also more extreme and more dramatically visible in Bangalore than in other cities. Due to societal modernization, the state is pressured to cut down trees to accommodate use of central urban land for nonresidential purposes and for expensive housing. Local middle-class residents and the urban poor are driven out of the city because of the rise in price of real estate and rent in the city center. They are therefore forced to squat on the urban fringe and to incur transport costs of commuting to the city each day in search for work (*India Today*, 1995).

While it is an open question as to whether the proliferation of shanty towns and environmental degradation is as a result of rural distress and increased population growth, or due to urbanization and globalization, what is certainly noticeable is the increasingly negative attitude of policymakers and planners in Bangalore toward slums. In discussions with the Bangalore state authorities, most policymakers did not officially acknowledge slum dwellers as citizens of the city, even though they clearly constitute the majority of the population. This attitude is reflected in the periodic demolition of any visible manifestations of poverty such as the frequent "clean-up" programs in which squatter settlements are demolished in order to preserve the quality of life of the so-called "modern" sector. Contrary to policy in other Indian cities, an increasing number of slums in Bangalore are located on private land that does not belong to the government and therefore precludes the eventual transfer of ownership to hut dwellers. In many cases, private developers build high-rise blocks so that less space is consumed for housing and the remaining space is allocated to commercial units for which private developers can reap hefty revenues.

A growing number of small, recently established nongovernment organizations such as CIVIC and the Bangalore Poverty Alleviation Programme (BUPP) have taken issue with the claim that slum dwellers have no right to live in the city. According to these groups, the recent internationalization of industrial activity in Bangalore has had a negative impact on the poor since less money is allocated to improving public services and providing urban development programs. These organizations are striving to give poor urbanites some say in the functioning of the city and are currently fighting against the state government's decision to force slum dwellers to share their already scanty land with private entrepreneurs. The BUPP is also developing an information system on slum activities using data compiled by slum dwellers themselves on the status of the land they occupy, the number of people living in each hut, access to amenities, slum dwellers' prioritization of their own problems, and on the nature of information and communication channels between economic agents in the informal sector. The information from the system will be circulated to city authorities for planning purposes and to slum dwellers themselves to make them more aware of their role in the life of the city.

Third, civic deficiencies caused partially by Bangalore's industrial success need to be faced. Although software companies are not big power users, they need to install voltage regulators, uninterrupted power supplies, and generators to run their computers, because of shortages of power. Similarly, there is a looming water shortage, with municipal pumped water only available 2 days a week and boreholes drying up. The Bangalore Development Authority is trying to encourage more private-sector involvement in the development of infrastructure, especially transport. In terms of industrial development, the city has almost reached saturation point. Today, the state of Karnataka is home to some 114 companies—all of which are located in Bangalore, due to the poor infrastructure facilities outside the city. The development of secondary cities within the state of Karnataka has been envisaged for some time by the Bangalore metropolitan regional development authority, with an ambitious project to develop a mega ring road and a light railway connecting all towns in the state. However, little has been done to date. As a result, thousands of young computer professionals continue to struggle along terrible roads to get to their jobs in software factories.

Information infrastructure in the region remains confined to the business community in the city with poor access to information outside the capital. While the 1965 Public Library Act specified the setting up of 10 district libraries, and 120 subdistrict libraries, by the mid-1980s, resources in the district and subdistrict libraries were suffering from de-

cline in funding resulting in inadequate building maintenance and staffing levels, discontinuation of periodicals, and outdated book collections. In terms of information and communication systems for the public sector and for universal usage, each district in the country has an information center set up by the National Informatics Centre for the purposes of planning and monitoring of development programs and for disseminating information to the public. However, to date, these systems have been largely underutilized, with a few districts performing ad hoc data processing rather than improving productivity of development programs (Madon, 1994b). More recently, the Department of Science and Technology (DST) has launched its Natural Resources Data Management System (NRDMS), with Karnataka volunteering to be the first state in the country to diffuse the system to all district offices by the end of 1996. This system attempts a more sophisticated and integrated areal planning approach through the use of geographic information systems, as opposed to schemewise monitoring of earlier initiatives. It is envisaged that each district in Karnataka will have its own computer system integrating a wide variety of physical and socioeconomic data relevant to the area concerned. However, one of the big problems with the initiative threatens to be sustaining the computerization effort once the pilot phase is over.

To sum up, in recent years Bangalore has grown into a modern, industrial city. Its economy has become more competitive, global, and increasingly dominated by information and communication technology. However, at the same time, the city and region of Karnataka have experienced growing poverty, social inequality, and gross deficiencies in public services.

Discussion

According to social theories of globalization and modernization, the nature of modern economic activity integrates distant localities in such a way that local events are shaped by events occurring many miles away and vice versa (Giddens, 1991). This dialectic process of globalization is in evidence today. For example, the consequences of software being developed in Bangalore impact employment prospects of programmers in advanced industrialized countries. At the same time, the influx of foreign high-technology industries in Bangalore has aggravated the local equilibrium, creating gross internal disparities in living standards, poverty, and civic deficiencies as discussed in this article. As a result, local groups in developing countries are beginning to confront decisions taken at a global level by multinational companies that have negatively affected their livelihood. This dialectic process between the growing internal disparities in Bangalore and the wider global context can be analyzed using the elements of Castells's framework.

Restructuring of Capitalism

The first issue in the framework related to the restructuring of capitalism is the internationalization of the economy. Through the emergence of new information and communication technologies, extremely powerful forces have been unleashed toward global integration. Together with other countries in the world, India has succeeded in participating in this globalization process due to its huge market and large human resource. It is assumed among policymakers in India that future prosperity for the country lies in its closer integration with the global economy and that any attempt to put an artificial bar on efforts toward economic liberalization would clearly jeopardize the great strides that have been made. According to Castells, internationalization of the economy in advanced

economies consists of capital movements, labor migration, internationalization of the production process, and the interpenetration of markets. In the case of India and many other developing countries, the "opening up" process has simply provided a base for foreign TNCs to tap the large domestic market and the local skill base.

Second, the framework points to a conscious weakening of organized labor in favor of capital and a rise in the activities of the urban informal sector in the wake of economic restructuring programs as this sector produces a significant number of consumer goods for national and international use. For example, the previous section revealed that a large proportion of the population of Bangalore is made up of low-level clerical and service workers in the informal economy supporting the high-technology firms. Apart from the increasingly important role of the informal sector in supporting global economic activity, the existence of this sector has another key function in developing countries. It is argued that the informal sector offers the rural poor an opportunity to improve the quality of their lives significantly and to participate in urban life (Balbo, 1993). If a large informal sector is one way of achieving greater equity, one needs to be very careful in fostering solutions aiming to make the city more integrated, homogeneous, and legal as advocated by some structural adjustment programs. Such a view may well be consistent with the industrial and postindustrial society in a Western context, but not so in cities in developing countries that need to accommodate for better or for worse an absolutely astonishing number of people.

The third issue relates to the changing pattern of state intervention. The recent pressures to deregulate, privatize, and be connected to the global market have forced many governments in developing countries to relegate the problem of poverty and gross internal disparities to the background. Studies carried out of the impact of high-technology development on cities in advanced economies reveal that income inequality between sections of the population tends to be an accepted phenomenon (Castells, 1989). However, in developing country contexts, we need to recognize the fact that those adversely affected by inequality constitute the majority of the population. For example, the previous section reveals how the majority of the population in Karnataka face increasing deprivation and poor access to civic amenities and information, while a minority take advantage of the prosperity brought about by closer integration of the city with the global economy. On moral grounds, one could argue that poverty is degrading because it deprives people of their dignity and destroys their creative capacity. But morality aside, leaving out large sections of the population from the fruits of economic growth has also been identified as being detrimental to the cause of capitalist development. As a result, according to new development ideology of the 1990s, the stance advocated by international agencies is that the governments of developing countries should strive above all to integrate all sectors of their economies into the global capitalist economy (North, 1995).

Informational Mode of Development

The first issue relating to the informational mode of development refers to organizational restructuring leading to increased productivity through the use of information technology in advanced economies. However, in low-income countries, a large information sector is not necessarily an indicator of overall prosperity, since it often exists because of organizational inefficiency or simply to absorb the surplus supply of labor (Katz, 1986). For example, in India, the lack of institutions responsible for the creation and manipulation of information results in the implementation of information systems with little understanding of their potential. For example, experience reveals that although communication net-

works have been introduced in India to decentralize decision making within the administration and information access for the public, these systems have been developed on an ad hoc basis and have delivered few real benefits in terms of enhanced productivity among user groups.

The second issue in the framework suggests that both advanced economies and developing countries exhibit segregation between high-level permanent knowledge workers, who are the core decision makers in organizations, and the flexible manual labor force. In the case of Bangalore and many cities in the developing world, this segregation is accompanied by social tension resulting from the extreme wage differential between these two groups of workers and the fact that many of these manual workers are migrants from rural areas and cannot easily adjust into city life.

Third, according to the framework, the informational mode of development in advanced economies results in the control and manipulation of information flows by the government, while being informed by the values and dynamics of society at a local level. However, in the case of many developing countries, this type of democratic organizational form in government is almost nonexistent, and "alternative" institutions are needed to reflect the interests of the silent majority. As the case of Bangalore reveals, the planning and control of the city and region lie firmly in the hands of organized government bodies, with very little opportunity for local entities to voice their concerns.

There is growing evidence that many nongovernment institutions and community organizations in developing countries have attained considerable success in involving the poor in both urban and rural areas in infrastructure-building projects (Harris, 1996). For example, experience has revealed that such initiatives have succeeded in organizing communities so that they are in better control over their work and residence. Grameen Bank's experience, now spanning a decade and a half, is a clear pointer that the poor are capable of taking significant initiatives when motivated by a catalytic agent (Shams, 1995). In the case of Bangalore, empirical evidence in the previous section showed that community organizations such as BUPP and CIVIC have attempted to record and thereby legitimize the economic activities of slum dwellers and semiskilled workers in the informal sector. Another crucial function served by BUPP relates to its attempt to capture information on informal channels of communication among slum dwellers and those engaged in economic activity outside the formal economy. According to BUPP community workers, the two worlds of the formal and informal sector are characterized by different exposure to information flow and communication patterns. The formal sector is usually connected to global communication networks, while for the informal sector communication could be hidden in social networks and experience. To date, we know very little about the functioning and dynamics of these networks in the informal sector.

Urban-Regional Transformation

The first issue in the framework relating to urban-regional transformation refers to the high demand for knowledge workers, which tends to outstrip the institutional capacity within the locality to produce such skills. This point is reinforced in Karnataka, with the stark contrast between select areas of the city and the rest of the region in terms of infrastructure and basic amenities, which has resulted in a handful of premier institutions in the city center being responsible for providing relevant skills for the industry. Essentially, only science and technology institutes within Bangalore city have the necessary infrastructure to produce the skills needed for the industry, creating excessive burden on city resources and resulting in an increasing shortfall of labor for the high-technology compa-

nies. As a result, domestic information technology companies are starting to relocate their activities to other cities in India, while foreign companies are seeking alternative countries within which to locate their subsidiaries.

Second, it is suggested that as the world economy is increasingly dominated by networks and flows of information, organizations are becoming more reliant on the global economy. As a result, knowledge workers appear to connect more with each other across boundaries with much less reliance on the local economy, creating two very distinct worlds within the same city in terms of housing, work, and consumption activities. While the increasing global connectivity of knowledge workers is apparent, no matter how integrated organizations and workers may become with the global economy, their ability to participate in global activities remains influenced by the local environment of their daily existence. In order to redress this imbalance, cities and regions are increasingly becoming critical agents of local socioeconomic development (Castells & Hall, 1996). In the context of developing countries, although municipal and regional authorities have less power than national governments to act upon the processes that shape their economies, they may be in a better position to negotiate with TNCs, to create conditions within the locality to attract new sources of domestic and foreign capital, to support the progressive upgrade of human resources and physical infrastructure, and at the same time to respond to indigenous needs such as equity in development indices.

The difficult challenge for governance in cities like Bangalore is how to provide services for a rapidly growing population, a large proportion of whom are illiterate, and at the same time seek to lock the city into the benefits of the global economy (Townroe, 1996). In order to achieve this goal, the new institutionalists argue that old systems of city management with an overdependence on organized government need to be replaced with alternative "appropriate" institutions (Toye, 1995; North, 1995). The argument put forward by this group of writers is that free-market conditions and liberalization of economic activity need not be in conflict with the development of the informal sector and with the poverty alleviation goals of governments. Much depends on the new opportunities that are created for the poor to freely market their products and services. While abandoning the institution-free theory of neo-classical economics, this approach builds on or modifies certain assumptions of the neo-classicists such as scarcity, efficiency, and hence competition by engaging the services of nongovernment institutions and community organizations.

With the backing of local government, grass-roots mobilizations can play a more decisive role as representatives of civil societies and thereby restore some level of local control in the process of globalization. For example, the pricing policy, the monetary policy, the credit policy, and the industrial policy of the local government would all have to be synchronized to support microlevel initiatives of community organizations. While governments have failed to deliver resources directly to the urban and rural poor under conventional programs, microlevel nongovernment initiatives will not succeed on their own. They require firm and direct political support from local government.

A final issue to address related to urban-regional transformation is that as the events that occur in distant localities across the globe are increasingly influencing one another, the problems of urban and rural development within one region are becoming less distinct. While the visible manifestation of poverty in developing countries typically exists in the city, its cause is often found in the rural areas (Wratten, 1995). For example, urban growth in Bangalore is linked integrally to the poor impact of rural development programs in Karnataka state. While urban areas benefit from a larger share of national resources, development theorists argue that investment should be targeted toward creating

greater synthesis between urban and rural development programs by easing growing industries out of core urban areas into its less developed hinterland (Lipton, 1977).

Conclusion

There is an evident tension between the notions of entering the global information society and local development. Those indicating globalization are almost never located at the local level, and often their choices carry unintended mainly negative consequences, which depress rather than stimulate long-run development of the locality. Cities and regions are indispensable elements in the information economy in which the main source of productivity is the capacity to generate and process new information using labor. This labor is, in turn, dependent on the social milieu of life and culture in the city. Individual citizens should develop an awareness of the precise role of their activities in the information economy. On the basis of such awareness, they will be better placed to bargain for control as it relates to their interests.

Bangalore is one city among many undergoing urban-regional transformation due to trends in globalization. While the city is most discussed in the literature for its recent integration into the global economy, the contribution of this article has been to focus on the accompanying social decline in the region. We have found the elements of Castells's framework to be relevant for the present study, and within each of the elements we have tried to raise issues of particular relevance to developing countries. We acknowledge that the current study is only a stepping stone and needs to be built on through a greater understanding of how global processes locate in local territories. This requires new concepts and research strategies that combine analysis of economic indicators and ethnography to investigate how the rapid growth of informatization affects the social fabric of developing countries.

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