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# Location theory in reverse? Location for global production in the IT industry of Bangalore

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**Abstract.** This paper is a detailed study of the location history of eight software and information technology (IT) enabled service firms, with varying attributes such as age of firm, type of work undertaken, and ownership sited in the southern Indian city of Bangalore. These cases are used to relate urban restructuring occurring in the city of Bangalore to the strategic shifting of location of firms within the urban fabric. While IT firms cannot be strictly classified as producer services, it is possible to contextualise their location decisions in terms of other office-based economic activities, such as producer services. Findings from the case studies are examined in relation to urban growth theories of the 1980s and 90s, which were related to an expansion of the service sector in advanced economies. The literature discussed in this paper explains the role of growth in producer services in suburbanisation of office space and the development of 'edge cities' and 'suburban downtowns' as alternatives to and in competition with traditional city centres. Studies of office location and contact patterns indicate the retention of management functions in the CBDs, with a consequent relocation of routine office operations to these suburban office spaces. The findings from the firms studied in Bangalore indicate a reverse pattern of peripheralisation of control functions and a retention of routine production functions in the core urban areas. The limited need for face-to-face contacts with actors in the local urban economy and the export-related output of this offshore industry are contributors to this apparent reversal of location dynamics. The paper briefly concludes with directions for future research on such specialised service production activity that is often being located in cities of developing countries, and its impact on the urban structure of these cities.

## Introduction

Global outsourcing of production in the information technology (IT) industry has become integral to contemporary globalisation. Unlike other more 'invisible' sectors such as finance or banking, the dispersal of IT production and related services to countries like India and China has received more than its fair share of media attention. It is in fact a very real example of globally integrated production and service provision made possible by the rapid developments in communication technology.

'Information technology', as understood in this paper, is the production of software applications, embedded software, software customisation, and IT enabled services (ITES) provision. The 'IT firms' referred to are of two types—software and ITES. Software firms include all firms that undertake production of programming applications for end users or carry out production of applications or parts of applications on contract to other firms. ITES firms are those firms that provide services enabled by communication technology for labour-intensive back office operations. These operations may involve direct contact, as in the case of call centres and customer services, or may relate to back office functions for airline bookings, medical transcription, and so forth.

In the case of India multinational IT firms took advantage of the skilled labour available from various public sector industries, universities, and research organisations, and established offshore production centres in the late 1980s. From an initial interest shown by large multinational firms such as Texas Instruments and Hewlett Packard there emerged a growth and agglomeration dynamic, which has now led to location of

most major software firms in the world in India, accompanied with rapid growth and internationalisation of domestic firms. The IT industry that expanded rapidly in India after the 1991 economic liberalisation has attracted attention because of its potential for further expansion and its rate of growth.

“The industry generated 330 billion Rupees (USD 7.7 billion) in 1999, 15 times the level in 1990. Exports of IT rose from USD 150 million in 1990 to nearly USD 4 billion in 1999. One study estimates that this could rise to USD 50 billion by 2008, leading IT to account for 30% of India’s exports and 7.5% of its GDP. Employment in the IT industry is projected to rise from 180,000 in 1998 to 2.2 million in 2008, to account for 8% of India’s formal employment” (HDR, 2001, page 37).

According to a recent estimate, India now has the highest number of IT export-related jobs (212 000 in 2003) and revenues in the world, followed by Ireland (60 000), China (42 000), and Canada (30 000) (Evalueserve, 2004).

Most of the export-related IT firms in India are located in and around the major cities. Of these, Bangalore, Hyderabad, Chennai, Mumbai, Delhi [suburban towns of NOIDA (New Okhla Industrial Development Area) and Gurgaon], and Pune lead in attractiveness for location (NeoIT.com Report, 2004).

While the first multinational IT firms were located in Bangalore, making it the city most identified with industry in India, realisation of the market potential for attracting offshore investment in the sector has more or less driven national urban policy in the last decade. Cities have become valuable resources for state governments to compete for footloose global investment. Bangalore has become a success story that other cities are vying to emulate. Unfortunately, while urban policy is strongly oriented towards creating an edge in a dynamic economic environment, very little study has focused on the spatial implications and patterns of location of these firms in an urban setting. Academic studies and media reports on the growing inequality in incomes and lifestyles (Benjamin, 2000), spatial polarisation (Nair, 2000), and crisis in civic infrastructure (Rappaport, 1996) have highlighted issues related to agglomeration of IT firms, but no concrete investigation has been made on the location dynamics per se.

A theoretically grounded study of the location of IT firms is constrained by the lack of a directly relevant body of work to place the study in context. Since the work done in IT firms is essentially office based, the extensive literature on the location of producer services (services provided by specialised firms to other firms, as opposed to individuals) from the 1980s and 1990s presents the only alternative for comparison. As producer services became a key determinant of physical change in the postwar economies of the US and Western Europe, studies of the location of offices became essential for understanding and for planning city development. Scholars documented new urban forms created by suburban location of offices such as suburban downtowns (Hartshorn and Muller, 1986), new suburbanisation (Cervero, 1989; Stanback, 1991) and edge cities (Garreau, 1991). Others, like Daniels (1979; 1985) and Schiller (2001) represented the shifting location of offices through their Multinucleation and Seed Pod models. Empirical studies on the determinants of location for producer service firms can be broadly grouped into three categories. The first relates to the role of face-to-face communication and its substitutability with technology (Daniels, 1979; 1985; Gottman, 1983; Illeris, 1996), the second relates to organisational restructuring and its spatial repercussions (Dicken, 1998; Illeris, 1996; Marshall and Woods, 1995) and the third relates to ‘other’ locational determinants which may be internal or external to firms (Airoldi et al, 1997; Bondenman, 1998; Campbell and Harrington, 1997; Coffey, 2000; Leslie, 1997; Zhou, 1998).

However, studies on producer services have dealt mostly with cities that are the 'control centres' of the new economy. This paper focuses on the city of Bangalore as an example of a city located at the other end of the spectrum. Though it could be said that the city is integrated into an international division of labour, the nature of the economic activity is far from being a 'control centre'. It is the recipient of a globally outsourced industry, where firms use locally available skilled labour to save costs of production in advanced economies. The purpose of this paper is to present detailed studies on selected firms involved in offshore production of IT in Bangalore and to highlight their unique patterns of location. The example of patterns and spatial restructuring observed in Bangalore is used as an illustration of the inadequacy of location studies of producer services for analysis of export-oriented IT firms, especially in the context of developing countries, where they are most often located.

The paper is divided into seven substantive sections. The first deals with the context of the globally outsourced IT industry with respect to Bangalore. The second section gives details of the methodology of the empirical study conducted in the city. In the next section the location pattern of the firms at a city level is discussed with a brief background of policies of the local and state governments that have influenced decisions of firms and developers. In the fourth and fifth sections location histories and spatial decisions are discussed and the findings are generalised to present an overall scenario of location/relocation of firms in the city. The sixth section illustrates how findings from the research represent a divergent view on location of offices at an intrametropolitan level from studies based on location of producer services in advanced economies. The last section puts forward two directions for research on location of 'office-based industries' as distinct from other office location studies—one arguing for a detailed study of contact patterns for such firms and the second arguing for comparative studies of location across other cities that are hosts to export-oriented production.

### **The global IT industry in Bangalore**

The city of Bangalore, located in the southern state of Karnataka, has acquired international acclaim and is often known by names such as the 'Silicon City of India', the 'IT Capital of India', and the 'Technology Hub'. Its transformation from the 'Garden City' and the 'Pensioners Paradise' to the 'Silicon City' has been a steep curve of change effected in the last decade.

Bangalore had 1154 registered IT firms in 2003 which had grown from a paltry 13 firms in the period 1991–92. These firms exported software and services worth US\$2.67 billion during the period 2002–03, which was almost half of the entire IT export from India (for further data refer to the website <http://www.bangaloreit.in>).

The first multinational firm (Texas Instruments) to locate in Bangalore (in 1984), acted as a precursor to other such firms, creating confidence in investors to locate in the city. Thereafter, agglomeration economies were set in place for future investments. The nature of the industry changed gradually to include the whole gamut of research and development, routine software customisation, and, more recently, back office services. As a result of this diversification there is wide variety of firms located in the city (Parthasarathy, 2000; Saxenian, 2000). A significant development in the IT industry in Bangalore has been the growth of domestic firms such as Wipro, Infosys, and Satyam Computers into large multinational firms, as a result of the boom in offshore business coming to India. It is these firms that have moved up the value chain and have taken up end user application products and services.

## Studying intrametropolitan location in Bangalore

This paper is based on an empirical study conducted to understand intrametropolitan location of IT firms in Bangalore, both at an overall city level and also through a detailed analysis of location histories of selected firms.

Location histories of firms and the logic of location decisions were reconstructed through forty-three interviews (conducted between 2001 and 2003) with key decision makers in the selected firms. The information derived from these interviews was supplemented with discussions with property developers (four interviews), real estate consultants (eight interviews), business promoters (three interviews), and local planning agencies (seven interviews). In addition to the interviews, spatial patterns at the city level were analysed through an address database of all registered firms in the city in 2002 (STPI, 2004) and data on property value trends maintained by the real estate consultants that were interviewed.

In order to get a wide mix of firms for the study of intrametropolitan location in Bangalore the adopted criterion was based on a classification given by India's National Association of Software and Service Companies (NASSCOM). The classification groups firms according to their share in the total software exports from the country (table 1).

As illustrated above, the case-study firms have been selected as per the export segments in the existing pattern of the industry in the country. The eight case studies vary according to the level of revenues, ownership, and types of products. They are all export-oriented firms with the majority of the production being for an external market. In that sense they may all be considered 'global firms'. All the firms have a considerable presence in Bangalore with their headquarters or Indian headquarters located in the city. The oldest firm is Wipro Ltd, which began operation in the Software sector in 1983, and the newest firms Acusis, which began operation in late 2001.

Semistructured interviews of about 45–60 minutes were conducted with key people in the firms detailed above. These people were typically chief operating officers (COOs) and managers of administration and facilities, human resources, and real

**Table 1.** Segments for case-study selection (source: adapted from NASSCOM, 2002).

Segment	Share of exports, 2001–02 (%)	Total revenue (\$ million)/ characteristics	Selected case firm	Revenue of firm (2001–02) (\$ million) <sup>a</sup>
Tier-1 players	33–35	>200	Wipro Ltd	418
Tier-2 players	33–35	20–200	1 flex <sup>b</sup>	68
Multinational corporation backends	14–15	Captive offshore development centre	IBM	170
Small/startup players	14–15	<20	V Moksha Mind Tree Info Quark First Ring	10 17 0.08 8.5
Focused service players	3–4	Focused on particular domain and deriving at least 50% revenue from service provision	Acusis	Had not completed year of operation at time of data collection
Product + service players	3–4	More than 50% revenue from software products	1 flex <sup>b</sup>	

<sup>a</sup> Calculated at exchange rate of 1US\$ = R 47.

<sup>b</sup> Included in two segments because of the nature of production.

estate portfolios. On average five or six people in different managerial positions were interviewed in each firm. The questions that were asked were divided into four substantive groups: details on nature of work, size, and history of the firms; location history of the firms; factors that influenced location, internal, and external linkages of the firm; and lastly the extent to which the firms utilise local resources.

Although a checklist of indicators on which information was to be collected was prepared before undertaking the interviews, the attitudes and communicativeness of the firms differed. The larger the size of the firm, the more hesitant the executives were in sharing information. Spatial decisions, in the case of multinational firms, are sometimes made by people who are located elsewhere; therefore the local management had limited awareness of the rationale behind spatial decisions. The domestic firms, on the other hand, were concerned about the image that they portray locally and were reticent in discussing aspects such as local resource utilisation and company policies on location, housing, and transport—issues which would jeopardise their position with the local public authorities. Due to these roadblocks in free communication with the interviewees, the strict schedule of questions had to be abandoned in most cases. Wherever a problem of a limited interview was faced, key information on opinions and decisions was obtained from the interviews and supplemented with information from other sources, such as the property agents that the firms had liaised with or the contacts of these firms in the planning authority.

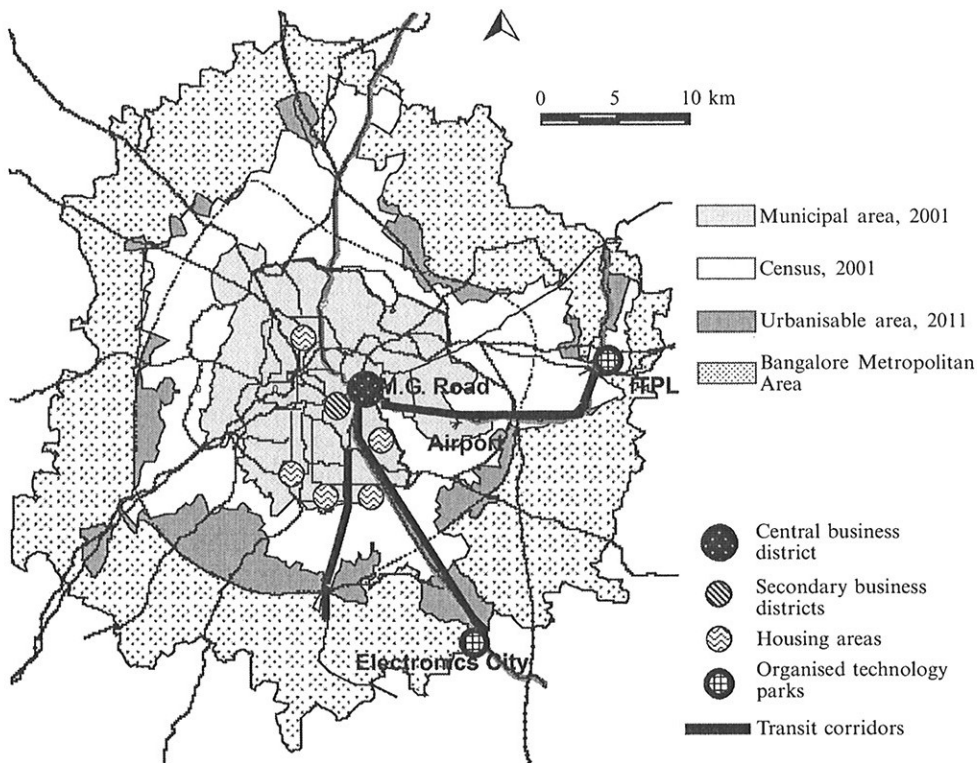
### **Location pattern at the city level**

When the spatial typology of location of IT firms in Bangalore is analysed, four major areas of concentration can be identified, each of which represents a unique urban pattern. These areas are:

- central business district (CBD) and the secondary business districts (SBD): multi-tenant office complexes;
- municipal areas in the south and east quadrant: converted residential properties;
- along major highways leading out of the city (suburban): single-firm offices;
- special zones or locations in the periphery (peripheral): specialised multitenant office complexes and single firms campuses.

Concentration of firms in the metropolitan area of the city (figure 1), as well as the development of infrastructure for the IT industry, has led to two distinct urban phenomena—multinucleation and peripheralisation of offices and retail space. As firms seek out areas for expansion and dispersal, the city has changed from a single-core CBD to multiple commercial and retail cores.

Several industrial location and urban policies have contributed to the peripheralisation of offices. The first step was the location of the satellite earth station in an industrial area (Electronics City) to the south of the city in 1995. The communication technology available at that time required a clear sight link with the wireless transmitters. This prompted firms to choose locations within the range of the wireless network. Additionally, state government policy to encourage the sector has translated into the development of two major technology parks in the periphery that are aimed at providing high-quality telecommunication infrastructure and commercial space to firms. Plans are underway to extend the technology parks to a much larger technology corridor, which would offer further incentive to firms to shift their offices to suburban and peripheral locations. Urban policy made by the Bangalore Development Authority is also oriented towards offering firms 'hassle-free' location. The IT policy of the state has facilitated location of offices to anywhere in the area of jurisdiction of the development authority, often overriding zoning regulations of the master plan. The development authority has been 'unofficially' instructed to give planning permissions to IT firms in a



**Figure 1.** Areas of concentration of firms in the Bangalore metropolitan area.

maximum of three days and to approve any change of use required (interview with the town planning member, Bangalore Development Authority, August, 2001). Similarly, office development by private builders is permitted with exemptions from the master plan if the development is being custom built for IT firms (Millennium IT Policy, 2001). As a result of these incentives offered by the state the real estate market in Bangalore was flooded with small-time entrepreneurs who wanted to capitalise on the demand for space from firms. The oversupply of space eventually led to a crash in values when the global industry went through a slowdown in 1997. This was expressed forcefully by one of the developers interviewed for the research:

“The policy is useful because it gives incentives for production of new space and initially it had that effect on the market. People who had vacant land or industrial land in the periphery started to convert it to Software Parks. Large builders also came into the market. But the problem is that it locks up space in a single use only. If the IT firms do not take up full occupancy then the investment is not recovered. The IT slow down has resulted in even committed space not being taken up as expansion plans are on hold” (interview, July 2002).

In effect, IT firms in Bangalore have had access to a buyer’s market for office space in the city. Supportive industrial policies of the state have facilitated firms having access to favoured locations that are often linked to tax incentives. While policy has been more reactive than proactive, supply for space has not been a limiting factor for location. This is also illustrated in the following detailed study of location history of selected firms in the city.

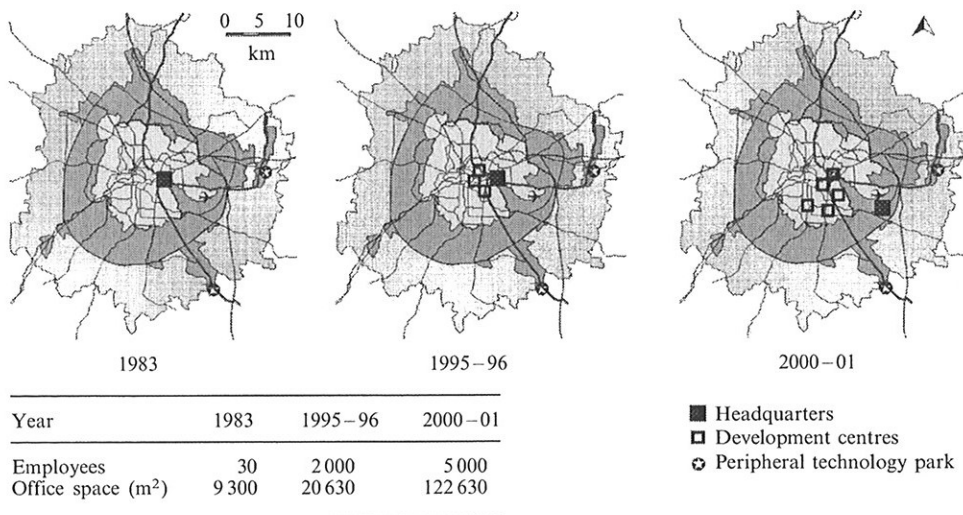
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### **Location history and spatial decisions**

Analysis of the location history and the future location plans of the firms studied suggests a sequential process of location and relocation. A common strategy of the firms is to make a distinction between administrative and production functions after reaching a certain size. While administrative functions relate to the running of the firm, production functions are those that are directly associated with the realisation of the project/technical work of the firm. Production is often undertaken in what are called 'development centres' or 'offshore development centres ('ODCs')'. The ODC is a model of functioning, in which the offshore office becomes an extension of the office of the client, and all systems are set up as replicas of the client. Therefore the office is required to be segregated from the other project offices, either physically or through electronic security systems. Separation of the ODCs from each other and from the administrative functions is as much a function of growth of the firms as is the need to protect client information, and has implications for location decisions of firms. Following this is a discussion of location strategies and histories of five of the eight firms studied. These firms have been selected because they show a clearer history of location in the city compared with some of the newer firms.

#### **Wipro Technologies Ltd**

This firm belongs to a large business group that diversified into IT in 1983 by setting up a subsidiary. The city of Bangalore had been the headquarters of the business group for thirty years before the IT firm was set up. Hence, Bangalore was also its natural choice for headquarters for the new firm. Initially, the administrative office of Wipro Technologies was located in the CBD, and the software development centres were located in three other offices around the CBD. The period of 1985–95 was a testing phase for the firm, and no major investment in property was considered until certainty of growth in this sector was established. Until 1995 the firm had grown from 30 employees to almost 2000 employees, who were divided equally in each of the four offices in the CBD. The period of 1995–96 brought about a shift from purely onsite to offshore software production by Wipro. Onsite production was undertaken by sending project teams abroad to the clients, whereas offshore production meant that projects could be worked on remotely. Once the credibility of the firm had been established clients were willing to increase the offshore element in the projects. Since expansion in the CBD was restrained by the phenomenally high rental and lack of large floor space, the firm rented space for new development centres in the residential areas while maintaining the corporate office in the CBD. Subsequently, as and when large projects were acquired by the firm, new space was leased in the proximity of the earlier development centres and an ODC established. Therefore, Wipro developed a network of development centres in the city and chose not to consolidate them in a single physical location later. As the IT industry boomed in 1996 and the firm had established its brand name, Wipro started a phase of investing in property in the city. They undertook two major projects, one to own and develop their largest development centre in the periphery in special economic zones, and the second for consolidation of the corporate headquarters of all the businesses in a single location. In late 2001 both projects were completed and the corporate headquarters of all Wipro companies were moved to a peripheral location about 12 km from the municipal area boundary.



**Figure 2.** Stages in the location of Wipro Technologies Ltd.

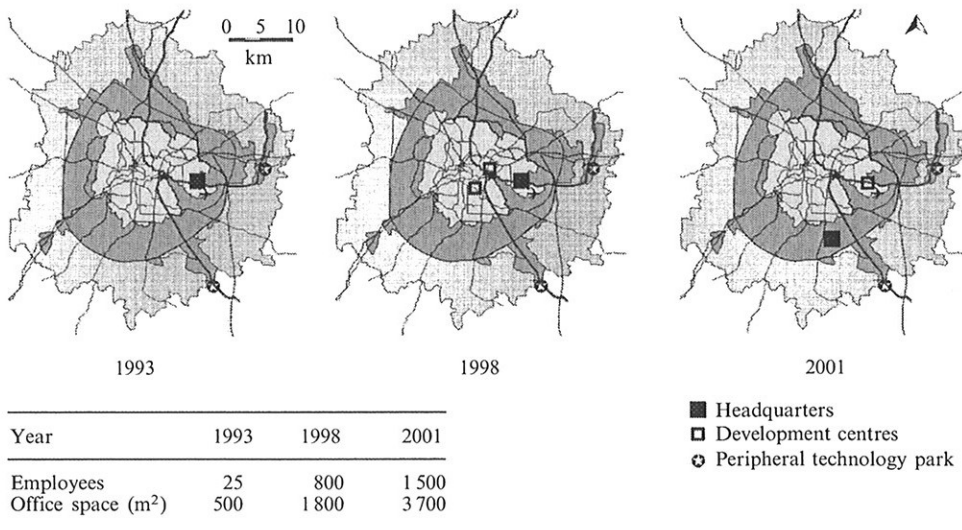
The stages of location of the firm can be divided into the following three phases (see figure 2 for location pattern):

- phase 1: initial location of headquarters and development centres in the CBD and SBDs in commercial complexes;
- phase 2: expansion of development centres into independent buildings and commercial space in residential areas;
- phase 3: decentralised development centres in various locations (suburban and municipal areas) and centralisation of corporate headquarters in suburban locations.

#### **IBM India**

IBM, which has been located in Bangalore for the last ten years, has a number of large offices all over India, but still decided to locate its headquarters for its India operations there. In 1993, when it started operation in the city, the firm arrived as a joint venture between the Tata Group (large Indian business conglomerate) and IBM International. The firm then occupied an office space owned by the partner firm in a prime commercial complex near the airport. This office still remains today the registered office of IBM India. In 1997 the stake of ownership by the Tata Group in IBM was reduced to 20% and IBM Global Services was extended to India. This was the time that software development had taken off in India, and the firm leased two office spaces for development centres, one in each of the CBD and the SBD. In 1998 the ownership was transferred completely to IBM International and the firm became a fully owned subsidiary. At the same time, in order to expand the IBM R&D located in Bangalore, the firm made a decision to consolidate its space in the city. A long-term lease agreement was made with a builder and landowner for a space about 10 km from the CBD along the corridors leading to the special economic zones. The agreement involved renovation of an existing building to suit the needs of the firm and a special agreement for future expansion in the land abutting the building. Though the firm had two options for sites for a consolidated campus, one being along an alternative corridor at a distance of about 15 km from the CBD, the current site was selected due to easier terms of the lease agreement and the employees' choice to stay closer to the city. After the crash of the IT global business, expansion plans for the construction of a large campus on the site were put on the back burner, but the development centres were





**Figure 3.** Shift of the location of IBM India in three phases.

mostly moved out to this single consolidated space. Though the office near the airport and the other two city offices are maintained as a backup space, the development centres and the headquarters are concentrated in the suburban location.

The shifting of location of the firm can be distinguished into three phases (see figure 3 for the location pattern):

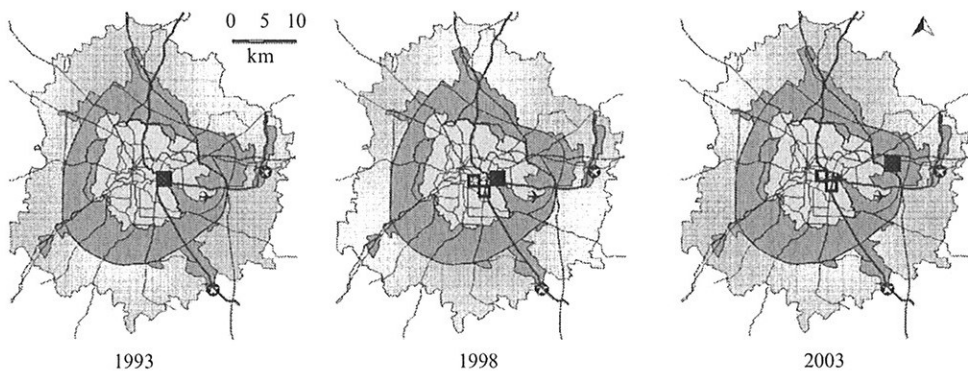
- phase 1: initial location near the airport in leased offices in a commercial complex;
- phase 2: expansion into prime commercial complexes in the CBD and SBD locations;
- phase 3: relocation to a place along the highway into a single-user occupied building while the original office is maintained.

#### **I flex**

I flex is an independent firm and was set up in Bangalore in 1993 and was once a part of Citicorp (a subsidiary of MNC Citigroup). Citigroup still owns 40% of the firm, but 1998 marked the final emergence of I flex Ltd as an independent firm selling Citigroup's banking-related software. The original location of I flex was a leased office space in a prime commercial complex in the CBD. This office was already available to the firm as a part of Citicorp. However, with the expansion needs and the rapid growth of the firm by 1998, additional space for the second development centre was leased in a commercial complex in the SBD. In 1998 the headquarters of the firm was also moved to Mumbai to achieve proximity to financial institutions. In the next planned move of the firm a site has been purchased in a suburban locality that lies to the east of the city, near the special economic zone. Construction of a 12 500 m<sup>2</sup> building and campus has already been initiated and the scattered development centres and the headquarters was scheduled to have moved to the new campus by the end of 2003.

As with the previous two cases the location cycle of I flex leads to ultimate suburbanisation and a consolidation of activities in a single campus. The phases can be distinguished as follows (see figure 4 for the location pattern):

- phase 1: initial location in a commercial complex in the CBD;
- phase 2: expansion into an additional office space in the SBD;
- phase 3: consolidation of space in a campus in a suburban location.



Year	1993	1998	2003
Employees	150	600	1 000
Office space (m <sup>2</sup> )	1 060	2 500	15 000

- Headquarters
- Development centres
- ⊗ Peripheral technology park

**Figure 4.** Stages in the location of Iflex.

#### First Ring and Acusis—ITES firms

There is a dissimilarity of location requirements for production of software-enabled and internet-enabled services. Location of ITES firms takes place as a result of a trade-off between rent, transport and employee costs, and additional costs of communication networks with sufficient speed and reliability.

Among the case studies First Ring and Acusis are both service firms which provide IT-enabled Services that are very much dependent on a high-speed internet connectivity. The basic infrastructure for these kinds of firms is now available throughout the city because of a newly laid fibre optic network, and yet they opt for completely opposite locations for their facilities. First Ring is located in the technology park, almost 15 km from the airport, and Acusis is located near the CBD. When the locations of Acusis and First Ring are compared, the influence of business models on location choice is illustrated. Acusis, a medical transcription firm, relies on high-speed communication to get voice data from its clients (large hospitals) in the US that has to be transcribed and sent back before the doctors return to work the next day. The speed of communication and of the transcribers is key to sustaining the business. Similarly, First Ring is also a service firm which offers back office operations such as airline bookings, customer support, and call centres, which have short turnaround times. Both of the firms have parent firms that are located in the US through which work is channelled to the main service centres located in India. However, First Ring, prioritising the quality of infrastructure, chose to locate itself in the technology park (20 km from the city centre) and transports its employees, working in 12-hour shifts, from all over the city to this peripheral location (interview with the personnel manager of First Ring, July 2002).

On the other hand Acusis has chosen to locate itself near the CBD. The firm is based on a model of 'home based transcription' (HBT) which enables the employees to get work at home through a high-speed communication network and to be able to transmit the output to the head office via the same network. The firm aimed to employ approximately the same number of employees as First Ring by the end of 2003, but the employees would not have been required to travel daily to the office, thereby saving huge costs which have been channelled into having a smaller but centrally located office. The finance manager of the firm stated that the central location was selected to ensure that in case the employees involved in the HBT needed to contact the office,

they could do so without having to travel large distances thereby saving time and money.

Contradiction in the above location choices lies in the fact that one firm prioritising high quality communication networks opted for a high-rent and high-transport-cost location, whereas a similar firm opted to locate in a smaller and cheaper office in the city and employed technological solutions to minimise transport costs.

### **Finding patterns in intrametropolitan location**

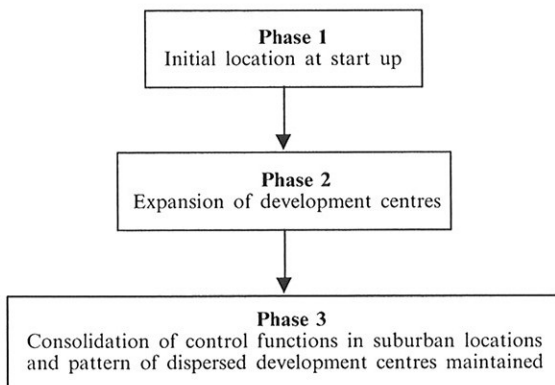
Though there are differences among the firms, and not all of them are at the same level of business development, a three-phase process of location and relocation can be identified. It is represented in figure 5.

In each phase of location and relocation, different factors influence decisions in firms. Table 2 divides the factors at each phase of location in four categories—communication factors, organisational factors, policy factors, and value preferences.

Communication factors relate to the considerations regarding physical transport and the substitutability of contacts with advanced technology. Organisational factors relate to changes to the way a firm operates. Policy factors are those incentives and spatial policies such as zoning regulations and tax incentives that the firms avail of and are subject to in the urban context. Value preferences are sociocultural aspects of location such as the aspiration to a certain image associated with office space and preferences for a better urban environment.

In the first phase, firms select an initial location in the city. Initial location of firms is mainly dependant on organisational factors such as ownership, size of firm, local partnerships that the firm has made, and size of the capital investment. Among the case studies large firms such as Wipro, IBM, and I flex, who had business partners in the city or were backed by large capital (in case of Wipro), prime CBD locations were preferred. Smaller start-up firms like Mind Tree and Infoquark opted for more obscure offices with lower rents. As discussed earlier, for ITES firms, location is based on a trade-off between quality of infrastructure and cost of transport.

In the second phase, as firms establish their credibility in the market, multiple development centres are needed. While administrative functions are not moved from initial locations, development centres are either expanded or multiplied. This phase is often accompanied with a shift to offsite production (remote working) rather than sending project teams to client offices. As firms start to get increasing offshore business, development centres need to be created and hence employee strength is enhanced. Since firms create a specialised niche in the market they sometimes handle projects of



**Figure 5.** Three-phase process of location and relocation of firms in intrametropolitan locations.

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competing clients. For example, I flex, which specialises in banking-related software, or Wipro, which is a specialist in enterprise resource planning (ERP) and e-commerce, often have projects from firms which are competitors in their own consumer markets. To maintain the levels of project security required to attain client confidence a physical separation of work is required. Separation of projects from competing clients thus becomes a factor for maintaining physically dispersed development centres. This fosters the creation of a network of offices of single firms within the city. The dispersal is maintained either in physical terms or electronically if the development centres are consolidated at a later date. Expansion of markets for firms also leads to organisational reorganisation. For example, as Wipro expanded its business it split its project teams by regional markets, and located them in separate offices. In addition to these organisational and communication factors, local incentives offered to IT firms begin to dictate location. Under the software technology parks (STP) scheme of the central government, individual premises are declared as 100% export oriented units, making them eligible for sales tax concessions. If a multiple office network is maintained projects can be moved around within the intracity network depending on the level of export segment in the output. Not all premises of firms are registered as STPs and so are not obligated to achieve the stated goals for export. Firms use this incentive scheme to their advantage through maintaining multiple development centres in the city. The scheme does not impose restrictions on the physical location of the firms, as long as they are within the jurisdiction of the Bangalore Development Authority. The human resource manager of Wipro conveyed this to us during our interview with him:

“Projects are allocated to specific offices depending on how easily a team can be put together. Projects are also moved around between offices to get tax benefits from the STP Scheme” (interviewed in August 2002).

The logic of multiple offices in the city was also explained by a need to prevent disruption due to disasters. In view of the September 11 attacks in the US firms have become conscious of the need to have multiple offices that are able to take over operations in case of the destruction of any single office. Backups of key information and multiple links in networks are facilitated by the multiplicity of offices. This was a very significant factor in the case of IBM, which has adopted this policy in its global offices.

In the third phase, firms consolidate control functions and some key development centres in user-specific campuses while a dispersed pattern of development centres is maintained. Because only suburbs and peripheral locations offer the possibility of large campuses, these are located outside the city with a high quality of firm-owned infrastructure. A campus model which was initiated by Infosys (the second largest IT firm in India), has become a matter of prestige. Facilities such as large conference halls, video conferencing, employee entertainment facilities, firm-owned satellite linkups, complete captive power backups, incubators, and so forth have become symbolic of a firm's success. The importance of image as a factor for relocation was stressed by the real estate manager for Wipro:

“As a start up firm we [Wipro Technologies] needed maximum visibility. An office on MG Road [CBD] was required. As the firm has grown, we now have to consider the image we portray to our overseas clients when they visit. A campus has become a necessity” (interviewed in July 2002).

The motivation behind the suburban and peripheral location for campuses is that large consolidated space is available at an affordable price. The suburbs offer a good environment and an option to escape from the overcrowded city center. The selection of location for the campus is based on a relative proximity to other development centres.

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In order to maintain the network of offices in the city, firms set up local area networks and centralised servers where project information is saved and accessed. Despite this, proximity adds to the convenience of movement between offices for face-to-face interactions.

As reported by the manager of Administration Facilities at Wipro Technologies the functions within IT firms are divided into three groups: technology, communication, and enterprise. Technology areas are the development centres, where actual production takes place; communications is the functions which are required to manage interaction between dispersed offices; enterprise is related to management and administrative functions. The consolidation and dispersal of these three categories of functions differ from firm to firm but a relative consolidation takes place in enterprise and key communication and technology functions in a campus. However, size of the firm is an important factor in deciding whether firms will consolidate all functions in a single peripheral location or whether they will maintain a dispersed pattern. This is apparent from the fact that IBM opted for a single location with a backup office, as compared with the fact that Wipro has multiple offices (see figures 2 and 3 for the comparative size of firms).

The three-phase process of location change observed among the case-study firms can be described as a dual process, where firms have varying tendencies both to disperse from city cores and also to centralise in other locations.

### **Divergence from studies of office location**

The observed spatial pattern of location of IT firms in Bangalore seems to correspond with location/relocation of offices and urban restructuring in most cities of advanced economies. Multinucleation, as put forward by Daniels (1985), and succession of location, suggested by Schiller (2001) in his Seed Pod model, are apparent in the spatial canvas of Bangalore city, influenced to a large extent by location decisions made by IT firms. Case studies of firms discussed in this paper confirm the dual process of peripheralisation and centralisation of offices in suburban and core areas. However, unlike the cities that these location models are based on, Bangalore's suburbanisation has not followed the same sequences of residential, retail centres, and office location. The demand for office space has fast-tracked suburban growth from agricultural land to offices. Residential and retail development is following as a result of office location.

Studies of office location conducted in the 1970s and 1980s were based on deciphering contact patterns of producer service firms (Daniels, 1979; 1985; Goddard and Morris, 1976). The main argument being that face-to-face contacts could be replaced by technology-driven telecommunication (Beyers, 2000; Castells, 1989; Daniels, 1985; Illeris, 1996) and this had enabled firms to split their functions at an intrametropolitan level. However, these studies were based on services that developed as a result of unbundling of 'office functions' from traditional manufacturing in postwar developed economies. These services agglomerated in the major cities and created a demand for office space in CBDs. This prompted an investigation into the contact patterns of firms and the possibility of splitting functions in firms to reduce pressure for space in CBD locations.

Though IT firms are very much an 'office-based industry', the export-oriented nature of their production is a critical factor that distinguishes them from producer services and is decisive in determining location at an intrametropolitan level. The key aspects of the work done in IT firms that creates this unique pattern are:

1. IT firms in Bangalore are involved mostly in export-related production of software and services.

2. Owing to their export-oriented nature, clients of these firms are located mostly overseas. This limits their need for face-to-face contacts in local physical proximity.

Alternatively, producer service firms in advanced economies service clients in the market in which they are located. They offer their services to other businesses that may have global operations, but which usually have strategic offices in the cities where producer service firms agglomerate. Interdependence of colocation of offices of producer services and their clients that are major global businesses is an assumption that underlies the studies of office location. Major 'global cities' such as London, New York, and Tokyo are understood to create a demand for advanced producer services, which becomes an indicator of the level of integration of these cities in the global economy (Sassen, 1991).

Unlike producer service firms, as IT firms involved in export-related service provision expand and split functions, they do not face issues of loss of strategic contacts if they move the location of their offices. Strategic contacts for maintaining competitiveness of IT firms are not related to the city in which they are located. In some cases strategic contacts with clients are maintained by establishing liaison offices in the markets from where business is outsourced. For example, Wipro, I Flex, and Info Quark, from among the case firms, have subsidiary offices in the US and UK which are involved in business development and promotion. At an intrametropolitan level, the stress is on 'intrafirm' internal contacts rather than 'interfirm' external contacts. Although a detailed study of contact patterns was not conducted during the above mentioned research, interviews revealed how intrafirm contacts determined location in the city.

A comment made by the real estate manager of Wipro on the future location pattern of the firm was:

"The site [Sarjapur Road Campus] for the Corporate Head Quarter was selected because of its proximity to the previous businesses and the growth of the firm has been this side. It has proximity to our other offices and we are sort of planning to consolidate all offices in this area. It helps our people to move between offices for meetings" (interviewed in July 2002).

If the factors that determine location at each phase in the sequence (table 2) are analysed it is apparent that all communication factors influencing software firms are related to intrafirm contacts. These may be related to opting for physically separated development centres to discourage interaction among employees working on projects of competing clients or maintaining relative proximity to other development centres for frequent meetings. ITES firms, on the other hand, opt for location based on the model of operation on which they work. This is still an intrafirm consideration that is dependent on the quality of communication infrastructure available to them. Recent security concern over data leakage from these firms would definitely have a bearing on the home-based working model employed by one of the case firms. It would be interesting to see how location decisions would be altered by this added factor.

Predominance of 'intrafirm' or internal contacts in everyday operation of the firm makes them relatively footloose for location. They are not bound to CBDs for location, divergence from location theory of offices occurs when firms are able to shift strategic and administrative functions to peripheral locations while retaining routine functions in the core city. But this is a logical pattern for IT firms because the technical employees of the firm, who are directly involved in the production process, travel shorter distances to the development centres if they are located in the main urban fabric. High-level managers and administrators, having higher affordability and being fewer in number than technical employees, can travel larger distances to peripheral locations.

**Table 2.** Theoretical classification of determinants at each phase of location.

	Communication factors	Organisational factors	Policy factors	Value preferences
Phase I	Trade-off between quality of infrastructure and transport cost for ITES firms: business model	Ownership of the firm and its existing size Size of initial capital investment Local partnerships and initial contacts		
Phase II	Separation of projects from competing clients Business model	Shifts from onsite to offsite production Increase in employee strength Organisational change	Maximum taxation benefits	
Phase III	Relative proximity to other development centres	Upgraded infrastructure Consolidation of control functions Size of firm	Maximum taxation benefits	Image Prevention of disruption due to disasters Better urban environment

One example of such reasoning was observed in the location decisions of IBM. As explained by their administration manager:

“We wanted to create a new image for IBM Global Services as a R&D centre and thought of doing it through a new campus. There were two choices for location—one was on Banerghatta Road [chosen location, which is 10 km from the CBD] and the other was in Whitefields [20 km from the CBD]. We had a vote among our employees. The management did not mind travelling longer but the other employees opted for the closer location” (interviewed in June 2002).

Although IBM ultimately opted not to split its management and development centres, the location closest to the CBD was selected for a consolidated office.

In the absence of external contacts being a limiting factor of location, alternative dimensions guide the location of firms in Bangalore. Significant among these are organisational and policy factors. Value preferences come into play at later phases of a firm's growth. Organisational restructuring, which is discussed by Marshall and Woods (1995) and Illeris (1996), is more relevant at a regional or, in fact, a 'global' scale. Offshoring of business to firms in Bangalore from advanced economies is, in itself, a manifestation of the split of functions in multinational firms. But the same is observed in Bangalore at an intrametropolitan level. Organisational expansion, which may have occurred as a result of change in business model (eg a shift from onsite to offshore production), an increase in business volume leading to employee growth, or splitting of functions for project security are all factors that have had an impact on location in the city.

Policy and value preference factors that influence location at later phases of a firm's growth are significant in their contextual relevance. The policy factor that has influenced location in the case-study firms relates to the taxation incentive available to firms involved in export. Forming a part of industrial policy of the national government, it contributes towards firms maintaining multiple offices in the city. By declaring selected offices as export-oriented units they are able to move around projects among their multiple locations, thereby not having to conform to export targets. When aggregated over a city level the choice of firms to maintain dispersed development

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centres contributes to the development of a multinucleated urban pattern and conversion of residential properties for office use.

Value preferences come into play when a firm has reached a certain size, and image considerations become important with respect to its competitors. A single-firm campus-like office has become a symbol of achievement among firms in the city. All firms aspire to set up a campus with a high level of infrastructure and a large amount of land in the periphery. The decision to consolidate key development centres and managerial functions in peripheral locations is as much an image boosting decision as a genuine need for functioning of the firm. As the real estate manager of Wipro stressed:

“After Infosys [largest Indian owned competitor to Wipro] made a campus in Electronics City [peripheral technology park], a campus has become a prestige issue. All of us have to think of campuses now” (interviewed in July 2002).

To summarise the discussion on determinants of location, the difference in nature of work and services produced by IT firms and other producer service firms leads to different outcomes in terms of location of offices. Unlike the findings from existing theories of office location the stress is not on factors of communication and face-to-face versus indirect contact, but on aspects relating to intrafirm communication and organisational factors. Since firms located in Bangalore have very little local market orientation, their interfirm contacts are focused more on their parent or subsidiary firms located elsewhere. The firms have more backward linkages with the city than forward linkages. Their primary interaction with the city is in terms of availability of skilled labour. In such a situation it is organisational factors and other factors such as policy and value preferences that determine their location at an intrametropolitan level. Very simply put, firms locate in the city, expand and multiply offices, expand further, and then consolidate key administrative functions in peripheral locations.

### **Directions for research**

The empirical study on IT firms in Bangalore, discussed in this paper, presents a small glimpse into what could be a much wider area of research. Two clear directions emerge from the discussion. The first is a need to pursue a detailed investigation into contact patterns of IT and other export-related firms. Since the study in this paper was focused on location histories, and contact patterns were implied and not directly evinced, building an alternative model for location of such firms requires a detailed enquiry. Most existing knowledge on location of office-based producer services, which forms a basis of comparison here, revolves around the role of contacts in determining location decisions. A detailed study might find that IT firms or other export-based firms have managed to substitute key face-to-face contacts with use of communication technology, but without concrete research this is mostly rhetoric.

As discussed in this paper, studies of location of offices in cities of advanced economies were initiated by the increasing pressure on CBDs for office space. This increased demand for space was a physical manifestation of the restructuring of the economy and the accompanying organisational changes it involved. Emergence of producer services as a sector ‘unbundled’ from manufacturing firms was a significant factor in the changes being observed in urban landscapes. Globalisation further reinforced these processes of change (Daniels, 1985; Illeris, 1996). Similarly, location of offshore ‘office-based industries’ in cities of developing economies represents a paradigm shift. A number of studies on Southeast Asian cities [Jakarta (Dick and Rimmer, 1998); Seoul and Korean cities (Cho, 1997); Kuala Lumpur (Bunnell et al, 2002; Indergaard, 2003)] have documented urban restructuring in terms of multinucleation and formation of enclaves, but none has explored the link between the urban patterns and location of specialised firms involved in export related advanced services. The Human Development



report of 2001 identified a number of regions outside the 'core' countries, which have become leaders in outsourced technology related production. Given that cities in regions such as Southeast Asia (also including China), South Asia, Eastern Europe, and Latin America have become significant centres of internationally dispersed production in manufacturing as well as services, the second direction of research would be to expand this analysis of the location of export-related firms to other cities in the developing world. Comparison of patterns across different contexts would be useful to reveal whether export-related firms do indeed represent a 'location theory in reverse'.

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