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The Case of the IT Park: Analysing the International Tech Park, Bangalore through the Eco Industrial Approach in Urban Planning

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June 2016

Abstract

Eco-industrial approach to urban planning views a component in the urban system in relation to others through spill over. IT Parks as a subsystem has a number of organic relations with the macro environment of local economy and ecology. The paper examines the case of one IT park as conceptualised as a self sufficient unit in the city of Bangalore and the way interactions have taken place in a span of two decades. The study uses both primary and secondary data for analysis.

Keywords: Eco industrial approach, Urban planning, IT sector, Bangalore

Eco Industrial Parks: Context and Questions

The United Nations Environment Program (UNEP) has released a report on the management of industrial parks. There are around 12000 industrial parks and export processing zones around the world, most of which are concentrated in the developed world. Due to the compact nature of the development of these zones and the millions of people it employs, there has been a recent and renewed interest in the design and functioning of these parks and ways to regulate their efficiency and energy. The UNEP guidelines are for design and management of industrial parks. With the development of Bangalore as an IT hub since 1998 when the first IT park was set up, the city has been grappling with the management challenges of such designated zones. There are two broad approaches to the idea of managing eco industrial parks- one is that of managing material and energy flows and the other, of larger ownership of the whole process with the help of larger connections and greater control of a wide range of variables over and above material and energy flows. The second approach involves the social and community sustainability measures like walk to work, support structures like health centres and schools within the park that is primarily based on employment of its inhabitants. Over the recent years (Cote and Rosenthal 1998), the social aspect of industrial park management has gained currency. However, specific study on business parks in India within this approach is missing. This paper attempts to study one business park in the city of Bangalore to analyse its economic, ecological and social dimensions of management through the industrial ecology approach.

The study attempts to understand the spread and growth of industrial parks in the city in the period 1998-2015 and the way industrial parks in general have facilitated interactions with the city around them. The primary research question is to evaluate one business park in the city of Bangalore through the industrial ecology approach. The IT park chosen for the study is International Tech Park (ITPL). The study attempts to understand whether the IT park as a self sustained community is functional with respect to walk to work claim. The paper is divided into three parts. In the first part, a brief review of literature points to the evolving definition of sustainability in the industrial ecology approach. The second part deals with the evaluation of the selected industrial park through primary as well as secondary data. The final part analyses the findings and provides conclusion.

Brief Review of Literature

Resource recovery and recycling in pre industrial urban loops were found very early in history. Cities have always managed a large number of industrial loops. Archaeological evidence suggests that perishable slaughter waste was fed into small industry in late Stone Age city of Çatal Hüyük in Turkey¹. In the Roman era, there were shops that were strategically located close to slaughter houses that made products like pins and nuts from bones and other waste products of the abattoir.²

The history of the early American cities also suggest that swine was raised next to liquid distilleries to feed on its waste. The milk industry slowly fed on the mash of these distilleries and by early nineteenth century there was a symbiotic relation between the dairy industry and liquid distilleries of New York. Perishability remained an important concern that determined the location and sustainability of various industries.

The idea and the significance of industrial loops have been around in record at least since the beginning of the nineteenth century. Charles Babbage (1835) observing the English industrial units remarked that managing waste can be done by 'the union of two trades in one factory, which otherwise might have been separated'.³ Simmonds (1862)⁴ analysed the five major industries of Victorian England-cotton, wool, silk, leather and iron- and observed that the waste of one industry could be the raw material of another in principally large industrial sectors where the scale of operation was high.

The development of waste to resource recycling, currently referred as 'industrial symbiosis' was getting attention during the first world war years especially in Germany.

¹Mellaart (1967) Mellaart, James. 1967. *Çatal Hüyük. A Neolithic Town in Anatolia*. New York: McGraw-Hill Book Company.

² Chevalier (1993).

³ Babbage deals extensively on industrial loops as early as 1835 in his seminal essay *On the Economy of machines and Manufactures* (as quoted in Desrochers 2001).

⁴ *Waste Products and Undeveloped Substances: Or, Hints for Enterprise in Neglected Fields*. London: Robert Hardwicke.

Talbot (1920)⁵ was writing about the German resourcefulness in finding a use for 'refuse' and making it the raw material for some other company in the early twentieth century.

In his paper Pierre Desrochers (2001)⁶, argues that EIPs work better through market approaches than public planning. Public sector can work either by building the industry from scratch or by virtually looping the selected industry for resource recovery and recycling. Citing the case of Kalundborg, Denmark which was the first case of industrial ecology that networked four industries in a small city, he illustrates how private players spontaneously came to the idea of looping industry to manage waste and generate resources through private agreements. In this manner, the looping was more spontaneous and driven by market phenomena like price loops, technology and private property rights than by command and control laws and regulations. The New York animal slaughter market that created resources for textile industry is another example.

Secondly, he also recognises that though industrial ecology views the system to be composed of a symbiotic loop of players, most of the operations trade outside the loop, making them open systems. Linked operations reduce the use of virgin materials, waste, pollution and increase energy efficiency and market values of products. These are also gradual developments and not forcefully planned entities.

Pellenbarg (2002) examines the shift in the concept of eco industrial parks and the related consequences in urban planning. From the early twentieth century emphasis on location of an industry based on the cost of transport and labour, the shift has been towards 'agglomeration' effects of symbiosis. This has resulted in emphasis being given to living conditions, environmental concerns, access to knowledge, quality of life variables. As a result even policy framework is shifting from pure industrial spatial planning to mixed use zones.

Analysing the relation between planning networks and EIPs further, Roberts (2004) calls for city wide analysis of 'assessing waste flows, markets, transport costs, infrastructure, public attitudes, social and economic impacts, and risks' before setting up an EIP. This would in turn lead to a policy that takes into account development plans, organisational structure, financial risks and public attitude. This approach also highlights externalities savings, economies of scale and innovation in dealing with challenges of site management and tenancy relations.

A broad survey of literature suggests a number of factors essential for the successful management of EIPs some of which are listed in table 1.

⁵Henry J Spooner's *Wealth from Waste* (1918) and Frederick Talbot's *Millions from Waste* (1920) talk about industrial symbiosis in early twentieth century. However industrial cities like Paris and London were already using waste-energy loops in the nineteenth century in urban centres. The waste was supplied by agriculture in the peri urban areas. See De Silguy (1989) for more on Flemish and French agriculture.

⁶The paper *Eco Industrial Parks: A case for private planning*.also traces the idea of industrial loops shortly after the third wave of industrialization beginning with Charles Babbage.

Table 1: Factors Affecting EIP functioning

Characteristics of successful EIPs
Cooperation between firms and local government
Broad range of participation between stakeholders (public utility, local company, trade unions, environmental organisations, experts and community)
Presence of trust between firms
Regular public monitoring of goals achieved
Public relations and widespread information dissemination

Source: Modified from Tudor et al (2004)

Concepts and Definitions

An industrial park is defined as ‘a large tract of land, sub-divided and developed for the use of several firms simultaneously, distinguished by its shareable infrastructure and close proximity of firms’.⁷ Industrial parks include industrial estates, industrial districts, export processing zones, industrial clusters, business parks, office parks, science and research parks, and bio-technology parks. Eco-industrial parks have now been added to this list.

An Eco Industrial Park (EIP) is a network of companies operating out of a single region that makes use of the resource requirements and waste generation of one another by trading. The idea comes from a stream of economists who perceive waste as a resource. The basic premise of industrial ecologists is in mimicking nature in which waste produced is consumed or recycled. Industries and companies are classified as producers, consumers or scavengers in the waste-energy loop. The application of the idea has been widely used for sustainable development of regions. EIPs utilise three types of ecological framework- industrial ecology, biological ecology and spatial ecology.

⁷Cote and Rosenthal (1998:182).

Table 2: Options for cooperation in EIPs

Options for cooperation at the process and site levels
<i>Options for sustainable production processes (streams)</i>
Exchange of energy, raw materials and water
Joint use of utilities and firm functions
Collective gathering and removal of waste materials
Combining transport of goods and people
<i>Options for sustainable site arrangements (areas)</i>
More intensive use of space
Public utilities with many useful effects
Joint commercial firm facilities
Multimodal transport and high-quality public transport
Adapted from Bakker et al. (1999).

Source: Tudor et al (2007)

Sustainability concerns attempt to address social dimension, ecological integrity and economic efficiency. World Conservation Strategy in 1980, *Our Common Future* the report of the World Commission on Environment and Development in 1987 and Agenda 21 in 1992 has resulted in gradual acceptance that sustainability as a goal for urban centres. Sustainability was defined to have four dimensions- economic, ecological, social and institutional. This application to industry led to a systems view of the city that focuses both on interaction and interconnectedness of participants. This is a major shift away from the earlier view of industrial systems that stresses independence and competition. Industries are embedded in a chain of consumers, resources like land and water and waste energy products that are analogous to a natural system. The benefits of sharing by products as inputs in another industry are done through shared mutual interests than overarching planning. Business competitiveness and improved efficiency encourage business to shift to industrial ecology approach than an independent one.

Location of IT Parks and urban growth pattern in Bangalore

The origin of the growth of the software industry in Bangalore can be traced to the entry of Texas Instruments, the first multinational company to have a base in this city in 1985. This paved way for entry of smaller domestic software companies to undertake software projects for overseas clients. In order to promote this industry, the government envisaged the establishment of dedicated business parks for this purpose (Vijayabaskar and Krishnaswamy 2004).

IT parks such as ITPL and Electronic City were established at the outskirts of the city. However, over the years, with the city constantly expanding and developing, these once remote pockets are now very much integrated within the main city limits.

Establishment of IT parks in Bangalore have resulted in the following effects on the surrounding areas:

1. Increase in land value
2. Development of related industries
3. Increase in housing and apartment complexes

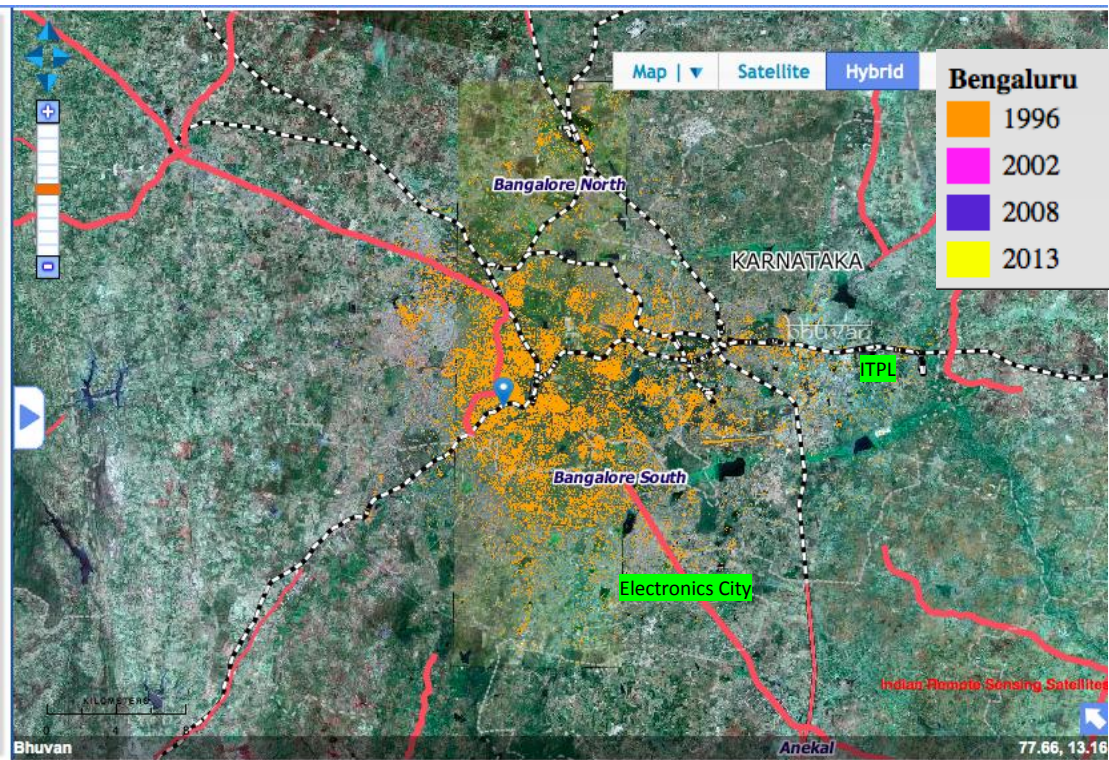
A visible effect of these parks is how the city has grown since the establishment of major tech parks. The following maps illustrate the pattern of urban growth in Bangalore since 1996.

The data source for this series of maps is the Urban Growth Monitoring section of the Bhuvan portal⁸. Locations of the following tech parks are added to this:

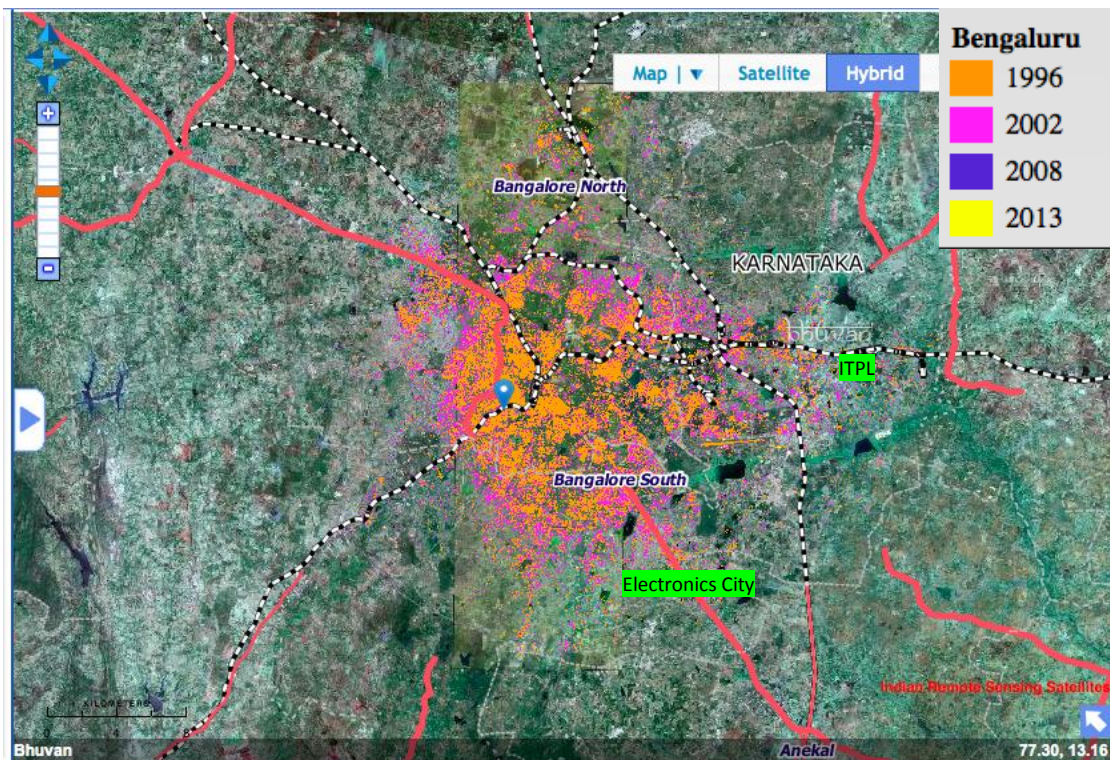
1. Electronic City: It is one of India's largest electronic industrial parks, formed in 1978 and spread across 332 acres (1.3 km²) in Bangalore. It consists of three zones– Phase I, Phase II and Phase III.
2. The International Tech Park Bangalore (ITPB or ITPL): This was created as a result of a joint venture between India and Singapore in January 1994.
3. Manyata Tech Park: Manyata Embassy Business park is situated in Hebbal on Outer Ring Road, and is spread over 424 acres. It has been in operation since 2006.
4. RMZ Ecospace Business Park: This project located on Sarjapur Outer Ring Road was designed by DP Architects from Singapore and completed in 2006. It has 9 blocks and is spread across an area of approximately 24 acres.

⁸<http://bhuvan.nrsc.gov.in/urban/sprawl/urbangrowth.php>

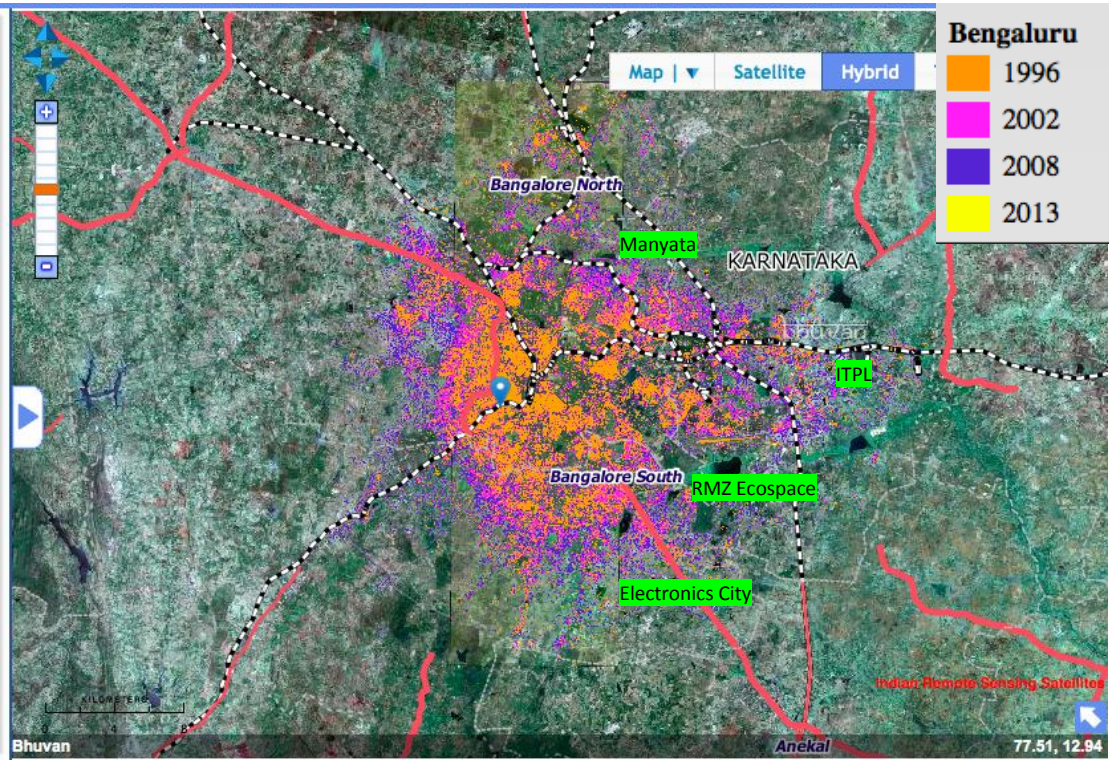
Map 1: Urban Growth and IT parks in Bangalore -1996



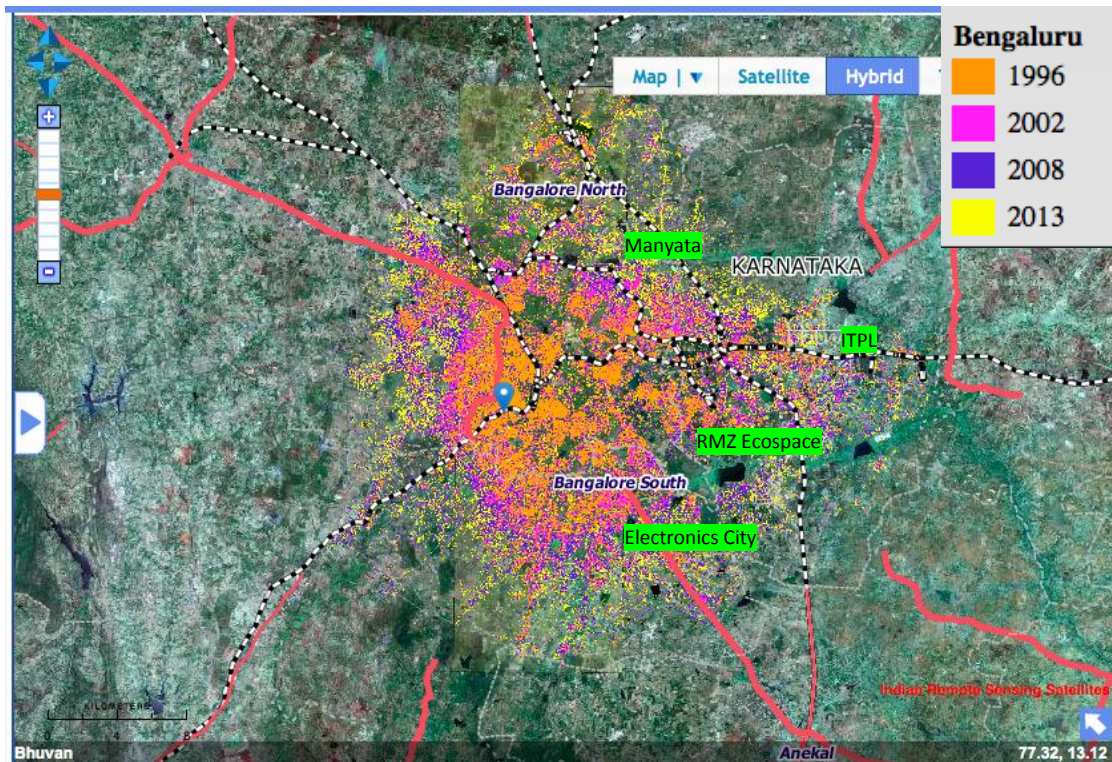
Map 2: Urban Growth and IT parks in Bangalore -2002



Map 3:Urban Growth and IT parks in Bangalore -2008



Map 4:Urban Growth and IT parks in Bangalore -2013



The Notion of an IT Park as a Self Contained City: The case of ITPL

No business park functions in isolation. As seen in the previous section, the development of IT parks in Bangalore has had an impact on the urban growth pattern. While this provides a macro level view of the phenomenon, an analysis of one IT park- ITPL provides insights into the notion of an IT park as a self contained city and what needs are met internally or externally.

ITPL is located in the Whitefield cluster in Bangalore, Whitefield was initially a small settlement to the east of Bangalore city till the late 1990s when the local IT boom turned it into a major suburb and hub for the technology industry.

Methodology

A questionnaire was circulated among 15 employees of software companies located in and around ITPL. There were 11 respondents.

The respondents are employees of the following companies in ITPL:

1. Shell
2. Oracle
3. TCS
4. Mu Sigma
5. Tesco

The following age groups were considered to reflect the different job levels:

1. 20-30 years
2. 30-40 years
3. above 40 years

Findings

The main findings with details of age groups, place of work, residence and distance from place of work are presented in Table 3.

Table 3: Main findings

S.No	Age group	Place of Work (ITPL)	Residence	Type of Residence	Distance from ITPL (km)
1	Above 40	Shell	Prestige Ozone, Whitefield	Apartment	5.5
2	Above 40	Oracle	Adarsh Palm Meadows, Whitefield	Independent house	4
3	Above 40	TCS	Indiranagar	Independent house	15
4	30-40	TCS	Old Madras Rd, Krishnarajapura	Apartment	10
5	30-40	TCS	Old Madras Rd, Krishnarajapura	Apartment	10
6	30-40	Oracle	HAL Airport Rd, Domlur I Stage	Independent house	17
7	20-30	Mu Sigma	Borewell road, Whitefield	Apartment	4
8	20-30	Mu Sigma	Borewell road, Whitefield	Apartment	4
9	20-30	Tesco	Kundalahalli	PG	6
10	20-30	Tesco	BTM 2nd Stage, Kuvempu Nagar	PG	20
11	20-30	Tesco	Marathalli	PG	11

Source: Primary Data

From Table 3, we see that 6 out of 11 respondents live 10 km or more from their place of work. The shortest distance is 4 kms, and these respondents live in Whitefield.

The following map indicates the places of work and residence of the respondents

Map 5: Place of work and Residence

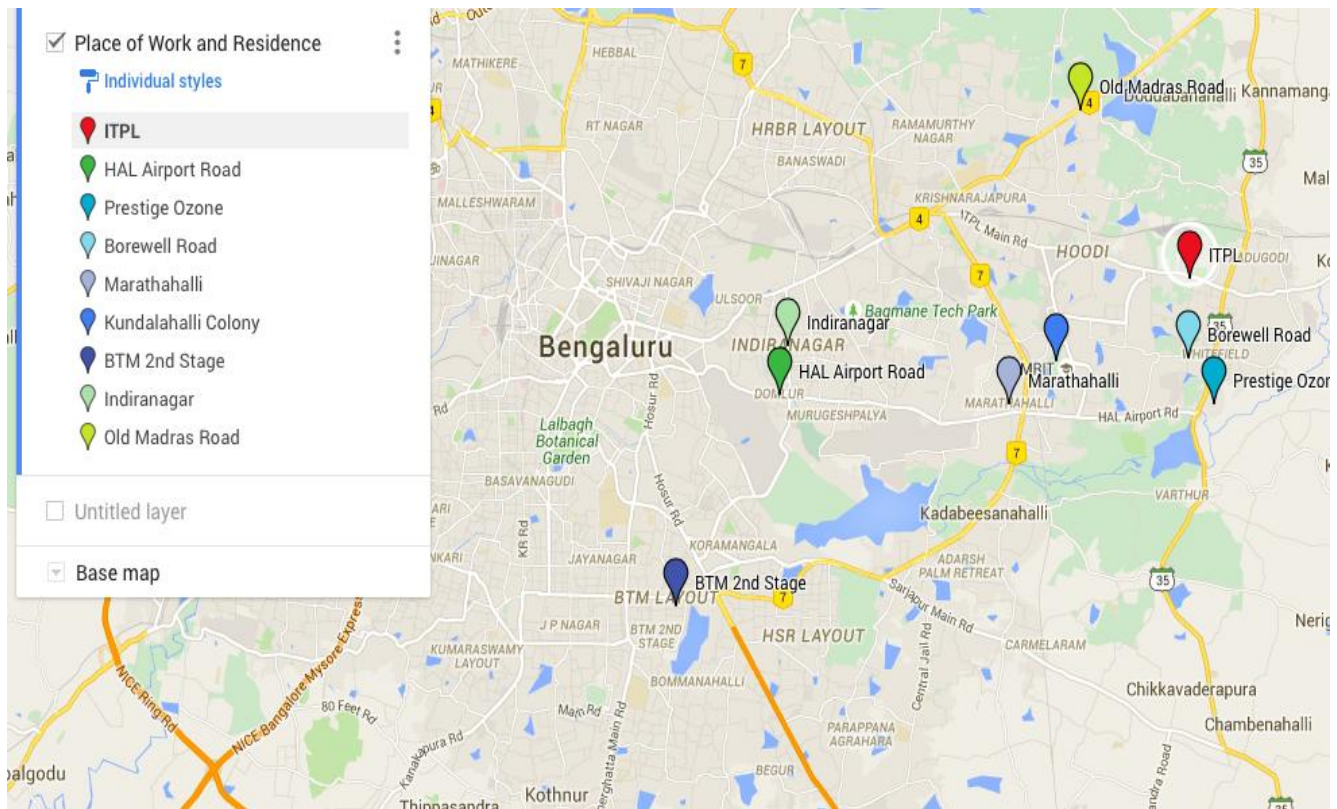


Table 4: Age of employees and distance from place of work

Age group	Avg. distance from work (in km)
Above 40	8.17
30-40	12.3
20-30	9

Source: Author calculation

Table 4 examines the relation between the age group of employees and the distance from work.

While 3 out of 5 respondents in the age group 20-30 live in paying guest accommodations in the nearby areas of Whitefield and Kundalahalli, the respondent who lives furthest away (in BTM) states the poor quality of PGs in Kundalahalli and inconvenience due to lack of cabs at night, etc are reasons for his choice of residence.

It should also be noted that the 20-30 year old respondents who live the closest to ITPL at Whitefield and Kundalahalli come from other states and are new to Bangalore. The respondent living at BTM on the other hand has been living in Bangalore for a few years.

Discussion and Conclusion

The growth and impact of select five IT parks in the city of Bangalore in the last two decades have led to measurable effects on the city that surround them. They have increased the land value in the surrounding area and have contributed to the development of related industries as well as housing complexes close to them. This last point of encouraging housing spread around has been important in answering why the IT park model that claims self sustainability is true only up to a point.

The findings from this study on ITPL suggest that the IT park has spill over effects on the immediate space surrounding it. The walk-to-work idea is not functioning among various age groups for various reasons. For the young age group band, their migrant status and expense of residence play a role in selection of residence type. In the older age group band, the needs of the other members of the family, status and affordability rather than proximity to work play a role in the selection of type of residence. In both cases, the IT Park is found to be in a balanced equilibrium with the space surrounding it.

The place of residence and the employment status reveals that choice and nature of the place of residence is related to a number of variables like age group, marital status, migrant status, to name a few. This choice in turn is shaped by the growth around the IT parks and not merely within it. Even when the employee of the IT Park has a walk to work system, it often affects the other members of the family including other working members and school going children. This is consistent with the observation from the literature review that suggests that EIPs are rarely isolated units and usually thrive on the open trade of material, human and energy exchanges with the city space.

Appendix I

Questionnaire for Survey

Personal Information

1. Name of the Respondent:
2. Age :
3. Gender :
4. Company that you work for:
5. Number of members in family:
6. Are there any other working member in the family? (If yes, then go to 7)
7. Whether the other working member travels more than 5 km to the work place?

Information related to Residence

8. Place of residence :
9. Type of Residence :
10. Distance from work place:
11. Reason for choosing the area of residence:

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