PERSPECTIVE IMPACTS OF INFORMATION TECHNOLOGY INDUSTRY IN DEVELOPMENT OF PUNE CITY IN INDIA

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Abstract

The emergence of Information Technology (IT) is increasingly influencing the socio-economic and physical landscape of cities. It has also resulted in development of predominantly IT based industrial cities. These cities have the opportunities and challenges with respect to the development of their socio-economic, infrastructural and environmental conditions because of the influence of the IT based industrial activities. This article therefore pertains to the analysis of the perspective impacts of IT industry and allied activities on the development of an emerging IT industrial activity based city. For this purpose, Pune, an emerging IT city in India was considered as a case study. Survey research methodology and a system dynamics modelling approach were employed to measure the influential socio-economic, infrastructural and environmental parameters of the city by considering the city as a system. This research shows that the location of IT industry and associated functions contribute significantly towards the socio-economic development of a city in terms of IT industry export, State Gross Domestic Product (SGDP), per capita SGDP, employment generation, to name some relevant aspects. However, there would be a reduction in satisfaction level of the infrastructure and an increase in environmental stress in the system, which needs strategic attention. Further, the model results and scenarios can facilitate evolving of feasible policy and strategic guidelines for the wholesome development of such cities.

Keywords: Information technology industry, System dynamics modelling, Infrastructure, Overall satisfaction, Environmental stress

1. INTRODUCTION

Technological advancement in the form of Information Technology (IT) is increasingly influencing every aspect of human life and city functions. It has increasingly become responsible for shaping the socio-economic and spatial development of the cities and transferring their economic role and pattern of spatial development across the globe (Agrawal, 2000; Ansari, 2001). In this process, a number of cities are in transition of changed socio-economic and spatial patterns by acquiring large scale IT based economic activities in addition to their existing functions. The impact of setting up of IT industries in the cities is felt on land use patterns, functional performance, urban economic structure and social interactions; and a steady moderation of the cityscapes as a whole is increasingly being experienced (Audirac, 2002; Dickey, 1985), thus emphasising distinctive spatial, socio-economic and environmental consequences. The process has brought about the expansion of urban areas, decentralisation trends of location of functions, and the amalgamation of adjoining rural areas to cities, which influence the growth and change in urban systems (Miller, Hunt, Abraham and Salvini, 2004). It is also observed that such cities are unique in nature because of their functions and requirements. They are essentially characterised by attributes like knowledge base, industrial structure, quality of life and availability of urban amenities having power to attract knowledge workers to build a strong knowledge base, accessibility to encourage and facilitate the transfer and movement, organised real estate development for adequate and suitable housing and commercial economic activities, and above all minimum environmental stress and higher satisfaction of living (Yigitcanlar, O'Connor and Westerman, 2008). Conversely, ensuing to such characters, these cities essentially require high quality environmentally sustainable and efficient infrastructure (GlobeScan, 2007, p. 25), particularly the primary infrastructure needs which influence the IT industry at the city level such as, transportation routes (intra city roads), power supply, areas for residences (housing) and built up commercial spaces for transactions. Further, IT based economic activities in general are based on skilled and quality human capital or knowledge workers, and it is well acknowledged that an IT city prospers only when it has the capacity to attract and retain these quality human resources (Van Winden, Berg, Van Den, and Peter, 2007). However, they can only be attracted or retained if the city provides a reasonable level of satisfaction in living in the city or a lower level of environmental stress. Thus, new challenges have been created for urban planners and developers, who consequently require to measure the impact of the IT industry or related activities on the city before deciding planning measures for the sustainability of IT cities.

This article is based on an exploratory investigation that attempted to observe the socio-economic and environmental effects on an emerging IT city in India, because of the location of large scale IT industrial and related activities in the city. In this context of the several system indicators which influence development of such cities, the few that are more relevant were measured over a projected period to understand the influence of emerging IT industries on the city. These indicators are earnings from IT exports, State Gross Domestic Product (SGDP), per capita SGDP, employment generation in IT industries and their contribution to total employment of the city, overall satisfaction of living in the city based on infrastructure, and environmental stress occurring because of development of the city (Moussiopoulos, Achillas, Vlachokostas, Spyridi and Nikolaou, 2010). It is believed that the results of this investigation will be useful for preparing strategic planning guidelines for balanced and sustainable development of such cities.

2. MATERIALS AND METHODS

2.1. Methodology, data and analysis

In this investigation a survey research methodology was employed. Two types of data, i.e., from both secondary and primary sources, were collected. Secondary data was collected from authentic published and unpublished literatures, reports and documents. Primary data was collected through a stratified random sampling survey method by using pre-tested schedules at household level and from IT industries located in the city. The survey was conducted among a total number of 300 selected households and 50 IT industries located across Pune city. The data collected was analysed by means of relevant statistical analysis such as tabulation, and correlation to identify the major control parameters influencing the functions of the city and employing a system dynamics model built to measure the impact of the control parameters on the socio-economic conditions, infrastructure and environment of the city.

2.2. Concept and theory

For the purpose of this investigation system dynamics theory based on the system's concept (Forester, 1969) was employed to analyse the functions of the city, in which a system functions as a whole with the interaction of several subsystems (Chadwick, 1971; Checkland, 1981; Coyle, 1996; Forrester, 1987; Shen, Qing, Bo-sin, Stanley, Yucun, Gordon, 2009; Sterman, Forrester, Graham and Senge, 1983). The study area Pune city was deemed suitable as a system in which the IT industry was considered to act as a catalyst for development of the system.

2.3. Modelling

System dynamics is especially designed for large-scale, complex socio-economic systems including but not confined to, global environmental sustainability (Forrester, 1968, 1987; Richardson and Pugh, 1989; Sterman, 2000), sustainable regional development (Saeed, 1994), environmental management (Costanza and Ruth, 1998), water resource planning and water systems (Stave, 2002, 2003; Stave and Cloud, 2000), ecological modelling (Patterson, Tim, Ken and Egor, 2004), agricultural sustainability and agriculture systems (Saysel, Barlas and Yenigun, 2002), dairy goat production (Guimarães, Luis and Marcelo, 2009), urban systems, infrastructure and land use modelling (Heimgartner, 2001; Katsuhiko, 2004; Shen et al., 2009) and their planning, development and management. It amalgamates ideas developed in various systems theories and is a result of cross-fertilisation of ideas from traditional management, cybernetics, and computer simulation (Shen et al., 2009). It is a theory of structure and behaviour systems (Forrester, 1968, 1969) and blends the art of traditional management with the science of feedback control.

The IT industry essentially bases its decision for its location on the quality and availability of human resources and the quality and extent of infrastructure available in the city. Good quality and adequate infrastructure creates the quality of life that attracts human capital. This includes an array of infrastructural services and facilities such as, roads, airports, communication, housing, power, education, health, shopping, leisure, and entertainment. The IT industry, the workforce associated with it, and the urban system supporting them are interdependent and cannot be isolated from each other. It is also always associated with other supporting dynamic existing functions of the urban system. Therefore, while planning for a city where the IT industry is predominant, for the development of the urban system, all aspects such as, the IT based industry, the workforce associated with it, the available infrastructure in the system, and socio-economic, physical and environmental parameters need to be considered in an integrated manner.

Based on the above premise, all the major control parameters identified through various statistical (tabulation and correlation) analyses which influence the development of Pune city, such as human resources, transportation and communication linkages (roads), local level infrastructures, a favourable environment and institutional support were considered to be essential for system development. Of these parameters, transportation and communication, and institutional support were exogenous parameters, whereas local level infrastructures, human resources, and a favourable environment were endogenous to the system. Endogenous parameters, particularly influential local level infrastructures, which were identified from statistical analysis - power supply, internal transportation (roads), real estate (built up commercial area and housing); and human resources were considered in detail for building the SD model, and consequently to understand the growth and influence of the IT industry in the city and measuring its impact on the city. Initially, separate SD models for population, local infrastructure such as transportation (roads), power supply, housing and commercial area, human resources, the IT industry, and for the system were built and then integrated to develop the integrated SD model for the system. POWERSIM software was employed in building the model. The model was developed using the main components of a system dynamics simulation, including stocks, auxiliary variables, flows, feedbacks, delays, and rates/decisions rules (Senge, Roberts, Ross, Smith and Kleiner, 1994). Stocks are accumulations within the system. Flows are the movement of contents throughout the system. Feedback loops represent a chain of causality. They are responses created by the system that will change the current pattern. Delays are sources of dynamics in almost all systems creating instability and oscillations. There is always a stock in the system framework that accumulates the difference between input and output. Decision rules or policies represent the criteria used to regulate flows in attempts to drive the system to a desired state (Sterman, 2000).

Figure 1 presents the conceptual feedback loop diagram used for the building of the integrated SD model for the city by integrating all the major sub-systems influencing the IT industry and IT city development.

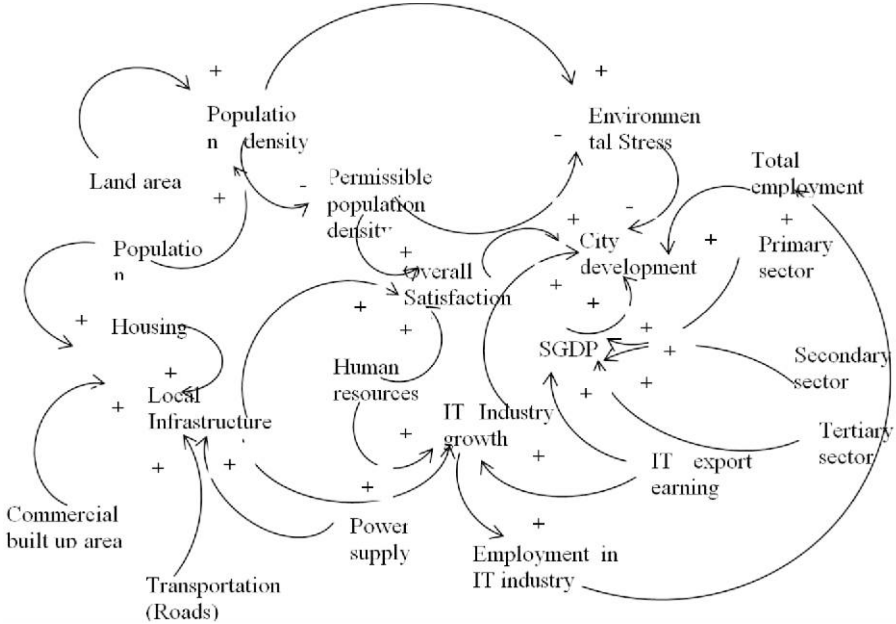

Figure 1: Conceptual feedback loop diagram for system dynamics modelling for growth of an Information Technology industry and development of a city

Each sector model was developed depending on the relevant resource flow and/or information flow among the major control variables influencing the particular sector. While developing the SD model for road sector, road length was considered as one of the most important variables for local transportation needs and accessibility, as the entire road transportation system is dependent on the availability of road lengths and their quality. The important control variables such as available supply of road length, perceived supply of road length, and demand for road length supply were considered in developing the model. The available supply of road length was calculated based on the normal road length growth rate and perceived supply of road length was calculated based on the perceived road length growth rate whereas demand for road length was considered as a function of area of the system, average width of road, and fraction of area was used for the roads. The satisfaction level of road length was a function of discrepancy in road length supply and demand for road length in the system. The SD model was developed to compute the demand and supply of road length, satisfaction level of the road subsystem, and effects of the road subsystem on IT industry export in the system.

Power supply is another important sub-system of the system for the development of the IT industry and the system itself. An SD model was developed in order to compute demand and supply for power supply and satisfaction level of power supply and its effect on the IT industry. The important control variables which were influential in developing the model are population, available power supply, additional installed capacity, perceived power supply, per capita power demand, demand growth rate, satisfaction level of power supply, and power perception delay. While building the model available power supply was considered as a function of normal power supply growth rate; additional power installed capacity was computed by considering additional power installation growth rate; perceived power supply was computed based on perceived power supply growth rate; and demand for power supply was taken as a function of population and per capita power supply demand. Satisfaction level of power supply was the function of discrepancy of available power supply and demand for power supply.

Availability of a dedicated built up commercial area attracts an IT industry in the system. The SD model developed in order to compute demand and supply of commercial area, satisfaction level of commercial area, and effect of commercial area on IT industry in the system was based on important control variables such as total area available in the system, available supply of commercial area, perceived supply of commercial area, demand for commercial area, and demand for employees (human resources) in the IT industries. Available supply of commercial area was considered as a function of area of the system (the study area), and normal fraction of area for IT industries; perceived supply of commercial area was taken as a function of area of the city, and perceived fraction of area for IT industries; and demand for commercial area was a function of demand for employees, and commercial area required per employee. The satisfaction level of commercial area was based on the discrepancy of available supply and demand for commercial area.

Housing provides one of the basic needs of human beings in the system and therefore is one of the most important subsystems of the system. The SD model developed in order to compute demand and supply for housing, satisfaction level of housing, and effect of housing on the IT industry in the system employed available supply of housing, normal housing construction rate, perceived housing construction rate, perceived house construction supply, depreciation of houses, construction delay, population, household size, demand for housing, discrepancy in housing supply, and satisfaction level of housing as control variables. Here total available supply of housing was a function of normal housing construction rate, housing completion rate, construction delay and depreciation of housing, which is a function of age of housing. Similarly, perceived supply of housing was taken as a function of perceived housing construction rate; and demand for housing was a function of population, household size and housing demand fraction.

The satisfaction level of housing was computed based on the discrepancy in housing supply and demand, i.e., total available supply of housing and demand for housing.

The human resource is an indispensable requirement of the IT industry and it is essential to compute demand and supply of human resource, satisfaction level of availability of human resource and effect of human resource on IT industry. The SD model developed was based on the control variables such as, normal availability of human resource for IT industry, perceived availability of human resource, IT industry export, satisfaction level of human resource availability, demand for human resource, and discrepancy of human resource. While normal availability of human resource was considered as a function of normal human resource growth rate, perceived availability of human resource was a function of perceived human resource growth rate; demand for human resource was treated as a function of the IT industry export; and satisfaction level of human resource was the discrepancy of normal availability of human resource and demand for human resource.

Further, a socio-economic model was developed by incorporating various economic sectors and social indicators to assess the economic and social capital status in the system. The SGDP and employment in the IT industry sector were considered as the indicators of economic and social capital in the system respectively. In model building, contributions from the IT sector in terms of employment generation and share in SGDP were integrated with the system model to arrive at an integrated system model. While constructing the structure of the model, contributions from the IT industry in the form of SGDP and employment generation from it were integrated with the SGDP and employment from other sectors in the system respectively. These were initially computed on normal terms excluding the contribution from the IT industry. The influence of infrastructure, such as, availability of housing, commercial area, roads, powers supply; and human resources were integrated with the model by using table functions and sensitivity analysis. The integrated model built was then employed to compute the various parameters such as total SGDP, employment generation from the IT industry and in the system, per capita SGDP, overall satisfaction level and environmental stress. The overall satisfaction level in the system was derived by considering it as a function of the effects of satisfaction levels in transportation (road sector), power supply, housing, and commercial area (computed as discussed in sector models) on the system because of location and functioning of IT industries in the system. The environmental stress was considered as a function of desired density and permissible density of population, whereas actual density of population was a function of population and area of city. The permissible density was considered as a function of overall satisfaction level and actual density.

Figure 2 illustrates a system flow diagram (structure) of the integrated model in which the stocks are the boxes; auxiliary variables are the circles; arrows represent the flow of resources or information; and valves are the rates/restrictions or rules that interfere in the flow. The algorithm employed in development of the system dynamics models is presented below.

Model equations

Population = Initial Population + Population * $[\int_{t0}^{t}$(birth rate)dt + $\int_{t0}^{t}$(immigration rate)dt-
$\int_{t0}^{t}$(out migration rate)dt– $\int_{t0}^{t}$death rate)dt]

Area of city = Initial area +$\int_{t0}^{t}$(Area*(area growth rate)dt

Total SGDP = ∑SGDP from all sectors excluding IT export+ earning from IT industry export

Per capita SGDP = Total SGDP / population.

Employment generation from IT = IT export / turnover per IT employee.

Environmental stress = (actual density-permissible density)/actual density.

Overall satisfaction level = (housing satisfaction level * weightage+ road satisfaction level * weightage + built up area satisfaction level * weightage + power supply satisfaction level * weightage).

SGDPF=primary sector contribution+ secondary sector contribution + tertiary sector contribution.

IT Export growth rate = IT export * (export growth fraction +(effect of power on IT industry + effect of built up area on IT industry + effect of employees on IT industry +effect of housing on IT industry +effect of road on IT industry) / 100)).

Per capita SGDP without IT export contribution = SGDP excluding IT export / population.

Employment in IT industry = Initial employment in IT industry +
$\int_{t0}^{t}$Employment in IT industry * (employment growth)dt

Power supply = Initial Power supply+$\int_{t0}^{t}$Power supply * (power supply growth rate) dt

Additional power installed capacity = Initial Power supply
+$\int_{t0}^{t}$Power supply * (additional power installation growth rate) dt

Total Power supply= Normal Power supply+ Additional installed capacity

Road length supply = Initial road length +$\int_{t0}^{t}$Road length * (road supply growth) dt

Initial house construction supply = Initial housing +$\int_{t0}^{t}$ housing * (house construction growth) dt

Available houses = Initial housing -$\int_{t0}^{t}$ housing * (depreciation rate of houses) dt

IT Export = Initial IT export +$\int_{t0}^{t}$ IT export * (export growth rate) dt

Total employees availability = Total Initial employee available
+$\int_{t0}^{t}$ Employee available * (normal employee growth rate dt

IT employment share of total employment = (Employment generation from IT/total employment in Pune)*100.

[1]The table functions were relationships between ratio under perceived conditions and normal conditions and time, which provided non linear relationships close to the real system. They were obtained through discussions with the experts and decision makers in the system. The values of table functions were finalised after they were discussed, debated, tested and suitably modified following an iterative process based on the observations and past experiences of the experts in the study area.

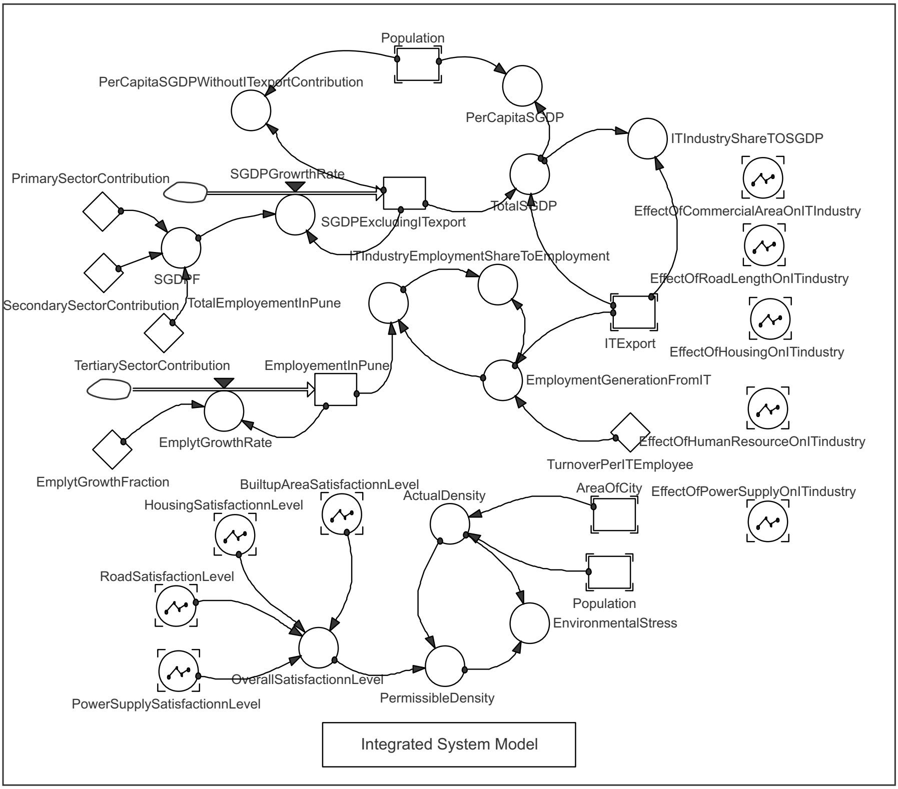

Figure 2: Integrated system dynamics models for Information Technology city development.

The model was established by considering year 2006 AD as the base year and the results for the concerned variables were computed by employing the model for the base year. The established model was then validated for structural validity by checking the algorithm and logical physical and information flow, and behavioural validity was done by comparing the model results from the year 2006 AD to the year 2009 AD with the actual data which was available in the system and was observed as being closely matched. The established and validated model was employed to compute the measured variables and their impact on the system for the projected year up to 2026 AD.

3. RESULTS AND DISCUSSION

The results of the various socio-economic and environmental indicators of development in the system were summarised and are presented in Table 1 and Figures 3(a) - 3(e). The various variables considered were earning from IT industry export, SGDP, IT export share to SGDP, per capita SGDP, employment generation through the IT industry, the IT industry employment share to total employment of the city, overall satisfaction, and environmental stress. The results revealed that the IT industry export would show an increasing trend over the projected periods with an increase of 777.60% in the year 2026 AD over the base year 2006 AD. The SGDP, including the contribution from the IT export, would increase by 237.01% as against a possible 145.53% under normal circumstances without the contribution from the IT industry export during the same period of the projection year 2026 AD from the base year 2006 AD. The share of the IT industry export to the total SGDP would increase considerably from 14.47% to 37.69% during the projected period. The per capita SGDP without the IT export contribution and with the contribution from the IT export would experience gradual growth over the projected period. However, it was observed that the per capita SGDP, including the contribution from the IT industry (1903.37 USD, 106.89% in year 2026), would increase at a rate twice of the per capita SGDP (1186.04 USD, 50.73% in year 2026 AD) without IT industry contribution. Similarly the employment in IT industry would increase multi-fold during the projected period, i.e., from 34704 in the year 2006 AD to 305368 in the year 2026,AD thereby increasing its share from 2.70% in the year 2006 AD to 11.98% in the year 2026 AD, thus contributing significantly to the total employment generation in the system. Further, the overall satisfaction level would show a decreasing trend from an index of 0.56 in the year 2006 to 0.42 in the year 2022 AD and then would increase gradually.

On the other hand, the environmental stress would increase from an index 0.44 in the year 2006 AD to 0.58 in year the year 2022 AD after which it would show a gradual decline. The decline of overall satisfaction and increase of environmental stress would occur initially because of the stress on the infrastructure and an increase in population density. However, it was expected that they would show improvement after a certain period with availability of adequate infrastructure and limiting of population density. Thus, it was revealed that the IT industry development and its integration in the system would bring about socio-economic development in terms of significant enhancement in the IT industry export, the IT industry export share in SGDP, an increase in per capita SGDP, an increase in employment generation in the IT industry and in the system (Pune city) in which IT industry would function as a catalyst, while experiencing growth in itself. However, there would be a consequent degradation in the city environment because of the higher density of population and stress on the land area availability, and a reduction in the satisfaction level of infrastructure because of a higher demand on infrastructure, such as, housing, commercial space, roads, power supply; and on human resources. However, a change in this scenario would be experienced with the gradual enhancement of the overall satisfaction level and decline in the environmental stress after a certain period (after year 2022 AD).

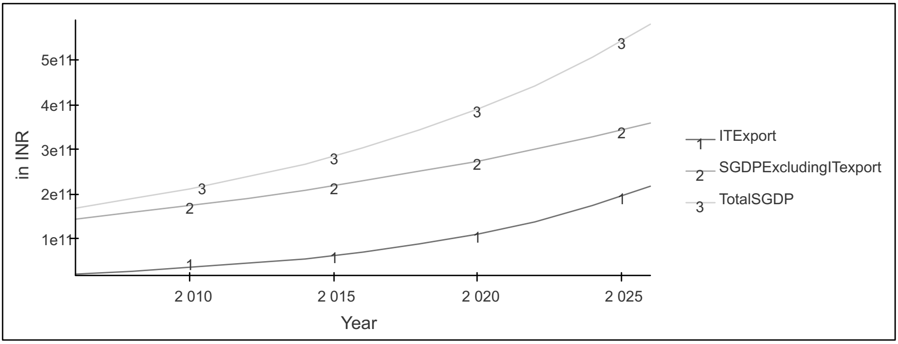

Figure 3 (a): State Gross Domestic Product and earning from Information Technology industry export up to year 2026 AD

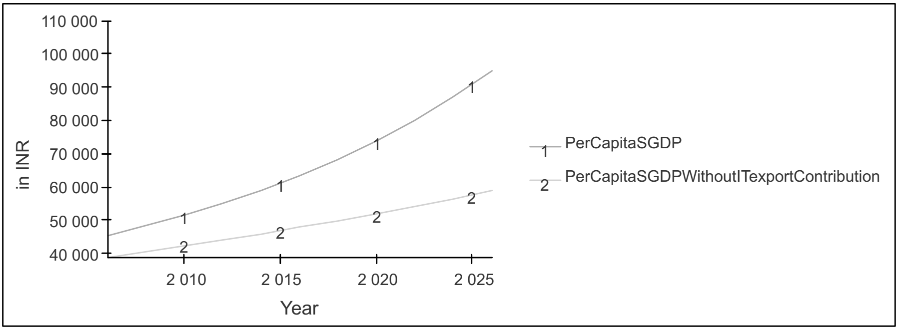

Figure 3(b): Per capita State Gross Domestic Product with and without contribution from Information Technology industry export up to year 2026 AD

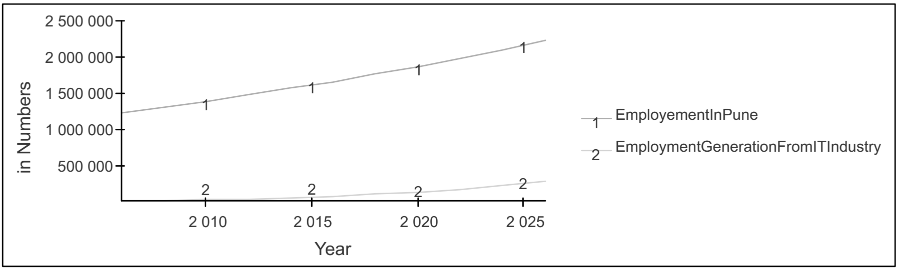

Figure 3(c): Employment generation from Information Technology industry and total employment in Pune city up to year 2026 AD

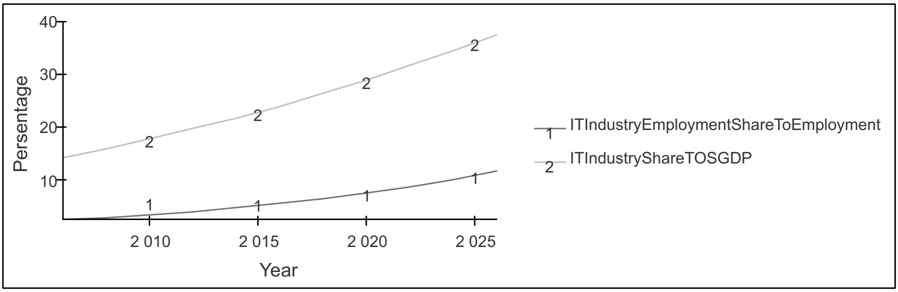

Figure 3(d): Share of Information Technology industry export share to State Gross Domestic Product and Information Technology industry employment share to total employment up to year 2026 AD

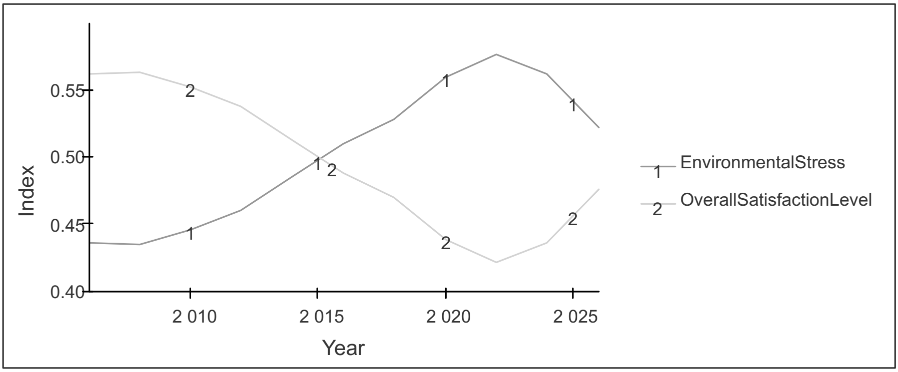

Figure 3(e): Overall satisfaction level and environmental stress in the system up to year 2026 AD

Table 1: Summary result of Information Technology industry and city development parameters for the years up to 2026 AD

Year	IT Industry Export in INR in billions (USD in billions)	% increase over base year 2006	SGDP excluding IT export in INR in billions (USD in billions))	% increase over base year 2006	Total SGDP in INR in billions (USD in billions)	% increase over base year 2006	IT industry share to SGDP (in per cent)	Per capita SGDP without IT industry export contribution in INR (in USD)	% of SGDP without IT industry contribution over base year 2006	Total per capita SGDP in INR (USD)	% increase of per capita SGDP over base year 2006	Employment generation from IT industry	Total employment in Pune (in numbers)	IT industry employment share to total employment	Overall satisfaction level	Environmental stress
2006	25 (0.50)		147.75 (2.96)		172.75 (3.46)		14.47	39343.14 (786.86)		46000.00 (920.00)		34794	1 287 200	2.70	0.56	0.44
2008	31.06 (0.62)	24.24	161.64 (3.23)	9.40	192.70 (3.85)	11.55	16.12	40991.05 (819.82)	4.19	48868.97 (977.38)	6.24	43236	1 370 785	3.15	0.56	0.44
2010	38.6 (0.77)	54.40	176.83 (3.54)	19.68	215.43 (4.31)	24.71	17.92	42707.99 (854.16)	8.55	52030.94 (1040.62)	13.11	53725	1 460 927	3.68	0.55	0.45
2012	47.96 (0.96)	91.84	193.44 (3.87)	30.92	241.41 (4.83)	39.75	19.87	44496.85 (889.94)	13.10	55529.89 (1110.60)	20.72	66758	1 558 39	4.28	0.53	0.46
2014	59.6 (1.19)	138.40	211.62 (4.23)	43.22	271.23 (5.42)	57.01	21.97	46360.63 (927.21)	17.84	59417.45 (1188.35)	29.17	82954	1 664 087	4.98	0.51	0.49
2016	74.06 (1.84)	196.24	231.51 (4.63)	56.69	305.58 (6.11)	76.89	24.24	48302.48 (966.05)	22.77	63754.30 (1275.09)	38.60	103078	1 779 079	5.79	0.49	0.51
2018	92.02 (1.84)	268.08	253.27 (5.07)	71.41	345.30 (6.91)	99.88	26.65	50325.66 (1006.51)	27.91	68611.78 (1372.24)	49.16	128085	1 904 646	6.72	0.47	0.53
2020	114.35 (2.29)	357.40	277.08 (5.54)	87.53	391.43 (7.83)	126.59	29.21	52433.59 (1048.67)	33.27	74073.91 (1481.48)	61.03	159158	2 042 313	7.79	0.43	0.56
2 022	142.09 (2.84)	468.36	303.12 (6.06)	105.16	445.21 (8.90)	157.72	31.92	54629.81 (1092.60)	38.85	80239.58 (1604.79)	74.43	197770	2 193 915	9.01	0.42	0.58
2024	176.57 (3.53)	606.28	331.60 (6.63)	124.43	508.17 (10.16)	194.16	34.75	56918.01 (1138.36)	44.67	87225.35 (1744.51)	89.62	245749	2 361 662	10.41	0.44	0.56
2026	219.4 (4.39)	777.60	362.77 (7.26)	145.53	582.18 (11.64)	237.01	37.69	59302.07 (1186.04)	50.73	95168.64 (1903.37)	106.89	305368	2 548 236	11.98	0.48	0.52

Note: the values in parentheses are converted values of Indian Rupees in US Dollars
INR- Indian Rupees
USD- United States of America Dollars

4. CONCLUSIONS

This investigation revealed that IT industry would influence cities having large scale IT industrial and related activities - particularly Pune city in India both socio-economically and physically. It would bring about socio-economic development with a significant increase in income in terms of contribution to SGDP and per capita SGDP. It would also generate significant employment in both the IT industry and the system if properly handled. On the other hand, it can be the thin end of the wedge and cause the city to deteriorate considerably, as it would affect the environment and satisfaction level on the infrastructure, which may deter the quality of life and restrict the growth of the IT industry in the city. However, there is a possibility that with adequate infrastructure development and perceived limiting of population density, there would be a gradual increase in satisfaction level and decline in environmental stress, thereby contributing to the overall development of the city. Therefore, adequate and strategic attention needs to be given to infrastructures such as housing, internal transportation (roads), power supply and the commercial built up area. In order to increase the satisfaction level, attention also needs to be given to other aspects such as human resources, which would influence the IT industry in Pune city where industries in this sector are predominantly present. Similarly, the density of population could be limited by employing appropriate measures such as limiting the population growth or increasing the area of the city by expanding its boundaries. This would mean that the density of the population would be reduced with respect to land area, hence reducing the environmental stress. Clearly, the behaviour of the city under various simulated conditions of the influential and major control parameters to achieve balanced and sustainable growth needs further investigation. However, this aspect was beyond the scope of the research reported in this article.

Further, this investigation revealed that the location of IT industries and allied activities in a city or the development of a city as a predominantly IT industrial city can become an important vehicle for socio-economic development of the city because of their capacity to contribute significantly in terms of higher earning opportunities from exports and employment generation, particularly in developing countries. However, in the absence of adequate provision for urban infrastructures and plausible efforts towards abatement of environmental degradation commensurate to the development of the IT industries and allied activities, which is sometimes the case in developing countries, there is a concern of higher pressure on the urban infrastructure and environmental stress, which may act as negative indicators for further location and growth of IT industries in such cities. Therefore, there is a need for integrated and strategic planning based on varied future scenarios for achieving the sustainability and wholesome development of IT cities in the developing world. However, it was construed from this investigation that integration of the IT industry development in the city development process would have a catalytic effect in the development of IT cities in India and similar developing nations.

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