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A STUDY OF THE FACTORS INFLUENCING THE LOCATION SELECTION DECISIONS OF INFORMATION TECHNOLOGY FIRMS

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ABSTRACT

This study seeks to understand the factors influencing the location selection decision making of information technology companies in India. The development of industrial estates has experienced phenomenal growth due to the globalisation policy of the government of India. Seven constructs, which include manpower, technology, social, hedonistic, industrial site, economic governmental factors, and as well as their underlying items, play vital roles in location selection decisions. A pilot study was conducted to understand the market and frame an effective questionnaire. The survey used a structured questionnaire for personnel from information technology organisations, government, and support service organisations. The data collected from the respondents was analysed to reduce it to meaningful factors. The factorised data and the constructs were further analysed with the help of a structural equation model. These analyses and path diagram reveal new dimensions in the location decision-making process.

Keywords: location selection decision, structural equation modelling, IT industry

INTRODUCTION

An industrial estate or industrial park is a self-contained geographical area, which has high quality infrastructural facilities and which houses businesses of an industrial nature. Industrial parks provide many advantages for businesses. The existing infrastructure of roads, large lots, sewers, ample electricity, and close location to related industries makes industrial parks attractive for businesses. The term "industrial estate" is often used interchangeably with such terms as industrial district, industrial park, industrial zone, special economic zone, and eco-zone. Industrial estates are specific areas zoned for industrial activity in which infrastructure, such as roads, power, and other utility services, is provided to facilitate the growth of industries and to minimise their impact on the environment. The industrial estates offer developed plots or pre-built facilities, power, telecommunication, water, sanitation and other civic amenities such as hospitals, sewerage and drainage facilities, and security.

Industrial estates can positively influence the socioeconomic development and industrialisation of a region by attracting investment, generating employment, leveraging skilled manpower resources, and adding to and improving social infrastructure (e.g., healthcare and educational facilities). Industrial estates in India are developed as "general industrial parks" (GIP), which cater to all types of industries. An example of the GIP is the Industrial Model Township at Manesar (Haryana), which has facilities that house different types of industries, such as auto and auto components, high-precision instruments, textiles, pharmaceuticals, and software. A "special industrial park" (SIP), however, focuses on a specific industry such as software, textiles, or plastics (Pitalwalla, 2006). The Software Technology Park at Whitefield in Bangalore is one such example.

The selection of an industrial location is an increasingly important decision faced both by national and international firms (Donovan, 2003). The general critical factors of an industrial location for the information technology sector are manpower, technology, and industrial site, as well as social, hedonistic, economic and governmental factors. In addition to location, foreign direct investment in industrial estates considers four other general factors: the political situation of foreign countries, global competition and survival, government regulations, and economic factors (Chaze, 2007).

One of the most important factors contributing to the success of an industrial estate is its location. The main criterion that firms should consider while deciding the location of an industrial estate is the natural competitive advantage of the region. A competitive advantage for a location would comprise the types of industries that can flourish there; the potential for forming industrial clusters in the region to ensure the economic viability of industrial estates; the presence of transportation nodes such as airports, railways and road networks; and the presence of technological research institutions and training facilities such as universities and colleges, which would add value to the growth of these estates and fiscal incentives for government agencies for setting up the industrial estates in particular regions (Jin & Grissom, 2008).

An imperative for an effective location decision is that managers must assess each potential location in terms of its impact on key operational performance measures. For instance, with a new location, managers must evaluate the competence of the local workforce and its impact on the quality of its products and services. Similarly, a firm that sets up a manufacturing or service establishment in a third world country to take advantage of lower labour costs must assess if the poor infrastructure or the non-availability of skilled personnel could erode its capability to compete on time. MacCormack, Newmann and Rosenfield (1994) suggest that the location decision framework used by managers predominantly emphasises the quantitative analyses for scale economies and other cost-based variables.

Usually, an industrial estate is configured around three zones – industrial, residential and commercial zones. The industrial zone encompasses industrial units catering to both domestic and export markets, the residential zone provides housing facilities, and the commercial zone comprises support facilities such as banks, post offices, hospitals, shopping centres and clubs (Hsueh, 2007; Chen & Hao, 2010).

The role of the central government in the establishment and upkeep of industrial estates in India has been mainly that of laying down the guidelines for the state governments. The responsibility for the selection of such factors as sites, development of areas, construction of infrastructure and facilities has been the mandate of the state governments. Subsequently, state governments created undertakings such as the State Industrial Development Corporation (SIDC) to execute this mandate. Some of the roles of SIDCs include setting up infrastructure facilities to promote industrial growth via industrial parks, identifying and promoting industrial projects, providing forms of financial participation such as term loans and direct equity participation, and handling the operations of the industrial parks. To date, in most states, the state industrial development corporations have been the sole promoting, investing, implementing and operating agencies for industrial parks. However, all states have encouraged private sector participation to ensure a more commercial approach to the entire exercise of setting up and managing industrial estates in the information technology sector.

Since the outsourcing market started in India in around 1991, after the liberalisation of the economy, it has rapidly become a global hub for back office services. Anywhere from one-half to two-thirds of all the United States Fortune 500 companies are already outsourcing to India, and according to Forrester Research, the amount of work undertaken for U.S. companies is expected to grow by more than double over the next couple of years (Overby, 2003). As companies from developed countries increasingly shift their information technology services and other back office works to the Indian subcontinent, there is a considerable effect on real estate-related services in India. The last decade has witnessed significant progress in the evolution of the Indian real estate market. Robust economic growth – spurred by sectors such as information technology (IT) and information technology enabled services (ITeS) – and a large urban population with higher incomes have placed considerable pressure on the prices for residential and commercial real estate.

The phenomenal growth of the information technology companies in a liberalised economy demands a clear understanding of location selection for their operation. Thus, a study with the objective to recognise the factors influencing the selection of location, along with other sub-criteria, such as the availability of skilled manpower, and technology, as well as the individual elements of the criteria, is certainly necessary.

INFORMATION TECHNOLOGY SECTOR IN INDIA

Today, India is home to some of the finest IT companies in the world. The software companies in India are known across the globe for their efficient IT- and business-related solutions. With the huge success of the software companies in India, the Indian software industry, in turn, has been successful at making a mark in the global arena; it has been instrumental in driving the Indian economy along a rapid growth curve. The NASSCOM (The National Association of Software and Services Companies) study reports that the IT/ITeS industry recorded a growth of 4–7% in 2010. In addition to the Indian companies, a number of multinational giants have also plunged into the Indian IT market. There are a number of reasons for the success of the information technology sector in India. India is the hub of cheap and skilled professionals who are available in abundance. This labour pool helps the information technology companies develop cost-effective business solutions for their clients. As a result, Indian information technology companies can place their products and services in the global market at the most competitive rates. This is the reason why India has been a favourite destination for outsourcing as well. Many multinational IT giants have their offshore development centres in India.

The information technology business sector in India covers varied types of business. There can be several types of business in the IT sectors – services, business processing, software and hardware. The information technology business sector in India can be broadly classified as

1. Information Technology Services (ITS)
2. Information Technology-enabled Services (ITeS)

    i. ITeS-BPO (Business Process Outsourcing)
    ii. ITeS-KPO (Knowledge Process Outsourcing)

3. Engineering Services
4. Research and Development
5. Software (SW)

    i. Infrastructure Software: Operating Systems, Middleware and Databases
    ii. Enterprise Software: Automate business process verticals such as finance, sales and marketing, production and logistics
    iii. Security Software
    iv. Industry-specific Software
    v. Contract Programming

6. Hardware Products

The global outsourcing market encompasses the outsourcing of business processes by sectors such as information technology, information technology enabled services, financial services, telecommunication, and airlines, among others. All of these sectors depend upon the ability to be remotely serviced. Given the labour-intensive nature of this work and the price of labour, it is typically outsourcing to a country such as India. In India, workers speak English and are generally paid salaries that are on average one-fifth of the salaries in developed countries. The interest in outsourcing is also linked to a trend in Western companies to concentrate on core activities and the perception that IT service vendors have the economies of scale and technical expertise to provide services more efficiently than internal IT departments. Except for the hardware business, all businesses of the IT sector are labour intensive, especially Business Process Outsourcing (BPO), which involves heavy manpower. BPO is transforming corporate real estate requirements. When developed countries outsource business processes to developing countries, there are consequences for real estate requirements. The real estate selection prerequisites for information technology organisation are the availability of location, quality of workspace environment and availability of human resources. Suburban areas with campuses or built-to-suit facilities are increasingly preferred locations of workplace by IT companies. The advent of BPO has transformed the way companies operate, including their real estate requirements. For those low-cost business process providers, the real estate costs are incorporated into the overall lower costs of the BPO organisation. However, presently the BPOs represent as much as 35% of traditional information technology jobs in India (Krishnadas, 2004).

The preferred Indian cities for locating IT-enabled service (ITeS) ventures are Mumbai, Chennai, Delhi, Bangalore and Hyderabad. This is due to not only the location factors but also the presence of support services. In these cities, developmental activity, due to easier availability of land, is characterised by the construction of larger floor plates and offers of custom-built facilities from developers. Secondary cities such as Pune, Cochin, Mysore, Jaipur, Vijayawada, Nagpur, and Kolkata qualify on many factors, but they lack support services (Van Dijk, 2003). There are about half a million people working in the IT sector in India, with large concentrations in Mumbai, Bangalore, Delhi, Hyderabad and Chennai. The southern states in India (especially Andhra Pradesh, Karnataka and Tamil Nadu) have developed strong reputations as the main sources of software development services. In particular, Bangalore is often called the Indian version of the Silicon Valley, referring to the concentration of computer-related enterprises in the city.

Research Gap

Location is viewed as an ongoing management priority. Location selection criteria are changing, consistent with the core competency opinion and organisational cost reduction strategies. The factors currently exerting a substantial influence over the location of corporate facilities include availability of technology to maximise operational performance, convenience for assuring the rapid delivery of goods and services to customers, positioning conducive to cost reduction and operational efficiency, access to the recruitment and retaining of the best talents, minimum disaster risk, and means of business continuity. Information technology companies settle in a location for a number of tax incentives. Incentives are also provided in India for investments in infrastructure. Companies look for a large number of education and training institutions in the city. It was often convenient to set up units along or in the vicinity of highways. Electricity and water supply positively influence location selection. As there is no elaborate information available, a field study is necessary to understand contemporary location selection for information technology companies.

RESEARCH METHOD

Objectives of Research

The industrial locations, especially locations of information technology organisations in high-tech industrial parks, play vital roles in successful operations. Location is important for the sustainability and growth of information technology organisations. There are many critical factors influencing the decision-making process of the selection of location. As the software industry is labour-intensive, social factors are also decisive and exert a significant influence in decision-making. The objectives of this study are identified as an attempt to answer the following questions:

1. What are the major factors in industrial location selection for information technology organisations?
2. What are the elements of industrial location selection factors for information technology organisations?

This paper first provides an analysis of the industrial location literature from which the critical factors are derived. Next, it presents results of the data analysis from developing the measurement instrument for research analysis and conclusions of the study.

Location-based Factors

A review of the empirical studies of industrial location reveals some of the most influential factors in making a decision to locate industrial plants at particular sites (Mazzarol & Choo, 2003; Wood & Parr, 2005). The most often-cited factors of industrial location are accessibility to industrial parks, airways, highway and railroad facilities; availability of the latest technology; availability of manpower; an industrial estate that is close to the city; availability of colleges and research institutions; congenial environment for business; incentives and tax-free operations; corporate tax structure; cost of electric power and other utilities; cost of industrial land; education systems; educational level of manpower; housing availability in communities close to industrial estates; infrastructure (roads, electric power, water and sewer, utilities, etc.); quality of life at the residential community; recreational facilities; shopping centres; standard of living; infrastructure for the latest technology; telecommunications facilities; local business regulations; medical facilities at the community; pleasant working environment; political stability; government aid and regulations; and prevalence of bureaucratic red tape. These factors are classified into seven basic categories: manpower, technology, social, hedonistic, industrial site, economic and governmental factors.

The emergence of a technology park brought about other dimensions of international location, where firms want to be closer to one another (Wood & Parr, 2005). Economic integration provides incentives to locate in certain regions, and such economic integration forces have dictated new rules for new location-decision makers. Cities and regions are competing to attract direct investment and creative talents. To succeed, they need to attach several new strings to their bows: diversified cultural offerings, quality of life, and life style. Culture has become an important soft-location factor and a key factor for boosting local and regional attractiveness. This study analyses the influence of "soft" location factors, in particular cultural activities of producers from urban regions on the competitive positioning (Masood, 2007).

Thirty-eight information technology park location-specific attributes are selected in seven categories. These were adapted from Schmenner (1982), MacCormack et al. (1994), Naidu, Heywood and Reed (2006), and Ulgado (1996). Table 1 describes the detailed measures used for the different categories of information technology park location factors. The research instrument used was a questionnaire. The structured questionnaire was formulated with constructs as critical factors influencing the decision of the selection of an information technology park location. A pilot study was conducted by the given questionnaire to make sure that the measures were valid, reliable, and user-friendly. Revised questionnaires were designed with the changes suggested by the industry experts to overcome the shortfalls or difficulties during the pilot study. The redesigned questionnaires were administered to the respondents, and data were collected.

Details of the critical measurements and dimensions are listed in Table 1. The statements consisting of 38 attributes on location selection are factor-analysed, to reduce the data to meaningful factors. For this purpose, the principal components analysis is used with varimax rotation. The resultant factors are identified using an eigen value greater than one criterion. As a general rule, for factor analysis, the minimum is to have at least five times as many observations as there are variables (Hair, Black, Babin, Anderson, & Tatham, 2006). Thus, the sample size of 312 was adequate and within acceptable limits. Instead of using the factor scores, items with average loaded factors are considered for the subsequent analyses. This method is supported by Hair et al. (2006) to analyse and interpret the results, rather than use the factor scores, which is basically the linear combination of all the variables and not simply the variables that load highly on a specific factor.

Research Design

The research has been based on the pilot study conducted and the consultation with field experts. Data collection has been through primary data sources.

Pilot study

The pilot study is designed and conducted to test the instruments used for data collection. The pilot study data were collected from the personnel of the information technology services (ITS), information technology enabled services (ITeS) and software (SW) organisations. The pilot survey comprised 59 technology company respondents from Ekkaduthangal, including Olympia Tech Park and TIDEL Park, Chennai. The questionnaire is the instrument used and is followed by a personal interview. The focus interview consists of open-ended questions and a set of questions in the form of a questionnaire. The adaptation of the research questions has been performed for the instruments from research journal papers (Bhatnaga & Amrik, 2005; MacCormack et al;, 1994; Mazzarol & Choo, 2003; McCann, Arita, & Gordon, 2002; Naidu, Reed, & Heywood, 2005). Individual questions are formulated based on the items considered for the construction of the research instrument.

Table 1
Critical measurements and dimensions for path analysis

Dimension	Measurements
Manpower Factor	
MPR1	Availability of manpower
MPR2	Education systems
MPR3	Educational level of manpower
MPR4	Skill level of manpower
MPR5	Wage rate
MPR6	Labour Union
Technology Factor	
TEC1	Infrastructure for latest technology
TEC2	Availability of latest technology
TEC3	Telecommunication facilities
Social Factor	
SOC2	Quality of life
SOC2	Standard of living of community
SOC3	Housing availability in the community
SOC4	Attitude of community resident
SOC5	Quality schools availability
SOC6	Colleges and research institutions availability
SOC7	Medical facilities
SOC8	Shopping centres
Hedonistic Factor	
HED1	Pleasant working environment
HED2	Recreational facilities
HED3	Relative humidity
HED4	Monthly average temperature

(continued on next page)

Table 1 *(continued)*

Dimension	Measurements
Industrial Site Factor	
INS1	Cost of industrial land
INS2	Accessibility
INS3	Closeness to city
INS4	Infrastructure (roads, electric power, water and sewer, utilities etc.)
INS5	Cost of electric power and other utilities
INS6	Proximity to other high-tech firms
INS7	Airway, highway and railroad facilities
INS8	Transportation cost
Economic Factor	
ECO1	Corporate tax structure
ECO2	Tax assessment basis
ECO3	Government aids, incentives and tax free operations
ECO4	Local business regulations
Governmental Factor	
GOV1	Government Regulations
GOV2	Prevalence bureaucratic red tape
GOV3	Political stability
GOV4	Congenial environment for business
GOV5	Supportive local authorities

Research frame

The research frame for data collection is from the city of Chennai, India. Private sector companies in the information technology sector are considered for surveying, but the government sector is not considered, because government companies are not present in Chennai. Additionally, IT hardware is not part of the study, as all those hardware organisations are located in manufacturing industrial estates (Okada & Siddharthan, 2007). The pilot study reveals that technology companies with employee strength greater than 50 or companies setting up units with a capacity of more than 50 employees encounter many location selection constraints. Thus, the research survey has been restricted to studying organisations with employee strengths greater than 50.

Sample size

In addition to the purpose of study and population size, other criteria are specified to determine the appropriate sample size: level of precision, level of confidence or risk, and degree of variability in the attributes being measured (Miaoulis & Michener, 1976). The sample size is determined based on the published tables, which provide the sample size for a given set of criteria. Table 2 presents the sample sizes that would be necessary for given combinations of precision, confidence levels, and variability from the published work. This finding should be noted, as sample sizes reflect the number of *obtained* (complete and accurate) responses, and not necessarily the number of surveys planned, and it is presumed that the attributes being measured are normally distributed or nearly so.

Table 2
Sample size

Size of population	Sample size (*n*) for precision (*e*) of:		
	±5%	±7%	±10%
100	67	51	100
200	101	67	200
300	121	76	300
400	135	81	400
500	222	145	83
600	240	152	86
700	255	158	88
800	267	163	89
900	277	166	90
1,000	286	169	91
2,000	333	185	95
3,000	353	191	97
4,000	364	194	98
5,000	370	196	98
6,000	375	197	98
7,000	378	198	99
8,000	381	199	99
9,000	383	200	99
10,000	385	200	99
15,000	390	201	99

(continued on next page)

Table 2 *(continued)*

Size of population	Sample size (n) for precision (e) of:		
	±5%	±7%	±10%
20,000	392	204	100
25,000	394	204	100
50,000	397	204	100
100,000	398	204	100
>100,000	400	204	100

Sample size for: Precision Levels ±5%, ±7% and ±10%; Confidence Level is 95% ; P = 0.5

There are 392 organisations that have an employee strength of more than 50, are located in the city of Chennai, and are representing companies in the IT service, ITeS and SW sectors (Source: The Associated Chambers of Commerce and Industry of India (ASSOCHAM), 2010). For the population size of 392, the opted sample size is 135 numbers with precision levels of ±5%. The actual sample size taken for the research analysis is 147 numbers for questionnaires, which are shown in Table 3, excluding incomplete questionnaires.

The accepted questionnaires are complete in nature; the ITS sector represents 21%, ITeS sector constitutes 57%, and SW covers 22% of the responses.

Table 3
Market sector data collection

Markets Sector		Questionnaires (Nos.)		
		Sent	Received	Accepted
ITS	Service	83	33	31
ITeS	BPO Voice Base	106	48	42
	BPO Non Voice Base / Back Office Support	54	29	23
	KPO	14	11	11
	Accounting Service	25	9	8
SW	Testing	62	15	15
	Enterprise Software	17	8	7
	Development	31	11	10
	Total	392	164	147

Research instruments

The instrument used for the research data collection was a structured questionnaire. The scale of development combined into an instrument is tested through the pilot study, with respondents from multiple strata. Pilot study data are analysed using the confirmatory factor analysis (CFA) with the help of software packages SPSS. The scale reliability and validity were assessed by a CFA. The research work of Masood (2007) has been referred to for factorisation. The research instrument development is based on the pilot study. The respondents were asked to indicate the relative emphasis placed on each factor on a five-point Likert scale, with end points of 1 (not important at all for making plant location decision) and 5 (extremely important for making plant location decision). The respondents were from information technology organisations, government departments, and other support service organisations that provide services to information technology organisations. The questionnaire used guidelines to verify the relevance of questions, breaking down questions whenever it was required, and to ensure that the questions did not demand participants' recall abilities. The questionnaire construction procedure is shown in Figure 1.

Internal consistency is estimated, using the reliability coefficient tested from Cronbach's alpha (α) analysis. To measure the reliability for a set of two or more constructs, Cronbach's alpha is a commonly used method, for which the alpha coefficient value ranges between 0 and 1, with a higher value indicating higher reliability among the indicators (Hair et al., 2006).

Two constructs have alpha coefficient values of more than 0.9. The constructs Manpower and Technological have Cronbach's coefficient values of 0.9438 and 0.9700, respectively. Industrial site has a coefficient value of 0.8816, and Economic has a coefficient value of 0.8111. Three constructs, Governmental, Social and Hedonistic, have alpha values of 0.7519, 0.7222 and 0.7141, respectively. The Cronbach's alpha values for this study, shown in Table 4, are all above 0.7, thereby testifying that the scales are internally consistent and have acceptable reliability values in their original form.

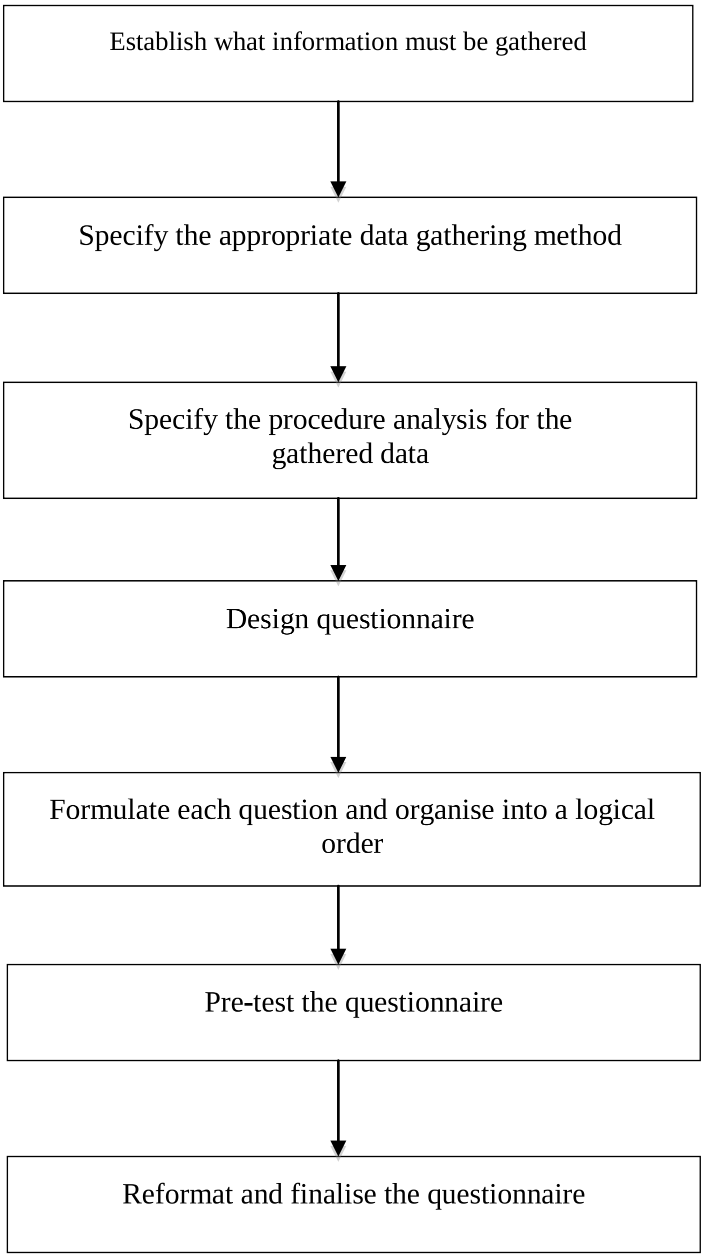

Figure 1. Questionnaire construction procedures

Table 4
Cronbach's coefficient alpha (α) value

Construct	Alpha (α) value
Manpower	0.9438
Technological	0.9700
Social	0.7222
Hedonistic	0.7141
Industrial site	0.8816
Economic	0.8111
Governmental	0.7519

RESEARCH ANALYSIS

Structural Equation Model

The structural equation model was examined to test the relationship between the constructs. The structural equation model shows potential causal dependencies between endogenous and exogenous variables. The parameter is the value of interest, which is the regression coefficient between the exogenous and the endogenous variables or the factor loading (regression coefficient between the indicator and its factor). The path diagram of the structural equation model shown in Figure 2 represents the research questions, and Table 4 illustrates the standard estimates. The seven-fold relationship (i.e., the impact of the constructs manpower, technology, social, hedonistic, industrial site, economic and governmental factors), on the preference for location, as per the coefficients of covariance, are 0.744 for "Manpower", 0.790 for "Technological", 0.692 for "Social", 0.217 for "Hedonistic", 0.564 for "Industrial Site", 0.675 for "Economical" and 0.334 for "Governmental". It can be ascertained that the technological factors construct has the biggest impact with a coefficient of 0.790, followed by the manpower construct with a coefficient of 0.749 and the social construct with a coefficient of 0.692. These three constructs have more impact on the selection of location for information technology organisations in a technology park. The economical and industrial site constructs with coefficients of 0.615 and 0.564, respectively, have a moderate impact on influencing the location selection decisions of information technology firms. The construct "Governmental" has a coefficient of 0.334, which is low, and the construct "Hedonistic" has the lowest coefficient of 0.217. Both these constructs have a lesser impact on location selection decisions. Moreover, the exogenous construct "Preference for Location" has a substantial impact on the construct "Selection" with a coefficient of 0.670 and provides evidence of the relationship as well.

$$SLO = f\{MPR, TCE, SOC, HED, INS, ECO, GOV, PRE\}$$

$$MPR = \beta_{11} MPR1 + \beta_{12} MPR2 + \beta_{13} MPR3 + \beta_{14} MPR4 + \beta_{15} MPR5 + \beta_{16} MPR6 + e_1$$

$$TCE = \beta_{21} TCE1 + \beta_{22} TCE2 + \beta_{23} TCE3 + e_2$$

$$SOC = \beta_{31} SOC1 + \beta_{32} SOC2 + \beta_{33} SOC3 + \beta_{34} SOC4 + \beta_{35} SOC5 + \beta_{36} SOC6 + \beta_{37} SOC7 + \beta_{38} SOC8 + e_3$$

$$HED = \beta_{41} HED1 + \beta_{42} HED2 + \beta_{43} HED3 + \beta_{44} HED4 + e_4$$

$$INS = \beta_{51} INS1 + \beta_{52} INS2 + \beta_{53} INS3 + \beta_{54} INS4 + \beta_{55} INS5 + \beta_{56} INS6 + \beta_{57} INS7 + \beta_{58} INS8 + e_5$$

$$ECO = \beta_{61} ECO1 + \beta_{62} ECO2 + \beta_{63} ECO3 + \beta_{64} ECO4 + e_6$$

$$GOV = \beta_{71} GOV1 + \beta_{72} GOV2 + \beta_{73} GOV3 + \beta_{74} GOV4 + \beta_{75} GOV5 + e_7$$

$$PRE = \beta_{81} MPR + \beta_{82} TCE + \beta_{83} SOC + \beta_{84} HED + \beta_{85} INS + \beta_{86} ECO + \beta_{87} GOV + e_8$$

$$SLO = \beta_{91} PRE + e_9$$

where

SLO	:	Selection of location of an organisation
MPR	:	Manpower factor
TCE	:	Technological factor
SOC	:	Social factor
HED	:	Hedonistic
INS	:	Industrial site factor
ECO	:	Economic factor
GOV	:	Governmental factor
PRE	:	Preference for location

Table 5
Standard estimation

Standardised regression weight		Estimate	S.E.	C.R.	*P* value
Manpower	← Preference for location	0.7438129	0.067	4.677	0.000
Technological	← Preference for location	0.7900132	0.063	4.649	0.000
Social	← Preference for location	0.6922289	0.057	4.426	0.000
Hedonistic	← Preference for location	0.2172231	0.071	5.457	0.002
Industrial site	← Preference for location	0.5641333	0.044	3.454	0.002
Economic	← Preference for location	0.6745441	0.059	4.365	0.000
Governmental	← Preference for location	0.3344215	0.057	4.523	0.002

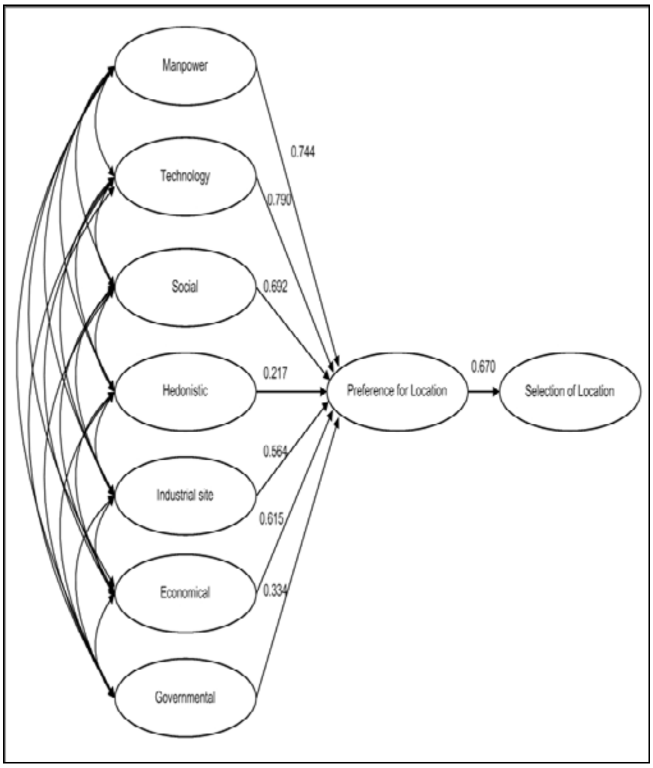

Figure 2. Path diagram of Structural Equation Model

The results from the structural equation analysis further show the formulation of the constructs and the subjective impacts of the constructs in the form of a path model. The path diagram (Figure 2) clearly illustrates the measurement model, which comprises of two latent constructs: preference for locations and selection of location. The first exogenous construct "preference for location" was formed based on seven variable inputs and the following endogenous inputs: technology, manpower, social construct, economical, industrial site, governmental factor and hedonistic factors. Influence of these seven endogenous constructs on the "preference for location" varies with different magnitudes, and the structural equation model comprises seven equations. The individual equation consists of the respective elements of the constructs. The second exogenous construct "selection of location" was formed by the exogenous construct "preference for location".

Parameter estimation is performed by comparing the actual covariance matrices representing the relationships between the variables and the estimated covariance matrices of the best fitting model. This is obtained through the numerical maximisation of a fit criterion, as provided by the maximum likelihood estimation, the weighted least squares method. The output of the SEM includes matrices of the estimated (Table 4) relationships between the variables in the model. The assessment of fit essentially calculates how similar the predicted data are to matrices containing the relationships in the actual data.

The structural equation modelling was used for exploring the impact of endogenous constructs on exogenous constructs in location selection with reference to information technology organisations. It allows for simultaneous testing of an entire model that consists of multiple separate relationships (Hair et al., 2006) and in terms of the exogenous predetermined variables. A two-stage approach was used in the structural equation model, where a measurement model that comprised the latent construct "preference for location" was assessed first, followed by a structural model that measures the construct "selection of location". The model shows causal dependencies between the endogenous and exogenous variables. The relationship and dependency help in evaluating the influence of the individual elements in the determination of location selection.

CONCLUSION

The globalisation of the Indian economy during the 1990s triggered the opening up of the information and communication technology related services sector. These business sectors are manpower intensive and technology driven. To meet the demands of industries, the government encouraged organisations to set up information technology industries and offered tax incentives and utility subsidies. The government policy framework made the private sector participate in developing the industrial estates, particularly in the information technology sector.

The selection of an industrial estate for an information technology organisation is a crucial and critical decision. Many factors influence the decision-making process. The survey conducted reveals that seven factors play a significant role in selection of location. Among the factors, manpower and technological factors are very predominant, and the hedonistic factor is least important. The structural equation model explained with a path diagram helps in understanding the selection decision of the location of information technology companies. This in turn facilitates academics and practising managers in making vital assessments on location decision while establishing a new setup or expansion.

This study makes recommendations to the practicing managers of information technology and real estate companies and to the policymakers in governments on the selection of the location for the efficient operations of their organisations. This study helps in suggesting the use of such factors as manpower, technological, social, hedonistic, industrial site, economic, and governmental factors in location selection decision making. Policy makers in the government make use of the report while deciding the promotion of a new industrial complex or special economic zone or, in particular, the area of information technology development. Decision makers and strategists of organisations can refer to this study report while locating their new business unit establishments as well as expanding their existing business divisions.

The research frame for this study was the geographical area of Chennai city, with a specific focus on information technology companies. Considering Chennai alone for the research is a limitation of the study. Further study can be conducted to explore the factors influencing the location selection decision in other cities. New studies can be conducted to investigate the relationship between variables in the context of region and country.

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