Influence of Infrastructure on the Economic Perspectives of Regional Tourism Development in Odisha State, India

Dillip Kumar Das

Abstract

It is already established that tourism can contribute significantly to the economy of a region. However, in addition to the prime attractions, which motivate tourists to visit a place, infrastructure and services provisions at the regional and destination level play a major role in the tourist satisfaction and tourist visits. As infrastructure provision is no more a free service and investment in tourism sector is not much favoured recently because of its volatility nature, it is pertinent to understand the relationship between the infrastructure and the tourism economics of a region before investing on them. Therefore, this paper investigates the most influential infrastructures at the regional and destination level, which influence tourism and their individual and combined effect on the tourism economics of a region. The study was conducted by considering a tourism resource rich region of Odisha state in India.

Department of Civil Engineering, Central University of Technology Free State, 20 President Brand Street, Bloemfontein, South Africa, 9300
E-mail: ddas@cut.ac.za Tel: 0027848529260, 0027515073647

Survey research methodology for data collection, relevant statistical analyses, multiple regression modelling and scenario analysis were followed. The findings are that there is a strong linkage between the infrastructure provision and tourism economics. The road length, rail route length, accommodation (hotels) infrastructure at the regional level and investment on the destination level tourism infrastructure mostly influence the tourist arrival. However, enhancement of these infrastructures individually without considering the effect of the other infrastructures will not lead to significant increase in the tourist arrival and consequent economic benefits. However, if they are enhanced together at a perceived rate, there will be significant increase in the tourist arrival, consequent earnings and employment generation from tourism in the region.

1. INTRODUCTION

Tourism has been transformed from a mere short term movement of people to places outside their places of living or work for leisure or vacations to a safe, pollution free modern industry with tremendous economic and social development potentiality (Bukert and Meddick, 1974). It is being connected with the business of providing recreation, accommodation, communication and other services to the tourists; and seen as a mechanism for promoting economic development. As a part of economic growth strategy, it is sought to earn significantly including generation of foreign exchange, increased employment, attraction of foreign capital, and promotion of economic independence (Matarrita-Cascante 2010; Sharpley and Telfer, 2002). Its success is evaluated by maintaining a growth in the number of tourist arrivals and associated expenditure, and obtaining an increasing percentage share of the total world tourism market (Holden 2008, p. 111). However, a development-driven tourism while seeking for economic development, it also seeks for optimum satisfaction of guest requirements, healthy culture, unspoiled nature/protection of resources, and increased well-being of the local population (Gezici, 2006; Muller, 1994) and promotion of social and environmental responsibility (Gezici, 2006; Matarrita-Cascante 2010; Saxena and Ilbery, 2008).

However, successful tourism development in a region is dependent on a host of economic, social, infrastructural, natural landscapes and environmental factors. In terms of economics, it includes contribution to the income and standard of living increased

employment opportunities, improved investment, infrastructure development, increased tax revenues (Bum, Lee, & Shafer, 2002), and increased opportunities for tourist spending (Milman and Pizam, 1988; Perdue, Long, and Allen, 1990; Pizam, 1978; Ross, 1992; Tyrrell and Spaulding, 1984). The social and cultural indicators are related to changes in value systems, individual behaviour, collective lifestyles, safety levels, moral conduct, creative expressions, traditional ceremonies, community organizations, local resources and facilities, labour structures, and language (Affeld, 1975; Butler, 1974; Fox, 1977; Kadt, 1979; Keogh, 1989). Similarly, the natural landscape and environmental conditions comprise the state of the natural environment (Belisle and Hoy, 1980; Liu, Sheldon, and Var, 1987; Liu and Var, 1986), agricultural and pastoral lands, and flora and fauna, an area's appearance (Bystrzanowski, 1989), traffic crowding, noise, and litter (Brougham and Butler, 1981; Caneday and Zeiger, 1991; Pizam, 1978).

However, there are two major challenges, which generally motivate a tourist to visit a tourist region or destination and consequently influence the success of tourism. First, the availability of the tourist attractions, known as prime motivators, for example- architectural heritages, monuments, religious places, wild life and so on directly influence tourist visits. Second, the presence of certain elements known as satisfiers such as, the image of a place, availability of infrastructure (transportation facilities, accommodation, recreation facilities, etc.), which although do not influence directly yet help in the decision making of the tourist to visit a place.

Of these two important challenges the satisfiers are often observed to play an integral role in the success of tourism of a region. One of such satisfier is infrastructure, whose role is highlighted in tourism literature by many scholars (Enright, and Newton, 2004; Nadeau, Heslop, O'Reilly, Luk, 2008). However, there is still a need to understand the influence of the basic regional infrastructure, such as, transportation roads, railways, and accommodation; and the destination level tourist infrastructure and services, such as, resting places, food locations, and shopping centres to name a few specifically on the economics of the tourism at the regional level. Further, tourism infrastructure development needs large investment, which has commercial business implications particularly when the investment is done by the private sector or in joint venture with both public and private participation (Hawkin, Mann, 2007). Thus, before the investment

in such infrastructure is carried out it becomes pertinent to understand its influence on the tourism development, specifically on the tourist arrival and consequent earnings from tourist expenditure.

Therefore, the objective of this paper is to find out the important infrastructures, which influence the tourism development significantly; and simulate their influence on the tourism economics at the regional level in the form of tourist arrival and consequent earnings and employment generation under different scenarios of provisions of such infrastructures. The study was conducted by considering a tourism resource rich region of Odisha state in India by following a systematic survey research methodology, statistical analyses, model development and simulated scenario analyses. The study revealed that roads, rail route length and accommodation (hotel) infrastructure at regional level and investment on the destination level infrastructures, such as, temporary resting places, waste disposal, parking places, shopping locations, and water supply mostly influence tourist arrival. However, enhancement of the individual infrastructure from the current scenario without considering the effect of the other infrastructures will not lead to significant increase in the tourist arrival and consequent tourist earnings and employment generation. On the other hand, it was observed that under perceived scenarios of enhancement of all the three above mentioned infrastructure and investment on the destination level infrastructure together, they will have notable impact on the tourism economics of the region particularly in terms significant increase in the tourist arrival, consequent earnings and employment generation from the tourism in the study area.

2. INFRASTRUCTURE AND TOURISM ECONOMICS

Tourism has become a significant tool in the regional development processes and increasingly interests have been turned to make it economically viable (Gezici, 2006). Like other emerging sectors in modern economies, tourism is a dynamic, ever changing industry, and results in creating huge impact on the economic activity of a region or a country. The economic development of a region from tourism depends on various factors, such as, income accrued from foreign exchange earnings, earnings from domestic tourism, earnings from exports, creating conducive atmosphere for employment generation, growth of craft industry, creation of infrastructure and services, etc., (Russell and Faulkner, 2004). It is argued that tourism provides the most harmonious

development with the characteristics of the regions and creates opportunities to disseminate the natural, historical, and cultural values. It beautifies the local environment, helps to maintain its built assets in place for other economic activities and aids in the reduction in the loss of natural resources, if there planned development is followed. In a sense, it assists in building of new assets, conserves the existing resources, creates new opportunities for employment, growth of craft industry and as a feedback enhances its economic prospects (Gezici, 2006; Hunter, 1997).

However, the success of tourism destinations or regions is influenced by their relative competitiveness (Enright, and Newton, 2004). The destination image or attractiveness and attributes that are seen to attract visitors, such as, climate, scenery, artefacts, the condition of a destination's general infrastructure, facilitating services and accommodation together with the factors influencing the destination's accessibility such as roads, railways, and air transport (Butler, 1980; Crouch and Ritchie, 1999; Enright, and Newton, 2004) help in building this competitiveness. More or so the infrastructure provision functions as the nervous system for effective development of a tourism region or destination. According to Beerli, and Martın, (2004), two types of physical infrastructure such as, general/basic infrastructure and tourist infrastructure which influence tourism development and create an image of a destination or region.

The general infrastructure includes transportation, communication, and health services at the broader perspective and forms a part of the macro level development. It helps in bringing the tourists to the destinations while serving other socioeconomic functions (Crouch and Ritchie, 1999). The tourist infrastructure, which mostly functions at the destination level comprises of accommodation, resting places, parking, food, shopping, waste disposal, water supply, information and entertainment facilities impacts the tourist satisfaction (Albalate and Bel, 2010).

Of all the infrastructures transportation, accommodation, and communication sector are classified as business factors, which contribute to the income and employment generation. The service quality of these infrastructures leads to reliability, assurance and tourist satisfaction that are highly important for tourism development (Crouch and Ritchie, 1999). Albalate and Bel (2010) further confirmed the views

of other scholars like Page (2005) that there is a close link between transportation and tourism development. For example, if there is good road transportation available, tourists can combine several attractions together as one trip because those attractions may be located in close proximity. Similarly, a number of attractions that fit to the interests of the tourists may be packaged and the trips may be optimised by the operators, which can be beneficial to both the tourists and operators from economic reasons (Xia, Evans, Spilsbury, Ciesielski, Arrowsmith and Wright, 2010). While road transportation is crucial, the role of railways and air travel cannot be undermined at the regional and national level (Das, 2006, 2009; Lumsdon, 2006). Thus, it is well acknowledged that transport provision in terms of roads, railways air travel is a major stimulus for the tourism development (Adams, 1997; Becken, 2002; Lumsdon, 2006; Van Doren and Lollar, 1985).

Accommodation is an integral part of tourism. The availability of good and affordable accommodation facilities provides an additional dimension to the destination image and attracts the tourists (Parrilla, Font, and Nadal, 2007). It also prolongs the duration of stay and its absence is a deciding factor for only day visitation or shorter duration of stay. On the other hand, it is also established that the higher the expenditure, the shorter the length of stay (Barros and Machado, 2010). Thus, it has huge implication on the earnings from tourism. However, more importantly accommodation requires large investment particularly from the private sector or from the public private partnerships although in some instances there are public sector investments alone. So this sector bears a business and commercial factor (Crouch and Ritchie, 1999) and thus has a very strong inter-linkage with tourism development from economic and destination image point of view (Das, 2009; Parrilla, Font, and Nadal, 2007).

Further, tourism may not sustain its contribution to economic development without satisfying tourists. Tourist satisfaction depends largely on the quality of tourism services, facilities and management at the tourist destinations (Enright, and Newton, 2004; Nadeau, Heslop, O'Reilly, Luk, 2008). This include the services such as, water supply, sanitation facilities, waste disposal, temporary resting areas, parking, shopping, Information and communication technology, and entertainment facilities. They provide a niche image to the destination as well as create both economic and employment opportunities (Pan, LiXiang, 2011; O'Connor, Höpken, Gretzel, 2008).

Therefore, infrastructure and economic perspectives of tourism development are highly interrelated although a few scholars counter argues that infrastructure requirements for quality tourism consume more natural resources and may create environmental degradation, which may ultimately deter tourists' visits and tourism development in a region (Bramwell, 2003; Boissevain and Theuma, 1998; Tosun and Jenkins, 1996). Thus, creation of tourist satisfaction with adequate and appropriate infrastructures, understanding of their economic implications along with the conservation of the environment are important dimensions of infrastructure creation for tourism development in a region. More briefly, if the visitor is not satisfied because of lack of infrastructure for a place worth to visit then it may disappear from the tourist map (Albalate and Bel, 2010). Besides, if the creation of infrastructure is not economically viable, there will not be any investment, which will harm tourism development (Hawkin and Mann, 2007). So there is a need to understand the influence of infrastructure on the tourism economics of a region for its tourism development.

3. STUDY AREA

The study area considered for this investigation (Figure 1) is the region bounded by the sea coast of Bay of Bengal and flood plains of Odisha state in India. It is located between the parallels of 17° 49' N and 22°34' N latitudes and meridian of 81°27' E and 87°29' E longitudes. The reasons for the choice of the region for this investigation are its homogeneous physical and demographic characteristics, location of the settlements (districts) in one axis, the reasonable communicable distance (about 350 km) by both the road and railway from its one end to the other end, and more importantly evenly distributed availability of a large number and varieties of tourist destinations in it. The region contains a variety of major tourist related resources, which caters to every facet of tourism. It is bestowed with about 45% (131 numbers) of the total tourist destinations of the state. These destinations include religious places (36.64%); scenic nature area and waterfalls (16.69%); archaeological, cultural heritages, and architectural elements (13.74%); sea beaches and back water lakes (9.91%); flora, fauna and wildlife (3.05%). A few examples of the touristic treasure includes Konark temple, Dhaulagiri, Khandagiri, Udayaygiri, Lalitgiri caves displaying magnificent historic monuments and architecture; Barabati fort (archaeological sites); Jagananath temple, Lingaraj temples, Raja Rani

temple, Kakatpur Mangala temple (places of worship showing Orissan architecture); sandy sea beaches of Puri, Chandrabhaga, and Chandabali; geo-thermal health sites at Taptapani and Atri; unique depository of flora and fauna, and wildlife of Nadan Kanan (exclusively known for white tigers), Satapada (Dolpines, tortoise), Bhitarakaniaka (Crocoldiles), and Chillika lake (migratory birds and marine life); Jaganath culture, and Car festival of Puri (colourful culture and festivals); and appliqué works of Pipili (beautiful handicrafts). Besides, the region experiences immigration of beautiful birds and tortoises to its various coastal sites from different parts of the world. Most of these tourism destinations are located within a close range of 150-250 Kms from the centre (considering the state capital Bhubaneswar as the centre) of the region (Figure 1). Further, the region is also bestowed with plentiful of resources and high-grade skill for the handicraft based products. At least 13 major handicraft types such as, works of clay, cloth, horn, silver filigree, bell metal, bamboo, sea shells, stone works, appliqué works (artistic thread work on colourful clothes), sabai grass work (artistic work with a type of grass locally available), wood works, and patta chitra (a kind of painting on palm leaves) are well known.

A close look into the tourism statistics for the last eleven years from year 2001 to the year 2011 revealed that the domestic tourists form the bulk of the total tourists' visiting the study area as the foreign tourists are limited to a few thousands only. The share of foreign tourists in comparison to domestic tourist flow was very meagre and varies between 0.30 per cent and 2.00 per cent of the total tourists in different years. For example, according to an estimate from the statistics of the department of tourism of culture of the state, the number of domestic tourists and foreign tourists visited to the study area in the year 2011 are 4150100 (99.68 per cent of total tourists) and 13220 (0.32 per cent) respectively. During this period, it was also observed that about 98.00 per cent of the domestic tourists and 45.00 per cent of the foreign tourists visiting to the state have visited the study area. Over the years annual tourist flow rate in domestic category is increasing at a very slow rate, whereas it is almost stagnant in foreign tourist category.

A comparative study between the tourist flow to the study area and the country revealed that the share of the domestic tourist inflow to the study area is very meagre, which varies between 1.26 to 1.35 per cent of the total domestic tourists of the country during the last decade. The scenario of foreign tourists inflow in to the study area was not

better (varies between 0.86 to 0.98 per cent of the foreign tourist arrival in the country). Also, it was observed that more than half (50.33%) of the domestic tourists visit to the study area belongs to the neighbouring states.

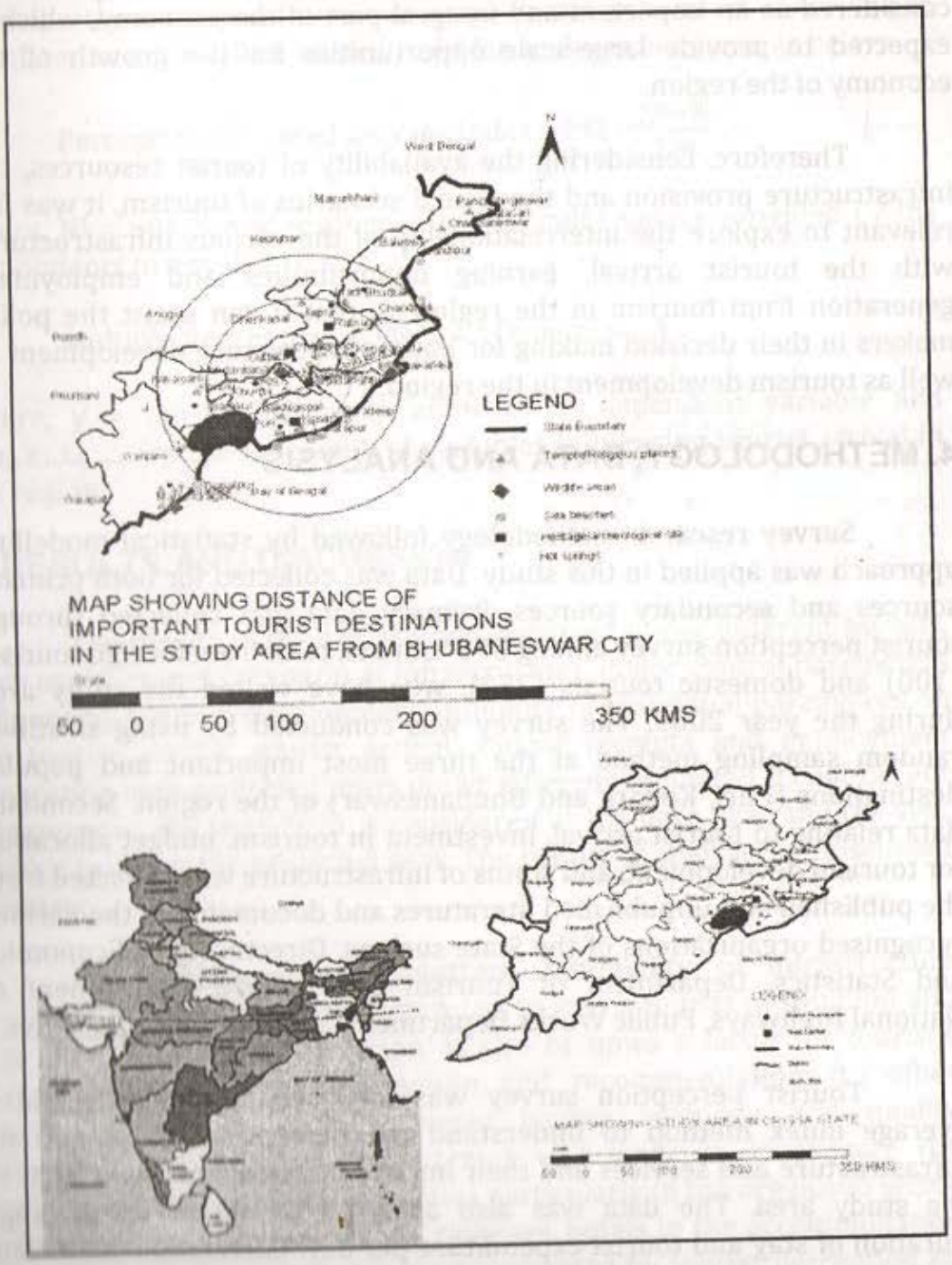


Fig 1: Map showing of study area in the Orissa state

The region is observed to be lagging behind economically and in terms of its physical infrastructure, which affect the tourism development despite the availability of significant tourism resources and needs careful attention. Further, in recent years the State Government has given priority to the tourism development and is now being considered as an important and integral part of the economy, which is expected to provide large-scale opportunities for the growth of the economy of the region.

Therefore, considering the availability of tourist resources, the infrastructure provision and the dismal scenarios of tourism, it was felt relevant to explore the interrelationship of the various infrastructures with the tourist arrival, earning opportunities and employment generation from tourism in the region so that it can assist the policy makers in their decision making for both infrastructure development as well as tourism development in the region.

4. METHODOLOGY, DATA AND ANALYSIS

Survey research methodology followed by statistical modelling approach was applied in this study. Data was collected for both primary sources and secondary sources. Primary data was collected through tourist perception survey among 350 tourists, both from foreign tourists (100) and domestic tourists (250), who have visited the study area during the year 2009. The survey was conducted by using stratified random sampling method at the three most important and popular destinations (Puri, Konark and Bhubaneswar) of the region. Secondary data relating to tourist arrival, investment in tourism, budget allocation for tourism development, and status of infrastructure was collected from the published and unpublished literatures and documents of the various recognised organisations of the State such as, Directorate of Economics and Statistics, Department of Tourism and Culture, Department of National Highways, Public Works Department, and East Coast Railways.

Tourist perception survey was analysed by using weighted average index method to understand the perception of tourists on infrastructure and services and their importance in attracting tourist to the study area. The data was also analysed to obtain the average duration of stay and tourist expenditure per day. Correlation coefficient analysis, multi multi-collinearity analysis, significance tests (F distribution and t test for p values) were conducted by using the

secondary statistical data collected from the year 2001 to the year 2011 to obtain the major control parameters (infrastructures) influencing tourism development in the region. Further, a multiple regression model was developed for predicting the tourist arrival in future by considering the time series statistical data, and consequently observing the earnings from the tourist expenditure and employment generated under varied simulated scenarios. The models used for analyses are given as below.

$$\text{Perception weighted average index} = PSI = \frac{\sum Pi * Ni}{\sum Ni}$$

where, Ni = number of respondents, Pi = index values provided by the respondents in a scale of 0 to 1.

$$\text{Multiple Regression model } y = f(x_1.x_2.x_3.x_4....)$$

where, y = tourist arrival in numbers as dependent variable and $x_1.x_2.x_3.x_4.....$ are the independent variables influencing tourist arrival in the region.

5. RESULTS AND DISCUSSION

The results of the analysis are discussed under different aspects, such as the current scenario of infrastructure, major control parameters influencing tourism development, influence of individual parameters on the tourist arrival, tourist arrival, tourist receipts and employment generation over projected years under different simulated scenarios. For this purpose, the year 2011 is considered as the base year and the year 2036 is taken as the projected year. The results of analysis are discussed as below.

5.1 Infrastructure situation: Availability of infrastructure functions as a catalyst in tourists mind to visit a tourist destination and stay there for a longer duration. It also becomes a factor for tourist's decision to revisit the destination and recommendations to other tourists to travel to such places having adequate and quality infrastructure. Therefore, an attempt was made to investigate the availability of infrastructure facilities particularly in the organised sector in the study area, such as, roads, railways, hotels in the accommodation sectors, and the travel agencies supplemented by tourist perception on several infrastructures at tourist destination level.

It is revealed that the overall density of roads and railways is found to be 1.98 Kms/sq. km and 18.82 km/1000 sq. km respectively, which were very meagre in comparison to national average. The availability of higher order roads (only 9.00% of the total road availability) is also very low. The condition of roads is not satisfactory as per the opinion of tourists as well. Similarly, although a number of trains are running connecting major cities and states of the country as well as different areas inside the state; many of the major tourist centre's of the study area are not connected with the rail connectivity because of the unavailability rail routes. The only major airport of the state is located almost at the centre of the study area connecting a few major cities of the country. However, the number of flights are very few and sporadic in nature. The air connectivity from the study area is limited to a few major cities of the country and there are no direct linkages to the various major tourist destinations of the country. Thus, the poor condition of road and rail linkages in the study area and the inadequacy of air connectivity to the region play a deterrent role in tourism development in the study area and the development of transport infrastructure are of paramount importance for the development of tourism in the region.

Accommodation scenario revealed that several types of accommodation in the form of hotels, panthanivases (guesthouses with all modern hospitality facilities run by tourism department), dharmasalas (hermitages/charitable guest houses), tourist bungalows, etc., are available in the study area. However, most of them are concentrated in the major urban areas and in a few important tourist destinations. The ratio of tourists and night occupancy of availability of hotels and hotel beds are 2544.85:1 and 104.82:1 respectively in the study area, thus, signifying the lower availability of hotels with respect to the tourist flow.

However, according to the tourist perception, a variety of the accommodation facilities are available within affordable range, and they are of satisfactory quality. Besides, according to majority of tourists, although they prefer to stay overnight in the tourist destinations, the accommodation facilities at many tourist destinations have not been adequately developed.

Of the other infrastructure and services facilities, temporary resting facilities at the destinations are one of the most important infrastructures sought after at the local level by the tourists, but by and

large they are not available in the study area. Their very absence creates resentment and dissatisfaction among the tourists, thus forms an obstacle in tourist attraction to the destinations. Public drinking water supply system mostly confined to a few urban areas and sewerage and drainage system have a very meagre presence in the region, thus showing the paucity of the services in the study area. Organised shopping facilities, organised parking, knowledgeable guides are also the areas of concern. Thus, the availability and quality of infrastructure facilities and services both at macro and micro level are cause of concerns and definitely are challenges in the tourism development process. However, as per the tourists' perception if the infrastructure and services provisions are adequately met they could become positive incentives for tourism development in the study area.

5.2 Parameters influencing tourism development: Based on the tourist perception by using weighted average indices method, the analysis of parameters under four important aspects such as tourism activities, infrastructure, ecological and environmental aspects, and policy initiatives influencing tourism development in the study area were attempted to understand their influence on tourism development and are presented in Table 1. Higher the tourist perception weighted index means higher the influence on tourism development.

It is revealed that activities such as, recreation (0.83) and pilgrimage (0.72) have higher weighted indices than other tourism activities such as, travel (0.56) and business or official visits (0.52) and are thus are more influential. Under the infrastructure, local transportation (0.89), regional transportation (roads -0.76, rail- 0.65), accommodation (0.68), and temporary resting facilities (0.92) are major parameters, followed by waste disposal (0.63), shopping locations, and parking facilities, which influence tourism in the region. On the contrary the influence of air connectivity is found to be very low (0.33) in transportation sector, and similarly, water supply (0.36) and sanitation facilities (0.23) as local level infrastructure have relatively lower influence. Deforestation and degradation of vegetation (0.84), human intervention (0.76) and loss of flora and fauna (0.65) are the major environmental concerns, but the pollution level has a lower influence. Under the policy initiatives investment (0.83), attention to heritage structures (0.80), attention to wildlife (0.72), and attention to coastal beaches (0.72) are major areas of concern, however, crime (0.23) has a very negligible influence.

Table 1

Weighted index averages tourism related parameters

Parameters	Tourist perception weighted Index	Parameters	Tourist perception weighted Index
Tourism Activity		**Infrastructure**	
Recreation	0.83	Regional Transport (Roads)	0.76
Travel	0.56	Regional Transport (Rail)	0.65
Pilgrimage	0.72	Air Transport	0.33
Business/official	0.52	Accommodation	0.68
		Local Travelling (roads)	0.89
Ecological and environmental parameters		Accommodation	0.63
		Temporary Resting facility	0.92
		Waste disposal	0.63
Deforestation and degradation of vegetation	0.84	Shopping facilities	0.52
Loss of flora and fauna	0.65	Parking	0.46
Inhospitable condition for migratory birds	0.58	Water supply	0.36
Human intervention	0.76	Sanitation	0.23
Air pollution	0.14	**Policy initiatives**	
Water pollution	0.50	Investment	0.83
Noise pollution	0.11	attention to heritage structures	0.80
		Attention to wildlife	0.72
		Attention to coastal beaches	0.72
		Crime	0.23

Source: Primary survey, 2009.

However, as the focus of the study is on the influence of infrastructure on tourism development, correlations between the tourist arrival and the important infrastructures at regional level and investment on tourism infrastructure at local level were attempted. It is to note that in the absence of quality data on individual local level tourism infrastructures, all the investments on such infrastructures were clubbed together and the total investment was considered as one parameter.

It is also observed that, although investment in tourism from the State is mostly scanty and usually is confined to the destination level infrastructural developments, such as, local transport, energy, water supply and sanitation, culture, publicity and promotions. However, it has been increased by three fold (36.6 Million INR in 2001 to 107.6 million INR in the year, 2011).

Table 2 revealed that the availability of road length ($r = 0.92$) and the availability of accommodation ($r = 0.82$) have higher correlation coefficients with tourist arrival. Also, the availability of rail route length ($r = 0.75$) and investment on destination level tourism infrastructure ($r = 0.70$) establish reasonably high correlation coefficients with tourist arrival, thus indicating that all these four parameters are highly essential to be considered for tourism development in the study area. Also, in order to test the interdependency and exclude any significant multi-co-linearity among the independent parameters multiple correlations and multi-co-linearity test by using Variance Inverse Factors (VIF) were conducted. It was revealed that all the four independent variables have shown lower correlations among each other (less than 0.51) as well as the VIFs have values within the acceptable range (between 1 to 4) except the member values and between the dependent and independent variables (Table 2). Thus, it is concluded that the four independent variables - road length, rail route length, accommodation and investment in destination level tourism infrastructure are fairly independent of each other and do not have significant co-linearity among themselves, and therefore can be used in the development of the multiple regression model to predict tourist arrival in the region.

Further, tourist stay in a region influence earnings from tourist receipts (Barros, Machado 2010; Gokovali, Bahar, and Kozak, 2006). The higher the stay, the higher the tourist spends and higher the earnings from tourist receipts although it is also established that the higher

Table 2

Correlation coefficients between tourist arrival and related Variables and Variance Inverse Factor (VIF) test

Parameters	Correlation coefficients					Variance Inverse Factors				
	Road length	Rail length	Hotel beds	Investment	Tourist arrival	Road length	Rail length	Hotel beds	Investment	Tourist arrival
Road length	1.00	0.45	0.42	0.41	0.92	-1.77	-1.04	-2.18	-1.25	5.08
Rail length	0.45	1.00	0.61	0.51	0.75	-1.04	1.68	-1.22	-0.65	1.16
Hotel beds	0.42	0.61	1.00	0.48	0.82	-2.19	-1.22	0.53	-0.94	3.15
Investment	0.41	0.51	0.48	1.00	0.70	-1.25	-0.66	-0.94	1.20	1.57
Tourist arrival	0.92	0.75	0.82	0.70	1.00	5.08	1.17	3.15	1.57	-8.22

Machado 2010). However, it was observed from the survey that majority of the domestic tourists stay 3 to 5 days in the study area while the duration of stay for the foreign tourists varies from 3 to 14 days. On an average the domestic tourists spend 3.96 days; and the foreign tourists stay about 8.30 days leading to overall average of 5.01 days for all categories of tourists.

An investigation of the money inflow from tourist spending revealed that the domestic tourist expenditure forms the bulk of the total tourist receipts and the share of the tourist receipts from the foreign tourist expenditure in the region is negligible. The inflow of money from the domestic tourist expenditure is on increasing trend, and the inflow from the foreign tourist expenditure is experiencing fluctuations.

At the current scenario the average tourist spends about USD 16 per day (about INR1000) in the study area excluding his international or regional travel expenses, which is expected to increase by 25-50 percent every five years according to the perception of the tourists.

5.3 Multiple regression models analysis, simulations for forecasting future scenarios

5.3.1 *Multiple regression model and validation of the model*: Considering the unavailability of the data on various qualitative variables and the importance of the four infrastructural variables (which includes investment on aggregate tourism infrastructure at destination level), and as ascertained from the analysis in the previous section (sections 5.1 5.2); road lengths, rail route lengths, accommodation (in terms of number of hotel beds) and investment in local tourism infrastructure development are considered as the most influential variables for tourism development in the study area.

A multiple regression model was established by taking tourist arrival as the dependent variable and these four most influential variables as the independent variables to predict the future tourist arrival and ensuing tourist receipts from the tourist expenditures and consequent employment generation from tourism in both organised and informal sectors. The multiple regressions model developed, which can enable forecasting tourist arrival at different perceived scenarios is presented.

$y = f(x_1, x_2, x_3 \ldots\ldots x_n)$

$y = 240.88 \times 1\text{-}12120.2 \times 2 + 398.46 \times 3 + 11660.73 \times 4 - 15898382$

y = tourist arrival in numbers,

x_1 = road length in km,

x_2 = rail route in km,

x_3 = hotel beds in numbers,

x_4 = investment in millions in Indian rupees (INR)

Table 3

Regression model validity parameters and test results

Regression model test parameters	values	
r^2	0.96	
Observed F	20.0005	
Critical F	9.12	
F distribution probability	0.016	
p values for		
Road length	0. 0043 (1 tailed)	0.0086 (2 tailed)
Rail length	0.0064 (1 tailed)	0.012 (2 tailed)
Accommodation	0.0031 (1 tailed)	0.0062 (2 tailed)
Investment	$7.1*10^{-09}$ (1 tailed)	$1.40*10^{-08}$(2 tailed)

Source: Model results and statistical analysis.

However, before employing the model for future predictions it was necessary to test its validity and usefulness. The validity and usefulness of the model was tested with r^2, F statistics and t statistics tests. In this model the high r^2 value (0.96) indicates that there is a strong relationship between the independent variables- road length, rail length, accommodation (hotel beds) and investment with the tourist arrival. The p values (both 1 tailed and 2 tailed) of the each of the independent variables are observed to be very low and significantly lesser than the Alpha value (<0.05) indicating that all the four independent variables used in the regression model are statistically significant and are useful for the prediction of the tourist arrival.

Further, as the observed F value (20.005) is significantly higher than the critical F value (8.89) for the Alpha value of 0.05, it is highly unlikely (with a probability of 0.015) that the higher F value occurred by chance, thus indicating that the regression model is useful for predicting the tourist arrival in the study area.

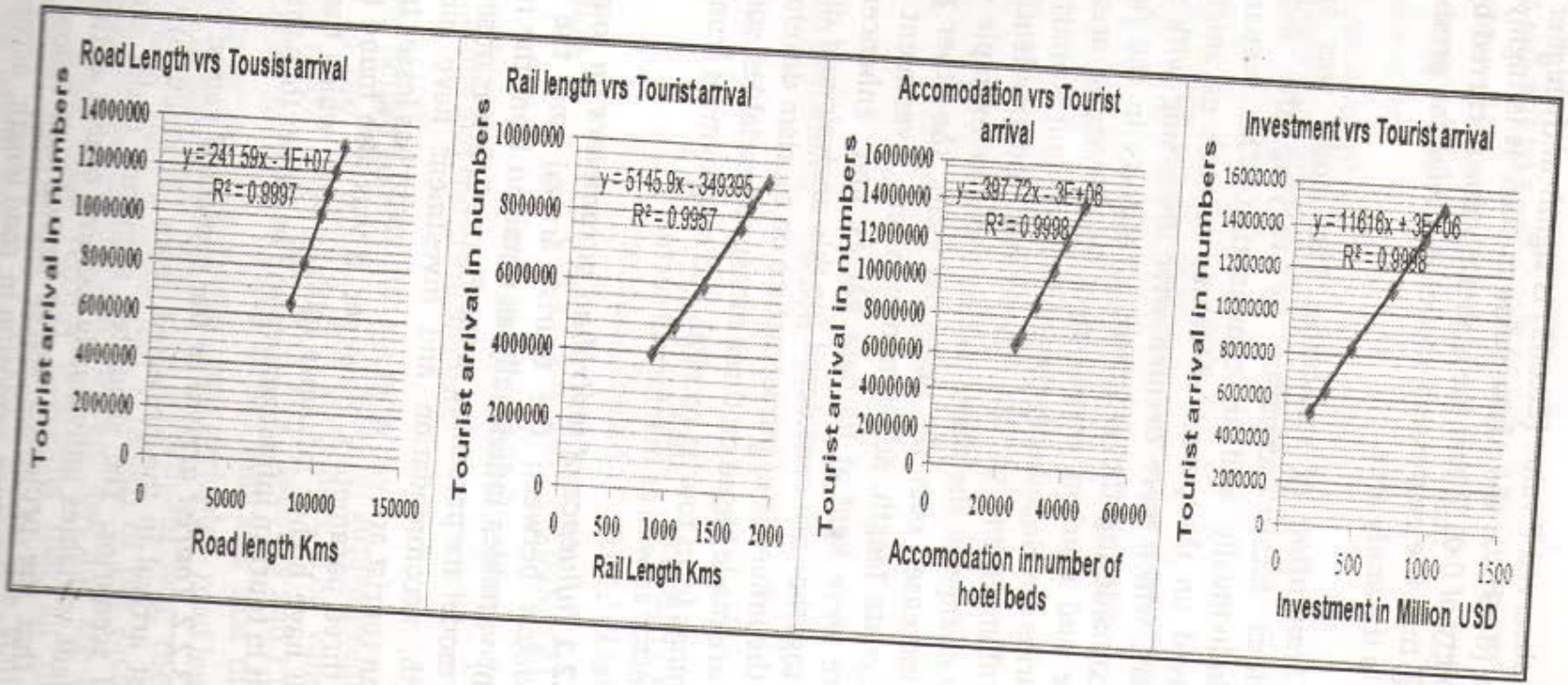
5.3.2 ***Simulation of scenarios*****:** The model was applied to simulate various future scenarios by varying the independent parameters individually and in combination. The scenarios were developed based on the perceived values of each parameter in the projected years, which were decided after discussing with the policy makers and considering the judgment of experts in the field of the infrastructure and tourism development in the study area. Of the several scenarios developed only five most important scenarios such as, consistent enhancement of one parameter independently without effecting any change in the other parameters (for example when road lengths are increased over the projected years, the other parameters such as rail route length, accommodation and investment in tourism infrastructure were kept at its base value); and enhancement in all parameters together are considered for this analysis and discussion to understand the influence of infrastructure on tourism development. The evaluations are made based on three measured variables, such as tourist arrival, earnings from tourist receipts and employment from tourism in organised sector as well as in informal sector.

5.3.2.1 ***Influence of individual parameters on tourist arrival*****:** The behaviours between the tourist arrival and the four major independent variables individually as obtained from the results of the regression model are presented in the Figure 2. It was observed that the road length, accommodation and investment have almost similar influence on tourist arrival, whereas rail length has lesser influence than the other three parameters. However, it was also found that the road length will have higher influence initially after which the influence of investment in tourism infrastructure will be higher than the others.

5.3.2.2 ***Tourist arrival in the projected years*****:** Figure 3 shows the tourist arrival in the projected years (2011-2036) under the five simulated scenarios. The simulated scenarios under enhancement of independent variables individually keeping others at their base values revealed that the projected tourist arrival will follow similar trend under the infrastructure provision in road length, accommodation and

Fig 2

Regression analysis for understanding the influence of individual parameters on tourist arrival



investment in tourism infrastructure, although initially roads will have more influence in initial periods but investment will have marginally higher influence than roads and accommodation in later years, such as after the year 2026. The influence of the rail length on the tourist arrival observed to be very marginal and lesser than the other three parameters. However, most importantly when all the parameters are enhanced in combination, the tourist arrival will increase significantly and would reach about 6.4 times of the tourist arrival at the base year amounting to 26917590 numbers.

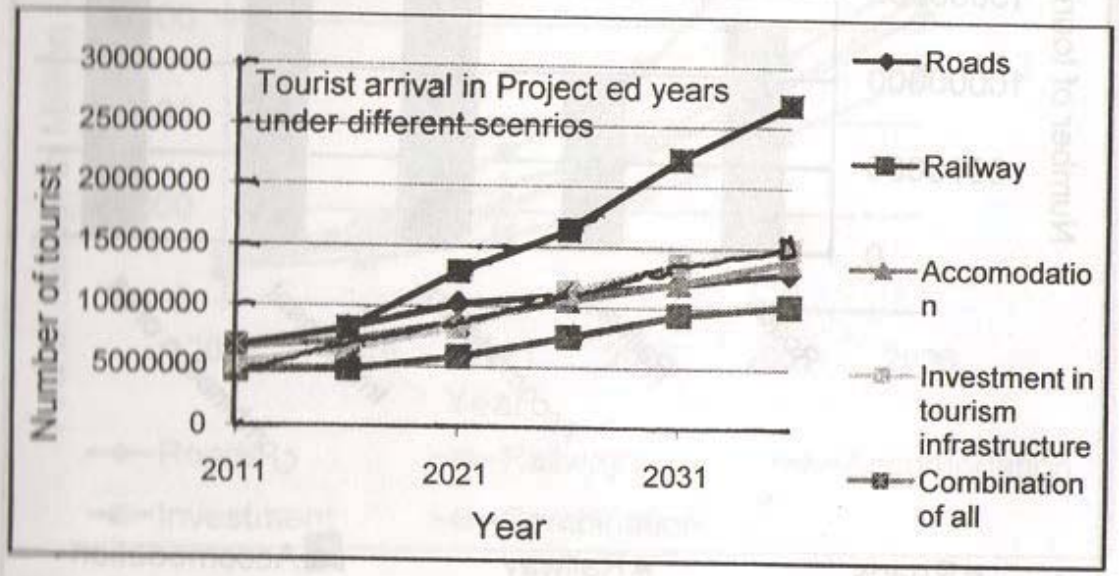


Fig 3

Tourist arrival in projected years under simulated scenarios

Again the analysis of tourist arrival under the five scenarios in the projected year 2036 (Fig 4) revealed that the tourist arrival under the combined scenario is much higher than the scenarios under the influence of the individual independent parameters (i.e., 1.8 times of investment scenario, 1.94 times of accommodation scenario, 2.08 times of road length scenario and 2.63 times of rail length scenario). Besides it is also observed that the influence of accommodation infrastructure and investment in local level tourism infrastructure are almost same followed by the roads. This shows that while the influence of accommodation and investment in local tourism infrastructure will increase in later years the influence of the roads will be limited. However, the influence of the rail infrastructure on tourists' arrival is the least. These results also validate the results of regression analysis of the influence of individual infrastructures on the tourist arrival in the study

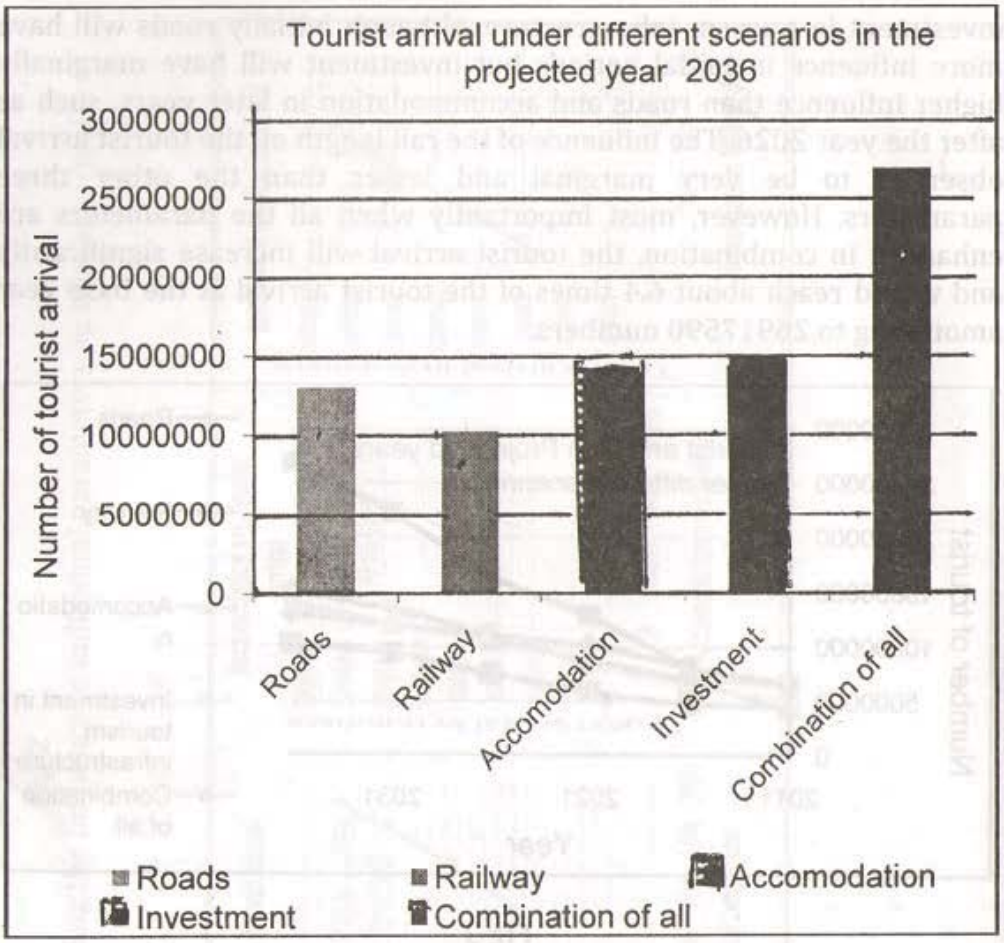


Fig 4

Tourist arrival in projected year 2036 under simulated scenarios

5.3.2.3 ***Tourist receipts from tourist arrival*:** The tourist receipts over the projected years are calculated by using the simulated results of the tourist arrival from the model and the average expenditure incurred by the individual tourists per day and average duration of stay in the study area. As mentioned earlier expenditure of individual tourist per day is considered to be enhanced at a varying rate of 25-30% in each period of five years.

Figure 4 revealed that enhancement in individual parameters will have marginal influence on the tourist receipts but the combined effect is highly significant. The tourist receipts because of the combined effect would increase by 12.2 times of the base year receipts amounting to 1318.96 million USD in the projected year 2036.

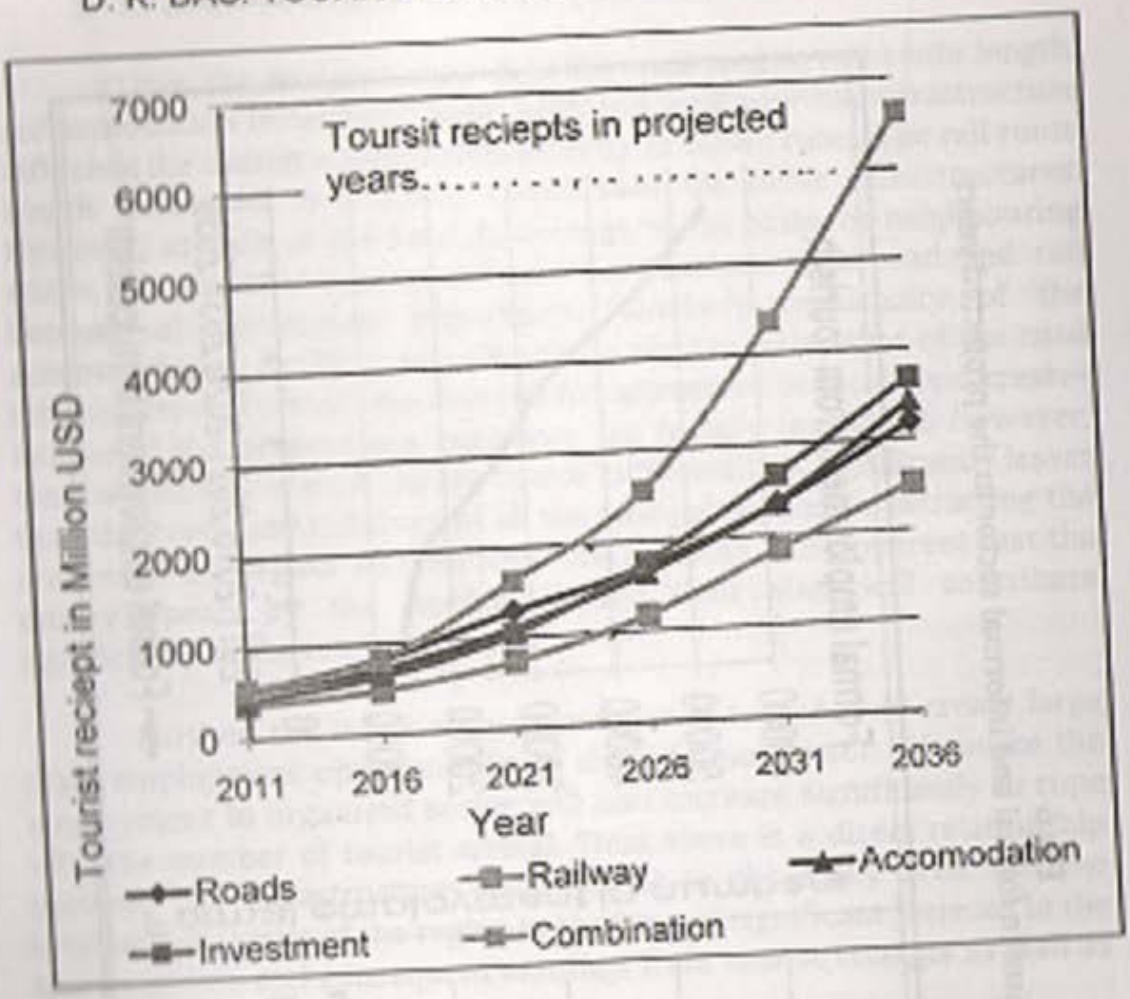


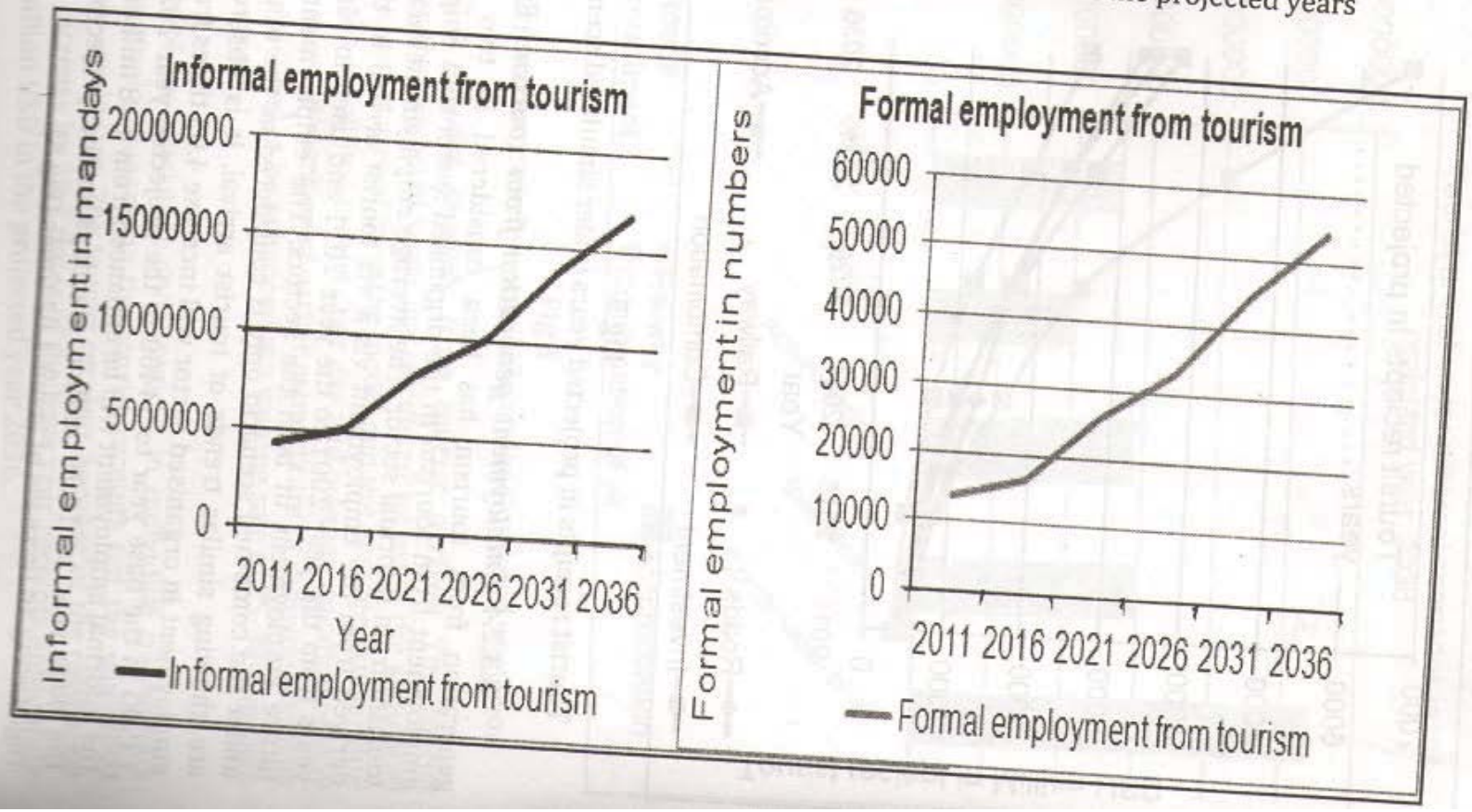
Fig 5

Tourist receipts in projected years under simulated scenarios

5.3.2.4 ***Employment generation from tourism:*** Employment generation from tourism has been considered in two categories- employment from tourism in the organised sector and employment in tourism from informal sector. The average employment quotients were derived from the employment vis a vis tourist arrival in the previous years from the year 2001 to the year 2011 and used in computing the future employment in both the sectors. The employment generation under the combined scenario only is considered as the other scenario are showing similar trends of tourist arrival. It is observed that the employment in organised sector will increase 4.03 times from a meagre 13500 in the base year to 54400 in the projected year 2036. Similarly the informal employment will be enhanced from 4.18 million mandays in the base year to 16.79 million mandays in the projected year 203 registering an increase of about 4.02 times (Fig 6).

Fig 6

Employment generation from tourism in formal and informal sector in the projected years



Thus, the analyses show that the road length, rail route length, accommodation in terms of hotel beds and local tourism infrastructure influence the tourist arrival independently at varied rates. The rail route length influences to a lesser extent than the other infrastructures. However, as bulk of the tourists belongs to the State or neighbouring states, the regional transportation infrastructure both road and rail become of paramount importance. Similarly availability of the accommodation facilities do influence in similar terms that of the road infrastructure. Further, the tourism infrastructure at local level creates images of the destinations, therefore are equally important. However, the contribution of each infrastructure individually is significantly lesser than the combined influence of all the four parameters in attracting the tourists to the region. As seen from this analyses, it is apparent that the money spend by the tourists during their stay will contribute significantly to the tourist receipts.

Further, the influx of large number of tourists will create large scale employment opportunities in the informal sector. Of course the employment in organised sector will also increase significantly to cope with the number of tourist arrival. Thus, there is a direct relationship between the infrastructure development in the study area and the tourism economics of the region in the form of significant increase in the tourist arrival and consequent earnings from tourist receipts as well as employment generation.

6. CONCLUSION

The study area is bestowed with huge resources for tourism development. Most of the tourism destinations are located within close proximity from the centre of the region providing opportunities for networking of destinations, development tourist circuits and local daily package tours. However, according to the perceptions of the tourists despite the availability of various tourist elements, lack of infrastructure both basic infrastructures at the regional level and tourism infrastructure at the destination level act as barriers to the tourism development in the region.

Further, development of such infrastructure needs huge investment. In a country like India and states like Odisha, with the halting of investment in tourism sector by external agencies like World bank or lesser chance of Foreign Direct Investment (FDI) considering it

as an unstable and volatile sector (Hawkins and Mann, 2007), the onus of investment falls on either the Government at the State/national level or entrepreneurs. Since infrastructure of late is not any more considered as a free service, there needs to be an economics attached to any investment that occurs in this sector and infrastructure provision must bear economic benefits (Rosentraub and Joo, 2009). The potential of the region for tourism development and these challenges of infrastructure development therefore necessitated this investigation to examine the influence of infrastructure on the tourism economics of the region.

The study followed a systematic survey methodology, relevant statistical analysis, modeling and simulated scenario analysis to understand the most influential parameters (infrastructures) and their impact on tourist arrival, earnings from tourist spending and employment generations independently and collectively under different perceived scenarios. It was revealed that of the various parameters the roads, the rail routes, the accommodation facilities (hotel beds) and the tourism infrastructure at local level (investment) influence the tourist arrival and consequent earnings from tourism and employment generation. Although, independently their influence is much lesser, their impact will be highly significant on tourism economics if they will be provided together in combination at a perceived rate. Consequently, it will have a huge contribution to the socio-economic development in terms of earning and employment generation of the region.

However, this investigation has its own limitations such as, individual tourism infrastructure could not be considered independently because of the unavailability of quality data and therefore they were clubbed together and the investment on them was considered as a parameter. It is also pertinent to note that although many scholars have proclaimed that air connectivity plays a very important role in tourism development, it is observed that it does not have much impact in the study area as majority of the tourists belong to domestic category. Besides, the region has an upgraded modern airport with opportunities for access to international flights.

Thus, air connectivity infrastructure was not considered in the development of the model and further analyses. Besides, the qualitative aspects of the infrastructures could not be incorporated in the model because of the limitations of the availability of qualitative data and the inherent limitations of statistical models like regression and ANOVA

analysis. Further, as the focus of the investigation was on the influence of infrastructures on the economics of tourism, the environmental considerations were kept out of the scope of the study. Therefore, further research is needed to incorporate the qualitative parameters of the infrastructure and environmental impacts of the infrastructure provision vis a vis economic benefits from tourism development. However, the current study reveals that combined infrastructure provision both at regional level and local tourist destination level together will significantly enhance the economic perspectives of regional tourism development in Odisha state, India, although individually they may not influence appreciably.

REFERENCES

Adams, J. (1997): Can Technology Save Us? *World Transport Policy and Practice*, Vol. 2(3), pp. 4-17.

Affeld, D. (1975): Social Aspects of Development of Tourism in Planning and Development of Tourism Industry in the ECE region, (pp.109–115). New York: United Nations.

Albalate, D., and Bel, G. (2008): Factors explaining urban transport supply and demand in large European cities, Working papers of the Research Institute on Applied Economics, Universitat de Barcelona.

Becken, S. (2002): Analyzing International Tourism Flows to Estimate Energy Use Associated with Air Travel, *Journal of Sustainable Tourism*, Vol. 10, pp. 114-131.

Beerli, Asuncion., and Martın, d. Josefa. (2004): Factors Influencing Destination Image, *Annals of Tourism Research*, Vol. 31(3), pp. 657-681.

Belisle, F., and Hoy, D. (1980): The Perceived Impacts of Tourism by Residents, *Annals of Tourism Research*, Vol. 7(1), pp. 83-101.

Barros, C. P. and Machado L. P. (2010): The Length of Stay in Tourism Annals of Tourism Research, Vol. 37, pp. 692-706.

Bramwell, Bill. (2003): Maltese Responses to Tourism, *Annals of Tourism Research*, Vol. 30(3), pp. 581-605.

Brougham, J., and Butler, R. (1981): A Segmentation Analysis of Residents Attitudes to Social Impacts of Tourism, *Annals of Tourism Research*, Vol. 7(4), pp. 569-590.

Bum, Yong., Ahna., Bong, Koo Lee, and Shafer, C. Scott (2002): Operationalizin Sustainability in Regional Tourism Planning: An Application of th Limits of Acceptable Change Framework, *Tourism Managemen* Vol. 23, pp. 1-15.

Butler, R. (1980): The Concept of a Tourist Area Cycle of Evolution: Implication for Management of Resources, *The Canadian Geographer*, Vol. 24 pp. 5-12.

Caneday, L., and Zeiger, J. (1991): The Social, Economic, and Environmenta Costs of Tourism to a Growing Community, *Journal of Travel Research* Vol. 30, PP. 45-48.

Crouch, G. I., and Ritchie, J. R. B. (1999): Tourism, Competitiveness, and Socia Prosperity, *Journal of Business Research*, Vol. 44, pp. 137-152.

Das, D. (2006): Planning for Tourism development in Orissa State, India unpublished Ph.d Thesis, IIT Roorkee, Roorkee, India.

Das, D. (2010): A System Dynamics model for regional tourism planning and development management, *Review of Business and Technology Research*, Vol. 3(1), pp. 243-252, ISSN 1941-9414.

Enright, M., and Newton, J. (2004): Tourism Destination Competitiveness: A Quantitative Approach, *Tourism Management*, Vol. 25, pp. 777-788.

Fox, M. (1977): The Social Impacts of Tourism: A Challenge to Researchers and Planners.

Hawkins Donald E., Mann Shaun (2007): The World Bank's role in tourism development, *Annals of Tourism Research*, Vol. 34(2), pp. 348-363.

Gezici, F. (2006): Components of sustainability, two cases from Turkey, *Annals of Tourism Research*, Vol. 33(2), pp. 442-455.

Gokovali, U., Bahar, O., and Kozak, M. (2006): Determinants of length of stay: A practical use of survival analysis, *Tourism Management*, Vol. 28, pp. 736-746.

Holden, A. (2008): Tourism and the Environment (2nd ed.), New York: Routledge.

Hunter, C. J. (1995): On the Need to Reconceptualise Sustainable Tourism Development, *Journal of Sustainable Tourism*, Vol. 3, pp. 155-165.

Liu, J., Sheldon, P., and Var, T. (1987): A Cross-National Approach to Determining Resident Perceptions of the Impact of Tourism on the Environment, *Annals of Tourism Research*, Vol. 14(1), pp. 17-37.

Lumsdon Les M. (2006): Factors Affecting the Design of Tourism Bus Services, *Annals of Tourism Research*, Vol. 33(3), pp. 748-766.

Matarrita-Cascante David (2010): Beyond Growth Reaching Tourism-Led Development, *Annals of Tourism Research*, Vol. 37(4), pp. 1141-1163, doi:10.1016/j.annals.2010.05.004

Page, S. J. (2005): Tourism and transport: Global perspectives (2nd ed.), Harlow: Pearson/Prentice Hall.

Nadeau John, Heslop Louise, O'Reilly Norm, Luk Peter (2008): Destination in A Country, Image Context, *Annals of Tourism Research*, Vol. 35(1), pp. 84-106.

O'Connor, P, Höpken, W., Gretzel U. (Eds.) (2008): Information and Communication Technologies in Tourism, Springer-Verlag/LLC, New York, Vol. 149, pp. 591-595, ISBN: 3211772790

Pan Bing, LiXiang (Robert) (2011): The Long Tail of Destination Image and Online Marketing, *Annals of Tourism Research*, Vol. 38(1), pp. 132-152.

Parrilla Javier Capo, Font Antoni Riera, Nadal Jaume Rosselló (2007). Accommodation Determinants of Seasonal Patterns, *Annals of Tourism Research*, 34 (2), 422-436

Perdue, R., Long, P., and Allen, L. (1990): Resident Support Tourism Development, *Annals of Tourism Research*, Vol. 17(4), pp. 586-599.

Ross, G. F. (1992): Resident Perception of the Impact of Tourism on an Australian City, *Journal of Travel Research*, Vol. 30(3), pp. 13-17.

Rosentraub Mark S., Joo Mijin (2009): Tourism and economic development: Which investments produce gains for regions? *Tourism Management*, Vol. 30, pp. 759-770.

Russell, R., and Faulkner, B. (2004): Reliving the Destination Life Cycle in Coolangatta: An Historical Perspective on the Rise, Decline and Rejuvenation of an Australia Seaside Resort. In Embracing and Managing Change in Tourism: International Case Studies, E. Laws, B. Faulkner and G. Moscardo, (eds.), (pp. 95-115), London: Routledge.

Saxena, G., and Ilbery, B. (2008): Integrated rural tourism, a border case study, *Annals of Tourism Research*, Vol. 35(1), pp. 233-254.

Tosun, C. and Jenkins, L. C. (1996): Regional Planning Approaches to Tourism Development: The Case of Turkey, *Tourism Management*, Vol. 17(7), pp. 519-531.

Van Doren, C., and S. Lollar (1985): The Consequences of Forty Years of Growth, *Annals of Tourism Research*, Vol. 12, pp. 467-489.

Xia Jianhong (Cecilia), Evans Fiona H., Spilsbury Katrina, Ciesielski Vic, Arrowsmith Colin, Wright Graeme (2010) Market segments based on the dominant movement patterns of tourists, *Tourism Management*, Vol. 31, pp. 464-469.