Journal of **Tourism** & Development | n.º **38** | 2022 | [**23** - 33]
DOI: 10.34624/rtd.v38i0.27361
e-ISSN 2182-1453

Measuring Tourism **Efficiency** for **Sustainable Tourism Policies**: An Empirical Study for India

BIDYUT KUMAR GHOSH * [bidyut.ghosh@manipal.edu]

DEBASISH BATABYAL ** [debasishbatabyal@gmail.com]

Abstract | India is full of biodiversity so are all its states and union territories. Many states are larger than many other countries of Europe and Africa whereas others are too small in terms of size, population, socio-economic and ecological diversity. It is possible to analyze the tourism efficiency of all Indian states and union territories to evaluate whether the states and union territories are harvesting maximum tourist arrivals by managing their diverse range of physical attraction features and human resources effectively. This study measures the tourism efficiency for all Indian states and union territories based on relevant national resources, economic, and deterrent variables derived from secondary data sources. The findings of the study confirm that the smaller states are performing better than the larger states as far as the environmental aspects and economic aspects are considered. The regression results also confirm that the area and per capita Gross State Domestic Product both are playing a significant role in shaping the tourism efficiency of the states of India. This perspective of ranking states and union territories adds significant inputs for future tourism planning and policy issues with certain important comparisons and recommendations.

Keywords | Tourism efficiency, data envelopment analysis, decision making units, sustainable tourism policy

* **Ph.D in Economics** (The University of Burdwan). **Associate Professor** at the Department of Commerce, MIT Campus, Manipal Academy of Higher Education, India. ORCID: https://orcid.org/0000-0002-7835-8171
** **Ph.D in Tourism Management** (The University of Burdwan). **Assistant Professor** in Travel & Tourism Management, Amity Institute of Travel and Tourism, India. ORCID: https://orcid.org/0000-0003-0191-9804

1. Introduction

India is emerging as one of the upcoming tourism destinations over the years and is the 8th largest economy concerning the contribution of travel & tourism to Gross Domestic Product (GDP). In 2018, the sector generated US$ 247.3 billion and was the source of livelihood generation for 42.7 million people (FICCI & YES BANK, 2019). According to the report of the Global Tourism Competitiveness Index, India's ranking has improved from 40th in the year 2017 to 34th in 2019, implying the greatest improvement among the top 25 percent of all countries in the world (World Economic Forum, 2019). According to the World Travel and Tourism Council, India ranked third in the tourism sector with a revenue of about US$247.3 billion which forms 9.2 percent of India's GDP in 2018. In the same year, the sector was predicted to grow at an annual rate of 6.9 percent and is expected to reach US$450 billion by 2028 with the predicted 9.9 percent contribution to its GDP. However, this prediction was made before the COVID 19 outbreak. Expert recommendations for tourism development and planning in the country are based on continuous up-gradation in tourism competitiveness index (TCI), emerging scope and easy facilitation process for establishing and running tourism business, rank for states/union territories in terms of state GDP, the most modern approach for sustainable tourism, allocation, and size of land areas for tourism and hospitality, accorded status, coordination, and priority for tourism by states or union territories, area of skill development and scope for employment through tourism and hospitality, up-gradation of government-owned infrastructure through private sector participation, support to small business enterprises, focus on backward destination development, creation of tourism advisory council at different levels, goods and service tax (GST) rationalization. Researchers and policymakers are also advocating the need of undertaking activities targeting the protection of natural resources especially from the viewpoint of growing interest in tourism policies (Marczak & Borzyskowski, 2020). Therefore, the performance of all Indian states and union territories is important for economic viability, socio-cultural integrity, and essential ecological sustainability.

The present study is an understanding of the tourism efficiency of all major Indian states and union territories that will surely produce better inputs for policy-making exercises and future planning amidst this COVID-19 pandemic resulting in a huge industrial and commercial transformation. Conventionally, arrival statistics are given priority in understanding stages of development over a longer period as evident in the tourism area life cycle (Butler, 1980). With the coefficient of variations of domestic and inbound tourist arrivals during the study period, consistency can be measured. This is not found suitable for future policy issues and ranking based on this coefficient of variations, very often, not found similar as regards the domestic and inbound tourist arrivals are concerned. While Gujrat is found to have been performing well in maintaining consistency in inbound tourist arrivals, Odisha is the best for domestic tourism. Again, analyzing arrival statistics only does not incorporate other important variables and sustainable orientation for future investment and policy implications. Again, a unified policy and development approach is missing as a consistent rank for domestic and inbound tourists' arrivals are different, very often, suggest two different approaches. This is not only a costly affair but also contradictory and self-ambiguous.

In this study, an attempt has been made to analyze whether the states and union territories are utilizing their resources (both natural and human) efficiently in attracting tourists globally as well as locally. It is noticeable that some Indian states are quite vast both geographically and demographically and offer their wide-ranging globetrotter attractions to the visitors and, they usually grab the top position in terms of inbound tourism in the

country. Usually, these states enjoy an edge over other states in terms of tourism infrastructure development, destination marketing, promotion, and global recommendation. Therefore, actual financial assistance and marketing support may not be as per their efficient tourism practices and real sustainable orientation. On the other hand, the smaller states and union territories, despite their small geographical area and short product lines, can attract significant inbound tourism (relative to their resources), though they will not be featuring at the top of the table concerning the financial allocation, infrastructural development, and global promotion. A large state will draw more tourists mainly because of its larger size and leave smaller states and union territories at the bottom of the table. Therefore, when the efficiency of a state or union territory regarding tourism efficiency is measured, due attention needs to be given to scale effect arising out of the larger human resources size, larger geographical area, and larger economic resources, and such considerations may be complete game changer concerning the ranking of Indian states or union territories in tourism efficiency table. Also, the Government of India in accordance with the United Nation's Sustainable Development Goals (Goal 8, 12 & 14) is striving towards the sustainable tourism development policy. Under this backdrop, this study has examined efficiency in attracting tourists at the state level vis-à-vis the human resources (considering the total population of the respective states), total land area, and economic indicator (Per Capita Gross State Domestic Product). Tourist attractiveness is estimated using the number of foreign and domestic tourist arrivals, as these are the most admired components in measuring efficiency in tourism development. In addition to output variables, two deterrent factors are considered in this study, that is, the air pollution estimated by the mean annual exposure of PM_{10} (in µg/m3) and sulfur dioxide (in µg/m3) respectively.

2. Theoretical context

Literature exists for measuring the tourism efficiency for different national economies worldwide. However, not too much literature is available for judging the efficiency of the tourism sector at the national level in India. Alavi and Mahmud (2000) adopted the shift-share technique for efficiency measurement and evaluation of a tourist destination, based on Creamer's (Creamer, 1943) locational shifts in producing, a tool that divides the growth in an economic variable such as income, output, employment, etc. in a particular tourist destination region into various elements. Cooper and Tone (1997) developed a scalar measure of inefficiency which could register all inefficiencies, including non-zero slacks on one side, and readily understandable also on the other side. When tourism is becoming one of the main economic activities, the implications in terms of tourist supply are increasingly diverse, unique, and demand-oriented, with increasing importance on location as an internal and external competitive advantage for principal supplies in tourism (Ribeiro & Costa, 2017). In any competitive and challenging environment, local and national policymakers accord a status to tourism as a means of magnifying effectual alternatives to redirect economies of many regions (Corinto & Curzi, 2017). For measuring how globalization and accessibility were critical for tourism efficiency in developing and developed nations with scope for labor productivity as a good representative for the efficient tourism practices. Now, this research has a new dimension with reduced accessibility, close down of borders, and increasing emphasis on self-reliant local production and distribution amidst this COVID outbreak. Again, Yi and Liang (2015) advocated a coordinative approach for measuring tourism efficiency using a panel data framework for twenty-one cities in China and this area of research was of immense importance with changing dynamics of tourism efficiency during and after the COVID 19 pandemic. In another study,

Soysal Kurt (2017) measured the relative efficiency of twenty-nine European countries for 2013 exhibited through input-oriented and constant returns to scale data envelopment analysis (DEA) and found inefficiency based on the relative efficiency scores through data analysis. In this study, expenditure incurred by tourists, persons associated as skilled, unskilled, or semi-skilled workers in the destinations, and the total bed capacity were input variables whereas foot-falls, room nights, and earnings from tourism were accepted output variables and finally, sixteen countries were found relatively efficient. In the input output-based model of tourism environmental pollution and tourism resource consumption. Empirically tourism development has a more negative impact on the environment and there are substantial regional differences in inefficiency, with suggestions for increasing tourism eco-efficiency and the development quality in destinations (Liu, Zhang, & Fu, 2017).

Chaabouni (2019) probed this using a two-stage double bootstrap framework with the help of a panel of twenty-one provinces in China covering the period of 2008 to 2013 and established that the east Chinese provinces are more efficient than the central and Western provinces. He also exhibited that climate change, trade openness, and market competitiveness enhanced efficiency in tourism. With Mitra's study (2020), an empirical research investigation was made by connecting optimum tourism output and handling its wide variety of human and natural resources wisely. In this study, he measured the efficiency of finally chosen one hundred seventy countries to subject to pollution deterrents and interestingly found small countries ranks were at the apex position. The implementation of the model in the tourism and hospitality sector has also been observed in the studies by several other researchers viz. Yu and Lee (2009) and Hong (2009). The efficiency of fourteen Mediterranean countries using three different model specifications of the method of data envelopment technique was estimated (Jesús, Francisco, Fernando, Diego, & Asunción, 2015). While the first model resorted only to physical variables, the other two also considered cyber metric variables. They found out approximately one-third of the fourteen efficiencies and some results interesting for future golf tourism development. So, there is a natural and obvious question arises whether tourism efficiency depends on the size of the nation. While Mitra (2020) argued for the better efficiency of smaller nations, based on the similar methodology (Data Envelopment Efficiency approach), Ohe and Peypoch (2016) found the large inns are relatively more efficient than smaller ones in Japan.

There is evidence of applying the data envelopment analysis for enhancing operational efficiency in medical tourism through measuring better provisions to inform the medical tourists in their decision-making process in Europe (Lorena & Theodore, 2019). The findings incorporate a crucial yardstick at the European level by helping the member nations to measure their services in the arena of medical tourism. Therefore, efficiency measurement in tourism is found varying from macro-level to micro, from the global, continent-wide approach to sector-specific or organization-specific. Now, this study attempts to assess and interpret Indian tourism efficiency at the state level and rank the states in terms of their relative performances in terms of their efficiencies in attracting the domestic and global tourists by making use of its natural and human resources while keeping in mind the pollution aspects of the respective federal states of the nation. Nurmatov, Lopez and Millan (2021) reveal the importance of the DEA methodology in the study of the productivity and efficiency of hospitality and tourism and show a high degree of industrial and geographical concentration in Europe and Asia with the recently accorded importance in culture, sustainability and performance studies.

Indian Perspective

From the Indian perspective, the National Council of Applied Economic Research (NCAER) compiled regional tourism satellite accounts for all the states and union territories in India in 2013 concerning 2009-10 as the base year to facilitate complete information of the Indian tourism sector. However, there is a dearth of literature in evaluating the efficiency of utilizing their natural and human resources vis-à-vis tourism development both at the state and national levels in India. Most of the research works so far concentrated on the importance of tourism development for inclusive growth of the nation and finding the linkage between tourism growth and economic growth, without considering the efficiency aspects of the tourism sector.

Using VECM (Johansen)-Granger's causality test for the period of 1978–2009, Mishra, Rout, and Mohapatra (2011) examined how tourism boosted up India's long-run economic growth. This has further been supported subsequently when the degree of association between international footfalls and energy uses and a nexus of economic growth from the Indian perspective for the period 1971 to 2012 has been observed (Tang, Tiwari, & Shahbaz , 2016). Being highly disagreed, Georgantopoulos (2013) using annual tourism expenditure, Gross Domestic Product, and real effective exchange rate for a period of more than two decades (1988–2011) failed to establish any causal connection between tourism and economic growth for India.

There are practical ways of improving ways for improving assessment of the effectiveness of a tourist destination, that is, by unifying the indicator set as a criterion of efficiency of activity of the subjects of the tourism destination (Romanyuk & Gareev, 2020).

However, the empirical literature has limitations too. The studies concerning the applicability of the tourism-led growth hypothesis and vice versa in India face a data constraint due to the non-availability of long time series observation in the public domain. The empirical literature in conformity with the tourism-led growth hypothesis examined the existence of co-integration linkages and causality between tourism growth and economic but ignores the actual efficiency vital for immediate policy discussion. Concerning the context of global literature as well the methodological approach for investigating the degree of linkages between tourism growth and economic growth, mostly the researchers have deployed Engle and Granger's (1987) two-step method and the Johansen test (Johansen, 1988).

Therefore, efficiency measurement in the tourism industry is multidimensional, varying from a single ingredient of tourism component in tourist destinations to overall efficiency measurement for a destination management organization (DMO). Countries with a federal structure, usually design, control and implement these destination management organizations at various levels for planning and policy implementation. At this present juncture of the virus economy capital falls short, accessibility is most costly, and staying in non-residence is highly unsafe (Euronews, 2020).

Specific Objectives

Under the backdrop discussed above, the issue of measuring tourism efficiency is not only essential but imperative as well. More specifically, the study attempts to examine the following objectives:

1. To measure the tourism efficiency and thereby to bring about a position statement for Indian states and union territories for the future development of tourism in the subcontinent;

2. To identify the significant predictor variable and their degree of association in explaining the tourism efficiencies of Indian states and union territories.

3. Methodology

The study is wholly based on the secondary data collected from the Indian states and union territories from the official websites of the Government of India varying from the websites of the Ministry of Tourism, Ministry of Environment and Forest, Niti Aayog, and World Bank. For smoothing the year-to-year fluctuations in the macro-level data, the average of the five years (2014–2018) data have been considered for the different efficiency measuring parameters. States and union territories for which the data is not available were dropped from the analysis. At present, there are 28 states and 8 union territories in the Indian federal structure. However, due to a lack of reliable data union territories viz. Andaman Nicobar Islands, Lakshadweep, Dadra Nagar Haveli, and newly formed Ladakh have not been considered in the study. However, Ladakh is included in erstwhile Jammu and Kashmir in this study. So, finally, data on a total of 32 states and union territories were available.

The technique of data envelopment analysis was deployed for estimating the relative efficiency of the states and union territories which are the primary decision-making units. The data envelopment method has the capability of measuring efficiency involving multiple inputs and multiple outputs parameters together. In the study, two tourism output measures (foreign and domestic tourist arrivals), three basic resources (population size, land area, and percentage of tourism to GSDP), and two pollution measures (PM_{10} and SO_2) were analyzed." These are narrated in table 1.

Charnes, Cooper, and Rhodes (1978) have developed this non-parametric technique of measuring the efficiency of multiple DMUs. The method can intermingle both a large number of inputs and outputs to derive the efficiency of the different decision-making units. Essentially this method makes use of a linear programming algorithm where the efficiencies of the decision-making units are reckoned by their distance from the efficiency frontier. The decision-making units which lie close to or on the frontier are considered as the most efficient whereas the decision-making units which go far away from the frontier are considered as least efficient.

Table 1 | Variables for tourism efficiency model of India

Sl. No.	Parameter	Description of Variables	Symbol
1	Incoming tourists	Foreign tourist arrivals (in number)	*FTA*
		Domestic tourist arrivals (in number)	*DTA*
2	Basic Resources	The population of each state (in number)	*POP*
		The land area of each state or UT in square k.m.	*LA*
		GSDP of each state or UT in current INR	*GSDP*
		Percentage of tourism to GSDP (Regional Tourism Satellite Account)	*PERCAPGSDP*
3	Pollution & air quality	Air pollution estimated by the average annual exposure of PM10 (μg/m3, micrograms per cubic meter)	PM_{10}
		Sulphur Dioxide (μg/m3)	so_2

Source: Own elaboration

The efficiencies of decision-making units are measured by evaluating the ratio of a linear combination of virtual outputs to a combination of virtual inputs in an input-oriented data envelopment model. Mathematically,

$$Max\ h_0 = \frac{\sum_{r=1}^{s} \alpha_r y_{r0}}{\sum_{i=1}^{m} \beta_i y x_{i0}} \quad \text{.....(i)}$$

Subject to: $\frac{\sum_{r=1}^{s} \alpha_r y_{rj}}{\sum_{i=1}^{m} \beta_i y x_{ij}} \leq 1$, j=1,.....,n; $\alpha_r, \beta_r \geq 0$

; i=1,....m; r=1,.....s;

Where *n=Number of decision - making units (states and union-territories)*
s=Number of outputs (domestic tourists arrivals and global tourists arrival)
m=Number of inputs (geographical area,population,per capita gross domestic product, pollution measures)

The parameters (b_r and a_r) represent the weights assigned to the inputs and outputs according to their relative importance. The application of data enveloped analysis in the context of measuring the efficiencies for the tourism industry was

explained in depth by Soysal Kurt (2017).

The precision of estimating the efficiency primarily depends on the rationality in selecting the input and output parameters (Wagner & Shimshak, 2007). In the study, foreign and domestic tourist arrivals (TA) are considered as outputs, whereas, the population of the states and union territories (POP), land area (LA), Gross State Domestic Product (GSDP), and percentage of tourism to GSDP (PERGSDP) inputs. Further, PM_{10}, so_2 emission are taken as a deterrent input parameters.

Finally, the relationship between tourism efficiency and resource parameters, and pollution measures are estimated using the Ordinary Least Squares Method. That is, $Y=\alpha+\beta X+u$ where Y is the tourism efficiency and X is a vector of regressors (viz.) and $\alpha$and $\beta$are the parameters of the model. u is the error term with all the usual assumptions, that is, $u \sim iidn(0,\sigma^2)$.

4. Results and Discussion

Globally, tourism performance can be measured in different ways such as absolute tourists arrival, tourists' arrival per unit of GDP, tourist arrivals per unit of population, tourists spending per unit of population, etc. Table 2 produces the ranking of states and union territories for three predominant criteria viz. tourist arrival per ten million state domestic product, tourist arrival per hundred local population, and tourist arrival per square thousand kilometers of land area.

Table 2 | Ranking of Indian States and Union Territories Concerning the Tourism Attraction Criteria

States/UT	Tourist Arrival / Local Population (per 00 population)	Rank	Tourist Arrival / Total area in sq. km (in thousand sq km)	Rank	Total Arrival / SGDP (absolute number per units of 10 million)	Rank
Andhra Pradesh	294	5	894820	8	235	3
Arunachal Pradesh	28	27	4556	30	21	27
Assam	18	28	70133	26	24	26
Bihar	29	26	318723	17	77	16
Chandigarh	122	13	11304047	2	42	22
Chattishgarh	75	20	142132	23	80	15
Goa	431	3	1698527	6	131	11
Gujarat	703	1	2167074	5	406	1
Haryana	32	23	183705	21	16	28
Himachal Pradesh	257	6	317382	18	153	7
Jammu Kashmir	97	18	282841	20	104	12
Jharkhand	103	16	426190	14	151	8
Karnataka	250	8	797637	10	143	10
Kerala	44	22	374337	16	25	25
Madhya Pradesh	126	12	295819	19	161	6
Maharashtra	103	17	374411	15	58	18
Manipur	6	31	6816	29	8	30
Meghalaya	31	25	40510	28	35	24
Mizoram	6	30	3331	32	5	31
Nagaland	4	32	4404	31	4	32
NCT Delhi	175	9	19848233	1	53	21
Odisha	31	24	83573	25	37	23
Pondicherry	122	14	3178132	3	57	19
Punjab	128	11	703414	12	89	14
Rajasthan	62	21	124936	24	62	17
Sikkim	167	10	143481	22	56	20
Tamil Nadu	488	2	2707709	4	294	2
Telengana	252	7	787243	11	150	9
Tripura	12	29	41564	27	12	29
Uttar Pradesh	114	15	942174	7	199	4
Uttarakhand	303	4	570549	13	168	5
West Bengal	80	19	826025	9	90	13

Source: Authors' estimation based on Secondary Data

Figure 1 is a choropleth map of Indian states and union territories estimated through the DEA(data envelopment analysis) method. Broadly, the states and union territories can be classified into four groups. Group 1 consists of the top-performing states viz. Chandigarh, Mizoram, Rajasthan, Sikkim, and Uttar Pradesh with efficiency measuring equal to unity. The second group comprises Kerala, the National Capital Territory of Delhi, Meghalaya, and Nagaland with an estimated efficiency ranging from 0.75 to 0.9. A large majority of states form the third group with an efficiency interval of 0.4 to 0.75 and the states and union territories that fall in this group are Assam, Madhya Pradesh, Punjab, Tripura, Telangana, Arunachal Pradesh, Odisha, Pondicherry, Manipur, West Bengal, Chandigarh, and Uttarakhand. The least efficient states and union territories with efficiency measures of less than 0.4 are Tamil Nadu, Haryana, Gujarat, Andhra Pradesh, Jharkhand, Himachal Pradesh, Maharashtra, Goa, Jammu and Kashmir, Karnataka, and Bihar. Thus, a large number of smaller states from North-Eastern India viz. Mizoram, Sikkim, Meghalaya, and Nagaland are showing extremely good performances along with some medium-sized states viz. Kerala and National Capital Territory (Delhi). Among the big states, only Rajasthan and Uttar Pradesh are showing good performances. Overall, most of the Indian states and union territories are showing moderate to a low level of tourism efficiencies and the average efficiency estimate is found to be 48 percent.

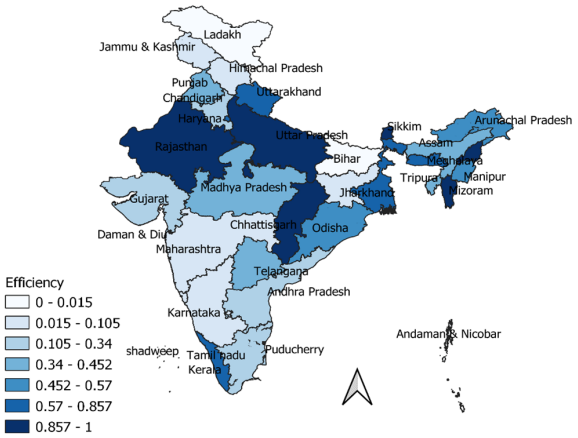

Figure 1 | Ranking of the Indian States and Union Territories in Tourism Efficiency
Source: Authors' estimates based on Secondary Data

The study further attempts to examine the relationship between tourism efficiency and different resource parameters and pollution measures in a multiple linear regression framework. Table 3 summarizes the results of the regression estimation.

Out of the five predictors, total geographical area and Gross State Domestic Product is found to be statistically significant. The total land area coefficient appears to be negative which implies that the larger Indian states and union territories are not being able to utilize their land areas efficiently. That is, smaller states are utilizing their land areas more efficiently to attract domestic and foreign tourists. This is why the smaller North Eastern states occupy the higher positions of the tourism efficiency table. The regression parameters of GSDP have a positive and statistically significant impact on tourism efficiency. This implies that for

Table 3 | Measuring the Impact of Resource Parameters and Pollution on Tourism Efficiency

Dependent variable: Tourism efficiency (η)			
Variable	**Coefficient**	**Standard Error**	**P-Value**
Const	0.34778	0.07411	0.00008 ***
Population	2.70417	2.65098	0.31710
Area	-1.43565	8.24196	0.09335 *
GSDP	4.56845	2.40844	0.06901 *
PM_{10}	- 3.57526	5.27533	0.94648
so_2	-0.00019	0.00057	0.73886
Unadjusted R-squared = 0.38203, Adjusted R-squared = 0.26319			
F-statistic (5, 26) = 3.21465 (p-value = 0.0216), Log-likelihood = -1.28554			

Source: Authors' estimate based on secondary data

the federal states of India tourism efficiency goes in harmony with the economic prosperity of the states. Both the pollution measures are showing a negative impact on tourism efficiency which is expected as more physical-economic activities will tend to create higher pollution levels and thereby reduce tourism efficiency. However, the pollution parameters are not statistically significant.

5. Conclusion

This study establishes the global trend of achieving tourism efficiency by small and/or unpopular states or regions. This efficiency categorizes Indian states and union territories as tourism destinations for future planning and development of tourism infrastructure, superstructure with sustainable orientations. It also provides valuable inputs to techno-economic feasibility studies of larger infrastructure projects in India through financial viability measures. Chandigarh, Mizoram, Rajasthan, Sikkim, and Uttar Pradesh form the top category with efficiency measuring equal to unity and as such ensure the best performing efficient tourism. Kerala, the National Capital Territory of Delhi, Meghalaya, and Nagaland form the second top category for priority promotion, infrastructure development, and fund allocation. India's paradise unexplored North-East is found to have been a suitable region for infrastructure development and tourism promotion, as no state is falling under the least efficient category. The Government of India has already initiated development policies for the North-East States in the name of much talked 'Look East Policy in the last decade of the previous century. Of late, further strengthening the policy in 2014 has been adding more stimulus to the development of this region. Another result revealing a very strong relationship between state GDP (SGDP) and tourism efficiency draws special attention for the investors, entrepreneurs, and policymakers as efficient tourism practices contribute to state-level GDP. Another noticeable fact is the efficiency positioning map, apparently with a group of states and union territories, is beneficial for an easy rating of efficiency. The bigger states of India need to rethink their tourism policies so that they can utilize their geographical resources in a better and practical way to attract more tourists and thereby improve their tourism efficiency.

References

Alavi, J., & Mahmud, Y. M. (2000). A Systematic Approach to Tourism Policy. *Journal of Business Research, 48*(2), 147-156.

Butler, R. W. (1980). The concept of tourism area cycle of evolution: implications for management of resources. *Canadian Geographer, 24*, 5-12. doi:10.1111/j.1541-0064.1980.tb00970.x

Chaabouni, S. (2019). China's regional tourism efficiency: A two-stage double bootstrap data envelopment analysis. *Journal of Destination Marketing & Management, 11*, 183-191. doi:https://doi.org/10.1016/j.jdmm.2017.09.002

Charnes, A., Cooper, W. W., & Rhodes, E. (1978). Measuring the efficiency of decision making units. *European Journal of Operational Research, 2*(6), 429–444.

Cooper, W. W., & Tone, K. (1997). Measures of inefficiency in data envelopment analysis and stochastic frontier estimation. *European Journal of Operational Research, 99*(1), 72-88. doi:https://doi.org/10.1016/S0377-2217(96)00384-0

Corinto, G. L., & Curzi, F. (2017). How to change vision from manufacturing to tourism?: the role of university in the Marche Region (Italy). *Revista Turismo & Desenvolvimento, 27/28*(1), 9-19. doi:https://doi.org/10.34624/rtd.v1i27/28.8345

Cracolici, M. F., Nijkamp, P., & Piet, R. (2008). Assessment of Tourism Competitiveness by Analysing Destination Efficiency. *Tourism Economics, 14*(2), 325-342. doi:https://doi.org/10.5367/000000008784460427

Creamer, D. (1943). *Shifts of manufacturing industries, in industrial location and national resources.* Washinton, D.C: Government Printing Office.

Engle, R. F., & Granger, C. W. (1987). Co-integration and error correction: representation, estimation, and testing. *Econometrica: journal of the Econometric Society*, 251-276.

Euronews. (2020, November 20). We need a 'war economy' to deal with COVID-19 crisis, UN chief Antonio Guterres tells Euronews. Retrieved from Euronews: https://www.euronews.com/2020/03/25/coronavirus-antonio-guterres-speaks-to-euronews\-about-un-s-covid-19-response

FICCI & YES BANK. (2019). India Inbound Tourism - Unlocking the Opportunity. New Delhi: FICCI Tourism Committee & Yes Bank. Retrieved November 24, 2020, from http://ficci.in/spdocument/23082/India-Inbound-Tourism-Knowledge-Paper-ficci.pdf

Georgantopoulos, A. (2013). Tourism expansion and economic development: VAR/VECM analysis and forecasts for the case of India. *Asian Economic and Financial Review, 3*(4), 464-482.

Hadad, S., Hadad, Y., Malul, M., & Rosenboim, M. (2012). The Economic Efficiency of the Tourism Industry: A Global Comparison. *Tourism Economics, 18*(5), 931-940. doi:https://doi.org/10.5367/te.2012.0165

Hong, W.-C. (2009). Global competitiveness measurement for the tourism sector. *Current Issues in Tourism, 12*(2), 105-132. doi:10.1080/13683500802596359

Jesús , T., Francisco , J., Fernando, V., Diego , P., & Asunción , A. (2015). Analysis of the efficiency of golf tourism via the Internet. Application to the Mediterranean countries. *Current Issues in Tourism, 18*(6), 595-608. doi:10.1080/13683500.2013.804806

Johansen, S. (1988). Statistical analysis of cointegration vectors. *Journal of economic dynamics and control, 12*(2-3), 231-254.

Liu, J., Zhang, J., & Fu, Z. (2017). Tourism eco-efficiency of Chinese coastal cities–Analysis based on the DEA-Tobit model. *Ocean & Coastal Management*, 164-170.

Lorena, A., & Theodore , M. (2019). Measuring the efficiency of medical tourism industry in EU member states. *Journal of Tourism Analysis: Revista de Análisis Turístico, 26*(2), 115-130. doi:https://doi.org/10.1108/JTA-02-2019-0006

Marczak , M., & Borzyskowski , J. (2020). Are Natural Resources Important Elements in The National Tourism Policy? Examples of European Countries. *Journal of Environmental Management and Tourism, 11*(5), 1200-1214. doi:https://doi.org/10.14505//jemt.11.5(45).17.

Mishra, P. K., Rout, H. B., & Mohapatra, S. S. (2011). Causality between tourism and economic growth: Empirical evidence from India. *European Journal of Social Sciences, 18*(4), 518-527.

Mitra, S. K. (2020). A different perspective to measure tourism attractiveness. *Current Issues in Tourism, 23*(14), 1718-1722. doi:10.1080/13683500.2019.1656711

Nurmatov, R., Lopez, X. F., & Millan, P. P. (2021). Tourism, hospitality, and DEA: Where do we come from and where do we go? *International Journal of Hospitality Management, 95*. doi:https://doi.org/10.1016/j.ijhm.2021.102883.

Ohe, Y., & Peypoch, N. (2016). Efficiency analysis of Japanese Ryokans: A window DEA approach. *Tourism Economics, 22*(6), 1261-1273.

Ribeiro, M., & Costa, R. (2017). Location as an influencing factor of competitiveness: the hotel industry in the Douro region. *Revista Turismo & Desenvolvimento*, *27/28*(1), 97-109. doi:https://doi.org/10.34624/rtd.v1i27/28.8375

Romanyuk, A. V., & Gareev, R. R. (2020). The system of indicators for assessing the effectiveness of the regions in the field of tourist services in Russia: Key problems and solutions. *Journal of Environmental Management & Tourism*, *11*(6), 1347-1367.

Romanyuk, A. V., & Gareev, R. V. (2020). The System of Indicators for Assessing the Effectiveness of the Regions in the Field of Tourist Services in Russia: Key Problems and Solutions. *Journal of Environmental Management and Tourism*, *11*(6), 1347 - 1367. doi:https://doi.org/10.14505/jemt.v11.6(46).05.

Soysal Kurt, H. (2017). Measuring Tourism Efficiency of European Countries by Using Data Envelopment Analysis. *European Scientific Journal*, *13*(10), 31-49. doi:https://doi.org/10.19044/esj.2017.v13n10p31

Soysal, H. K. (2017). Measuring Tourism Efficiency of European Countries by Using Data Envelopment Analysis. *European Scientific Journal*, *13*, 31.

Tang, C., Tiwari, A., & Shahbaz , M. (2016). Dynamic inter-relationships among tourism, economic growth and energy consumption in India. *Geosystem Engineering*, *19*(4), 158-169. doi:10.1080/12269328.2016.1162113

Wagner, J. M., & Shimshak, D. G. (2007). Stepwise selection of variables in data envelopment analysis: Procedures and managerial perspectives. *European Journal of Operational Research*, *180*(1), 57-67.

World Economic Forum. (2019). The Travel & Tourism Competitiveness Report 2019: Travel and Tourism at a Tipping Point. Geneva: World Economic Forum. Retrieved November 24, 2020, from `http://www3.weforum.org/docs/WEF_TTCR_2019.pdf`

Yi, T., & Liang, M. (2015). Evolutional Model of Tourism Efficiency Based on the DEA Method: A Case Study of Cities in Guangdong Province, China. *Asia Pacific Journal of Tourism Research*, *20*(7), 789-806. doi:10.1080/10941665.2014.932294

Yu, M. M., & Lee, B. C. (2009). Efficiency and effectiveness of service business: Evidence from international tourist hotels in Taiwan. *Tourism Management*, *30*(4), 571–580.