India's Medical Tourism Analysis and Forecasting

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Abstract

The paper deals with India Medical tourism analysis and forecasting, applying an assortment of time series forecasting models, for monthly data spreading over 2014 to 2018. Medical tourism worldwide and in India is on rise. Figures of medical tourist arrivals in India for 2014, 2015 and 2016 suggest of a significant growth. A number of measures have been taken by the Government to attract medical tourists to the country. This study was undertaken to analyse the growth trends in medical tourism in India over a period of last five years and also to project the medical tourist arrivals over the next couple of years using the sophisticated ARIMA method of trend projection. The paper discusses these trends including their calculations. The projections show a great potential for the country to earn valuable foreign exchange through medical tourism. India has a huge cost and expertise advantage which if leveraged through proper publicity can make it one of the leading medical tourist destinations in the days to come. The Government should step-up its efforts in this direction with aggressive publicity policies.

Keywords: India, Medical tourism, Inbound medical tourism, Forecast, ARIMA model.

Introduction

Medical tourism industry is one of the fastest growing service sectors of 21st century. The sector is growing exponentially and has emerged as a major force for the growth of service exports worldwide. With the availability of high quality healthcare services at affordable rate increased role of information and communication channels wider range of healthcare services from traditional to modern one, India is one of the major players in this multi-billion industries. As per the Ministry of Tourism (2018) "the Foreign Tourist Arrivals (FTAs) in India on medical visa during 2016 and 2017 were estimated at 427014 and 495056 respectively, registering a positive growth of 15.9%."

Medical Tourism holds immense potential for India. The Indian systems of medicines, Ayurveda, Yoga, Panchakarma, Rejuvenation Therapy, etc., are among the most ancient systems of medical treatment in the world. India can provide medical and health care of international standards at low costs. India excels in the state of the art medical facilities, reputed health care professionals, quality nursing facilities and traditional healthcare therapies.

India has emerged as a major Medical Tourism destination. Ministry of Commerce informs that as per a FICCI-IMS Knowledge Paper titled 'Medical Value travel in India: Enhancing value in MVT', published in 2016, "India is amongst the top 6 MVT (Medical Value Travel) destinations of the world which include Thailand, Singapore, India, Malaysia, Taiwan and Mexico (India ranked third in the world in 2015). It is further informed that as per the above report, through adequate focus and effective execution, Indian Medical Value Travel, pegged at 3 billion USD in 2015, can be a 9 billion USD opportunity by 2020. This situation shows that medical tourism in India is passing through a process of dynamic change. The market has been growing rapidly and is playing an increasingly important role in international tourism trade and trade relations".

"When it comes to tourism, this developing nation (India) only welcomed 7.7 million international visitors, which can be attributed to the visa requirements for almost all nationalities travelling for tourism. Healthcare in India is mainly dominated by the private sector and most of the healthcare expenses are paid out-of-pocket, as insurance is not yet popular in this destination. Although there are public healthcare facilities owned, control and run by the government, its unreliability makes the private medical sector the main source of healthcare for as many as 7 out of 10 households. This makes the private sector bigger than the public one and thirsty for incremental business including medical tourism, which can take advantage of its not so strong currency and already achieved economies of scale."

The purpose of this research is for India medical tourism to analyse past five years' data of medical tourists in India to project two years' data of likely medical tourist visitors to India. The present study will try to project the number of medical tourist arrivals from various country of nationality till 2018 as precisely as possible based on available models as suited to the nature of data specific to individual country. Since the data on the number of medical tourist arrivals and their country of nationality is not readily available, this report will significantly help decision makers for long term decision making for sustainability of medical tourism industry in India.

There are 75 nations from which Medical Tourists visit India. Among them are: Bangladesh, Afghanistan, Iraq, Maldives, Oman, Yemen, Uzbekistan, Ethiopia, Kenya, Sudan, Nigeria, United republic of Tanzania, Somalia, Saudi Arabia, Sri Lanka, Myanmar (Burma), Pakistan, Tazikistan, Mauritius, Uganda, Rwanda, Bahrain, Kuwait, Seychelles, Fiji, Turkmenistan, United kingdom, Zambia, United states, Zimbabwe, Cambodia (Kampuchea), Malawi, United Arab Emirates, Madagascar, Australia, Liberia, South Africa, Jordan, Ukraine, Tuvalu, Germany, Iran, Palestine, Burundi, France, Comoros, Angola, Eritrea, Lebanon, Netherlands, Sierra Leone, Congo, Qatar, Bulgaria, Norway, Niger, Singapore, Italy, Gambia, Botswana

This paper is structured in four section, after the introduction. In the second section, it was made literature review where it was write information about Medical tourism analysis and forecasting, India, Medical tourism, inbound medical tourism, Forecast and ARIMA model. In the third section, it was made research methodology where it was writing about objective of the study, description of data collection and description of data analysis. The four part presents and analysis of the results, it includes Tourist arrival and the descriptive analysis. The fifth part of the work includes conclusions, limitations and future research.

Literature Review

Béland and Zarzeczny (2018) have drawn on the existing literature to discuss a comparative research agenda on medical tourism that stressed the multidimensional relationship between medical tourism and the institutional characteristics of national health care systems. While on one hand, it is claimed that such characteristics shape the demand for medical tourism in each country, on the other hand, the institutional characteristics of each countries health care system can shape the very nature of the influence of medical tourism on that particular nation.

Research from Alberta, Canada, suggested that the financial costs associated with treating complications from medical tourism for bariatric surgery are quite huge, and complication rates are sizably higher than similar surgeries conducted in Alberta (42.2–56.1% versus 12.3% locally) (Kim, et al., 2016).

Despite the enactment of the Affordable Care Act (ACA) in 2010 in the USA healthcare system, about 9% of the population remains uninsured (Cohen, et al., 2016) and people who lacked insurance coverage but who faced a medical need might go to some other country to seek cheaper treatment. In fact, the higher cost of care in the US has been recognized as a major factor pushing US citizens to seek care at lower cost outside the USA, an option that is facilitated by healthcare globalization. At the same time, differences in regional health system institutions within the two countries can also affect the demand for medical tourism within their borders. For example, in states like Texas, where the elected officials have so far refused to expand Medicaid as part of the ACA (Béland, et al., 2016) large number of people live without health care coverage than elsewhere (about 18% of the population as of March 2016 (Mangan, 2016), which may push them to look to Mexico for a cheaper health care. The extent of these concerns differs depending on the urgency of the issue and whether it falls within the purview of hospital and physician services covered by the universal system (versus, for instance, dental care where public coverage is more limited) (Snyder, et al., 2017).

Chun (2017) referring the 13th Five-year Plan of China that as proposed the strategy of "healthy China", felt hat medical tourism the country was developing rapidly in that environment. The author concluded by saying that Medical tourism in China started late and was in its initial development stage. Also the medical literature was quite insufficient.

Investigating challenges faced by main stakeholders in medical tourism Thayarnsin and Douglas (2017) have opined that due to the expansion of the global tourism industry, medical tourism destinations were competing with each other in the international marketplace.

Some medical tourists even purchase medical complication insurance because of the concerns like complications during treatment (Braverman, 2016).

Stephano (n/d) has listed the most common medical conditions treated in medical tourists from USA:

– Dentistry; Cosmeticsurgery; Cardiacconditions; Invitrofertility; Weightloss; Dermatology; Liver, kidney transplants; Spinesurgery.

The primary concern of Americans considering medical and surgical treatment in hospitals and clinics outside the United States is the quality of the care. The Joint Commission (formerly the Joint Commission on Accreditation of Hospitals) began to evaluate, inspect, and accredit hospitals outside the United States in 1998. Many overseas hospitals are staffed in part by physicians and other health professionals who were trained in US hospitals. One hospital in India has 200 US-trained board-certified surgeons (Boyd, et al., 2011).

Most of the studies have highlighted the reasons for the increase in medical tourism especially in the Western countries. As stated in the 1st chapter under the heading Medical Tourism in India, the Ministry of Tourism has stated that there is a big potential for the growth of Medical Tourism in the country in the backdrop of two important factors – low cost and expertise like Ayurveda. This then demands an analysis of the past trends of the number of medical tourist arrivals in the country to project the future estimates so as to gear-up well in time to meet the increased demand. No such studies have been found that have tried to mathematically project the likely number of medical tourist arrivals.

Research Methodology

A time series model explains a variable with regard to its own past and a random disturbance term. Particular attention is paid to exploring the historic trends and patterns (such as seasonality) of the time series involved, and to predict the future of this series based on the trends and patterns identified in the model. Since time series models only require historical observations of a variable, it is less costly in data collection and model estimation.

Time series models have been widely used for tourism demand forecasting in the past four decades with the dominance of the integrated autoregressive moving-average models (ARIMA) proposed by Box and Jenkins (1970). Different versions of the ARIMA models have been applied in over two-thirds of the post-2000 studies that utilised the time series forecasting techniques. Depending on the frequency of the time series, either simple ARIMA or seasonal ARIMA (i.e., SARIMA) models could be used with the latter gaining an increasing popularity over the last few years, as seasonality is such a dominant feature of the tourism industry that decision makers are very much interested in the seasonal variation in tourism demand. With regard to the forecasting performance of the ARIMA and SARIMA models, empirical studies present contradictory evidence.

The ARIMA model (*p,d,q*), in which *p* corresponds to the order of the Autoregressive process (AR), *d* is the number of differences or integrations, and *q* corresponds to the order of the Moving Averages process (MA), is represented by the following expression (Zou & Yang, 2004; Fernandes, et al., 2008):

$$\left(1-\phi_1 B-\ldots-\phi_p B^p\right)\left(1-B\right)^d Y_t=\left(1-\theta_1 B-\ldots-\theta_q B^q\right)e_t \quad [1]$$

or also, in a more summarised form, by:

$$\phi_p\left(B\right)\nabla^d Y_t=\theta_q\left(B\right)e_t \quad [2]$$

ARIMA models are normally used with quarterly, monthly or even weekly, daily or hourly data, or, in other words, in a context of short-term forecasting. For such purposes, ARIMA models are used to capture seasonal behaviour, in a manner that is identical to the treatment of the regular (or non-seasonal) component of the series. In such applications, it is not customary to work with just one ARIMA model (*p,d,q*), but with the product of the models: ARIMA $\left(p,d,q\right)\left(P,D,Q\right)_s$ in which the first part corresponds to the regular part and the second to the seasonal part, corresponding to the following expression (Zou & Yang, 2004; Fernandes, et al., 2008):

$$\phi_p\left(B\right)\Phi_P\left(B^S\right)\left(1-B\right)^d\left(1-B^S\right)^D Y_t=\theta_q\left(B\right)\Theta_Q\left(B^S\right)e_t \quad [3]$$

The forecasts made with the ARIMA model, based on historical data, are given by the forecasting function:

$$Y_t^*\left(m\right)=\mathrm{E}\left\{Y_{t+m}/Y_t,Y_{t-1},Y_{t-2},\ldots\right\} \quad [4]$$

ARIMA model building method is an empirically driven methodology of systematically identifying, estimating, diagnosing and forecasting time series (Cuhadar, 2014).

Following objectives were set for this study:

a) To review the medical tourism in India;

b) To analyse past five years data of medical tourists in India;

c) To project two years data of likely medical tourist visitors to India.

The study was carried on the basis of secondary data. The main objective was to analyse last five years data pertaining to visits by medical tourists to India and also to project the next two years data on the basis of the historical data.

Following methodology was designed:

a. Collect the last five years data of medical tourists visiting in India;

b. Carry a monthly split of the annual data on the basis of total monthly tourist visits;

c. Apply the ARIMA method to analyse the historical data for the past 60 months, (or five years – 2014-2018);

d. Project the data for the next 24 months (or two years 2019 and 2020).

Since ARIMA is not the only technique of time series modelling the data forecasting was also done using the least squares method through MS Excel. Both the results were compared to get a better insight of the projections.

The monthly data of foreign tourist arrivals was taken from the Tourism Statistics Report (2017) published by the Ministry of Tourism.

The error accuracy is calculated using the following formula:

$$Error\ Accuracy = \frac{(Y_i - Y_t)}{Y_i}\ \%$$

Where, Y_i = Tourist Arrivals in 2017 by Month, and Y_t = Tourist Arrival in 2018 (Projected).

Table 1: Monthly total tourist arrivals in India (2014-2017 real, 2018 projected)

Month	2014	2015	2016	2017	Projected (2018)	Error Accuracy
Jan	731021	790854	844533	983413	837455	14.84%
Feb	649203	761007	848782	956337	803832	15.95%
Mar	628148	729154	809107	904888	767824	15.15%
Apr	535823	541551	592004	740275	602413	18.62%
May	499320	509869	527466	630438	541773	14.06%
Jun	545725	512341	546972	669989	568757	15.11%
Jul	645420	628323	733834	788377	698989	11.34%
Aug	569538	599478	652111	724067	636299	12.12%
Sep	506300	542600	608177	722567	594911	17.67%
Oct	621124	683286	741770	875838	730505	16.59%
Nov	669602	815947	878280	1004826	842164	16.19%
Dec	813633	912723	1021375	1176233	980991	16.60%
Total	**7414857**	**8027133**	**8804411**	**10177248**	**8605913**	15.44%

In the following table we can see the Medical Tourists Arrivals (MTA) by month and projected MTA for 2018 and Error accuracy.

Table 2: Monthly medical tourist arrivals

Month	2014	2015	2016	2017	Projected (2018)
Jan	18170	23046	40960	47837	59984
Feb	16136	22176	41166	46519	57576
Mar	15613	21248	39242	44017	54997
Apr	13318	15781	28712	36009	43149
May	12411	14858	25582	30667	38805
Jun	13564	14930	26528	32591	40738
Jul	16042	18310	35591	38349	50066
Aug	14156	17469	31627	35221	45576
Sep	12584	15812	29497	35148	42612
Oct	15438	19912	35976	42604	52324
Nov	16643	23777	42597	48878	60322
Dec	20223	26598	49537	57216	70265
Total	**186312**	**235932**	**429031**	**497073**	**618432**

Thus there were 60 observations past data points and on those ARIMA method was applied to analyses past data and also get the projections for the next two years (24 months). The results obtained were as given in the Table 3.

Table 3: Summary statistics on ARIMA modelling of the MTA's series

Variable	Numbers Observations	Min	Max	Mean	S.D.
MTA's	60	12 411	70 265	32 611.67	15 065.98

Note: Min.-Minimum; Max.-Maximum; S.D.-Standard Deviation.

The minimum MTA of 12411 corresponds to the month of May 2014 whereas the maximum MTA of 70265 corresponds to the month of December, 2018. The standard deviation is 15066 and is around 50% of the mean of 32612.

The forecast for the next 24 months (years 2019 & 2020) is presented in Table 4.

Table 4: The ARIMA model forecast for next 24 months

Month/2019 Year	MTA's	Month/2020 Year	MTA's
Jan	76622	Jan	79573
Feb	76862	Feb	80252
Mar	76610	Mar	80953
Apr	76362	Apr	81669
May	76250	May	82397
Jun	76297	Jun	83134
Jul	76492	Jul	83878
Aug	76813	Aug	84627
Sep	77236	Sep	85380
Oct	77740	Oct	86135
Nov	78306	Nov	86893
Dec	78921	Dec	87652
Total	**924511**	**Total**	**1002543**

Thus for 2019 the MTA arrival is projected at 924511 whereas for the year 2020 the same is projected at 1002543 (as per ARIMA method).
The annual forecasting if done on the basis of annual data using the least squares method is as under.

Table 5: The Least Squares method forecast

Year	MTA's
2014 (A)	184298
2015 (A)	233918
2016 (A)	427014
2017 (A)	495056
2018 (P)	616414
2019 (F)	728951
2020 (F)	841488

Note: A=Actual, P=Projected and F=Forecast.

Thus for 2019 the MTA arrival is projected at 728951 whereas for the year 2020 the same is projected at 841 488 (as per least square method).

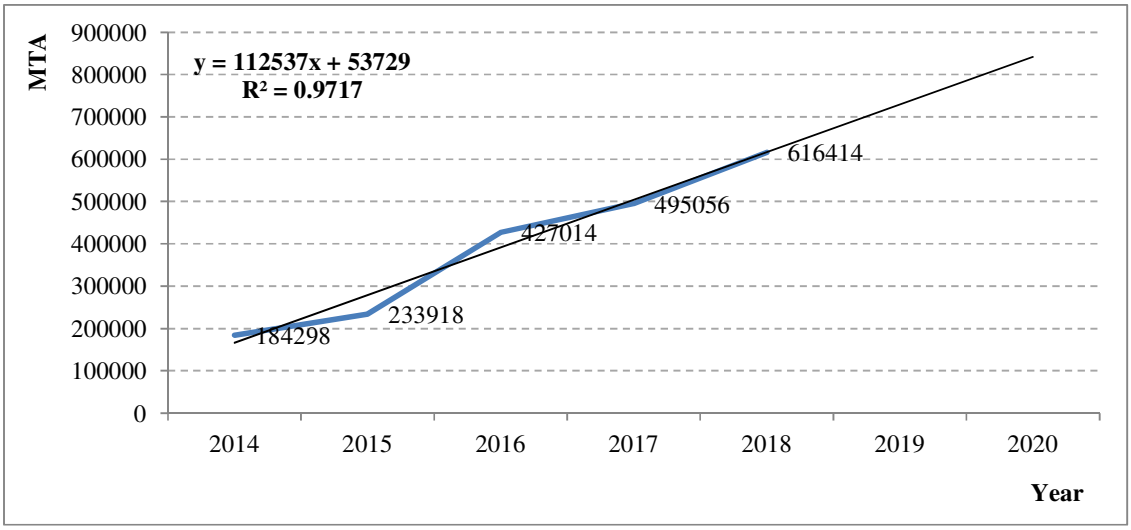

Fig. 1: MTA's in India as per least squares method.

The comparison of forecasts of MTA as per two different methods

Table 6: Comparison of forecasts of MTAs as per two different methods

Method	2019	2020
ARIMA	924511	1002543
Least Squares	728951	841488

The above table shows a comparison of the two-year forecasts as per the two methods of forecasting, namely, ARIMA and least squares.

Conclusions

The model as per ARIMA that emerged on the basis of past 60 months' data was as under:

- The forecast for Medical Tourist Arrivals in India for the years 2019 and 2020 are quite encouraging. The ARIMA method may be considered as more accurate as it involved a monthly projection for 24 months. The annual summations for 2019 and 2020 are a total of 12 monthly summations of the forecasts.

- A major upswing was noted in the year 2016 when the number of MTA shot up from 233918 in 2015 to 427014 in the year 2016. This was a rise of 83% over the last year. This is one swing that has led to a spurt in the projections for the years to come.

Given the highly encouraging projections for the next two years, Government should take all measures possible to make it a reality. These numbers can be taken as targets and efforts can be stepped up in achieving these.

Government and the Ministry of Tourism should use effectively use publicity campaign to highlight "Advantage India" for medical treatment in the form of low cost and expertise. It should try and capitalize on its legacy method of Ayurveda which has no side effects. Lessons can be taken from the success story of brand "Patanjali" products that are based on Ayurveda and have gained immense popularity not only in India but even abroad.

The Government should try and come out with a scheme for medical insurance for foreign nationals including non-resident Indians (NRIs). In India, the health insurance business has gained immense foothold in recent years and it can attract even foreigners. The Government should try and tie-up with

Foreign Governments with blanket insurance for a fixed number of medical tourists based on past historical data. For example, if on an average one lakh people from the US visit India for medical treatment, then the Government of India and the Government of US along with a health insurance company can enter into a blanket insurance cover for one lakh US nationals for the forthcoming year.

The study has projected data for the future two years. Projections are after all projections. They are subject to limitations and are affected by a range of factors. However, the researcher in this case has attempted to use a sophisticated model to minimize errors due to assumptions like homoscedasticity by using the ARIMA model. Other methods of projections can also be used to arrive at more number of projections. In fact, the ARIMA model itself has different methods and those can be used.

Acknowledgements

This work is supported by International Funds under the Project 'Paisaje Ibérico' – INTERREG_0421.

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