Asian Review of Social Sciences
ISSN: 2249-6319 (P) Vol.10 No.2, 2021, pp.75-80

DOI: https://doi.org/10.51983/arss-2021.10.2.3027

Forecasting of Tourism Demand: Methodological Advancement in Search of Suitable Model

Mamta Meena
Assistant Professor, Department of Geography, University of Rajasthan, Jaipur, Rajasthan, India
E-mail: mamtamanutal@gmail.com
(Received 12 September 2021; Revised 6 October 2021; Accepted 10 November 2021; Available online 23 November 2021)

Abstract **- Travel and Tourism is one of the "World's largest industries and generator of quality jobs" (World Travel and Tourism Council). Day by day tourism is getting popularity, and its contribution in world economy is also increasing. People are travelling mostly due to inversions. A person who lives in arid plains, one in a year wants to travel to see the beauty of mountains or Sea. A Person who works in a very stressful and compact schedule, also want to relax by travelling or finding recreation. Life style generated stress and boredom are affecting not only productivity of a person but also health of that person. Education is also a significant factor for tourism. The case study of the tourism demand forecasting is done in context of Jaipur city of Rajasthan State in India. Jaipur city is the capital of the state Rajasthan. It has both cultural and natural sites as attraction for tourists. Forecasting Tourism demand is an essential tool to predict the future of this industry in a particular Region. For the forecasting of tourism demand in Jaipur city time series analysis method is used. The paper is written to analyze the trends in tourist arrivals and the future of tourism in the city, and it is an exercise to find out best model for forecasting of tourism demand. It will be useful in proper of use of resources and appropriate planning of tourism in the city.**
Keywords: **Tourism Demand, Forecasting, Time Series, Trends, Models**

I. INTRODUCTION

Tourism has become one of the most significant industry in the world today. It has impacts on the economy, society, environment and resources. So, it is essential to study this phenomenon. Rajasthan is one of the most popular tourist destination ns in India. It is among top ten states which are famous for tourism in India. In 1971 no. of Domestic tourist was 880694 and foreign tourist was 42500 in Rajasthan. In 2018 it increased to 50235643 and 1754348 with an increase of 9.41% in domestic tourists and 8.97 in foreign tourists from last year. Tourism in Rajasthan extends almost through the entire state, though tourist activity is concentrated around six main cities, which serve as 'tourist hubs' for places of tourist attraction in and around these 'hubs'. These tourist 'hub' cities are Jaipur, Jodhpur, Jaisalmer, Bikaner, Udaipur and Mount Abu. This paper is based on one of the most popular area for research in tourism geography, Tourism Demand. In this paper tourism demand forecasting is done with the various models of tourism forecasting. "Tourism demand is a measure of visitors' use of a good or service. Such use includes the economists' concept of consumption, as well as the presence of a visitor at a destination, port of entry or other tourism facility, and on a transport vehicle, regardless of whether any exchange takes place. Tourism demand can be measured in a variety of units, including a national currency, arrivals, nights, days, distance travelled and passenger - seats." These definitions are also used in this paper by UNWTO Domestic Tourism: "Residents of a country travelling within their country." International Tourism: "All travel that involves visitors crossing an international boundary". Tourists: "Tourists are visitors who stay at least one night in a collective or private accommodation in a place visited".

A. Study Area

Jaipur is the capital city of Rajasthan state of India. It is located on 26° 55' north latitude and 75° 49' east longitude. The city is surrounded by the Nahargarh hills in the north and Jhalana in the east, to the south and the west of the city are also prevailing hillocks but they are isolated. Its' Climate is Semi-Arid; it has Rainfall-about 60 cm from south west monsoon. Major tourists' attractions in Jaipur city are City palace, Amber fort, Nahargarh fort, Jaigarh Fort, Hawa Mahal, Jal Mahal, Jantar Mantar Observatory, and Birla Temple etc. It has a famous mall WTP and Chokhi Dhani as a destination for Rajasthan's culture. In 1997 the no. of Domestic tourists in Jaipur was 700358 and foreign tourists were 184112. In 2018 the no.'s increased to 1787836 and 681227 respectively. It has 5 % and 7.45 % growth in no. of tourists from previous year.

B. Importance of Tourism Demand Forecasting

As we all know that tourism Product is Perishable. The production and consumption take place at the same time and it involves people interaction as suppliers and consumers, such as hotel staff, waiter's etc., so having enough of the right supply needed accurate forecasting.

Customer satisfaction depends on complement services. For example, Forecasting can be helpful in ensuring the complementary services are available when and where future visitors need them, Tourism supply requires large, long lead-time investments in plant, equipment and infrastructure. So it essential for avoiding a loss and maximum benefit, to forecast tourism demand accurately.

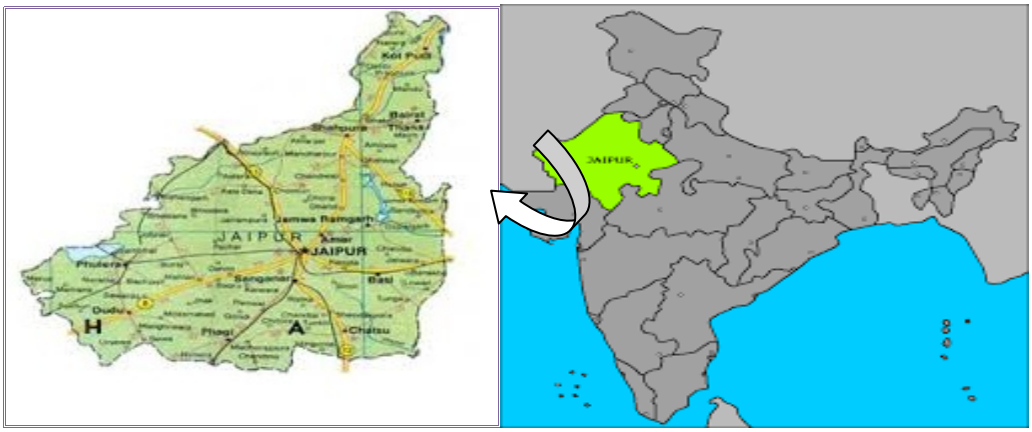

Fig. 1 Study Area

Research Problem/ Research Question: Jaipur has become a center of tourist attraction. Many tourist attraction centers in the city is facing traffic congestion problem. Many a times the resources left unused, so for proper planning and management of tourism and to avoid tourist related problems, the research question arises, can we forecast tourism demand? If we are able to forecast the accurate tourism demand we can save our resources, increase our Employability and avoid problems related with growth of tourism.

II. OBJECTIVES OF THE STUDY

1. This paper is written with the objective of accurate forecasting of tourism demand in Jaipur city.
2. Another objective is to find out most suitable model of tourism forecasting for Jaipur city by examining the various models of tourism demand forecasting.

III. RESEARCH METHODOLOGY

Tourist arrival data of both domestic and foreign tourists of Jaipur is used for demand forecasting. It is based on Quantitative Methods of Forecasting. These are the selected quantitative methods of Forecasting.

A. Single Moving Average Method
B. Single Exponential Smoothing Method
C. Double Exponential Smoothing Method
D. Triple Exponential Smoothing Method
E. Box-Jenkins Approach (ARIMA)

A. Single Moving Average Method

We can average any number of periods to produce a forecast through the SMA model. The general equation for the single moving average is:

$Ft = (At+1 – At+2 – At–n) /n$

Where F = forecast value, A = actual value, t = some time period, n = number of past periods.

The SMA method allows some past values to determine forecast values, and all have the same influence on the forecast value.

B. Simple Exponential Smoothing Method

The single exponential smoothing (SES) method allows us to vary the importance of recent values to the forecast and includes all of the information past values can provide us.
The logic of the SES is evident in its general equation:

$Ft = Ft–1 + a (At–1 – Ft–1)$

Where F = forecast value, a = smoothing constant between 0 and 1, A = actual value, t = some time period.

C. Double Exponential Smoothing

Second order or double exponential smoothing was developed to deal with time series showing a linear trend over time
Brown's one-parameter adaptive method
The equations for this DES Method are

Level: $a\ At + (1 – A)\ (Lt–1 + bt–1)$,
Trend: $bt = a\ (Lt – Lt–1) + (1 – a)\ bt–1$
Forecast: $Ft+h = Lt + hbt$

Where L = level of the series, a = level and trend smoothing constant between 0 and 1
A = actual value, b = trend of the series, t = some time period, h = number of time periods ahead to be forecast.

D. Triple Exponential Smoothing Method

The Holt-Winters' trend and seasonality method employs triple exponential smoothing: one equation for the level, one for the trend and one for the seasonality. The equations associated with each of these elements are as

Level: $Lt = a\ At/St–s + (1 – a)(Lt–1 + bt–1)$,
Trend: $bt = B(Lt – Lt–1) + 1 – a)bt–1$,
Seasonal: $St = CAt/Lt + (1 + a)\ St–s$,
Forecast: $Ft+h = (Lt + hbt)St–s+h$

Where L = level of the series, a= level smoothing constant between 0 and 1, A = actual value
s = number of seasonal periods in a year (for example, four Quarters, twelve months)

b = trend of the series, B = seasonal smoothing constant between 0 and 1, S = seasonal component
C= seasonal smoothing constant between 0 and 1,t = some time period, h = number of time periods ahead to be forecast.

E. ARIMA Method

The Box–Jenkins approach searches for the combination of two forecasting methods and their parameters that minimizes the error in simulating the past series. The two methods are auto regression and moving average. The Box–Jenkins approach is a process that makes use of these two methods to suggest the most appropriate form of the forecasting model and then tests this model's validity. The acronym, ARMA, is used to identify the autoregressive/ moving average combined method.

Auto regression Equation
At = a + b1At – 1 + b2At – 2 + . . . + bnAt – n
Where A = actual value in the time series a = a constant identified through computational iteration, b = coefficient identified through computational iteration, called the 'autocorrelation'
t = some time period, n = number of past values included. 'Computational iteration' indicates that, from a set initial value of the constant or a coefficient,

IV. ACCURACY TEST

1. To test the forecasting accuracy of the All the forecasting Methods, the Mean Absolute Percentage Error (MAPE) was calculated.

The mean absolute percentage error is expressed in generic percentage terms and it is computed by the following formula

where: A – actual value, F – forecast value, t – some time period,

Forecasting accuracy was established according to the following

MAPE values (Baggio and Klobas, 2011)
1. Lower than 10% - highly accurate;
2. 11%-20% - good;
3. 20-50% - reasonable;
4. Higher than 50% - inaccurate.

2. RMSE: Root Mean Square Error, or RMSE

RMSE = $\sqrt{\text{Square of (et/at)/n * 100}}$
Where n = number of periods = forecast error, A = actual value of the variable being forecast, n= some time period

V. RESULTS AND DISCUSSION

On the basis of the forecasting methods, various graphs and diagrams are prepared.

A. Annual Growth of Tourism in Jaipur City

In this diagram the Annual Growth of Tourism in Jaipur city is shown.

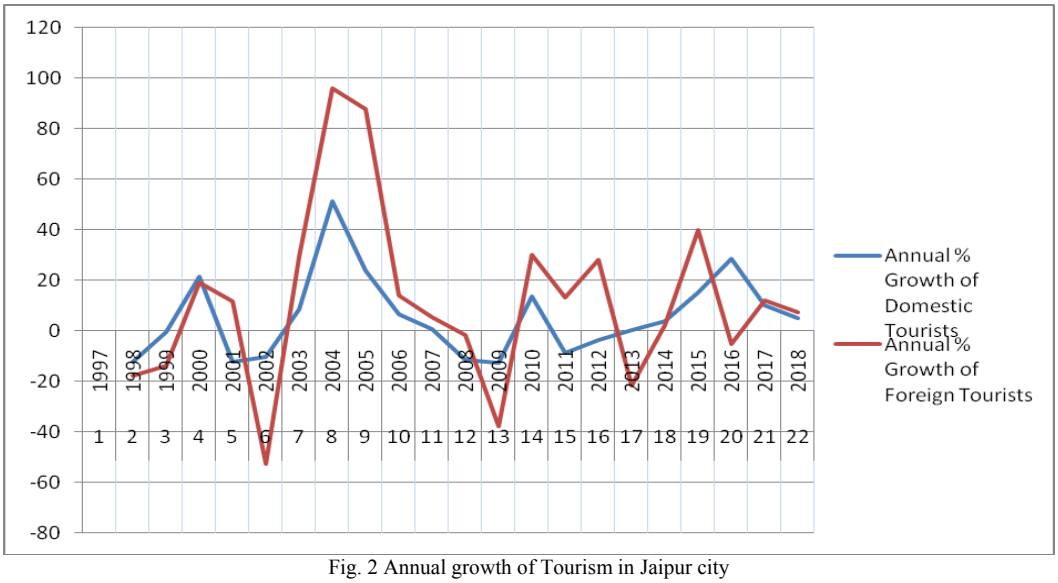

Fig. 2 Annual growth of Tourism in Jaipur city

It shows the impact of World Economic slowdown on the no. of foreign tourist in the year 2008-09.

The table, given below shows the no of tourist and their growth in past 22 years. In the year 1997 no. of domestic tourist was 700358, it increased to 1787836 in 2018. It shows 155.27% growth in 22 years. Tourism growth in past 10 years is 79.50% (Domestic tourism). Foreign tourist growth in past 22 years is 244.35%, and it is 140.36%. We can say that Jaipur city is getting more popular in foreign tourist day by day.

TABLE I TOTAL NUMBER OF TOURIST ARRIVAL IN JAIPUR CITY WITH ANNUAL GROWTH IN %

Sl. No.	Year	Domestic Tourists	Annual % growth	Foreign Tourists	Annual % Growth	Total Tourists
1	1997	700358	-	184112	-	884470
2	1998	616315	-12.00000571	150971	-18.00045624	767286
3	1999	613511	-0.454962154	129955	-13.92055428	743466
4	2000	745476	21.50980178	154756	19.08429841	900232
5	2001	655715	-12.04076322	172950	11.75657164	828665
6	2002	589414	-10.1112526	81451	-52.90488581	670865
7	2003	640130	8.604478346	105161	29.10952597	745291
8	2004	968123	51.23849843	206272	96.14876237	1174395
9	2005	1198000	23.74460683	387295	87.75936627	1585295
10	2006	1278603	6.728130217	441910	14.10165378	1720513
11	2007	1287072	0.662363533	464841	5.189065647	1751913
12	2008	1138859	-11.51551739	456165	-1.866444655	1595024
13	2009	995996	-12.54439751	283423	-37.86831519	1279419
14	2010	1133543	13.80999522	368512	30.02191071	1502055
15	2011	1035885	-8.615288525	416824	13.11002084	1452709
16	2012	998703	-3.589394576	534256	28.17304186	1532959
17	2013	1001169	0.246920256	416824	-21.98047378	1417993
18	2014	1041604	4.038778668	426576	2.339596568	1468180
19	2015	1201152	15.3175295	596756	39.89441506	1797908
20	2016	1544730	28.60404012	565978	-5.15755183	2110708
21	2017	1702665	10.22411684	633990	12.0167215	2336655
22	2018	1787836	5.002217113	681227	7.450748435	2469063
	Total	22874859		7860205		30735064

B. Result of Linear Trend Lines

Linear trend line with the line diagram of the tourist arrival in Jaipur city is given below.

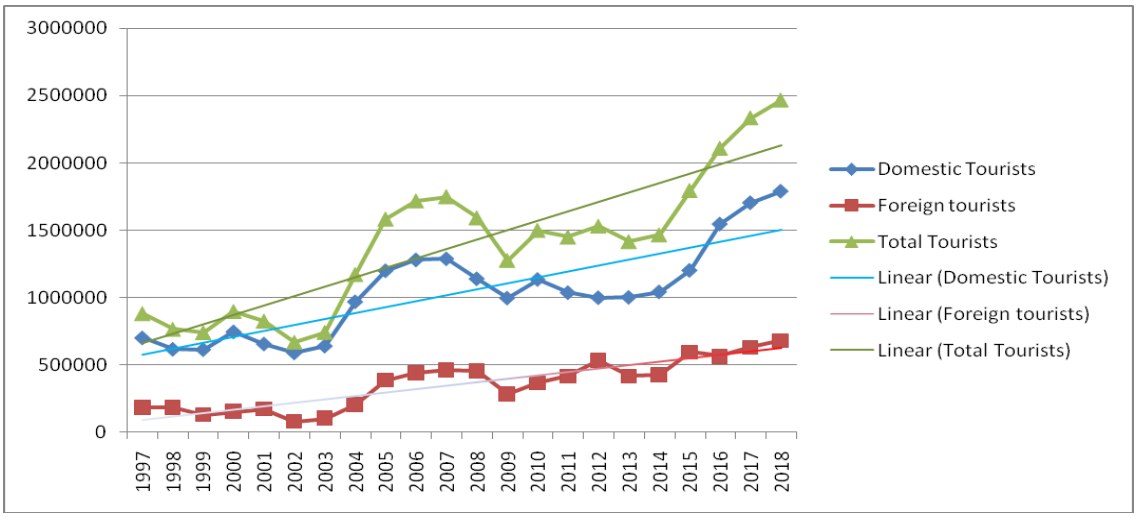

Fig. 3 No. of tourists and the trend lines

Trend lines are showing increasing trend in both domestic and foreign tourists.

The table given below, Shows the result of the forecasting models.

TABLE II RESULTS OF SELECTED MODELS FOR TOURISM DEMAND FORECASTING

Year	Moving average (Domestic Tourists)	ARIMA (Domestic Tourists)	Holt-Winters (Domestic Tourists)	Moving average (Foreign Tourists)	ARIMA (Foreign Tourists)	Holt-Winters (Foreign Tourists)	Moving average (Total Tourists)	ARIMA (Total Tourists)	Holt-Winters (Total Tourists)
1997	643394.6667	622761.938		155012.6667	149931.087		798407.3333	782357.957	
1998	668915	696046.104	700358	154948.5	180911.287	184112	823863.5	878555.810	884470
1999	666275	612520.532	680187.68	158548.8	180911.287	176158.16	824823.8	762155.385	856345.84
2000	644086.2	609733.795	660823.5568	138016.6	127695.785	163743.7616	782102.8	738494.662	824567.3184
2001	648849.2	740886.326	675111.356	128854.6	152065.629	158412.9324	777703.8	894212.414	833524.2884
2002	719771.6	651677.958	667813.5411	144118	169943.334	158368.5518	863889.6	823123.962	826182.0928
2003	810276.4	585785.153	645579.1075	190625.8	80035.007	136956.5452	1000902.2	666379.124	782535.6527
2004	934854	636188.910	637716.7963	244417.8	103332.818	123297.1181	1179271.8	740307.459	761013.9145
2005	1074385.6	962162.555	710241.7956	321095.8	202686.044	135910.7717	1395481.4	1166542.167	846152.5673
2006	1174131.4	1190624.271	833747.5231	391296.6	380562.032	192261.6637	1565428	1574694.600	1026009.187
2007	1179706	1270731.022	966466.9242	406726.8	434227.572	258251.3108	1586432.8	1709008.437	1224718.235
2008	1166814.6	1279147.881	1087160.448	402970.2	456759.926	323892.816	1569784.8	1740198.475	1411053.264
2009	1118271	1131847.384	1156140.609	397953	448234.755	379961.7076	1516224	1584358.545	1536102.317
2010	1060597.2	989863.949	1176346.354	411836	278495.805	386406.8725	1472433.2	1270863.903	1562753.226
2011	1033059.2	1126564.113	1218308.215	403967.8	362105.567	407865.0095	1437027	1492011.201	1626173.225
2012	1042180.8	1029507.364	1225049.176	432598.4	409577.682	435052.2788	1474779.2	1442995.164	1660101.455
2013	1055702.6	992554.283	1213951.698	478247.2	524968.174	484256.643	1533949.8	1522708.556	1698208.341
2014	1157471.6	995005.101	1197055.607	508078	409577.682	497436.4287	1665549.6	1408511.299	1694492.035
2015	1298264	1035191.154	1185407.67	528024.8	419160.148	507096.2401	1826288.8	1458362.714	1692503.91
2016	1455597.4	1193756.865	1208628.694	580905.4	586381.637	552446.4796	2036502.8	1785885.920	1761075.173
2017	1559095.75	1535219.557	1309365.165	619487.75	556138.700	583112.332	2178583.5	2096594.318	1892477.497
2018	1678410.333	1692182.198	1437273.335	627065	622968.339	623282.5207	2305475.333	2321030.478	2060555.856
2019	1745250.5	1776828.826	1570656.578	657608.5	669384.142	667183.8508	2402859	2452553.104	2237840.429
2020	1766543.25	1765889.420	1633927.288	669417.75	657747.168	699496.285	2435961	2436153.606	2333423.573
2021	1755896.875	1755017.364	1697197.998	663513.125	646312.497	731808.7193	2419410	2419863.765	2429006.717
2022	1761220.063	1744212.245	1760468.708	666465.4375	635076.614	764121.1535	2427685.5	2403682.850	2524589.861
2023	1758558.469	1733473.649	1823739.418	664989.2813	624036.062	796433.5878	2423547.75	2387610.133	2620173.006

On the basis these three models the no. of tourist in upcoming five years is given in Table II. This table shows the projected data of tourists in the upcoming five years. It shows continues but slow growth in tourism sector. The no. of tourists in the year 2019 to 2023 is given in the table.

C. The Accuracy Check: This table is the result of forecasting models selected in this paper. Explanation of the Accuracy Check MAPE value, MAPE values (Baggio and Klobas, 2011)

TABLE III RMSE AND MAPE VALUES OF SELECTED MODELS

Forecasting Models	Tourists	RMSE	MAPE
ARIMA	Domestic Tourists	147217.6121	11.09452333
	Foreign Tourists	87900.77332	24.67958804
	Total Tourists	209103.3077	12.76895746
Moving Average	Domestic Tourists	93713.160	8.621
	Foreign Tourists	57895.659	19.940
	Total Tourists	134086.827	9.467
Holt- Winter	Domestic Tourists	262553.606	17.025
	Foreign Tourists	116721.538	26.794
	Total Tourists	357337.378	17.682

1. Lower than 10% - highly accurate; According to it the result of Moving Average is highly accurate.
2. 11%-20% - good; All the three methods are showing good accuracy of result.
3. 20-50% - reasonable; ARIMA and Holt Winter fall in the category.
4. Higher than 50% - inaccurate.

With the above analysis we can give result that the best suitable model for the tourism forecasting in Jaipur is Moving Average Method because it gives least values of MAPE and RMSE. MAPE value of Moving Average in Domestic tourist category is 8.621, which is according to the description of Mape values, highly accurate. So it can be said that the forecasted values for the upcoming five years in this category can be very close to reality. The Mape value for foreign tourist category is 19.940, which shows it a good forecast. There are fair chances of it to being close to reality. We can also say that the results of all the three methods are quite similar to each other.

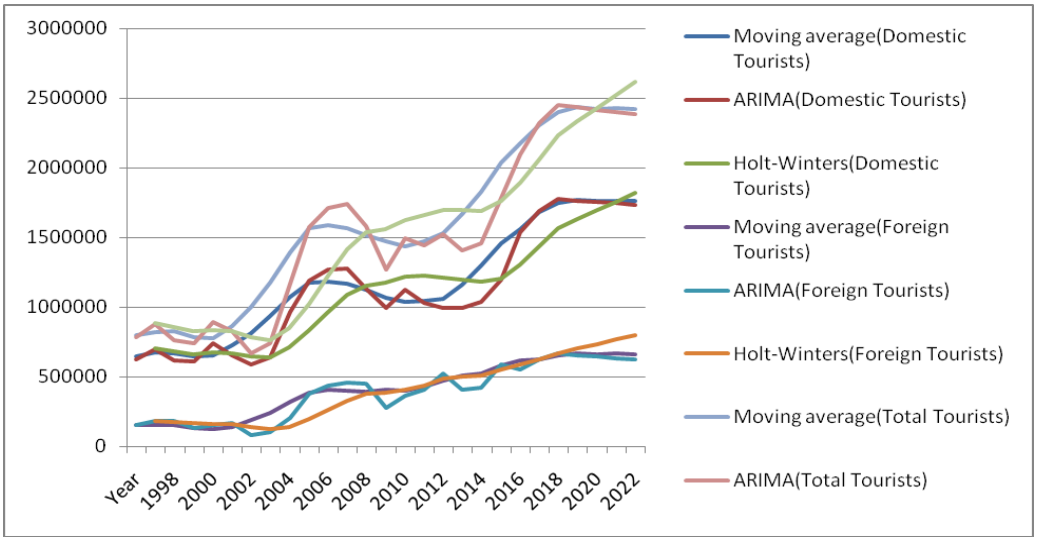

Fig. 4 Forecasting values of models

The results of forecasting from all the selected models are quite similar. On the basis of the obtained forecasted no. of Tourists the no. of tourists' facilities and tourists' infrastructure can be developed. It can also be said that there is some slow growth in tourism of Jaipur city. So it is the need that some policy measures and promotion measures should be attempted.

VI. SHORTCOMINGS

Basically, tourism forecasting comes under behavioral sciences. It is almost impossible to predict the behavior of tourists. But some models can be prepared according to the statistical methods.

VII. CONCLUSION

Tourism demand forecasting is an essential tool in tourism industry to save resources. If we already know about the no. of tourist arrival in future we can prepare services accordingly. If estimated number of tourists is less than man power and other resources can be invested in another sector. The policy makers can change their policies according to the estimated no. of tourists. In conclusion we can say that there should be some promotion measure in Tourism in Jaipur City. The no. of tourist in the upcoming five years in the city is shown in the table II of the paper it the two methods are showing similar results and it can be predicted that the rate of growth of tourism in the city in slow in compare to past years. This research can be used by managers of tourists facilities. The govt. officials related to tourism department should be alert and take some policy measures for growth of tourism. And at the search of the best model for the tourism demand analysis it is found that Moving Average Method is best. It shows least values for both MAPE and RMSE.

REFERENCES

[1] Blake, A. T., Durbarry, R., Eugenio, J. L., Gooroochurn, N., Hay, B., Lennon, J., Sinclair, M. T., Sugiyarto, G., & Yeoman, I. (2006a). Integrating forecasting and CGE models: The case of tourism in Scotland. *Tourism Management*, *27*, 292-305.

[2] Blake, A. T., Gillham, J., & Sinclair, M. T. (2006b). CGE tourism analysis and policy modelling in L. Dwyer & P. Forsyth (Eds.). *International handbook on the economics of tourism, 2*, 245-260.

[3] Cooper, C., Wanhill S., Fletcher, J., Gilbert, D., & Fyall, A., (2004). Tourism: Principles and Practice, 3rd ed. USA: Financial Times/ Prentice Hall.

[4] Frechling C. D. (2001). *Forecasting tourism demand methods and strategies*, 2nd ed., Routledge CRS press, Taylor & Francis Group.

[5] Kurukulasooriya, N., & Lelwala, E., (2014). Time series behavior of burgeoning international tourist arrivals in Sri Lanka: The post-war experience. *Ruhuna Journal of Management and Finance, 1*, 1-14.

[6] Nelson, V., (1998). *An introduction to the geography of tourism,* 2nd ed., London, Rowman & Littlefield.

[7] Song, H., & Li, G. (2008). Tourism demand modeling and forecasting– A review of recent research, *Tourism Management, 29*(2), 203-220.

[8] Uysal, M., Muzaffer, X., & Crompton, J. L. (1985). An overview of approaches used to forecast tourism demand, *Journal of Travel Research*, *23*, 7-15.