

# Modelling Travel Patterns and Predicting Spatial Temporal Movement of Inbound Tourists to India - A Markov Chain Approach

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**Abstract** Demand for tourism must be predicted in order to optimise management, increase income, and making policies for attracting the tourists. Repeat visitation along with managing inbound tourism demand is at the core of a destination marketing strategy. Tourism demand modelling has gained popularity among researchers in the current decade because of its predictive and analytical prowess. The present study, while making use of secondary data on inbound tourism (Foreign Tourists Arrivals- FTAs) spanning more than four decades (i.e. 1981-82 to 2022-23), offers valuable insight for Destination Management Organisations (DMO) towards repeat visitation based on results from Markov Chain Analysis. The analysis reveals that the number of tourists from the USA, Australia, and Canada has consistently grown at a faster rate than in other countries. However, decade-wise results from the Markov Chain Analysis identified that visitors from the UK, USA, and Bangladesh emerged as the most loyal sources of tourists visiting India across each decade. Despite this loyalty, projections for FTAs indicate a declining trend from the UK, USA, France, and Canada for the selected period. The research findings emphasize the need for the government to develop competitive tourism marketing strategies for attracting tourists from developed countries.

**Keywords:** Tourism Demand Modelling, DMO, Foreign Tourist Arrivals, Growth, Inbound Tourism, Markov Chain, Projection

## INTRODUCTION

Tourism has evolved as the fastest-growing industry in the world. Determining the maximum number of visitors is essential for long-term strategic planning in order to grow tourism and support the anticipated maximum loads. Long-term tourism forecasting is essential for giving policymakers information for decisions such as increasing tourism facilities and infrastructure in accordance with sustainable development principles (Manisha & Singh, 2024). Tourism demand modelling and forecasting have been a focal point of academic research in the field of tourism (Song & Li, 2008; Witt & Witt, 1995; Song, Qiu & Park, 2019). Various

tourism databases offer a wide range of data measurement indicators, which are essential for analysing symmetries and asymmetries within the data to achieve more accurate interpretative results (Andraz et al., 2015; Khan et al., 2020). With similar goals of numerous tourism stakeholders, tourism demand forecasting is used as a common combat strategy by researchers, practitioners, and policymakers for increasing foreign tourists' inflow at the destination (Makoni et al., 2023; Bufalo & Orlando, 2024). Shapoval et al. (2018) argued that for destinations to be successful in attracting tourists, it is imperative for organisations to continuously monitor the two dimensions of tourist arrival at the destination. First, the attributes of the destination, and

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second, the type of tourists who look forward to selecting the same destination. Based on the strategies for the future of destination management organisations (DMO), it becomes necessary to measure symmetries/asymmetries of data collected and gained through multiple agencies with the key focus highlighted (Croes et al., 2018) to create and refine market strategies which are based on planning for tourism-related businesses, investment in destination infrastructure, and government macroeconomic policy (Song & Turner, 2006).

A comprehensive understanding of forecasting in tourism is highlighted with a key synthesis to research in a similar domain. Song et al. (2019) work, "A Review of Research on Tourism Demand Forecasting: Launching the Annals of Tourism Research Curated Collection on Tourism Demand Forecasting," offers a comprehensive overview of the evolution of research in this field, presenting historical evidence that highlights the development and significance of tourism demand forecasting as a research area (Song et al., 2019). The shifting distribution of foreign visitor arrivals poses significant theoretical questions regarding the fundamental assumptions of spatial and temporal patterns of development, in addition to having substantial implications for social, economic, and environmental domains. For instance, an increase in the dispersion of arrivals would suggest that, over time, travellers seek authenticity and attempt to avoid congested areas. Furthermore, when travellers seek new, less crowded destinations, it would challenge assumptions about the limitations of tourism as a catalyst for economic growth. Conversely, the perception that destinations with low visitor numbers are less touristic and more exotic may indicate that such nations possess considerable potential for tourism development (Lacher & Nepal, 2013). Underpinning the research goal with completeness and accuracy of tourism data allows measuring the demand of tourists originating from different nations termed as inbound tourism, and it becomes more important for developing nations like India. In the last decade, India has undertaken massive investments in infrastructure to provide nook and corner air connectivity with the best airports, world-class availability of road networks, and an effort to create a world-class rail network. Sharma et al. (2022) emphasise that investment in infrastructure is an important parameter for destination choice criteria for inbound tourism traffic to India.

Therefore, tourism demand forecasting as well as assessment of shifts in foreign tourist arrivals (FTAs) with the help of tourist arrival statistics provides a clear direction for the future where (Sinclair, 1998) admits tourism is the economic driver for several economies all over the world. Webster and Ivanov (2014) assert that tourism helps in the economic welfare of the local population, and Akama and Kieti (2007) argue that tourism helps in reducing socioeconomic disparities.

Summing up the benefits of tourism and the need for deep diving into statistical tourism data Markov Chain analysis provides better and future opportunities for the researchers to synthesise the computed results in the modest way possible.

## REVIEW OF LITERATURE

The rational decision-making process of tourists in identifying, selecting, and visiting a destination closely aligns with the principles of utility maximisation and cost-benefit analysis, considering factors such as time, money, and effort invested in the trip. Wong's (1997) consumer utility maximisation model depicts a consumer-centric approach originating from microeconomics. Burgan and Mules (2001) used cost-benefit analysis with a key focus on government intervention in public expenditure for tourism utilities. Burgan and Mules (2001) focused on step-by-step variables undertaken by tourists to move closer and finally visit the destination.

Han et al. (2006) addressed tourism demand to be highly sensitive and influenced by multiple determinants, such as exchange rate volatility, relative price changes, and expenditure. In a similar article, price competitiveness was found to be instrumental in addressing the issue of US tourism demand for countries like France, Italy, and Spain but not for other countries in the same region like the UK. Observing the critical studies of demand and supply in tourism and analysing the tourism system from the historical perspective. Many researchers (Gunn, 1994; Lieper, 1979; Mill & Morrison, 1985; Chand, 2012) argued the idea of measuring tourists at the host and destination to provide more attraction towards the destination image. Critically, examining the databases as identified to be the foundation of destination marketing strategies therefore provides a deep-diving approach, making it argumentative. All the destinations highly focus on being competitive, and none of the destinations remains competitive all the time. Managing the tourist footfall and maintaining tourist footfall at a destination is at the core of destination competitive benchmarking.

The measurement of asymmetric data in the tourism industry for better destination management has been used in multiple dimensions, ranging from hospitality (Yang et al., 2020), tourist arrivals and employment (Sharma & Mitra, 2021), pandemics and tourist arrivals (Uzunerand & Ghosh, 2021), real exchange rate and tourist arrivals (Karimi et al., 2019), etc. Valadkhani et al. (2017), using the Granger causality test to understand the asymmetries of data in inbound and outbound markets to/from Australia, argued that policymakers and tourism marketing agencies need to portray efficiencies in developing strategies for resilient markets such as China to attract more tourism traffic. Croes et al. (2018) argued that measuring business cycles

with asymmetric data in small destinations where local economies are highly tourism-dependent and there is less tourism inflow can further lead to more economic and social imbalances; hence, the measurement of tourism statistics becomes more fruitful. Whereas, Sharma et al. (2022) assert that the measurement of data from different sectors is the right kind of approach for developing countries such as India, where the choice of destination is based on multiple variables such as ICT, governance, and infrastructure. Tangvitoontham and Sattayuanuwat (2022) measuring tourist arrivals to a destination using religion as a main parameter addresses, religion plays a prominent role and identify that Muslim travelers likes to follow those destinations which are Islam-friendly with better options for Halal Meal.

In continuation, many other determinants do contribute to the decision making of tourists to travel to a destination, such as substitute prices at the destinations (Martin & Witt, 1988). Diversified key drivers have been identified to understand the total tourism inflow towards a highly rich and culturally diversified nation like India.

A higher tourist income positively influences tourism flow to Asian countries (Xu et al., 2019; Permatasari & Esquivias, 2020). Tourism in Asian countries is adversely affected by higher transportation costs and the relative costs of tourism products. (Tang & Tan, 2016; Ulucak et al., 2020). In India, in addition to economic development, factors such as world-class monuments, natural landscapes, and cultural heritage attract both international and domestic visitors (Parida et al., 2017).

In the Indian context, the originating country's per capita income and level of economic development, relative cost of living, past experiences, and learning of tourists are significant factors which impact international tourist arrivals in India (Barman & Nath, 2018). Deese (2013) examined the importance of relative prices, geographical and cultural factors, income level of the tourists and the impact of government policies on inbound tourism.

Various studies have identified key variables that influence tourism demand. Dhariwal (2005) and Martins et al. (2017) highlight exchange rates, inflation, and world income as major factors. Blake et al. (2006) emphasise the importance of human capital, while Adeola and Evans (2019) point out the significance of distance. Security and conflicts were noted by Dhariwal (2005), whereas institutional quality was discussed by Ghalia et al. (2019). Fareed et al. (2018) explored that tourism demand is influenced by terrorism activities in the host countries. Barman and Nath (2018) highlighted that the infrastructure development of the country can be an important determinant which influences tourism demand.

Though identifying the key determinants' for the choice of international tourists to visit the nation is an important area

of research, exploring the possibilities with the measurement of behavioural intentions like repeating the destination and positive word of mouth are hooked to the stable number of tourism inbound statistics and its measurement.

The measurement of repeat visitation has been identified as an important variable in studying the hidden patterns of travel motives (Agarwal, 2023). The statistical record management of the government provides yearly statistical evidence of both inbound and outbound tourist figures with no particular reasons and future strategies to gain more tourists from losing nations or retaining them from existing countries. Our research highlights the fluctuations in tourist arrivals and departures to/from India. In this study, we attempted to assess the dynamics of shifting preferences among different international tourists over the years to assess the current position of gain and loss from tourist arrival data. To examine the changes in preferences among foreign tourists arriving in India as the preferred destination, the researcher employed the first-order Markov Chain technique. The insight into historical tourist records allows us to interpret that a reasonable contribution has been made by several countries towards the total amount of inbound tourism traffic to India. The contribution of inbound tourist traffic can be seen and measured in the post-liberalisation era, post-industrialisation era, and during the modern India era with initiatives taken under various tourism policies to boost more inbound tourist traffic to the nation. The National Tourism Policy is the government policy document to provide a visionary approach to make India one of the favoured destinations among foreign tourists. Evidence from trade theory highlights that the movement of merchandise from one nation to another is termed international trade, and on the other end, the movement of people in the choice to move from one country to another is called international tourism (Keum, 2010).

To create a tourism-friendly ecosystem for both tourists and local economies, efforts in the same direction began with the formation of the Republic of India in 1947. In the Second Five-Year Plan (FYP) i.e. (1956-1961) the government initiated action with the formation of the Department of Tourism in 1958, and the Third five-year plan (1961-1966) witnessed the formation of the Ministry of Tourism and Civil Aviation. The Fourth FYP (1969-1974) and Fifth FYP (1974-1979) respectively focused on building healthy infrastructure in India for Tourism, including accommodation, railways, bridges, etc. The first tourism policy for tourism came up in 1982 naming it as "National Tourism Policy on Tourism, 1982 under Sixth FYP (1980-1985). During 1985-1990 the seventh FYP highlighted the key remarks towards the tourism sector with a major thrust on the development of tourist circuits, setting up the special national committee on tourism, setting up Finance Corporation of India in 1989 with status of industry to the tourism sector. Eight FYP (1992-

1997) paved the future direction with the National Action Plan for Tourism (NAPT). In 2002, under the Ninth FYP (1997-2002) saw the creation of a special and independent charge to cabinet rank minister with the formation of the Ministry of Tourism and the launching of the Incredible India Campaign. The tenth FYP (2002-2007) helped in promoting and positioning India as one of the key destinations for international travellers (2007-2012). The Eleventh FYP led to an increase in tourist footfall and international receipts for India, and the Twelfth FYP (2012-2017) with an aim to improve the tourism sector and Draft National Tourism Policy 2015 came into existence.

In summary, this study focuses on how different tourism policies have helped India retain loyal foreign tourists over the years. We estimated the dynamics of foreign tourists' arrivals from major countries across different decades. Additionally, using the Markov technique allows us to predict the futuristic approach taken by stakeholders to attract, retain, and hold the position of various countries in total footfall to India. Moreover, this technique aids in reevaluating tourism marketing strategies and reallocating the tourism budget, enabling the government to achieve its goal of positioning India as a preferred destination in Southeast Asia for foreign nationals.

Markov Chain Analysis (MCA) technique provides solutions to stochastic decision method that primarily involves a finite set of nations (Grewal et al., 2019). The Markov Chain Analysis (MCA) approach used in tourism studies provides opportunities to assess the dynamics of change in the inbound tourism patterns of foreign tourists, capturing the shifts in their preferences and behaviours over time (Rao & Parwez, 2005). The advantages of Markov Chain Analysis (MCA) allow its use in situations of similar nature problems, highlighting key advantages such as a strong statistical foundation, robust data handling, and computational efficiency for futuristic development and evaluation. Previously, this highlighted technique has been employed by many researchers to fulfil various study objectives in different domains. For instance, it has been used to examine the direction of trade in Indian coffee (Naik & Nethrayini, 2017), to understand the dynamics of cropping pattern changes (Reddy & Achoth, 2000; Ramya et al., 2012; Ragamalika et al., 2019; Reddy et al., 2022), and to study dynamic behaviour in large-scale grid systems (Dabrowski & Hunt, 2009). In the modest way possible to the best possible knowledge of the researchers' none of the studies reviewed utilized MCA to examine the dynamics of shifts in the inbound tourism patterns towards India. Therefore, researchers emphasise the existing research gap and the value of the MCA technique in analysing the dynamic behaviour patterns of foreign tourist arrivals to India, utilising extensive secondary data on tourist arrivals.

## MATERIALS AND METHODS

### Nature and sources of data

This study relies on secondary data sources from Indian tourism statistics (Government of India). The study uses data pertaining to more than four decades of related country-wise arrivals of foreign tourists to India for the period 1981-82 to 2022-23. The highlight of the data shows the major contribution to the inbound tourism market coming from key markets such as Australia, the United Kingdom, the United States of America, Sri Lanka, France, Canada, Germany, Malaysia, and Bangladesh. The remaining countries were pooled under the category 'others'. To achieve the objectives of this study, the entire dataset was divided into decades, providing clearer insights into the dynamics of Indian tourism over each period.

### Markov Probability Model

In this study, first-order MCA is applied using Lingo 19.0 software (Naik et al., 2023) to analyse the patterns of foreign tourist arrivals to India from various countries, including Australia, the UK, the USA, Sri Lanka, France, Canada, Germany, Malaysia, Bangladesh, and others. Variations in the number of tourists from these nations can be linked to a range of symmetric and asymmetric factors specific to each country of origin. The stochastic process involved in identifying the factors driving the shift of tourists from one country to another is closely tied to the unique characteristics of each tourism destination and is significantly influenced by government policies and initiatives aimed at enhancing international tourism.

The technique employed involved constructing a transitional probability matrix  $P$ , where each element  $P_{ij}$  represents the likelihood of tourists shifting their destination from country  $i$  to country  $j$  over time. Importantly, the diagonal elements of matrix  $P$  signify the proportion of tourists from each nation who consistently choose India as their preferred destination, highlighting their loyalty to the country (Aradeshna & Shiyani, 2013). The technique treats the average number of foreign tourists arriving from a specific nation to India as a stochastic variable, which depends on the prior arrivals of tourists from that nation to India. This approach captures the probabilistic nature of tourist arrivals, reflecting how past patterns influence future trends in tourism flows between countries. The equation can be denoted as,

$$N_{jt} = \sum_{i=1}^n [N_{it-1}]P_{ij} + u_{jt}$$

Where,

$N_{it}^*$  = Number of foreign tourists arriving in India from the  $j^{th}$  nation in year  $t$

$N_{it}^{-1}$  = Number of foreign tourists arriving to India from  $i^{th}$  nation in  $t-1$  period.

$P_{ij}$  = Probability of shift in the arrivals of foreign tourists to India from  $i^{th}$  nation to  $j^{th}$ .

$U_{jt}$  = Residual term which is statistically independent of  $N_{it-1}$ .

$t$  = Time period

$n$  = Number nations from where the tourists visit to India

The characteristics of the transitional probability matrix of the form  $(c * k)$  with  $P_{ij}$  elements are as follows.

$$\sum_{i=1}^n P_{ij} = 1 \quad \text{for all } i \quad (2)$$

and  $0 \leq P_{ij} \leq 1$

Subsequently, the transitional probabilities of the model were estimated using the minimum absolute deviation (MAD) estimation method, which minimises the sum of absolute deviations (Naik & Nethrayini, 2017). To implement MAD, we employed linear programming, as it satisfies the requirements for transitional probabilities to be non-negative and ensures that the sum of each row meets the necessary constraints.

Linear Programming (LP) formulation is given in the following form:

Min  $OP + Ie$  (3) which is subject to,

$$XP^* + V = Y$$

$$GP^* = 1$$

$$P^* \geq 0$$

Where,

O	It represents vector of zeroes.
$P^*$	Stands for vector in which $P_{ij}$ elements are arranged.
I	Appropriately dimensional vector of areas and is the vector of absolute errors
Y	The proportion of foreign tourists from each country who visited India.
X	The block diagonal matrix containing lagged values of Y
V	Vector of errors
G	Grouping matrix to add the row elements of P arranged in $P^*$ to unity.

In the transitional probability matrix, the diagonal elements represent the probability of retaining the share of foreign tourists arriving in India from different nations from previous years, indicating the loyalty of tourists who regularly visit India. The row elements of the matrix show the probability of foreign tourists from the corresponding nation visiting India in the previous period being lost to other nations in the current period. The column-wise elements of the matrix indicate the share of foreign tourists gained by the corresponding nation from other nations considered in the study.

Finally, a projection of the number of foreign tourists who wish to visit India from different nations was conducted using the estimated transitional probability matrix. This was done by multiplying the elements with the base-year share of foreign tourists from the respective countries. Thus, the anticipated share of foreign tourists from each nation at time  $t$  was obtained by multiplying the number of tourists who visited India from these nations in the previous period  $(t-1)$  with the transitional probability matrix.

## RESULTS AND DISCUSSION

### Growth in the Arrivals of Foreign Tourists

In the present study, to see the overall picture of India's potential to attract foreign tourists from different nations, we computed the growth rate, decade-wise and country-wise arrivals of foreign tourists to India from 1981-82 to 2022-23 (Rahman, 2021). Table 1 shows that there was a positive and significant growth (4.87%) in the arrivals of foreign tourists to India during the overall study period (1981-2022). The highest growth in tourist arrivals was observed from the USA (7.64%), followed by Australia (6.98%), Canada (6.77%), Malaysia (5.67%), United Kingdom (4.76%), Bangladesh (4.67%), 'Others' (4.09%), Germany (3.48%), France (3.43%), and Sri Lanka (3.26%). This indicates a strong and increasing preference from these nations to visit India; this trend can be attributed to improved connectivity, bilateral relations, and targeted marketing efforts by India's tourism authorities. These positive trends highlight India's growing appeal as a tourist destination. However, a closer examination of the decade-wise and country-wise growth patterns reveals important nuances.

**Table 1: Decadal Growth in FTAs in India**

Year	Australia	UK	USA	Sri Lanka	France	Canada	Germany	Malaysia	Bangladesh	Others	Total
1981-1990	4.88**	8.78**	5.87**	-1.47*	4.88*	6.30**	5.50**	3.28*	0.13	4.14*	4.00**
1991-2000	12.83**	6.97**	10.58**	7.63**	4.17**	10.08**	1.70	7.33**	6.15**	2.41*	5.17**
2001-2010	15.86**	9.24**	13.00**	11.74**	12.05**	13.01**	15.32**	12.12**	0.90	13.69**	11.13**
2011-2022	-4.15	-7.48	-3.09	-11.81	-11.16*	-4.19	-10.56*	-13.94	4.52	-9.87	-6.06
Overall	6.98**	4.76**	7.64**	3.26**	3.43**	6.77**	3.48**	5.67**	4.67**	4.09**	4.87**

\*\*&\* indicates significant at 1 and 5 percent respectively.

Source: Ministry of Tourism, Government of India.

Further, if we look at decade-wise growth in the arrivals of tourists from different nations, during the first decade (1981-1990), the UK exhibited the highest and most significant growth (8.78%), followed by Canada (6.30%) and the USA (5.87%). This reflects a strong historical and cultural connection between India and the UK, which is likely influenced by factors such as the large Indian diaspora. Many citizens of Indian origin living in the UK frequently visit India to reconnect with their families, attend cultural and religious events, and explore their diverse heritage. This consistent flow of visitors significantly contributes to the steady number of tourists from the UK travelling to India.

During this decade (that is, 1981-1990), Bangladesh (0.13%) and Sri Lanka (-1.47%) showed minimal or negative growth, possibly due to political instability and economic conditions in these countries.

During the second decade (1991-2000), the highest growth in the arrivals of tourists to India was seen in the case of Australia (12.83%), followed by the USA (10.58%), Canada (10.08%), and Malaysia (7.33%). Above surge could be linked to economic prosperity in these countries during the 1990s, increasing outbound travel. In contrast, Germany exhibited the lowest and non-significant growth (1.70%) in tourist arrivals to India, indicating limited change in tourist flows from Germany during this period.

Again, the growth in the arrivals of tourists from Australia increased by 15.86% annually during the third decade of the study period (2001-2010), followed by Germany (15.32%), 'Others' (13.69%), Canada (13.01%), the USA (13.00%), Malaysia (12.12%), France (12.05%), and Sri Lanka (11.74%). This period saw a broadening of India's appeal to a wider range of countries. Even though the arrivals of tourists from major countries during the third decade saw tremendous growth, Bangladesh exhibited the lowest growth

of about 0.90%, which was non-significant, suggesting persistent barriers to travel from this neighbouring country.

One interesting observation was made during the fourth decade of the study period (2011-2022), where the arrivals of overall foreign tourists to India declined drastically by 6.06% annually. This trend can be attributed to global economic challenges, geopolitical tensions, global financial meltdown, and the impact of the COVID-19 pandemic.

Bangladesh was an exception, with tourist arrivals increasing by 4.52% annually, although this increase was non-significant. This increase has made Bangladesh one of the major sources of tourists for India, accounting for approximately 21% of the total arrivals in the year 2022. Although most tourists from Bangladesh arrive for leisure purposes, followed by medical and business reasons, their arrival patterns are unstable in nature (Karim, 2020). Growth in arrivals from Bangladesh can be driven by factors such as medical tourism, leisure, and business travel. The highest decline in tourist arrivals to India was observed from Malaysia (-13.94%), followed by Sri Lanka (-11.81%), France (-11.16%), Germany (-10.56%), and 'Others' (-9.87%). The lowest decline was seen in Canada (-4.19%) and the USA (-3.09%).

## Dynamics of Changing Pattern of Foreign Tourist's Arrival (FTAs) to India

We employed first-order Markov Chain Analysis (MCA) to understand the decade-wise dynamics of foreign tourists' arrivals to India. We focus on nine major countries—Australia, the UK, the USA, Sri Lanka, France, Canada, Germany, Malaysia, and Bangladesh—which collectively account for the majority of FTAs to India over the years.

The remaining countries were grouped together under the category of 'Others', and the results are given in Tables 2-5. These matrices signify the pattern of shifts in the arrival of foreign tourists to India.

During the first decade of the study period (1981-1990), the results of the MCA revealed that the UK, Bangladesh and, and 'Others' emerged as the most stable sources of tourists visiting India for various specific needs. The diagonal

elements of the matrix (Table 2) show that these nations retained approximately 95.86%, 72.30%, and 62.35% of their tourists visiting India, respectively. In contrast, tourists from Sri Lanka (47.18%), the USA (12.36%), and Germany (9.91%) were the least likely to revisit India. Additionally, Australia, France, Canada, and Malaysia proved to be the most unstable sources of Foreign Tourist Arrivals (FTAs) for India, as none of these countries consistently maintained their rankings in tourist arrivals throughout the year.

**Table 2: Transitional Probability Matrix for FTAs in India During 1981-1990**

Countries	Australia	UK	USA	Sri Lanka	France	Canada	Germany	Malaysia	Bangladesh	Others
Australia	<b>0.0000</b>	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000
UK	0.0000	<b>0.9586</b>	0.0000	0.0000	0.0160	0.0254	0.0000	0.0000	0.0000	0.0000
USA	0.0251	0.0000	<b>0.1236</b>	0.0000	0.0000	0.0676	0.3498	0.0000	0.0000	0.4340
Sri Lanka	0.0000	0.0000	0.0000	<b>0.4718</b>	0.0000	0.0000	0.0000	0.0000	0.5282	0.0000
France	0.0000	0.0000	0.0000	0.0000	<b>0.0000</b>	0.2861	0.0000	0.1761	0.2746	0.2632
Canada	0.0000	0.0000	1.0000	0.0000	0.0000	<b>0.0000</b>	0.0000	0.0000	0.0000	0.0000
Germany	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	<b>0.0991</b>	0.0000	0.0000	0.9009
Malaysia	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	<b>0.0000</b>	1.0000	0.0000
Bangladesh	0.0217	0.0000	0.0988	0.0644	0.0000	0.0176	0.0000	0.0160	<b>0.6235</b>	0.1580
Others	0.0272	0.0229	0.0612	0.0288	0.0909	0.0000	0.0261	0.0198	0.0000	<b>0.7230</b>

Source: Authors calculation.

In this decade, the 'Others' category of countries gained a major share from Australia (100.00%), followed by Germany (90.09%), the USA (43.40%), France (26.32%), and Bangladesh (15.80%). This indicates that these minor nations, grouped as 'Others', act as important sources of FTAs for India. Similarly, Bangladesh gained FTAs in India from Malaysia (100.0%) and Sri Lanka (52.82%). The major countries that lost their share of foreign tourists were Australia and Germany, with their previous period shares being lost to 'Others' in the current period at rates of 100.00% and 90.90%, respectively. Thus, Australia, France, Canada, and Malaysia emerged as unstable sources of FTAs to India during the above period.

On the contrary, if we look into the results of MCA for the second decade of the study period (1991-2000), there was a notable shift in the pattern of inbound FTAs to India (Table 3). During this period, the USA, 'Others', and Germany emerged as the most stable source of tourists visiting India, retaining about 53.81%, 45.55%, and 43.81% of their tourist shares over the year, respectively. In contrast to the results of the first decade, the UK (5.18%) and Bangladesh (12.65%) were identified as the least stable sources of FTAs for India. The remaining countries included in the study were considered the least loyal tourists, as they failed to retain any portion of their share from the previous year.

**Table 3: Transitional Probability Matrix for FTAs in India During 1991-2000**

Countries	Australia	UK	USA	Sri Lanka	France	Canada	Germany	Malaysia	Bangladesh	Others
Australia	<b>0.0000</b>	0.0000	0.1296	0.0351	0.0000	0.0000	0.0000	0.0000	0.8353	0.0000
UK	0.0287	<b>0.0518</b>	0.0000	0.1309	0.0000	0.0713	0.0000	0.1267	0.1570	0.4336
USA	0.0000	0.2815	<b>0.5381</b>	0.0000	0.0000	0.1803	0.0000	0.0000	0.0000	0.0000
Sri Lanka	0.1290	0.0000	0.2535	<b>0.0000</b>	0.1412	0.0033	0.0000	0.0000	0.0000	0.4730
France	0.0000	0.0000	0.0000	0.0000	<b>0.0000</b>	0.0000	0.0000	0.0000	0.0000	1.0000
Canada	0.3266	0.0998	0.0000	0.5736	0.0000	<b>0.0000</b>	0.0000	0.0000	0.0000	0.0000
Germany	0.0000	0.1136	0.0000	0.0000	0.1188	0.0000	<b>0.4381</b>	0.0000	0.0000	0.3296
Malaysia	0.0000	0.2884	0.3464	0.0000	0.2086	0.1567	0.0000	<b>0.0000</b>	0.0000	0.0000
Bangladesh	0.0000	0.3665	0.0412	0.0000	0.0275	0.0000	0.0000	0.0000	<b>0.1265</b>	0.4383
Others	0.0000	0.1354	0.0466	0.0266	0.0457	0.0000	0.0557	0.0072	0.2273	<b>0.4555</b>

Source: Authors calculation.

The major countries whose share of FTAs to India was lost during this decade were France (10.00%) to 'Others', Australia (83.53%) to Bangladesh, and Canada (57.36%) to France. Although France lost its entire share to 'Others', it gained a considerable share from Canada.

India (Table 4). An examination of the results reveals that Bangladesh, Australia, the UK, 'Others', and Sri Lanka were the most stable sources of FTAs to India, with retention rates of about 87.20%, 76.94%, 72.47%, 61.45%, and 54.93% of their tourists' arrivals to India over the year, respectively.

Similarly, the results for the third decade of the study period (2001-2010) exhibit a different pattern of FTAs to

**Table 4: Transitional Probability Matrix for FTAs in India During 2001-2010**

Countries	Australia	UK	USA	Sri Lanka	France	Canada	Germany	Malaysia	Bangladesh	Others
Australia	<b>0.7694</b>	0.0000	0.0000	0.0000	0.0000	0.0000	0.2306	0.0000	0.0000	0.0000
UK	0.0000	<b>0.7247</b>	0.1302	0.0000	0.0696	0.0459	0.0000	0.0212	0.0084	0.0000
USA	0.0000	0.0000	<b>0.0000</b>	0.0000	0.1213	0.0000	0.0000	0.0000	0.0000	0.8787
Sri Lanka	0.0000	0.0000	0.0264	<b>0.5493</b>	0.0000	0.1058	0.0000	0.3185	0.0000	0.0000
France	0.0000	0.9430	0.0000	0.0010	<b>0.0000</b>	0.0000	0.0000	0.0561	0.0000	0.0000
Canada	0.0000	0.0000	1.0000	0.0000	0.0000	<b>0.0000</b>	0.0000	0.0000	0.0000	0.0000
Germany	0.1269	0.0000	0.2642	0.5546	0.0000	0.0000	<b>0.0000</b>	0.0000	0.0000	0.0543
Malaysia	0.0000	0.0000	0.5364	0.0000	0.0000	0.0000	0.0000	<b>0.0000</b>	0.0000	0.4636
Bangladesh	0.0000	0.0517	0.0615	0.0000	0.0000	0.0147	0.0000	0.0000	<b>0.8720</b>	0.0000
Others	0.0067	0.0000	0.1781	0.0000	0.0243	0.0760	0.0806	0.0199	0.0000	<b>0.6145</b>

Source: Authors calculation.

By contrast, the remaining nations (the USA, France, Canada, Germany, and Malaysia) acted as the most unstable sources of FTAs for India, as they did not retain any of their shares from the previous year. Among these unstable sources of FTAs, the USA lost its major share to 'Others' (87.87%), France lost its share to the UK (94.30%), Canada to the USA (100.00%), Germany to Sri Lanka (55.46%), and Malaysia to the USA (53.64%) and 'Others' (46.36%).

These results highlight the varying degrees of tourist loyalty and dynamic shifts in tourist sources over the years. The substantial retention rates for some countries indicate a strong, consistent interest in India as a travel destination,

while the losses in other sources suggest areas where targeted efforts may be needed to stabilise and grow tourist inflows. Understanding these trends is crucial for formulating effective tourism policies and marketing strategies.

Finally, during the last decade of the study period (2011–2022), Bangladesh emerged as the most stable and loyal source of FTAs for India, retaining approximately 80.06% of its share of tourist arrivals to India (Table 5). Contrasting with previous decadal results, Canada emerged as the second most stable and loyal source of FTAs for India, with a retention rate of approximately 58.68% of tourist arrivals. Similarly, 'Others' (58.29%) and the UK (55.21%) remained stable sources of tourists for India.

**Table 5: Transitional Probability Matrix for FTAs in India During 2011-2022**

Countries	Australia	UK	USA	Sri Lanka	France	Canada	Germany	Malaysia	Bangladesh	Others
Australia	<b>0.0000</b>	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0292	0.3102	0.6606
UK	0.0000	<b>0.5521</b>	0.4479	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
USA	0.0000	0.1696	<b>0.0000</b>	0.0000	0.0000	0.0719	0.0641	0.0000	0.0000	0.6945
Sri Lanka	0.0000	0.0000	0.0000	<b>0.0000</b>	0.0568	0.0000	0.4450	0.0000	0.0000	0.4981
France	0.0000	0.0000	0.4849	0.5151	<b>0.0000</b>	0.0000	0.0000	0.0000	0.0000	0.0000
Canada	0.0000	0.0000	0.4132	0.0000	0.0000	<b>0.5868</b>	0.0000	0.0000	0.0000	0.0000
Germany	0.0000	0.0000	0.0000	0.0000	0.5541	0.0000	<b>0.0174</b>	0.0000	0.0000	0.4285
Malaysia	0.0148	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	<b>0.0000</b>	0.9852	0.0000
Bangladesh	0.0369	0.0064	0.1070	0.0000	0.0000	0.0325	0.0000	0.0008	<b>0.8006</b>	0.0157
Others	0.0660	0.0532	0.1411	0.0476	0.0222	0.0000	0.0084	0.0786	0.0000	<b>0.5829</b>

Source: Authors calculation.

During this decade, Bangladesh gained a major share of tourists arriving in India from Malaysia (98.52%). The 'Others' category gained a significant share from the USA (69.45%), Australia (66.06%), Sri Lanka (49.81%), and Germany (42.85%). This shift indicates the diversification of India's tourist sources and highlights the growing importance of non-traditional markets in contributing to India's inbound tourism.

Throughout the study period, utilising the Markov Chain technique, we classified the selected countries into five categories: stable sources, least stable sources, unstable sources, countries that gained, and countries that lost their share of FTAs (see Table 6). Examination of the table reveals that the UK and Bangladesh acted as stable sources of FTAs

across all four decades, with the exception of the second decade (1991-2000) where USA and Germany tourists demonstrated more loyalty in revisiting India.

Conversely, the USA and Germany were identified as the least stable sources of FTAs during the first and fourth decades of the study, while the UK and Bangladesh were found to be the least stable sources during the second decade.

Further analysis identified unstable sources of FTAs throughout almost all four decades of the study period. Countries such as Australia, France, Canada, and Malaysia were found to be unstable based on the retention of their tourist arrivals over the years. These countries even lost their share of FTAs to nations such as Bangladesh, the UK, and other minor countries.

**Table 6: Categorizations of Countries Based on Transitional Probability Matrix for FTAs in India**

Decade	Stable Sources of FTAs	Least Stable Sources of FTAs	Unstable Sources of FTAs	Countries Gained by Others	Countries Lost to Others
First (1981-1990)	UK, Bangladesh	Sri Lanka, USA and Germany	Australia, France, Canada and Malaysia	Bangladesh	Australia , Canada and Germany
Second (1991-2000)	USA, and Germany	UK and Bangladesh	Australia, Sri Lanka, France Canada and Malaysia	USA, Sri Lanka and Bangladesh	France, UK, Sri Lanka, Germany, Malaysia, Australia, Bangladesh, Canada
Third (2001-2010)	Australia, UK, Sri Lanka, Bangladesh	-	USA, France, Canada, Germany, and Malaysia	UK, USA, and Sri Lanka	USA, Germany, France, Sri Lanka, and Malaysia
Fourth (2011-2022)	UK, Canada, Bangladesh	Germany	Australia, USA, Sri Lanka, France and Malaysia	Bangladesh, USA, Sri Lanka, France, Germany	Australia, UK, USA, Sri Lanka, France, Canada, Germany, Malaysia

\* FTAs: Foreign Tourists Arrivals.

## Projection of FTAs to India

In continuation with the analysis of diversification in the shift of FTAs to India using the Markov Technique, we have also projected the FTAs to India up to 2027-28 from major countries. The results are presented in Table 7. The projections indicate that the majority of the nations considered for the study show a declining trend in the arrivals of foreign tourists to India from 2022-23 to 2027-28. However, Germany and Bangladesh are exceptions,

showing promising growth in FTAs to India. Specifically, tourist arrivals from Germany are projected to increase from 32,983 to 38,304, while those from Bangladesh are expected to rise from 207,684 to 260,079.

Sri Lanka exhibits mixed trends, with FTAs declining between 2022-23 and 2024-25, followed by an increasing trend up to 2027-28. Major declining trends are seen in the case of the UK, the USA, France, and Canada. These results may be attributed to the recent geopolitical relationships between India and these nations.

**Table 7: Projected Number of FTAs to India**

Countries/ Year	Australia	UK	USA	Sri Lanka	France	Canada	Germany	Malaysia	Bangladesh	Others
2024	44472	156414	215136	42307	35861	61580	39211	43785	236179	537183
2025	44802	152931	213951	44041	36083	59277	37821	43735	246024	533463
2026	44919	150673	212076	43978	35329	58161	38461	43461	253960	531112
2027	45052	149034	210755	43478	35628	57629	38304	43286	260079	528884

Source: Authors calculation.

This projection highlights the potential for targeted marketing and engagement strategies to sustain and enhance tourism from key markets such as Germany and Bangladesh, while also indicating a need to address the factors contributing to the decline from other nations.

*Theoretical Contributions:* The theoretical contributions of this research are worth noting for the future direction of

research. First, the study provides a new dimension while converging the statistical data for interpretation using Markov analysis to study the direction of tourism flow towards developing nations like India, where tourism provides fuel for economic growth. Second, the research is an add-on to the knowledge base as relatively scanty literature is available which makes combining tourism statistics and econometric techniques to analyse tourist inflow. The results reveal

that predicted future tourist figures and further strategic intervention in the same direction can improve the number of tourist arrivals in a country such as India. Third, the study provides a clear indication and direction for government agencies to synthesise their marketing efforts to attract more visitors from the identified specific nations. Finally, the overall results of the study enable future researchers to underpin the position of nations in terms of tourist arrival statistics and future losers and gainers in the broader Asian context. The predictive analysis using Markov Technique shows the relationship ties with the closely associated countries, highlighting the impact of foreign policy on the ease of travel in the nation.

*Practical Implications:* Precise tourist forecasting is crucial for tourism planning for strengthening the existing regulatory framework (Manisha & Singh, 2024). The overall assessment of the research study provides a critical overview of the importance of repeat visits to the country. Understanding repeat visitors and first-time visitors is an important area of research, where research highlights that new unique travel experiences are also at the core motives of the repeated visitors' travel journey (Agarwal et al., 2023). The major part of the research portrays a practical work model for tourism managers, government agencies, and other stakeholders in the tourism field. First, the result of the study using Markov chain analysis provides direction to marketing agencies and policymakers to keep a keen eye on tourism statistics for both inbound and outbound tourist traffic to create destination-originating strategies, taking tourists as a heterogeneous group of a target market. The usage of Markov chain analysis as a technique has been marked as the right kind of technique in tourism, where tourist arrivals and departure numbers showcase signs of big data (Liu et al., 2025), an important area of concern for the destination management organisation (DMO).

Second, destination managers need to put more effort in those markets which are losing their position in the current times with fewer tourist arrivals from countries which patronise travelling to meet their food habits or other specific needs. Lastly, the results also bring an alarming sign for agencies to create better relationship management strategies with tourists for repeat visitation or positive word of mouth using continuous and repeated multi-channel conversations like push email campaigns, e-postcards on the anniversaries, communication about new attractions, etc.

*Limitations and Future Directions:* Limitations of the research need to be interpreted and analysed within the research domain in the context of the research problem and the methodology employed in generating the results. The data collection for the research is based on multi-level and multi-destination secondary data used from reliable sources

under the aegis of "The Ministry of Tourism", Government of India. Future studies might interpret the results from cross-country statistics using data of a similar nature to identify, elaborate, and synthesise the positions of all countries in the region to obtain high benefits from tourism. In addition, the same research can be undertaken to see the inflow of tourism coming from the same cultural tie nations and others to develop strategies to work on interest-based tourism for segmented groups like segments interested in ancestral history in any nations like Britishers interested seeing old graves of their ancestors in India or Pakistani nationals or Indian nationals interest in seeing their roots before the partition of 1947. More elaborative work of a similar nature can gain insights into cooperation among international tourism agencies from each nation to develop a mechanism to act and react to the efforts to increase tourism inflow among nations. Such work could be complemented with the use of other similar techniques such as the spline model and ARIMA. More analytical research can be undertaken to determine the key determinants to make a decision to repeat visits to countries. Overall, in the modest way possible, the current research is an attempt to measure the current position and provide future direction to the tourism inflow in the nation.

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