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## Understanding Tourism Dynamics Using GIS and Forecasting Model in Banswara District, Rajasthan, India

Viranch N. Dave

*The Maharaja Sayajirao University of Baroda*, viranch.n-geogphd@msubaroda.ac.in

Mudit D. Mankad

*The Maharaja Sayajirao University of Baroda*, mudit.mankad-geography@msubaroda.ac.in

Ami U. Rawal

*The Maharaja Sayajirao University of Baroda*, ami.rawal-geography@msubaroda.ac.in

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### Cover Page Footnote

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## 1. Introduction

Tourism is a quintessential form of social and economic activity; it brings people together. Tourism influences the development regime of an area. It can contribute to the betterment of people and local businesses by developing potential tourist sites (Pratiwi et al., 2022). Tourism can be considered a short-term movement of people outside their place of residence, which is temporary but should last at least 24 hours (Holloway & Humphreys, 2022). Tourism is an activity that is chiefly concerned with visitors. A visitor is the one who is considered a traveler, making trips to a destination outside their location of stay. The purpose of the visit can be anything ranging from interpersonal to business and so on, but not employment. Visitor is a basic concept that also includes the category of same-day visitors or excursionists; however, tourism is concerned with people moving from known permanent locations to unknown temporary places for any purposes such as leisure, business, treatment, and so on, but not remuneration, and the duration should not exceed 12 months (Gupta, 2021).

Since World War II, the tourism industry worldwide has seen incremental growth with only two exceptions: one of the global recession of 2008-09 and the COVID-19 pandemic of 2020-21 (Liu et al., 2022). The tourism industry saw a considerable slowdown in 2008-09. Still, during the last two years of a global pandemic, there were moments during the waves when different variants of the virus caused complete shutdowns. The tourism activity completely came to a standstill. It is quite undeniably true that the COVID-19 outbreak has created an intense effect on the travel and tourism industries. Based on the estimates released by the World Travel and Tourism Council in collaboration with Oxford Economics, about 62 million jobs were lost in this sector due to this pandemic (Orîndaru et al., 2021). Thus, the pandemic and its impact on tourism activity certainly pushed all the stakeholders to rethink and re-evaluate policies and plans to make the tourism industry more resilient and resolute in the future. What is being noticed during this pandemic phase has been the persistent search for local destinations that have the potential to generate tourism. During the past two years, mass tourism and long-distance travel were not possible due to the restrictions enforced. Moreover, those people who lived outside their domiciles came back home as a result of work-from-home activity or the loss of jobs. This chain of events led to realizing greater possibilities of tourism in their milieu and, ultimately, exploring those destinations, which can increase tourism potential in the future. There is a realization of an opportunity to rebuild tourism, which can be more sustainable, benefiting the local economy. This rebuild can encourage the local communities to take leadership and regenerate short-circuit economies (Brouder et al., 2020).

The aim of this study is to understand the overall tourism dynamics of Banswara District of Rajasthan State, India, by identifying and subsequently

mapping major tourism potential destinations by consulting with all stakeholders, including the general public, conducting a literature review, and conducting fieldwork. In addition to these, several important criteria, such as the transport network as well as the tourism data, are being analyzed, as understanding the present conditions of the transport network helps in knowing the present scenario of connectivity and accessibility to the site, and it certainly helps in formulating plans to improve and enhance its accessibility by creating and designing new tourist circuits. Circuits are designed with the help of GIS and digital mapping using Google Maps and Open Street Maps (OSM). Several studies have highlighted the utility of GIS in the planning of tourism. For example, Mukherjee and Parida (2021) used GIS to create an interactive portal to make tourism planning more effective for the Sunderbans World Heritage Site. Past data on tourism helps ascertain the amount of tourism activity in an area and identify the trend. This data plays a pivotal role in tourism forecasting. In disciplines such as tourism, obtaining accurate forecast results has become one of the major issues for researchers, policymakers, and so on (Montaño et al., 2013). Several forecasting methods have their pros and cons. Scholars have used different methods based on their objectives and the availability of data, like Ahire et al. (2020) and Athanasopoulos et al. (2011), who have used time series forecasting methods combined with ARIMA and others to identify the best-performing method based on their results.

The general aim and objective of this paper are to understand the tourism dynamics of Banswara District, Rajasthan. However, the main motivation for conducting this study is shaped by three specific objectives. The first is related to the identification of the study area's innate potential to develop as a tourism destination that can subsequently add to its future economic base. Second, assess the strength of the transport network in the area to shed light on the possibility of forming tourist circuits. Third, this study attempted to blend GIS with forecasting techniques for doing retrospective and prospective analysis of tourism activity in the study area. Therefore, this paper aims to enrich the literature review related to tourism in this region.

## 2. Study Area

Banswara District is located in southern Rajasthan State between 23° 11' and 23° 56' N latitudes and 73° 58' and 74° 49' E longitude (District Census Handbook, Banswara, 2011). In terms of tourism, Banswara has much to offer, as it maintains many attractive sites. From archaeological to natural, the region has some important sites that can attract tourism. The District generally receives a good amount of rainfall during monsoon season, and therefore it is known as 'Cherrapunji of Rajasthan' (Dave, 2023). The District's geographical location of being surrounded by the Aravalli Hills towards the west and the Malwa Plateau in

the east gives it good orographic rainfall, which makes it look attractive during the monsoon season. The river Mahi, which flows through the Banswara District, also has a variety of beautiful landforms that can attract many tourists in the future. The District has many waterfalls and several river islands on the Mahi backwater, and these picturesque islands are the reason behind the naming of Banswara as the “city of 100 islands.”

Compared to scenic tourism, religious tourism is quite well developed in the District, as it attracts mass tourism every year. The Banswara District is known as Little Kashi as there are 12 Shivalingams of immense importance to the local people. The religious site that is most famous and attracts thousands of people annually, not only from Rajasthan but also from other adjoining States such as Madhya Pradesh and Gujarat, is the Tripura Sundari Temple of Umrai village in Talwara block. Since the early 2000s, the Rajasthan government has emphasized the development of Tripura Sundari as a destination for spiritual and religious tourism.

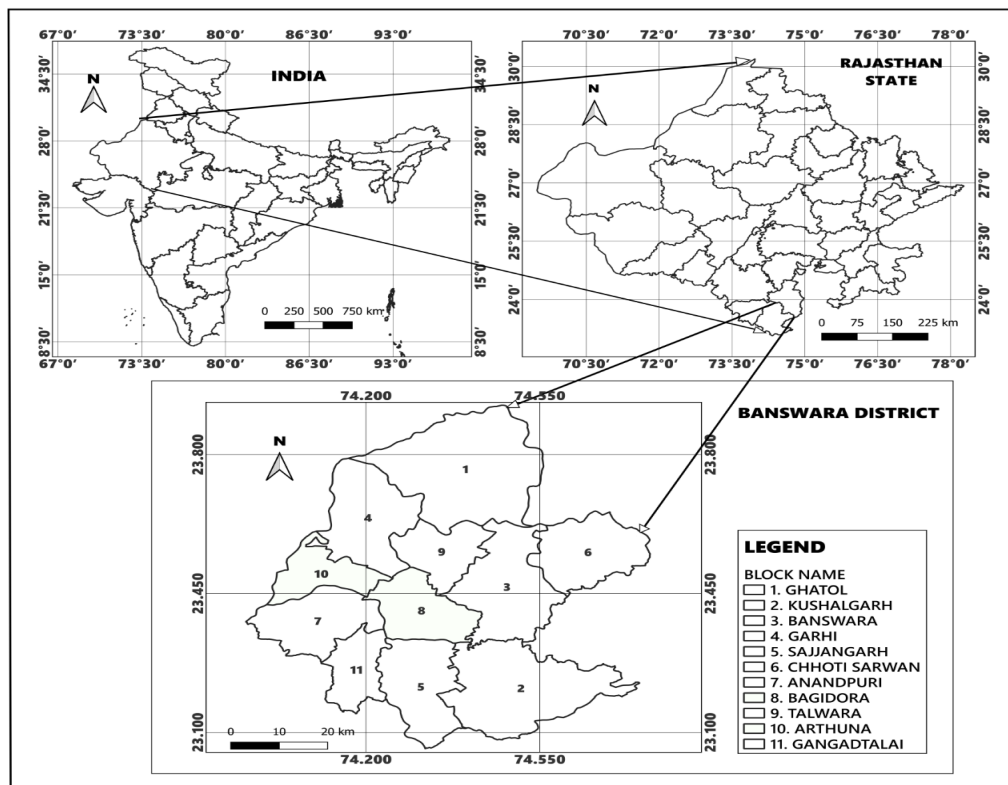


Figure 1. Location of the study area

*Note:* Created by author using the shapefile derived from Geographical analysis(<https://geographicalanalysis.com>), Bhukosh(<https://bhuvan-app1.nrsc.gov.in>) and Rajdharaa Portal(<https://gis.rajasthan.gov.in/>)

Transportation plays a major role in tourism activity; in Banswara, the only primary mode of transport available is road transport. According to the “Basic Road Statistics report published by the Rajasthan Government in 2017, the total length of the road network in the Banswara District is 4173.88 km. The total length of the National Highway in Banswara District is 141.60 km, while the total length of the State Highway is 251 km (Basic Road Statistics of Rajasthan, 2018). Presently, there is no rail transport available for the District. Thus, road transport is the main mode of transport.

### 3. Data and methodology

Data requirements for this study were fulfilled through both primary and secondary sources. Information on Banswara District and its tourism sites was obtained from secondary sources like the District Census Handbook 2011, the District Gazetteer, and also by taking suggestions and opinions from local people and experts. Shapefiles derived from different sources were used for creating the study area map. The shapefile of India with its State boundaries is downloaded from Geographical Analysis online (<https://geographicalanalysis.com/gis-blog/download-free-india-shapefile-including-kashmir-and-ladakh/>), the Districts of Rajasthan State were digitized from Bhuvan State portal of Indian Space Research Organization (ISRO) and then downloaded in a shapefile format. The Banswara District and its block boundaries were digitizing the block boundaries using Bhuvan ISRO (<https://bhuvan-app1.nrsc.gov.in/state/RJ>) and RajDhaara GIS (<https://gis.rajasthan.gov.in/>) and then downloaded as a shapefile. All maps were finally created in QGIS 3.20.2 map composer by incorporating shapefiles.

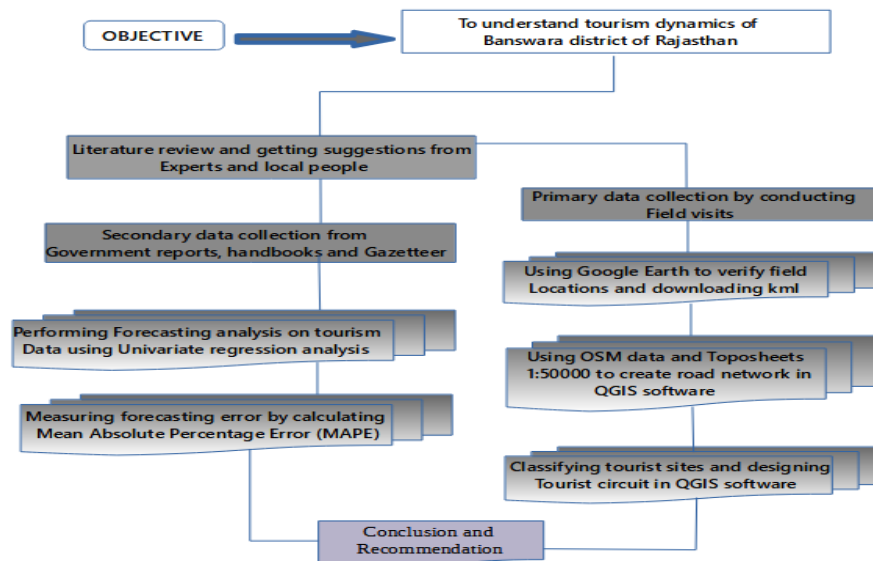


Figure 2. Research Methodology chart

Source- Created by author

### 3.1 Forecasting Tourism Footfall using Univariate Regression Analysis

Predicting the future based on past data using different techniques is known as forecasting. Forecasting in tourism studies has gained considerable attention and has become an essential element in tourism management. Four types of forecasting techniques are used in predicting tourism: exploratory, speculative, normative, and integrative. At the same time, the majority of studies are either exploratory or speculative (Moreira & Santos, 2020). Forecasting using regression analysis falls under the subcategory of casual methods of quantitative forecasting. This method uses changes in time, such as the year or month, to explain the variations happening in the series on which forecasts have to be carried out (Frechtling, 1996). The data taken into account in this study is the total number of tourist arrivals in Banswara District from 2010 to 2021. The data were derived from the webpage of Rajasthan Tourism, Government of Rajasthan (<https://www.Tourism.Rajasthan.Gov.In/annual-progress-report.Html>). Graphs representing the data are also created. All statistical analysis, including forecasting, is done in LibreOffice Writer.

The equation for the linear regression model is

$$y = a + bx \dots\dots\dots(1)$$

Where,

y= Dependent or forecast variable

a= Intercept constant

b= Slope constant

x= Independent or explanatory variable

Intercepts a and b are computed using the following equations

$$a = \frac{(\sum y)(\sum x^2) - (\sum x)(\sum xy)}{n(\sum x^2) - (\sum x)^2} \dots\dots\dots(2)$$

$$b = \frac{n(\sum xy) - (\sum x)(\sum y)}{n(\sum x^2) - (\sum x)^2} \dots\dots\dots(3)$$

For measuring the forecast error, different studies have used different measures like Mean Absolute Percentage Error (MAPE) and Root Mean Square Error (RMSE). MAPE values are easy to interpret and therefore it is highly recommended and used in measuring forecast accuracy, therefore in this study, MAPE is calculated using the following equation.

$$MAPE_h = \frac{1}{S} \sum_{s=1}^s \left| \frac{y_h^s - \hat{y}_h}{y_h^s} \right| \dots\dots\dots(4)$$

### ***3.2 Classifying Tourists sites and creating Circuits in QGIS***

Tourism planning and management become more effective and appropriate when modern GIS software is used. These days, there has been a significant increase in the use of GIS in tourism development and management (Cimbaljević et al., 2019). The ability of GIS to create databases, overlay, and conduct comparative analysis helps in formulating more efficient and viable strategies that can help stakeholders make more effective alternative decisions. Information regarding the site and its accessibility are two vital components of tourism. GIS brings these two together, thus helping in identifying clusters, creating tourist circuits, finding the best possible route to reach a destination, and connecting the destinations more effectively. According to the Ministry of Tourism, Government of India, “a tourist circuit is defined as a route on which at least three major tourist destinations are located such that none of these are in the same town, a village, or a city; at the same time, they are not separated by long distances; and also, it should have well-defined entry and exit points”(National Informatics Centre, 2018).

Field visits were carried out to collect the latitude and longitude of the sites using the Geographic Positioning System (GPS); furthermore, information about the sites was collected, and thereafter, the sites were classified based on their primary significance. Latitude and longitude were then inserted in Google Earth, and the point location was downloaded in Keyhole Markup Language (KML) file format. These KML files were then used to create a database in QGIS. A road network of Banswara District was created using a shapefile downloaded from the webpage of Open Street Map (OSM) (<https://www.openstreetmap.org/>), and these were further verified using Toposheets of 1:50000 scale of the study area. Tourist circuits were identified using digital mapping from Google Maps and designed in QGIS software to create the final output.

## **4. Results**

In this section, the results of the forecasting analysis and the maps created in QGIS 3.20.2 showing tourist sites and tourist circuits in Banswara District are presented.

Based on the Annual Progress Report of Rajasthan Tourism, Government of Rajasthan, the total tourist footfall in Banswara District for the year 2021 was 52,294, and further elaborating the data reveals that it accounted for about 0.26% of total Rajasthan State’s tourist footfall in the year 2021. The year 2010 is taken as the base year for calculating the percentage change of all the subsequent years. The data given in Table 1 clearly shows that the total tourist footfall followed an increasing trend in nearly all years from 2011 to 2019, excluding 2015, in which the numbers went down. The year 2019 shows the highest exponential increase in total tourist footfall in Banswara District, but thereafter, due to the global



pandemic outbreak, the numbers for the years 2020 and 2021 started decreasing when compared to the base year. In Figure 3, the data are fitted into the equation of a straight line  $y=a+bx$ , where  $x$  is the independent variable (here, time period) and  $y$  is the dependent variable (here, total tourist footfall). The derived Mean absolute percentage error (MAPE) is 1.83%.

#### ***4.1 Forecasting Tourism Arrivals using Univariate Time Series Analysis***

Table 1. Derivation of forecast values by actual values of tourist footfall Banswara District.

YEAR	TOTAL TOURIST FOOTFALL	PERCENTAGE CHANGE (%)
2010(AV)	97008	-
2011(AV)	98486	1.52
2012(AV)	101666	4.80
2013(AV)	112230	15.69
2014(AV)	114181	17.67
2015(AV)	113492	16.99
2016(AV)	121626	25.37
2017(AV)	130042	34.05
2018(AV)	132755	36.84
2019(AV)	140214	44.53
2020(O)	46171	-52.40
2021(O)	52294	-46.09
2022(FV)	152448	57.14
2023(FV)	157285	62.13
2024(FV)	162731	67.75
2025(FV)	167316	72.47
2026(FV)	172867	78.19
2027(FV)	178205	83.70
2028(FV)	182586	88.21
2029(FV)	187114	92.88
2030(FV)	192166	98.09
2031(FV)	196809	102.87

Data source: Calculated from annual progress report of Rajasthan Tourism, 2013-2021.

Note: AV-actual value, FV- forecast value, O- Covid years (Outliers).

When it comes to forecasting, the study took into account the data on total tourist footfall for the years 2010 to 2019, while the data for the years 2020 and 2021 are considered outliers, as shown in Table1. These were COVID-19 years and are not included in this analysis, as the analysis done using them showed a consistent decline in tourist footfall from 2024 onwards; therefore, the results can

be misleading. The prediction for 2022–2031 is made by excluding the outliers. The percentage change is calculated from the base year 2010. The derived correlation coefficient  $\rho$  is 0.98, while  $*p < 0.001$ . Figure 4 shows that the total tourist footfall is expected to follow an increasing linear trend from 2022 onwards. The percentage change for the forecast value from 2022 to 2031 is expected to grow at a rate of four to six percent compared to the base year of 2010 (Table 1).

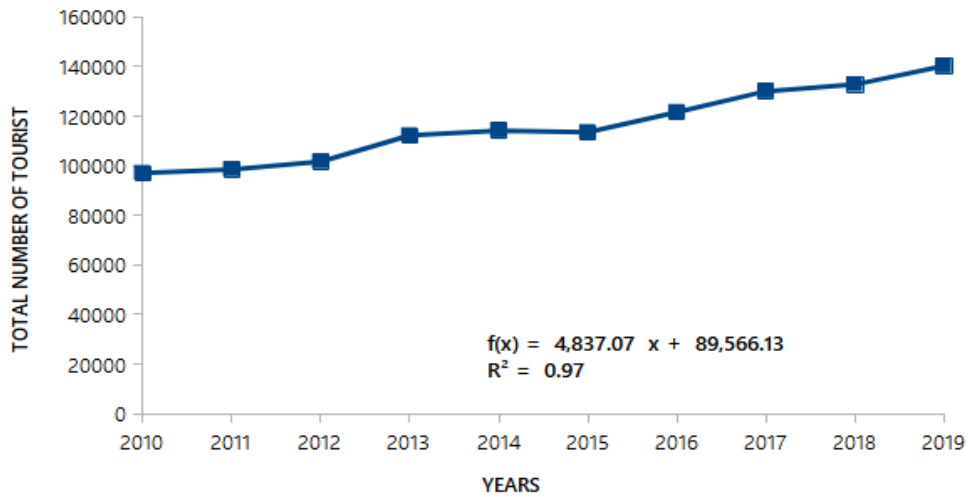


Figure 3. Total tourist footfall 2010-2019  
Source- Created by author

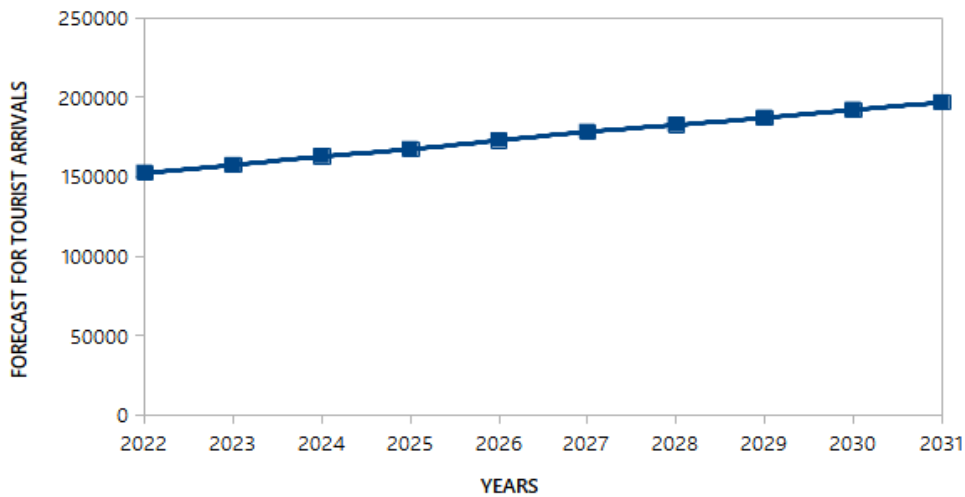


Figure 4 Forecast Results  
Source- Created by author

#### 4.2 Classifying Tourists sites and creating Circuits in QGIS

After making some changes to Peter’s inventory of tourist classification, the important locations of Banswara District are classified based on their primary significance into four major classes (Fig. 5), such as: 1. Religious Attractions 2. Scenic Beauty 3. Places of Historical and Archaeological Significance 4. Fairs and festivals

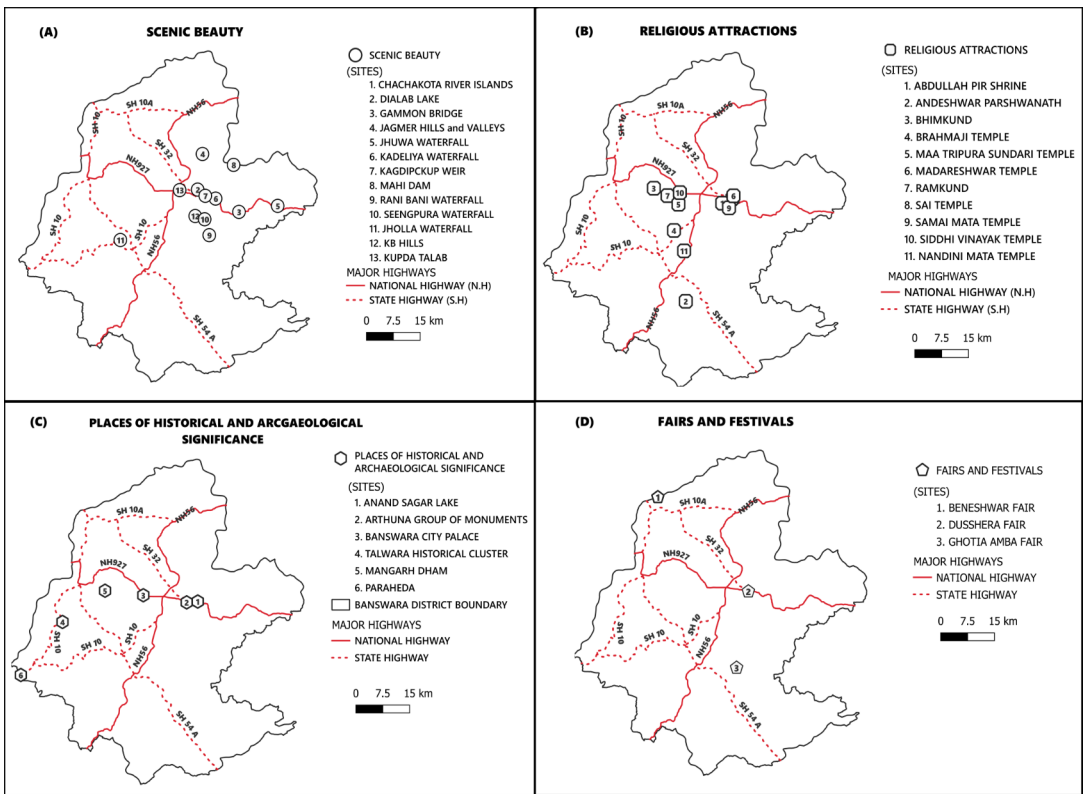


Figure 5. Major tourist sites in Banswara

Note. Created in QGIS by author using OSM data (<https://www.openstreetmap.org>) for road layer and point location of sites collected using GPS.

In Banswara, most tourist sites are located along the National Highway NH 927A (Fig. 5). In this study, two major tourist circuits are identified, as shown in Fig. 6. The sites that are included in the circuit are well connected to the National Highway 927 A, which connects Banswara with Dungarpur District in the west and Ratlam District in the east. Ratlam District of Madhya Pradesh is the nearest railway junction for Banswara District. These two tourist circuits identified are named based on the primary significance of the sites as: 1. the Religious-Historical Circuit; and 2. The Mahi River Circuit. Both circuits take one day each to cover, i.e., a day trip in nature. The calculated distance and time taken to reach the sites that come under the Mahi River Circuit are given in Table 2, while the

same information for the Religious-Historical Circuit is given in Table 3. Information on travel time and distance for a site is calculated from its previous site.

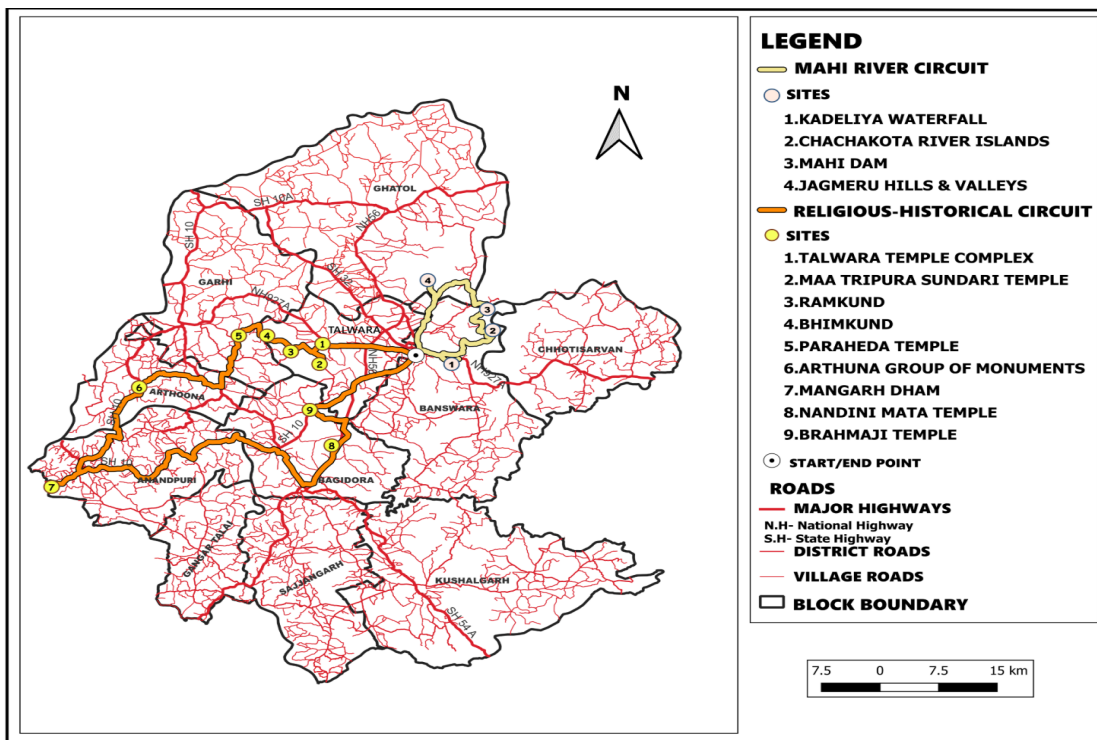


Figure 6. Map Showing the proposed tourist circuits in Banswara District

Note. Created by author in QGIS by author using OSM data

(<https://www.openstreetmap.org/export#map=9/23.4935/74.3692>) for road layer and point location of sites collected using GPS.

Table 2. Information on order, travel time and distance of sites in Mahi River circuit

SITE I.D	SITES IN THE CIRCUIT	TRAVEL TIME TAKEN	DISTANCE IN (KM)
1	Banswara City (Start point)	0	0
2	Kadeliya Waterfall	17minutes	7kms
3	Chachakota River Islands	32minutes	15.3kms
4	Mahi Bajaj Sagar Reservoir	26minutes	11.4kms
5	Jagmeru Hills and Valleys	35minutes	16.4kms
6	Banswara City (End point)	26minutes	12.1kms

Table 3. Information on order, travel time and distance of sites in Religious-Historical circuit

SITE I.D	SITES IN THE CIRCUIT	TRAVEL TIME TAKEN	DISTANCE IN (KM)
1	Banswara City (Start point)	0	0
2	Talwara Temple Complex	20minutes	12kms
3	Maa Tripura Sundari Temple	11minutes	5.1kms
4	Ramkund	13minutes	7.2kms
5	Bhimkund	13minutes	6.4kms
6	Paraheda	11minutes	6.3kms
7	Arthuna Group of Monuments	38minutes	23.8kms
8	Mangarh Dham	50minutes	28.1kms
9	Nandini Mata Temple	80minutes	52.3kms
10	Brahmaji Temple	16minutes	9kms
11	Banswara City (End point)	31minutes	17.9kms

Data Source- values obtained by conducting field visits and using Google Maps.

## 5. Discussion

The annual progress reports are the main source of data on the total tourist footfall in Banswara District from 2010 to 2021, and these data have been used to understand the trend of tourist arrivals in Banswara District from 2010 onwards in this study. Fig. 3 clearly shows an increase in total tourist footfall, first from 2010 to 2014, then a marginal decline in 2015, and further increasing up to 2019. The increase can be attributed to the efforts put forth by Rajasthan Tourism and the stakeholders in Banswara District tourism. Since the turn of the 21<sup>st</sup> century, there have been consistent efforts to bring Banswara District on the tourist map of Rajasthan. The report published by Ferguson A.F. & Co. (2002), which gives an elaborate note on the plans and perspectives on Rajasthan tourism for the next 20 years, highlights the prospect of the tribal culture of the Bhil community and the history of Banswara District in boosting tourism. Thus, during the first decade of the 21<sup>st</sup> century, several efforts were made to promote the significance of the Beneshwar Fair, the Arthuna Temples, and the Mahi Dam. The result was highly positive, as more and more tourists started visiting Banswara District. The percentage change in tourist footfall calculated from the base year 2010 shows

that from 2015 to 2019, the total number of tourists arriving in Banswara District increased significantly. The COVID-19 pandemic affected the total tourist footfall, but the forecasting analysis clearly shows significant prospects in the coming years. Rajasthan Tourism and the Banswara District administration have also played a pivotal role in organizing events such as Arthuna-Mahi Mahotsav, the Ghotia Amba tribal fair, the Beneshwar fair, and so on, which have helped not only attract tourists to Banswara District but also showcase various tourism attractions ranging from natural to cultural, among others.

As Banswara District possesses different types of tourism sites, the present study attempted to classify major tourism sites. For classifying the sites in Banswara District, there was a need to identify the primary significance of a particular site for the people, as several sites have multiple overlapping significance. For example, the famous Samai Mata Temple is located on the top of an elevated plateau that can be viewed as a site having importance in terms of adventure-based tourism prospects, but local people visit this place because of its religious appeal. The case is similar for the Ramkund, Bhimkund, and Madareshwar Temple, all of which are natural caves, but the local people perceive Ramkund and Bhimkund as places that are linked to the legends of Ramayana and Mahabharata, while the Madareshwar Temple is a deep cave in which there is holy shivalinga, due to which the local people even relate this place to the Amarnath cave shrine. Thus, these sites are put into the category of religious attractions. Many other sites are included in religious attractions like the Tripura Sundari temple (which is also known as Tartai Mata) in Umrai village, the Siddhivinayak temple in Talwara village, and the Lord Brahma temple in Cheench village. The Abdullah Pir shrine, also known as Dargah of Abdul Rasul, is a popular place of worship for the people of the Bohra community, and the Andeshwar Parshwanath temple near Kushalgarh which houses the 12<sup>th</sup>-century idol of Lord Parshwanath, are both classified as religious attraction.

Besides religious attractions, there are also natural attractions as the Mahi River and its tributaries flow through the Banswara District, and being in the upper catchment of the Mahi River, there are many landforms like waterfalls, rapids, river islands, and so on. Over the last few years, many tourism stakeholders from Banswara District have been constantly involved in exploring and bringing forth such natural attractions as Jua Fall, Jholla Fall, Singhapura Fall, Chachakota river islands, Jagmeru hills and valleys, and so on. These are all classified as 'Scenic Beauty' (Fig. 5 A).

The cultural ethos and glory of the Bhil Tribal Community are reflected in the fairs and festivals that are organized every year. Some important fairs include the Beneshwar Fair and the Ghotia Amba Fair. Beneshwar fair happens every year in January/February on the Sakar Khaiya river island located on the confluence of the Mahi, Jhakham, and Som rivers (Bagchi et al., n.d.). Jointly organized by the

Banswara and Dungarpur District administrations, the Beneshwar fair is considered the world's largest tribal fair. Ghotia Amba Fair happens in March every year near Borigama village. There are also several other fairs that play a major role in attracting tourism, such as the Mangarh fair, the Dusshera fair, and so on. These sites are categorized into 'Fairs and Festivals' as shown in Fig 5 D.

Banswara was a part of Bagar or Vagad, and it came under the rule of different dynasties such as the Western Kshatrapas, the Guptas, the Hunas, the Vallabhis, the Arabs, the Parmaras, the Solankis or Chalukyas of Gujarat, and ultimately the Guhilots of Mewar (Sehgal, 1974). Thus, there are many historical and archaeological sites that are of high value and can attract tourists. There are remains of temples at Arthuna and also at Talwara. The temples at Arthuna and Pareheda were built by the Paramaras rulers and there are few exquisite temples at Talwara, which are in ruins and were built by the kings of Chalukyas or Solanki dynasty in and around 12<sup>th</sup> century A.D (Sehgal, 1974) There are also several man-made lakes that are historical. The the former rulers of Banswara (locally known as the Maharawals) constructed these lakes for the purpose of water conservation. Some of the most beautiful lakes are Anandsagar and Dialab. The Anandsagar lake is believed to have been constructed by Lanchi Bai, who was the queen of Banswara; therefore, it is famously known as 'Bai Talav'(Meena, 2021). The Srigadh Palace, or RajMandir, which is located in the centre of the city, was built by Maharavals in different time phases. There is another important place of historical significance known as Mangarh Hill. This place is known for a popular revolt that involved the people of the Bhil community under the leadership of Guru Govindgiri in 1913 (Vashistha & Vashishtha, 1991). These sites are categorized as 'Places of Historical and Archaeological Significance' as shown in Fig 5C.

Classification provides a proper framework that gives a clear picture of the diversity of tourism sites located in an area. This also gives an opportunity to create a tourist circuit. Designing a tourist circuit is an essential component of tourism planning. Accessibility, connectivity, and the number of tourist sites are the main factors that play a major role in delimiting a tourist circuit. This religious-historical circuit is for those who want to experience the Banswara District's religious and historical fabric. This circuit consists of the Talwara temple complex, which includes both historical and religious sites like the Siddhivinayak temple, the ancient Dwarkadeesh temple, and so on. This circuit also includes religious sites like the Tripura Sundari Temple, the Ram Kund, the Bhim Kund, the Nandini Mata temple, and the Brahmaji Temple as well as archaeological sites like Paraheda, Arthuna, and the historical Mangarh Hill. The total length covered by this circuit is 168 km, and all sites can be visited in one day, starting from Banswara city (Table. 3).



Figure 7. Images showing important tourist locations of Banswara. A: Paraheda temple. B: Clock tower of City Palace. C: Bastion at Bai Talaab. D: Kadeliya Waterfall. E: Chachakota river islands. F: View of the plateau from Samai Mata hill.

*Note:* Photographs taken by author during field visit

The other circuit can also be called the ‘Ratlam Road circuit’ because all these sites are more or less connected with the Ratlam Road (part of National Highway 927A, which connects Banswara with Ratlam). This circuit gives tourists enough opportunity to witness the picturesque landforms created by the Mahi River. These include river islands, waterfalls, hills, and valleys, among others. The main important sites of this circuit are Kadeliya Waterfall, Chachakota River Islands, Mahi Dam, and Jagmeru Hills. This circuit covers a distance of 62 km

## 6. Conclusion

The study attempted to understand the tourism dynamics of Banswara District of Rajasthan State, India, by using forecasting techniques on tourism footfall data and GIS technology to create a database showing classified tourist sites based on their primary significance and also creating tourist circuits using Google Maps and Open Street Maps (OSM). The findings of this study show that tourist footfall is expected to be back to pre-COVID levels in 2019 from 2022 and is further expected to increase until 2031.

The second important finding of this study reveals that Banswara District is not monotonous regarding its tourist attractions. It has various cultural, religious, historical, and nature-based sites that can appeal to different types of tourists. Further studies can explore the potential of the local cuisines of Banswara District in attracting tourism because of the influence of the adjoining Malwa culture and



also the Mewar culture on the indigenous cuisines of Vagad, which gives them a unique blend and makes them more varied. Thus, research on ‘gastronomy’ can open up more possibilities for generating culinary tourism in Banswara District. It can be said that tourism in Banswara District is still in its incipient stage.

Forecasting in this study was performed using univariate regression analysis. The present study performed forecasting analysis on tourist footfall data by excluding data for the COVID-19 period (2020-2021) as the results derived by including these years showed large differences. The utility of more complex methods like ARIMA, exponential smoothing, and others that can prove to be robust to such outliers can be explored. Further studies can deal with these outliers by employing other sophisticated methods and algorithms. Analysis of monthly tourist footfall data can help to get a far better picture of the tourism prospects in Banswara District.

Another major finding of this study is the understanding of the prospect of using GIS in tourism studies. The present study used GIS to create a database for the sites selected and identified in Banswara District and thereafter to create maps. Tourist circuits were created using the Open Street Map (OSM) data. For finding the shortest paths, Google Maps digital mapping is used. Future studies can use network analysis techniques in GIS software to determine more efficient tourist circuits. It is being noticed during the design of the tourist circuit that some of the sites, such as Jhua waterfall and KB Hills, among others, are not accessible due to a lack of proper road connectivity; therefore, at present, they are not included in any tourist circuit. Improvements in the transport network can lead to the design of more efficient tourist circuits.

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