Temporal Study of Trend Analysis of Tourism Flow in Kullu District, Himachal Pradesh from 2008-2022 and its Seasonality for Tourism Forecasting

Venus Arora

M.A., Department of Geography, Panjab University, Chandigarh

Abstract:
Accelerating growth of the tourism industry in the Kullu district of Himachal Pradesh over the past decade, contributing substantially to the district economy, and creating employment opportunities for locals, attracts the attention of researchers to a greater extent. This research paper presents insights into tourism dynamism in the study area, spanning the period from 2008 to 2022. It mainly uses secondary data collected from various government departments, tourist records, and surveys to analyze the trend and seasonality of tourism and further explore their implications for tourism forecasting. The findings of the study reveal considerable fluctuations in tourist influx over an analyzed period which could be attributed to various economic, social, and climatic factors.

Further research explores seasonality, including peak and off-peak seasons, and the factors responsible for them. Cartographical methods and statistical methods such as (simple average method, annual growth rate, and coefficient of determination) are used to quantify seasonality, propose a tourism forecasting model on the basis of the former, and further check the accuracy of the model.

The results of the study help in understanding the tourism dynamism in Kullu district in a better way and provide valuable insights for the policymakers, tourism authorities, and local residents for developing various strategies to optimize tourism opportunities, manage the quality of tourism services, and ensure the development of the study area.

Keywords: temporal study, seasonality, tourism forecasting, annual growth rate, simple average method, coefficient of determination.

Introduction:
In the present-day scenario, Tourism forms an important pillar of the economy of any country, which makes it a global phenomenon. Every year, the number of people exploring different destinations for leisure, adventure, and cultural experiences is increasing. United Nations World Tourism Organisation (UNWTO) defines tourism as "a social, cultural and economic phenomenon which entails the movement of people to countries or places outside their usual environment for personal or business/professional purposes. These people are called visitors (which may be either tourists or excursionists; residents or non-residents) and tourism has to do with their activities, some of which involve tourism expenditure." “In India the tourism industry has been showing a tremendous growth over the decade or so. The crucial
indicators of tourism such as domestic tourist arrivals, foreign tourist arrivals, foreign exchange earnings, total contribution of travel and tourism to GDP, and total contribution of travel and tourism to employment have been performing well.” (Rout et al. 2016) The state of Himachal Pradesh is unarguably one of the first choice of people planning to go on vacations. This in itself makes tourism sector one of the important part of states’ economy. “State attracted about 139.23 lakh Tourists, of which 138.97 lakh were Indian and 0.26 lakh foreigners visited the State till November, 2022. It constitutes 7.0 per cent of Himachal’s GDP, and contributes around 14.42 per cent direct and indirect employment to the total employment in the State.” (Economic survey of Himachal Pradesh – 2022-2023).

In the past decade, the district of Kullu in Himachal Pradesh, India, has emerged as a great tourist hotspot. This industry has experienced significant growth, contributing a major part to the district's economy and creating employment opportunities for the locals. This significant increase can be attributed to the efforts and tourism policies of the government and the increasing popularity of tourism and its sub-divisions such as adventure tourism, eco-tourism, religious tourism, cultural tourism, snow tourism, etc. Further the stats of tourism data follow a seasonal pattern and a proper knowledge of this pattern is essential for the stakeholders for planning accordingly. “Seasonality is the systematic, although not necessarily regular, intra-year movement caused by changes in the weather, the calendar, and timing of decisions, directly or indirectly through the production and consumption decisions made by the agents of the economy. These decisions are influenced by the endowments, the expectations and the preferences of the agents, and the production techniques available in the economy.” (José María Martín et al., 2019). Butler (1994, p. 332) defines seasonality as “a temporal imbalance in the phenomenon of tourism, [which] may be expressed in terms of dimensions of such elements as numbers of visitors, expenditure of visitors, traffic on highways and other forms of transportation, employment, and admissions to attractions.” By analyzing this seasonality pattern, we can further make a forecasting model of tourism on the basis of seasonality for the year 2023. “Modeling seasonal variations in a tourism time series has become an important issue in tourism forecasting in recent years.” (Kulendran and Wong 2005).

The purpose of this research paper is to analyze the trend and seasonality of tourism in Kullu district from 2009 to 2022 to understand the tourism dynamism of the district and examine the factors that have contributed to this trend. It provides a valuable insight into the tourism industry of the district by analysing the seasonality factor, its implication on tourism, and providing a forecasting model for 2023, serving as a paving stone for sustainable tourism planning and development in the area.

Objectives:
The key objectives of the present study are:
1. To analyze the trends of tourist influx in Kullu district from 2009–2023 and the factors responsible for them.
2. To study the seasonality of tourism in Kullu district and its implications for tourism forecasting.
3. To develop a tourism forecasting model without a trend line on the basis of the seasonality of tourism in Kullu district.
4. To check the accuracy of the developed forecasting model.
Study Area:
Located in the North-western part of Himachal Pradesh, Kullu District is often referred to as the "Valley of Gods" Resting in the lap of the Himalayas, nestled between the mighty Pir Panjal and the Dhauladhar mountain ranges, this region offers a unique blend of natural landscapes, rich cultural heritage, and adventurous outdoor activities. The district is famous for its picturesque valleys, river rapids, dense forests, and snow-capped peaks, making it a haven for nature lovers, trekkers, adventure seekers, and mountaineers. Its cultural heritage, including its annual international fair known as Kullu Dussehra and numerous ancient temples, including the famous Raghunath Temple and Hidimba Temple, attracts a massive inflow of both domestic and international tourists and pilgrims. Districts’ adventure tourism has also gained immense popularity. Activities such as paragliding, river rafting, trekking, jeep safaris, camping, mountain climbing, and skiing are a few of the most famous, attracting a large number of adventure-loving people from all over the globe. Places such as Rohtang Pass, Beas Kund, Jibhi, Solang Valley, Bagha Sarahan, Hampta Pass, etc. are famous for such activities.

The study area is located in the middle Himalayas and is one of the most visited places in India. The district is located at 31.8246° N latitude and 77.4702° E longitude. It has a population of 18,536 and an area of 5,503 square kilometers. It is bordered by Lahaul and Spiti in the north, Shimla district in the southeast, Mandi District in the south, and Kangra district in the west. A major tributary of the Indus River, Beas, flows through the district. Its major tributaries like Parbati, Tirthan, Bhuntar Khad, and Nogli Khad drain the whole district. Administrative headquarters are located in the main Kullu town. Administratively speaking, Kullu district has four tehsils, namely Manali, Kullu, Banjar, and Nirmand, and two subtehsils, Anni and Sainj. Other major towns in the district that attract a large number of visitors every year are Manali, Naggar, Bhuntar, and Kasol.

The region experiences a warm and temperate type of climate. The summer season from April to June is very pleasant, thus attracting a large number of tourists. Further winters in November to February experience snowfall, making it a perfect hill station destination for winter sports and activity lovers.

Figure 1 Location map of Study area
Research Methodology:

1. Data collection:
The data for the study has been collected from a wide range of research articles, newspapers, websites, government reports, and books. The data has also been gathered from the Tourism Department of Kullu, Himachal Pradesh, Himachal Pradesh Tourism Policy, 2019, and the Department of Tourism and Civil Aviation, Government of Himachal Pradesh.

2. Data analysis:
   - To analyze the trend, we create a trend line using the total number of tourist inflow in every year of the given time span. (2008–2022)
   - To find the growth pattern, we calculate the Annual growth rate by first subtracting the total number of tourists in a particular year (the present year) from the number of tourists in the previous year (the base year), then dividing the result by the number of tourists in the previous year, i.e., the base year, and multiplying it by 100.

Annual Growth Rate (AGR) = no. of tourists (present year) – no. of tourists (base year) / no. of tourists (base year) * 100.

   - To analyze the seasonality of the tourists, we use the seasonality index or seasonality relative. It is calculated as a percentage ratio between the average level of each month of the given time period and the general monthly average. Referring it as seasonal coefficients, Constantin & Daniela (2011) gave the formula of seasonality index as follows:

Seasonality index = ratio of the average level of each month of the given time period to the general monthly average * 100.

   - For forecasting the values for next year, we use the simple average method.
   - For evaluating the forecasting model, we use the coefficient of determination (R-squared).

Results and Discussion:

   - Temporal Analysis of Tourism in Kullu District:

<table>
<thead>
<tr>
<th>Year(s)</th>
<th>No. of Domestic Tourists</th>
<th>Annual Growth Rate</th>
<th>No. of Foreign Tourists</th>
<th>Annual Growth Rate</th>
<th>Total</th>
<th>Annual Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>2001674</td>
<td></td>
<td>112910</td>
<td></td>
<td>2114584</td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>2224649</td>
<td>11.14%</td>
<td>119514</td>
<td>5.84%</td>
<td>2344163</td>
<td>10.85%</td>
</tr>
<tr>
<td>2010</td>
<td>2395990</td>
<td>7.7%</td>
<td>133707</td>
<td>11.87%</td>
<td>2529697</td>
<td>7.91%</td>
</tr>
<tr>
<td>2011</td>
<td>2659527</td>
<td>10.99%</td>
<td>138488</td>
<td>3.57%</td>
<td>2798015</td>
<td>10.6%</td>
</tr>
<tr>
<td>2012</td>
<td>3082545</td>
<td>15.9%</td>
<td>143900</td>
<td>3.90%</td>
<td>3226445</td>
<td>15.31%</td>
</tr>
<tr>
<td>2013</td>
<td>2766709</td>
<td>-10.2%</td>
<td>119341</td>
<td>-17.06%</td>
<td>2886050</td>
<td>-10.55%</td>
</tr>
<tr>
<td>2014</td>
<td>3187436</td>
<td>15.2%</td>
<td>104309</td>
<td>-12.59%</td>
<td>3291745</td>
<td>14.05%</td>
</tr>
</tbody>
</table>
Beginning text in the document.

Table No. 1 shows the annual growth rate of both domestic and foreign tourists from 2008 to 2022 and the total percentage change of tourist inflow from year to year in the same time frame. From the above-mentioned data, we can see that the number of both domestic and foreign tourists grew from 2008 to 2012. The rate of growth was greater for domestic tourists than for foreign tourists. This could be attributed to the greater accessibility and popularity of the places for domestic tourists than for foreigners. In 2013 (-10.55%), a sharp decline can be seen in these numbers, which could be attributed to the early monsoon causing heavy rainfall and landslides in North India. According to the newspapers, tourists related the cloudbursts and landslide incidences of Uttarakhand to those of Kullu and Manali. Even though in 2014 there was again a rise in the number of domestic tourists (15.2%), the number of foreign tourists (-12.59%) remained low and witnessed negative growth. This shows the more precautionary nature of the foreign tourists.

From 2015 to 2017, the number of both increased to a greater extent. But this trend witnessed a dip again in 2018 (-22.15%). The reason behind this was heavy rainfall, which caused the swelling of the river Beas, raising it to the level of the Manali Chandigarh highway. This heavy rainfall eventually led to flash floods in many areas of the district. A cloudburst in the upper Parbati valley near Rasol in August triggered more floods. Khokhan Nullah caused flash floods in Bhuntar, which is a major town in Kullu district.

Figure 2 Bar Diagram with Trend Line of Tourists’ Arrival in Kullu District, HP, 2008 - 2022

```
<table>
<thead>
<tr>
<th>Year</th>
<th>Total Number of Tourists (in thousands)</th>
<th>Domestic Growth Rate (%)</th>
<th>Foreign Growth Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>3314463</td>
<td>3.9%</td>
<td>4.94%</td>
</tr>
<tr>
<td>2016</td>
<td>3515169</td>
<td>6.05%</td>
<td>11.50%</td>
</tr>
<tr>
<td>2017</td>
<td>3732044</td>
<td>6.17%</td>
<td>9%</td>
</tr>
<tr>
<td>2018</td>
<td>2912552</td>
<td>-21.95%</td>
<td>-27.69%</td>
</tr>
<tr>
<td>2019</td>
<td>3056463</td>
<td>4.94%</td>
<td>7.01%</td>
</tr>
<tr>
<td>2020</td>
<td>763379</td>
<td>-75.02%</td>
<td>-93.12%</td>
</tr>
<tr>
<td>2021</td>
<td>1647329</td>
<td>115.79%</td>
<td>-96.44%</td>
</tr>
<tr>
<td>2022</td>
<td>2876513</td>
<td>74.62%</td>
<td>1370.6%</td>
</tr>
</tbody>
</table>

```


End of text.
Though next year, i.e., in 2019, things went back to normal, the year 2020 witnessed the largest dip in the number of tourists as the country was facing the worldwide pandemic situation caused by COVID. COVID caused a severe strain on economies all over the world. The tourism sector was one of the most affected sectors because of the lockdown. In 2021 (-75.61%), the domestic tourist number increased once again in the district, but the foreign tourist influx still witnessed more negative growth. The reason behind this was the precautions taken by individuals on a personal level and the stringent government rules on movements from one place to another.

**Figure 3 Tourist Inflow from 2008 - 2022**

These fluctuations in the pattern were mainly because of heavy rains, floods, snowfalls in the state of Himachal Pradesh and occurrence of the global pandemic.

**Figure 4 Annual Growth Rate (AGR) of tourists’ arrival from 2008 - 2022**

- **Analysis of Seasonality in tourism in Kullu District:**
  According to Constantin Secăreanu, Daniela Firoiu (2011), “In tourism, seasonal variation concretizes in a greater or lesser concentration of tourist flows in certain periods of the year, as a result of the impact of:
natural factors (the succession of seasons, climate conditions); social factors (legal holidays, days off, the structure of the school and university years etc.)” From the above-drawn line diagrams, we can easily envisage a particular pattern of tourist arrivals every year and give the reason of formation of such patterns on the basis of natural and social factors as suggested by Constantin and Daniela.

Table 2 Seasonality index of each month from 2008 to 2022 of Domestic Tourists’ data

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>92</td>
<td>95</td>
<td>62</td>
<td>73</td>
<td>10</td>
<td>11</td>
<td>83</td>
<td>84</td>
<td>10</td>
<td>10</td>
<td>14</td>
<td>17</td>
<td>14</td>
<td>14</td>
<td>15</td>
<td>19</td>
</tr>
<tr>
<td>Feb</td>
<td>10</td>
<td>11</td>
<td>13</td>
<td>11</td>
<td>85</td>
<td>10</td>
<td>99</td>
<td>11</td>
<td>12</td>
<td>12</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>16</td>
</tr>
<tr>
<td>Mar</td>
<td>15</td>
<td>17</td>
<td>19</td>
<td>67</td>
<td>24</td>
<td>16</td>
<td>21</td>
<td>25</td>
<td>25</td>
<td>32</td>
<td>27</td>
<td>28</td>
<td>13</td>
<td>15</td>
<td>22</td>
<td>23</td>
</tr>
<tr>
<td>Apr</td>
<td>29</td>
<td>31</td>
<td>33</td>
<td>26</td>
<td>38</td>
<td>27</td>
<td>34</td>
<td>29</td>
<td>32</td>
<td>35</td>
<td>32</td>
<td>0</td>
<td>87</td>
<td>25</td>
<td>28</td>
<td>28</td>
</tr>
<tr>
<td>May</td>
<td>28</td>
<td>29</td>
<td>30</td>
<td>12</td>
<td>48</td>
<td>13</td>
<td>39</td>
<td>34</td>
<td>42</td>
<td>41</td>
<td>41</td>
<td>44</td>
<td>15</td>
<td>37</td>
<td>32</td>
<td>32</td>
</tr>
<tr>
<td>Jun</td>
<td>39</td>
<td>34</td>
<td>36</td>
<td>38</td>
<td>36</td>
<td>36</td>
<td>42</td>
<td>33</td>
<td>44</td>
<td>44</td>
<td>42</td>
<td>18</td>
<td>18</td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Jul</td>
<td>39</td>
<td>34</td>
<td>36</td>
<td>38</td>
<td>36</td>
<td>36</td>
<td>42</td>
<td>33</td>
<td>44</td>
<td>44</td>
<td>42</td>
<td>18</td>
<td>18</td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Aug</td>
<td>99</td>
<td>51</td>
<td>15</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>28</td>
<td>27</td>
<td>25</td>
<td>24</td>
<td>21</td>
<td>22</td>
<td>21</td>
<td>22</td>
<td>22</td>
<td>22</td>
</tr>
</tbody>
</table>

From the above drawn line diagrams, we can easily draw a pattern of tourist arrivals every year and give the reason of formation of such patterns on the basis of natural and social factors as suggested by Constantin and Daniela.
By analyzing the above-calculated seasonality indices for each month from 2008 to 2022, we can easily conclude that the trimester of April-May-June witnesses the largest domestic tourist inflow every year, which is 129%, 145%, and 164%, respectively. The reason behind this pattern could be the summer break in schools, colleges, and universities during these months. After this trimester, the number first decreases because of the monsoon arrival; in general, this decreasing trend reverses in October (101%), which could be attributed to the international fair of Dussehra, which showcases the cultural and religious heritage of the state. Further decreases from November (83%) to February (56%) because of the harsh winters and inaccessibility of many areas due to heavy winter snowfall. Further, with the arrival of spring in March (101%), many places in the district witnessed scenic views of beautiful flowers, attracting people in large numbers.

Figure 5: Line Graph showing Seasonality Pattern of Domestic Tourists’ Arrival of each Year from 2008 to 2012
Figure 6 Line Graph showing Seasonality Pattern of Domestic Tourists’ Arrival of each Year from 2013 to 2017

Figure 7 Line Graph showing Seasonality Pattern of Domestic Tourists’ Arrival of each Year from 2018 to 2022

Major discrepancies in this seasonality pattern, particularly in the years 2020 and 2021, were caused by the outbreak of the global pandemic COVID-19. Other minor differences were predominantly caused by natural factors such as early monsoons, cloudbursts, and flash floods in particular years.

Table 3 Seasonality index of each month from 2008 to 2022 of Foreign Tourists’ data

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>45</td>
<td>49</td>
<td>57</td>
<td>52</td>
<td>36</td>
<td>37</td>
<td>33</td>
<td>34</td>
<td>37</td>
<td>39</td>
<td>31</td>
<td>32</td>
<td>34</td>
<td>32</td>
<td>23</td>
<td>36</td>
<td>349</td>
</tr>
<tr>
<td>Feb</td>
<td>57</td>
<td>42</td>
<td>48</td>
<td>53</td>
<td>35</td>
<td>40</td>
<td>36</td>
<td>37</td>
<td>39</td>
<td>43</td>
<td>32</td>
<td>33</td>
<td>24</td>
<td>32</td>
<td>16</td>
<td>23</td>
<td>350</td>
</tr>
</tbody>
</table>
Foreign tourist arrivals (FTAs) follow more or less a similar pattern of seasonality to that of domestic tourists, with few variations. Here, the seasonal index increases from April (108%) to July (140%). This could be because of their long stay in the country, generally from 1 month to 5 months. Further high values of SI in the months of September (124%) and October (127%) can be because of Dussehra. In the winter season, the pattern is similar to that of domestic tourists’ arrival.
Figure 8 Line Graph showing Seasonality Pattern of Foreign Tourists’ Arrival of each Year from 2008 to 2012

Figure 9 Line Graph showing Seasonality Pattern of Foreign Tourists’ Arrival of each Year from 2013 to 2017

Figure 10 Line Graph showing Seasonality Pattern of Foreign Tourists’ Arrival of each Year from 2018 to 2022
• Implications of the Seasonality of tourism in Kullu District on tourism forecasting:
The changes in tourists’ arrivals and activities throughout the different seasons of the year define the seasonality of the place. Analyzing this pattern and its implications is very important for the further forecasting and development of this industry. Following are certain implications of seasonality for tourism forecasting in Kullu district of Himachal Pradesh:

1. **Demand Analysis:** By analyzing the seasonality, one can get insights into peak seasons with high demand coinciding with summers and festivals and off-peak seasons with lower demands, such as winters. From the above analysis, we can see a pattern of a decrease in the tourist’s inflow in the winter seasons and an increase in the same during the April-May-June trimester. By identifying this pattern, stakeholders can allocate resources and plan their strategies accordingly.

2. **Capacity Arrangement:** Seasonality data assists in forecasting and planning the capacity of tourism-related services and infrastructure in Kullu district. During peak seasons, such as Dussehra and summer holidays in schools, the demand for accommodations, transportation, and attractions is high. Understanding seasonality helps improve the allocation of resources to match the expected demand.

3. **Revenue Management:** Seasonality impacts pricing strategies in Kullu District. During peak seasons, when demand is high, prices for accommodations, tours, and activities can be adjusted accordingly. Forecasting seasonality allows businesses to optimize revenue generation by implementing dynamic pricing strategies to maximize profits during peak periods.

4. **Staffing and Employment:** The seasonality of tourism influences employment patterns in the district. During peak seasons, there is a higher demand for tourism-related services, leading to an increased need for staff and temporary employment opportunities. By forecasting seasonality, businesses can plan their staffing needs accordingly, ensuring a sufficient workforce during busy periods.

5. **Marketing strategies:** by identifying the seasonality pattern of tourism authorities and stakeholders, they can prepare effective marketing and promotional strategies varying from season to season by modifying their tourism campaigns. It can help in balancing the number of tourists from off-season to peak season, eventually reducing the dependency on a single season and thus reducing the losses.

6. **Risk Management:** This analysis helps detect the possible risks and vulnerabilities in the district’s tourism industry, such as early monsoons, COVID pandemic situations, and harsh winters. By identifying such fluctuations, individuals as well as authorities can plan for eventualities accordingly. They can even diversify their market reach to reduce the impacts of such external factors.

• **Seasonality Forecasting Model:**
We have used the simple average method for forecasting seasonality (without a trend line) for the months of 2023. This approach simply assumes that future values will be similar to the historical average values for corresponding time periods. Owing to the simplicity of the model, it may not capture more complex variations in the data. It forecasts the estimates for the year 2023 by first simply calculating the average for each month in 2023 and further dividing it by the seasonal index, or seasonal relative. We can calculate the monthly average of 2023 by first calculating the average tourist inflow of each year and further calculating the average total average value of each year from 2008 to 2022.
Table 4 Seasonal Forecast for the year 2023

<table>
<thead>
<tr>
<th>For Domestic tourists</th>
<th>SI / Seasonal relative</th>
<th>average for each month in 2023</th>
<th>seasonal forecast 2023</th>
<th>For Foreign tourists</th>
<th>SI / Seasonal relative</th>
<th>average for each month in 2023</th>
<th>seasonal forecast 2023</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>0.58</td>
<td>222980.3</td>
<td>129213.7</td>
<td>January</td>
<td>0.43</td>
<td>8038.58</td>
<td>3490.665</td>
</tr>
<tr>
<td>February</td>
<td>0.56</td>
<td>222980.3</td>
<td>125186.4</td>
<td>February</td>
<td>0.44</td>
<td>8038.58</td>
<td>3509.132</td>
</tr>
<tr>
<td>March</td>
<td>1.04</td>
<td>222980.3</td>
<td>231604.9</td>
<td>March</td>
<td>0.79</td>
<td>8038.58</td>
<td>6358.131</td>
</tr>
<tr>
<td>April</td>
<td>1.29</td>
<td>222980.3</td>
<td>288167.4</td>
<td>April</td>
<td>1.08</td>
<td>8038.58</td>
<td>8707.063</td>
</tr>
<tr>
<td>May</td>
<td>1.45</td>
<td>222980.3</td>
<td>322811.2</td>
<td>May</td>
<td>1.30</td>
<td>8038.58</td>
<td>10430</td>
</tr>
<tr>
<td>June</td>
<td>1.64</td>
<td>222980.3</td>
<td>364827.5</td>
<td>June</td>
<td>1.37</td>
<td>8038.58</td>
<td>11013.8</td>
</tr>
<tr>
<td>July</td>
<td>1.04</td>
<td>222980.3</td>
<td>231834.8</td>
<td>July</td>
<td>1.40</td>
<td>8038.58</td>
<td>11277.6</td>
</tr>
<tr>
<td>August</td>
<td>0.98</td>
<td>222980.3</td>
<td>219605.7</td>
<td>August</td>
<td>1.19</td>
<td>8038.58</td>
<td>9556.663</td>
</tr>
<tr>
<td>September</td>
<td>0.94</td>
<td>222980.3</td>
<td>209663.6</td>
<td>September</td>
<td>1.24</td>
<td>8038.58</td>
<td>9971.196</td>
</tr>
<tr>
<td>October</td>
<td>1.01</td>
<td>222980.3</td>
<td>224422.3</td>
<td>October</td>
<td>1.27</td>
<td>8038.58</td>
<td>10230.86</td>
</tr>
<tr>
<td>November</td>
<td>0.83</td>
<td>222980.3</td>
<td>184087.3</td>
<td>November</td>
<td>0.97</td>
<td>8038.58</td>
<td>7762.93</td>
</tr>
<tr>
<td>December</td>
<td>0.65</td>
<td>222980.3</td>
<td>144338.2</td>
<td>December</td>
<td>0.52</td>
<td>8038.58</td>
<td>4154.932</td>
</tr>
</tbody>
</table>

Figure 11 Line Graph showing seasonal pattern of forecasted values of Domestic Tourists’ arrival in 2023 in Kullu District
Figure 12 Line Graph showing seasonal pattern of forecasted values of Foreign Tourists’ arrival in 2023 in Kullu District

By constructing line graphs using the calculated forecasted values of each month of 2023, we can visualize a similar pattern of the diagram to that of previous years graphs, which had a definite peak and off-peak season.

- **Evaluation of the seasonality forecasting model:**
  
The coefficient of determination, or R-squared, measures the ratio of variance in the dependent variable, i.e., actual value, that can be explained by the independent variable, i.e., forecasted values, in this model. It provides us with an indication of how well the forecasted model fits the observed data. Its value ranges from 0 to 1. Following are the major interpretations of different ranges:
  1. Close to 0 means the model does not explain much of the variance in the observed data, and this is not a good fit.
  2. 3 to 0.5 suggests a moderate fit. Here, though the model explains a reasonable amount of variance in the data, there is still need for improvement.
  3. 5 to 0.7 indicates a relatively good fit, and here the model explains a substantial part of the variance in the observed data.
  4. 7 to 0.9 range indicates a strong fit, where the model explains a large portion of the variance in the observed data.
  5. Close to 1 shows an excellent fit where the model explains almost all of the variance in the observed data.

We can employ coefficient of determination as a measure of the goodness-of-fit or accuracy of seasonality forecasting model in this tourism research. Based on the above interpretations, the values of $R^2$ obtained from the calculations can be properly evaluated.
Evaluation of Domestic Tourists forecasted values from 2008 to 2022:

We have calculated the value of R^2 both yearly and all together from 2008 to 2022 for domestic and foreign tourists separately. Results for years from 2008 to 2012 are above 0.7, which shows a strong fit of the model. Further, the value decreased for 2013 (0.6598) and 2014 (0.6511), which could be attributed to the early monsoon, heavy rainfall, landslides, and cloudbursts in the region. Further, the R^2 value from 2015 to 2022 is again above 0.7, showing a strong fit of the model to the data. The decline of the value in 2020 (0.5171), 2021 (0.2197), and 2022 (0.5022) was the result of an unpredicted global pandemic, COVID-19, which severely affected the global economy. The value of R^2 for overall domestic tourist data spanning from 2008 to 2022 is 0.7492, which again indicates a strong fit, which means the prepared forecasting model explains a large part of the variance in the observed data.

Figure 14 R^2 value for Domestic Tourists forecasted data from 2008-2022
Evaluation of Foreign tourists forecasted values from 2008 to 2022:

The R^2 values for the years 2008 and 2009 are 0.6454 and 0.6714, respectively. It indicates a relatively good fit, and here the model explains a substantial part of the variance in the observed data. Further, this value increases for the years 2010 and 2011, and the value is above 0.8, which shows a strong fit. The decline in value in 2012 and 2013 can be attributed to the same reason as that of domestic tourism’s value decline.

A strong fit can be further seen from 2014 to 2017. But due to heavy rainfall in 2018, eventually leading to major flash floods, the actual value of tourists declined from the predicted value. Its impact could also be seen in the 2019 data. This value further declined because of the COVID-19 pandemic in 2020–2021. Though the value again returned to normal in 2022 with domestic tourists’ influx, the value still remained low in the case of foreign tourists in flux because of the much more stringent rules of both the home and destination countries.

Regardless of a few discrepancies in the year-wise calculated values of R^2, the total value of R^2 from 2008 to 2022 is 0.8507, which shows a strong goodness of fit, proving the accuracy of the created forecasting model.

Figure 15: R^2 value for each year foreign tourists forecasted estimates from 2008 to 2022.
Conclusion:
This study revolved around conducting a temporal study of tourism in the Kullu district of Himachal Pradesh from 2008 to 2022 and analyzing the seasonality of the same for further tourism forecasting. We got a deeper understanding of the district’s tourism dynamics from the valuable insights regarding the patterns and trends in tourist arrivals gained by analyzing the pre-available tourist data. The research objectives were successfully achieved by examining the tourism statistics. Seasonal variation was identified, and it enabled the prediction of a forecasting model for the next 12 months of 2023. The findings of the study provide insights for tourism planning and decision-making in the district. Further, the identification of peak and off-peak seasons, along with an understanding of seasonal fluctuations, can guide resource allocation, capacity planning, pricing strategies, and employment management.

The findings of this research provide valuable implications for tourism planning, management, and decision-making in the Kullu district. The identification of peak and off-peak seasons, along with an understanding of seasonal fluctuations, can guide resource allocation, capacity planning, pricing strategies, marketing campaigns, and employment management. Moreover, the forecasting model developed based on seasonality patterns enables stakeholders to make informed decisions, optimize resource utilization, and effectively manage tourism demand throughout the year. However, it is important to note that the accuracy and reliability of the forecasting model depend on various factors, including the quality and availability of data, the accuracy of assumptions, and the modeling techniques employed. Additionally, it is crucial to consider external factors such as socio-economic changes, political situations, and natural events such as rainfall, landslides, floods, etc. that may influence tourism demand beyond the identified seasonality patterns. Additionally, analyzing the impact of external factors and conducting sensitivity analyses could provide a more comprehensive understanding of the complexities of tourism forecasting in the Kullu district. Overall, this study contributes to the knowledge and understanding of tourism trends and seasonality in the Kullu district of Himachal Pradesh, facilitating better planning, management, and sustainable development of tourism in the region. The insights gained from this study can guide policymakers, tourism authorities, businesses, and other stakeholders in making informed decisions and
formulating effective strategies to optimize tourism opportunities and mitigate the challenges associated with seasonality.

References:
8. Himachal Pradesh tourism policy, 2019, Department of Tourism and Civil Aviation, Government of Himachal Pradesh.
9. [https://en.m.wikipedia.org/wiki/2013_North_India_floods](https://en.m.wikipedia.org/wiki/2013_North_India_floods)
10. [https://himachaltourism.gov.in](https://himachaltourism.gov.in)
11. [https://hpkullu.nic.in/map-of-district/](https://hpkullu.nic.in/map-of-district/)