Quest Journals
Journal of Research in Applied Mathematics
Volume 10 ~ Issue 6 (2024) pp: 07-16
ISSN (Online): 2394-0743 ISSN (Print): 2394-0735
www.questjournals.org

Review Paper

Analyzing the Trend and Seasonality of Tourists Arrival in Bihar: AQuantitative Study

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ABSTRACT: *The current paper analyzes the changes in the tourist inflow of the last two decades for Bihar. The trend followed by the total tourist arrival is obtained from the year 2001- 2021 is calculated in two parts; the first part consists of the trend of total tourist arrivals before the COVID pandemic whereas the second part consists of the trend of the total tourists arrivals during the COVID pandemic. The paper also finds out the seasonal variations/seasonality for the period of five years from 2015-2019. The study finds out that there is a significant change of nearly cent percent in the total tourist arrivals for the last two decades. The study also finds out the peak seasons (In-Demand Seasons) of the total tourists inflow through the method of 12-Months Moving Average for 2015-2019. This study basically depends on the secondary data obtained from the official website of Bihar Government and the data from the yearbook of India Tourism Statistics. The study of trends and seasonality is helpful for making better planning and policy for the Bihar State Tourism Department. There lies a considerable gap in the study on the tourism industry of Bihar that's why the study is carried away.*
KEYWORDS*: 12-month moving average, hypothesis testing, regression analysis, SPSS, Welch's t-test*

R*eceived 20 June, 2024;* ***R****evised 28 June, 2024;* ***A****ccepted 30 June, 2024 © The author(s) 2024.*
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I. INTRODUCTION

Since ages, Bihar is known for its rich cultural legacy and wealthy heritage. Its history dates back to the opportune of human civilization. The state of Bihar, because of its upper-class history has so many things to do as in heritage tourism, cultural tourism. Apart from these products Bihar has other products to offer too, such as Eco-tourism and religious tourism (A tourism product is the overall experiences, activities which are offered for sale to tourists). For anystate or any nation, Tourism is among one of those industries which contribute highly in developing the economy, and which also helps in generating thousands of jobs. So, for every state or nation, tourism industry plays a significant role as any otherindustry does. However having such great scope of attaining top order position among Indian states and UT's in tourism, Bihar stays behind. According to India Tourism Statistics 2022 Yearbook, rank of Bihar in foreign tourist visits in 2021 was 25 among 37 states and UT's of India. Whereas, the rank in terms of domestic tourist visits of Bihar in 2021 was 21, which is a matter of concern.

Purpose of study

Although the history of Bihar is undoubtedly colorful, it regrettably fails to contribute significantly to the overall prosperity of the state. The state ranking of Bihar is worse in the visiting list of tourists because of which the revenue generation is extremely low, henceforth, the impact of tourism industry in contributing the economy is minimal. Also, there is nearly no to very less number of studies done previously on Bihar state tourism department so far. There needs a rigorous understanding and deep- rooted detailed scrutiny of the reasons of why Bihar lags behind in the tourism department particularly despite of having such vast scope.

In recent years, Bihar state Government has made some initiatives in improving the condition of this industry. However, there still lies a gap which needs a fulfillment. The findings of this study will help the policymakers in making better decisions. This paper is focused on finding the change occurred in the total tourist arrivals (TTA) in the past two decades for Bihar. Along with the finding of current trend and seasonal variations occurred in the recent past.

Research Questions or Hypothesis

1. To analyze the changes in the TTA in Bihar from the year 2001-2021. In order to find the answer of the above stated question, Hypothesis is formulated and tested.

2. To find out the decadal growth rate (DGR) occurred in TTA from 2001-2021.
3. To get the idea of ongoing trend of the total tourists visits before the COVID pandemic and during the COVIDpandemic.
4. To evaluate the seasonal variations occurred in the year 2015- 2019 of TTA.

II. DEFINITIONS AND METHODOLOGY

The secondary data of TTA is obtained for the year 2001-2021 from India Tourism Statistics Yearbook (2002- 2022). The tourist data of 2001-2021 [1,2] is used to carry out the hypothesis testing, for generating the exact decadal growth rate and in finding the two trend lines (of before COVID pandemic and during COVID pandemic) followed by the visits in the twenty-year long run. On the other hand, for analyzing seasonality, the secondary data from the official website of Bihar government is incorporated in the study from the year 2015-2019.

In this paper, Firstly, the hypothesis testing is applied to find the authenticity of the research hypothesis.

H_0: There is no significant change between total number of tourist arrivals in between 2001-2011 and 2012-2021

H_1: There is a significant change between total number of tourist arrivals in between 2001-2011 and 2012-2021

To check the significance of hypothesis testing, first there's a need to find out which test is appropriate for our data. There are two types of tests: 1. Parametric Test and 2. Non-Parametric Test. The choice of test depends upon the distribution of the sample implied. Once the distribution of the data is obtained, the appropriate test is applied to carry out the hypothesis testing. Through the same data, the DGR between the TTA for the two decades is also obtained with the help ofsimple tools.

Trend: According to Eurostat, a trend refers to the slow variation over a longer period of time, usually several years, generally associated with the structural causes affecting the phenomenon being measured. It is a time-series component.A trend can be identified by analyzing the overall direction of a market.

In this paper, the Trend is calculated through linear model technique with the help of SPSS software. The two trend lines show the movements in the total tourist arrivals for the long run in tourist visits. The trend line equation andthe R square value are obtained through data analysis technique and are given in the result section.

Seasonality: Seasonality is another component of Time-series. It shows the seasonal variations in the trend followed by a market, fluctuations in the demand and supply of the commodities [3]. It may occur at specific time intervals such ason yearly, monthly or weekly basis.

There are various seasonality measurement methods through which seasonality can be obtained such as:

1. Seasonality Ratio
2. Seasonality Indicator
3. The Gini Coefficient
4. Seasonality Index

These are the main and widely used indicators to measure seasonality [4].

Evaluation of seasonality indices on monthly data records (time series model)

This paper uses the method of seasonality index to find out the seasonality in number of visitors in Bihar. The method of seasonality index helps in decomposing the TTA data into the time series components which helps to identify fluctuations easily [5]. In this paper the seasonal variation is obtained for the data of five-year span from 2015-2019, by finding the seasonal indices manually through the method of 12-Month moving average. Foremost, the 12- Month moving average is calculated for the first 12 months until the last 12 months from the data of column (3) from Table 3. Thesame calculation runs for the next 12 months until the end of the data. Then the central moving average is calculated fromthe top two entries of 12-month moving average i.e., column (4) until it reaches the end of the data. After that the ratio is obtained shown in column (6) by dividing the TTA from column (3) to the central moving average i.e., column (5).

Once the ratio is obtained, the other part of calculation begins which is shown in table 4. The ratio

value of the column (6) in the table (2) consists of some irregularities in it. Therefore, in the next step median value of each of the ratio (in percentage) is obtained, to eliminate the irregularities. By dividing the monthly median value by the total median value, the seasonal indices are generated [6].

III. RESULTS AND CONCLUSIONS

The first objective is to find out the change occurred in the TTA in between the year 2001-2021. For which in the first step, the hypothesis is formulated and checked.

Hypothesis testing

Research Hypothesis (H1): There is a significant change between total number of tourist arrivals in between 2001-2011 and 2012-2021. To carry out the hypothesis testing, and to find out the change in the TTA for the last two decades, the data of 2001-2021 is divided into two sets. First dataset comprises the data of TTA from 2001-2011 is presented in Table 1 and the second dataset comprises the data from 2012- 2021 is presented in Table 2.

Table 1: Total Tourist Arrivals in Bihar during the years 2001-2011

Year	Total Number of Tourists
2001	6146841
2002	6973080
2003	6105530
2004	8135574
2005	6944006
2006	10764714
2007	10530249
2008	12235183
2009	16207721
2010	16583411
2011	19369977

Table 2: Total Tourist Arrivals in Bihar during the years, 2012-2021

Year	Total Number of Tourists
2012	22544032
2013	22354141
2014	23373885
2015	28952855
2016	29526658
2017	33496768
2018	34709584
2019	35083179
2020	5946104
2021	2502239

The comparison between the two datasets through hypothesis testing first requires a check of whether the data is normally distributed or not. For this the datasets are run through SPSS.

Test of Normality for Table 1 during 2001-2011

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
DATA	0.178	11	0.200*	0.887	11	0.127

* This is a lower bound of the true significance.

a. Lilliefors Significance Correction

The P-value of Shapiro-Wilk test is more than 0.05, which shows that our data is normally distributed.

Test of Normality for Table 2 during 2012-2021

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
DATA	0.248	10	0.082	0.850	10	0.059

a. Lilliefors Significance Correction.

The P-value of Shapiro-Wilk test is more than 0.05, which shows that our data is normally distributed.

The normality test for both the datasets in Tables 1 and 2 shows that they are approximately normally distributed. But there lies an unequal variance between both the datasets as the Levene's statistics mentioned in the table 1, is less than 0.05. Therefore, a non-parametric test i.e. Welch's t-test is applied as it fulfills the assumption of unequal variance in the datasets [7].

Assumptions for applying the Welch's t-test are: Unequal sample size and Unequal variances between groups. Both the assumptions met here; therefore, Welch's t-test is included in the study.

Welch's t-Test: Two-Sample Assuming Unequal Variance

	Variable 1	Variable 2
Mean	10908753.27	23848944.5
Variance	2.18443E+13	1.30654E+14
Observations	11	10
Hypothesized Mean Difference	0	
df	12	
t Stat	-3.335452231	
P(T<=t) one-tail	0.002968935	
t Critical one-tail	1.782287556	
P(T<=t) two-tail	0.00593787	
t Critical two-tail	2.17881283	

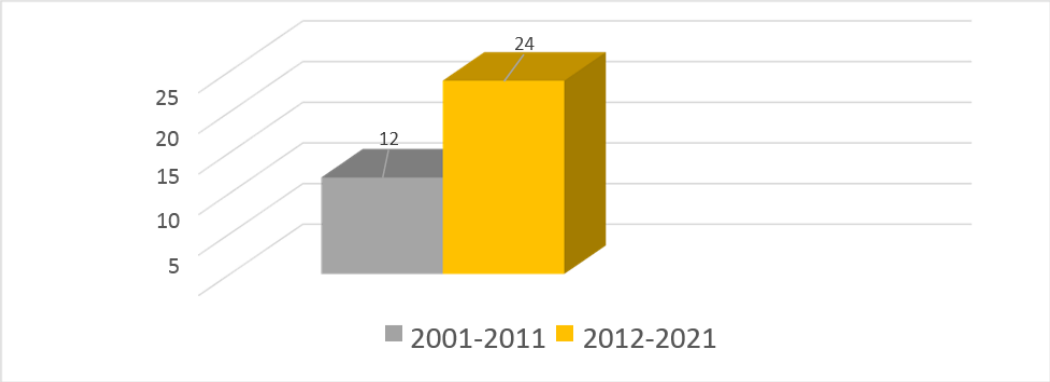
The result of hypothesis testing done with the help of Welch's t-test shows that the two-tailed significance value is less than 0.05, which means the null hypothesis, is rejected. Thus, it is concluded that there is a significant change between TTA in between 2001-2011 and 2012-2021 due to state's infrastructural development and improvements in the rule of law [8].

Decadal Growth Rate

The other half of the first objective was to find out the decadal growth rate. For which the Bar graph representation of TTA from 2001-2021 can be seen in the Fig.1

Fig. 1: Decadal growth rate in total Tourist Arrivals during 2001-2021

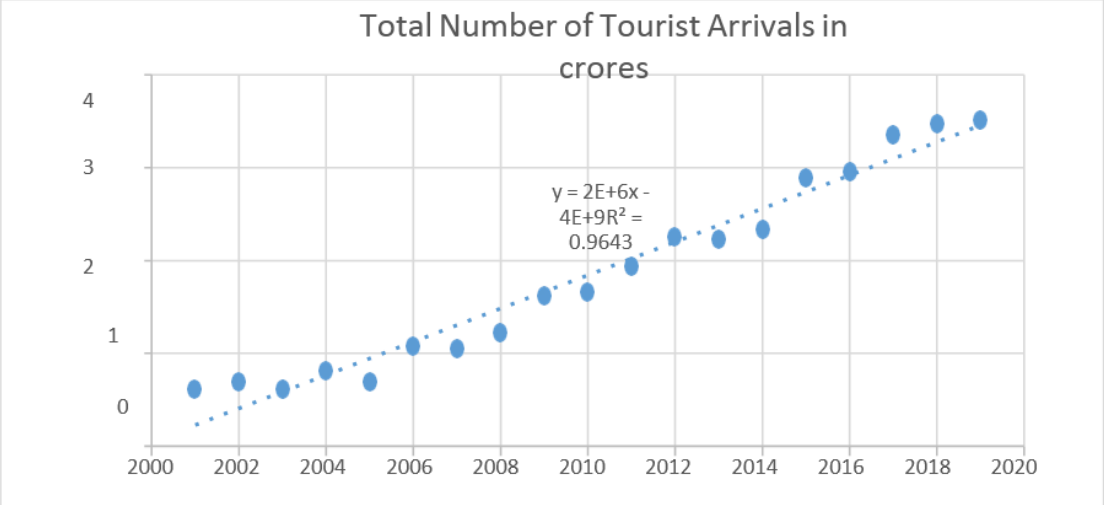
The graph represents a decadal growth of approximately 98.74% in the TTA between 2001 and 2021. This concludes a good positive sign in the growth rate of tourist visits.



Trend of the Tourist Arrivals

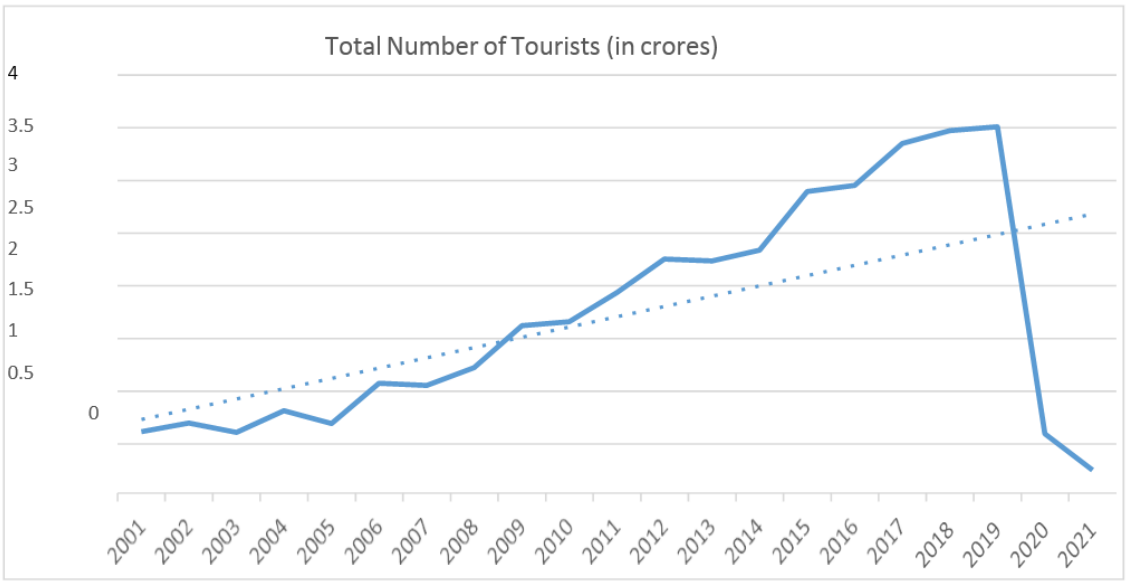
The trend is obtained through the data of TTA from the year 2001-2021 mentioned in Tables 1 and 2. With the application of regression analysis the trend line equation and value of R square is estimated through SPSS shown in Fig. 2.

Fig. 2: Trend of TTA during 2001- 2019 before COVID Pandemic



The trend line equation and R^2 is obtained as: Y = 2E + 6x - 4E + 9 and R^2=0.9643

Fig. 3: Trend of TTA from 2001- 2021 including COVID Pandemic impacted year



The trend of the total tourist arrival is seen to be increased before the COVID pandemic and then the trend of the total tourist arrival decreased drastically during COVID pandemic. From 2001-2019 there was an upward trend and afterwards a steep trend is observed which is because of COVID pandemic. Figures 2 and 3 have shown the trend of TTAfrom 2001-2019 and 2001-2021 respectively.

Seasonality or seasonal variations

This study uses seasonal indices to measure the seasonality [3], shown in Tables 3 and 4. Seasonality or seasonal variations is depicted to be following a sequence of peak seasons in Oct.-Jan. 2015-2019. There have been some studies done prior which states that Bihar has a season between October to January 2015-2019, but through this study an unusual peak is seen in the month of July and August, which is rare. The seasonal variation is shown graphically in Fig. 4.

Table 3: Calculation of index through method of moving averages during 2015- 2019

Year (1)	Months(2)	Number of tourist arrivals (3)	12 months moving average(4)	Central movingaverage (5)	Ratio of number of tourist arrivals to thecentral moving average (6) = [(3)/(5)]
2015	January FebruaryMarch	21,09,163			
	April May June July	11,77,071			
	August	11,21,705			
	SeptemberOctober	9,34,531			
	NovemberDecember	7,09,878	2,412,738		
	January February March	16,43,692	2,411,088	2,411,913	1.188
	April	28,64,826	2,426,126	2,418,607	1.674
	May June July August	40,49,434	2,436,181	2,431,153	0.426
	SeptemberOctober	10,35,899	2,444,666	2,440,424	0.837
	NovemberDecember	20,43,827	2,459,177	2,451,922	1.473
	January February March	36,12,391	2,389,852	2,424,515	3.155
2016	April	76,50,438	2,280,439	2,335,146	0.895
	May June July August	20,89,363	2,313,926	2,297,182	0.591
	SeptemberOctober	13,57,526	2,388,758	2,351,342	0.528
	NovemberDecember	12,42,364	2,607,456	2,498,107	0.415
	January February March	10,36,358	2,647,219	2,627,337	0.336
	April	8,84,003	2,460,555	2,553,887	0.318
	May June July August	8,11,799	2,609,911	2,535,233	0.612
	SeptemberOctober	15,51,863	2,622,076	2,615,993	1.702
	November	44,51,280	2,635,753	2,628,914	0.736
		19,33,888	2,644,171	2,639,962	1.768
		46,68,203	2,648,805	2,646,488	1.545
2017		40,89,538	2,664,027	2,656,416	2.037
		54,10,473	2,965,033	2,814,530	1.379
		38,81,639	2,685,282	2,825,157	0.532
		15,03,500	2,746,917	2,716,099	0.518
		14,06,486	2,849,137	2,798,027	0.406
		11,37,375	2,935,547	2,892,342	0.325

		9,39,610	2,791,397	2,863,472	0.347
		9,94,467	2,615,673	2,703,535	1.910
		51,63,931	2,614,686	2,615,179	0.418
		10,94,268	2,611,818	2,613,252	1.023
		26,73,512	2,618,919	2,615,369	2.254
2018		58,94,848	2,703,915	2,661,417	1.926
		51,26,454	2,837,871	2,770,893	1.328
		36,80,678	2,550,626	2,694,249	0.658
		17,72,944	2,894,935	2,722,781	0.548
		14,91,653	2,849,102	2,872,018	0.478
		13,72,078	2,537,113	2,693,107	0.454
		12,22,585	2,241,444	2,389,278	0.820
		19,59,556	2,892,465	2,566,955	1.014
		26,01,944	2,909,842	2,901,154	0.592
		17,16,993	2,912,607	2,911,225	1.795
		52,25,979	2,921,276	2,916,942	0.728
		21,23,506	2,922,124	2,921,700	0.736
		21,50,984	2,848,378	2,885,251	0.547
		15,78,425			

	DecemberJanuary	1,14,92,937	2,715,721	2,782,050	4.131
2019	February March April	19,81,464	2,683,744	2,699,733	0.734
	May	15,24,833	2,751,216	2,717,480	0.561
	June July August	14,76,109	2,739,145	2,745,181	0.538
	SeptemberOctober	12,32,762	2,725,844	2,732,495	0.451
	November	10,74,601	3,068,381	2,897,113	0.371
	December	10,10,062	2,923,598	2,995,990	0.337
		13,33,263			
		60,35,646			
		19,78,659			
		19,91,366			
		56,88,871			
		97,55,543			

Table 4: Calculation of Monthly Seasonal indices during 2015-2019

Months	Ratios (* 100)				Median	Seasonal Index
January	65.80	73.39	89.47	137.9	81.43	83.18
February	53.21	54.78	56.11	59.09	55.45	56.64
March	47.77	51.78	52.83	53.77	52.30	53.42
April	40.65	41.48	45.11	45.39	43.29	44.22
May	32.49	33.65	37.09	82.14	35.37	36.13
June	31.79	33.71	34.73	101.4	34.22	34.95
July	59.18	61.21	118.8	191.0	90.00	91.93
August	41.84	167.4	170.2	179.5	168.8	172.42
September	42.61	72.80	73.56	102.3	73.18	74.75
October	73.62	83.75	176.8	225.4	130.27	133.06
November	54.70	147.3	154.5	192.6	150.90	154.14
December	132.8	203.7	315.5	413.1	259.60	265.17
Total					1174.81	1200.00

Fig. 4: Graphical representation of monthly seasonal indices of Total Tourist Arrivals during 2015- 2019

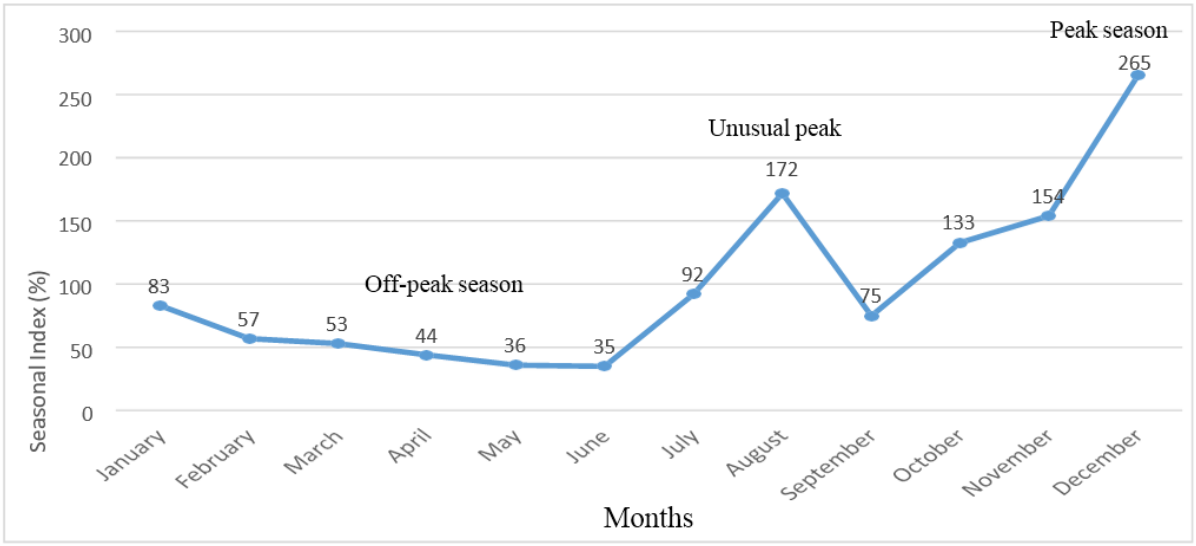


Fig. 4 depicts that earlier the shoulder peak season was from the month of October to January but in this study it is foundthat there is an unusual upsurge in the TTA for the months of July and August.

IV. DISCUSSION

Tourism helps in the overall development of a state through economic diversification, wealth generation, employment, tax revenue, business development, etc. [9, 10]. Hence, there is a need of rigorous study of this sector. In this paper firstly we dealt with the hypothesis testing by the test of significance of the changes occurred between the TTA in between 2001-2011 years and 2012-2021 years. The result of this hypothesis testing comes out to be the rejection of the null hypothesis concluding that there is a significant variation between TTA in between 2001-2011 and 2012-2021. The second objective of this paper was to find out the exact variation occurred in the total TTA for the last two decades by knowing its DGR. The DGR has increased almost double from the period of 2001-2011 to 2012-2021 and calculated as 98.74%. The third objective was to get the idea of trend followed by the TTA between 2001 to 2019 years and during COVID pandemic 2020-21. The two trend lines mentioned in the result clearly show the loss of tourists inflow occurred during COVID pandemic time. The last objective was to obtain the seasonal variations in the total tourist arrivals for the year 2015-2019 for the effective analysis. The seasonality is calculated with the help of 12 months moving average method of finding the seasonality index for the related five years. The indices reveal that there are suitable months particularly October to January for the tourist visits in Bihar as depicts in the graph also. However, there is some unusual peak of the tourist visits in the month of July and August during the years 2015-19 particularly in southern districts of Bihar. The southern districts are pleasant during monsoon and the rains come in short spells making it enjoyable fresh natural showers. Seasonality is a problem which needs to be over-come [11, 12].

Further studies could be carried out on finding more of the reasons of why and how this unusual upsurge is seen.

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