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Assessment of Tourism in Nepal with Reference to Regional Countries: Trend Analysis and ARIMA Approach

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Abstract

Tourism (either domestic or international or both) is an internationally flourished business or industry all over the world. The economic foundations of tourism are essentially the cultural assets, the cultural property and the nature of the travel location. So, it has a greater contribution to the country's balance of payments. Simple trend analysis was carried out using a set of line graphs along simple linear regression. For forecasting of international tourist arrivals of period: 1962-2020, and real per capita international tourist receipts of period: 1995-2018, the suitable Auto-Regressive Integrated Moving Average (ARIMA) models were developed using Akaike Information Criterion along with method of autocorrelation function and partial autocorrelation function.

Nepal has a significant growth rate of 1.372 of the international tourist arrivals. It has the eighth position for international tourist arrivals among nine counties. Likewise, Nepal has a significant growth rate of 1.315 of real per capita international tourist receipts. It has the fourth position for real per capita international tourist receipts among nine counties.

Nepal has been receiving its international tourist arrivals, growth as well as real per capita international tourist receipts. Forecasts of international tourist arrivals of Nepal are 879638.3 in 2018, 860459.0 in 2019, 875824.1 in 2020, 891189.3 in 2021, and 906554.4 in 2022. Forecasts of real per capita international receipts in dollars are 687000000 in 2019, 727000000 in 2020, 807000000 in 2021, and 845000000 in 2022.

Keywords: Trend analysis, Akaike Information Criterion, autoregressive integrated moving average, autocorrelation function, partial autocorrelation function

Introduction

Tourism is an internationally flourished business and industry all over the world. It has a greater contribution to the country's balance of payments. Tourism, that may be either domestic or international or both, is travel for pleasure or business or both. It is an art of science in the business for attracting, accommodating, and entertaining tourists and the business of operating tours (Oxford English Dictionary, 2005).

The economic foundations of tourism are essentially the cultural assets, the cultural property

and the nature of the travel location. The World Heritage Sites are particularly worth mentioning today because they are real tourism magnets.

In the context of Nepal, the Rana ruler had isolated Nepal from external influences for a hundred and four years. During that period, Nepal was a 'forbidden land' for foreigners. It is found that tourism in Nepal was promoted after the establishment of democracy in 1951. The international tourists are found to visit Nepal as they are attracted by various natural and cultural heritages of Nepal, its diverse topography, varied climate, diverse flora and fauna, different shrines and temples, jungle safari and trekking. The past thirty years beginning from 1962 show that Nepal has experienced an unprecedented rise in the tourist arrivals and its contribution to 20% of the foreign exchange (MoCTCA, 2001). But, this arrival saw steadlly declent due to the heightened political instability and the war on terrorism within the country, the region and beyond (Thapa, 2003). However, Nepal started enyoing once again the up market trend in the 2010s.

The scenario of international tourist arrival is presented in Figure 1 for the period of 1994-2019 in Nepal. Ministry of Culture, Tourism and Civil Aviation (MoCTCA), tourist arrivals show a steady trend during 1994-2019 in Nepal (Government of Nepal, 2020) on average. This is depicted by the upward trend-line.

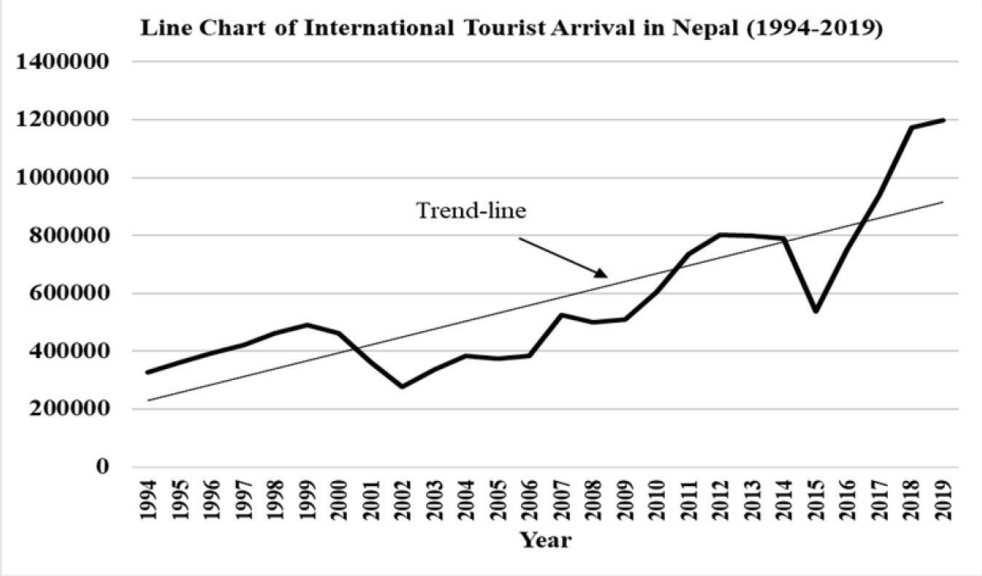

Figure 1: *Line chart of actual number of international tourist arrival during 1994-2019 along with trend-line*

The recent trend of tourist arrival in Nepal seems satisfactory (Dhakal, 2014) from 1994 to 2014. However, there is a sudden decline in the tourist arrival in 2015. This is because of the impact of the 7.6 magnitude earthquake that hit a large part of central Nepal. It heavily affected the tourism business and livelihoods based on tourism. The overall economic loss due to the earthquake was equivalent to US$ 7 billion. The disaster effect on the tourism sector was estimated at 81241 million, 11.5 percent of total (Rijal, 2016). The data on arrivals of tourists are ever changing in years to come in Nepal. In other words, that may not be steady forever. So, it is necessary to assess the pattern of the tourist arrivals in Nepal. However, the sudden decline is seen in 2015. This is because of Earthquake and aftershocks in Nepal

The economic development of the world as well as regional levels has been linked increasingly to tourism development and particularly to the volumes of tourist arrivals (Song & Witt, 2000, Song et al., 2009). Furthermore, global international tourism has become one of the major economic exports and a significant contributor to many national economic development strategies. International tourism as an export income provides employment opportunities and affects living standards through external economic benefits that flow into many sectors of a national economy. Thus, the tourism industry becomes a very important economic activity contributing to the growth of the Gross Domestic Product (GDP) of all the countries in this world.

In the changing world over the year to year, there were many consequences experienced by the world how the number of tourists has been declined. History has said that there was a decrease in tourism numbers because of a strong economic slowdown due to the late-2000s recession during 2008-2009, and in the consequence of the outbreaks of the 2009 H1N1 influenza virus, but later slowly recovered (WTO, 2009). Recently (in 2019-2020), the pandemic of coronavirus (COVID-19) has been negatively affecting the tourism industries all over the world.

According to the United Nations specialized agency (UNWTO, 2020), the crisis could lead to an annual decline of between 60% and 80% when compared with 2019 Figures. This places millions of livelihoods at risk and threatens to roll back progress made in advancing the Sustainable Development Goals (SDGs).

The latest data from the UNWTO has shown that the COVID-19 pandemic has caused a 22% fall in international tourist arrivals during the first quarter of 2020. It could decline by 60-80% over the whole year. Further, it is assumed that 67 million fewer international tourists up to March translates into US$ 80 billion in lost exports (UNWTO, 2020). However, several countries have been fighting against this pandemic to revive the tourism business. Therefore, the business may take improvement and ultimately normal stage in years to come. Nepal has also faced the same problems in all sectors of the business including tourism.

Despite the natural or manmade consequences, tourism is also changing with the capacity of destinations as there should be a greater skill to manage larger volumes of internationally diverse tourist populations, with new markets opening for tourists.

As such, the forecasting of International Tourist Arrivals (ITA) and Real Per Capita International Tourist Receipts (RPCITR) has become a more pressing issue in recent years for governments at all levels including Nepal, in order to reliably estimate tourism growth and the economic benefits generated by expanding tourism activities.

This paper, therefore, aims at filling this gap by providing a graphical as well as simple regression analysis of ITA (by means of all transportation in Nepal) and RPCITR at regional levels.

Hence, this study has taken following two objectives.

Objective

Increasingly, international tourism arrival sizes and hence receipts, have impacted on regions within countries including Nepal. Tourism growth can no longer be simply measured at a country or national level, as regional governments seek regional forecast information for

economic, transport and infrastructure planning for their regions, to enable a greater share of the growing world tourism receipts to be earned in their regions.

Based on the scenarios of international tourism arrival sizes and receipts, this study aims:

- to assess simple trend analysis of international tourist arrivals and real per capita international tourism receipts for nine Asian countries including Nepal, and
- to develop an ARIMA model to forecast international tourist arrivals and real per capita international tourism receipts in Nepal (this study will develop the ARIMA models under this objective for forecasting purposes).

Literature review (Empirical)

The study has carried out the time-series analysis of international tourist's arrivals and receipts. Several literatures are found to review the time-series of the two variables of interest, international tourist arrivals and receipts on the behalf of the world, Americas, Africa, Europe, Asia-Pacific, Middle East and Nepal.

According to UNWTO (2013), international tourist arrivals increased to 1.035 billion in 2012, which was the highest over the past three years. In the late-2000s recession, tourism arrivals declined to negative in the second half of 2008 after an increase of 5% in the first half of 2008. The international tourist arrivals then increased in diminishing rate and ended up only 2% for the year, compared to 7% increase in 2007. Only in 2011 and 2012, the international travel demand continued to recover from the losses of the recession (UNWTO, 2009). There was no improvement in the negative trend of tourism arrival during 2009. The situation further aggravated in some countries because of the outbreak of the H1N1 influenza virus, resulting in a worldwide decline of 4.2% in 2009 to 880 million international tourists' arrivals, and a 5.7% decline in international tourism receipts (UNWTO, 2010).

In 2020, international tourism had faced a similar situation to that of the late-2000s recession. With the outbreak of pandemic Coronavirus (COVID-19), there has been a ban in travels and tourism, frequent lockdown in different countries due to risk of transmission. It resulted in substantial reduction in passenger travel by air and sea and contributed to a sharp decline in tourism activity. Despite the decline in inflow and outflow of tourists, the evidence suggests that tourism as a global phenomenon reflects no signs of substantially long term effect of the pandemic. Moreover, it has been suggested that travel is essential to maintain relationships, as social life is increasingly networked and conducted at a distance (UNWTO, 2020). ARIMA (0, 0, 0) (1, 1, 0)12 is found to be the best model to forecast international tourist visits to Bhutan from Jan 2017 to Jun 2017 with 91% accuracy (Choden & Unhapipat, 2018).

The model of A.R.I.M.A.(1,1,1), as most suitable for forecasting, has shown a 13.9% increase in international tourist arrivals is expected by 2018 in F. Y. R. Macedonia (Petrevska, 2017). Based on the review of the literature as discussed above, the objectives and methods are formulated accordingly.

Materials and methods

Data collection

This study has used the secondary data on ITA obtained from MoCTCA (HMG, 2001, Government of Nepal, 2019). It has also obtained data on RPCITR of Nepal along with other

countries and world for the period of 1995-2018 (only available) from the World Bank (WB) data portal published in the Yearbook of Tourism Statistics (WTO, 2020).

This study has used a different period of data on the basis of its availability. For instance, the data for ITA is available from 1962 to 2019. However, the data on RPCITR are not available from 1962-2019. All the data can be made available on demand. In order to go into deep insight of ITA and RPCITR, index-ITA is generated in terms of percentage by dividing the ITA of all the years of 1995-to 2018 by the ITA of the year 1995 for all the nine countries. Likewise, index- RPCITR is generated in terms of percentage by dividing the RPCITR of all the years of 1995 to 2018 by the RPCITR of the year 1995 for all the nine countries.

Graphical and time series analyses are carried out for indices of ITA and RCPITR using the annual data from 1995 to 2018 on the basis of the data availability for all the nine countries. For Nepal, ARIMA models are carried for ITA using the annual data from 1962 to 2019 and for RCPITR using the annual data from 1995 to 2018. The different time period used here is due to the availability of data for the target variables ITA and RCPITR.

Limitation of the study

There are some limitations of the study. They are outlined below.

- Time-series data consists of four component, namely secular trend, seasonal variation, cyclical variation and irregular variation. Use of annual data has prevented computation of the seasonal pattern of the tourist arrivals and tourist receipts. However, the cyclical variation may be minimized when the differenced data on ITA and RCPITR are carried for their time series analysis.
- There are impacts of some irregular variation like the political movement (Maoist Insurgency) and the earthquake on the tourist arrival. This is not incorporated in the study.
- The forecast of the tourist arrivals and real per capita international tourist receipts may not be so accurate while applying ARIMA model due to the effect of the irregular variation as well as inherent variability that cannot be minimized to zero.
- Selection of the length of the time-series may affect the model calibration and hence, the prediction too. Similarly, there may be several features that may impact the fluctuation of the tourist arrivals and RCPITR. This study only considers year as an explanatory variable.

Despite these limitations, the better fit of the models to the tourist arrival and RCPITR data can give a reliable insight of the tourist arrivals pattern and tourist receipts in near future when the time-series models are used along with their accuracy measures, validation technique and diagnostic tests (Gujrati, Porter, & Gunasekar, 2012).

Data analysis and methods

The ITA for a country works as a good indicator of the role of tourism in the economy both in terms of GDP and foreign exchange generation. Likewise, RCPITR can indicate that tourism is beneficial for a country as it can provide useful information about the contribution of each tourist in real, i.e. deflated terms (Paptheodorous & Song, 2005). In order to assess this economic behavior of the tourism business in a country, this study is going to apply the

methods that may assess the past and present trend, and its future scenario. The methods are (a) simple trend analysis, and (b) the possible ARIMA models (Gujrati, Porter, & Gunasekar, 2012).

Graphical as well as quantitative methods are employed to assess the pattern of the variables of interests. The assessments were carried out for simple trend analysis using (i) simple line graphs, and (ii) simple linear regression applied just to compare the growth rate of the trend lines.

The ARIMA model will require the steps (i) identification, (ii) estimation, (iii) diagnostic checking, and (iv) forecasting. The proposed model will look like ARIMA (p, d, q), popularly known as the Box-Jenkins (1976) methodology (Gujrati, Porter, & Gunasekar, 2012). Here, p stands for a number of auto-regressive terms, d for the number of times the series has to be different before it becomes stationarity, and q for the number of moving average terms. A general forecasting equation of ARIMA model is specified as follows in terms of y_t:

$$\hat{y}_t = \mu + \emptyset_1 y_{t-1} + \cdots + \emptyset_p y_{t-p} - \theta_1 \varepsilon_{t-1} - \cdots - \theta_q \varepsilon_{t-q}$$

$$\hat{y}_t = \mu + \emptyset_1 y_{t-1} + \cdots + \emptyset_p y_{t-p} - \theta_1 \varepsilon_{t-1} - \cdots - \theta_q \varepsilon_{t-q}$$

Before identification or specification of the model, there are several methods available to check whether there is a stationarity in the variable of interest, say, y_t. One of the methods is the Augmented Dickey-Fuller (ADF) test (Dickey & Fuller, 1979) and is used to determine the order of integration of the time series (Song & Witt, 2000). The ADF test sets the null hypothesis as the series has a unit root. This test uses the following equation to identify the presence of the unit root in the given series.

$$\Delta y_t = \alpha_0 + (1 - \rho)\alpha_1 T - \rho y_{t-1} + \sum_{i=1}^{p} \gamma_1 \Delta y_{t-1} + u_t \rightarrow [1]$$

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In the above equation, y_t is the time-series of the variable of interest (In this study, it may be ITA and RPCITR); T for a linear deterministic time trend; p is the order of augmentation of the test; ut is a white noise error term. The t-statistic is applied to decide whether the p^{th} order ADF test has a unit root (or non-stationarity) of the annual tourist arrivals.

Autocorrelation Function (ACF) and Partial Autocorrelation Function (PACF) are applied to identify the suitable equation of the ARIMA model models (Gujrati, Porter & Gunasekar, 2012).

There may be several possible ARIMA models to be calibrated using the data of different time periods. This is usually practiced to identify the best model among them so that prediction or forecasting of the tourist arrival will be precise and reliable. The study has applied the goodness-of-fit criteria like R-Square, or Akaike Information Criterion AIC (Gujrati, Porter, & Gunasekar, 2012) to find the best model among a set of models. Further, diagnostic checking is also used. Then the final model is applied for forecasting the future tendency of the variable of interests (ITA and RPCITR).

There is a facility to perform ARIMA automatically in the econometric software, EVIEWS 10.0 (Evaluation Version) (Quantitative Micro Software, 2010). The following sections provide the results along with discussion.

Findings/results/discussion

Graphical analysis

Figure 2 demonstrates the line graphs of time-series of index of international tourist arrivals (ITA) for the period from 1995 to 2019.

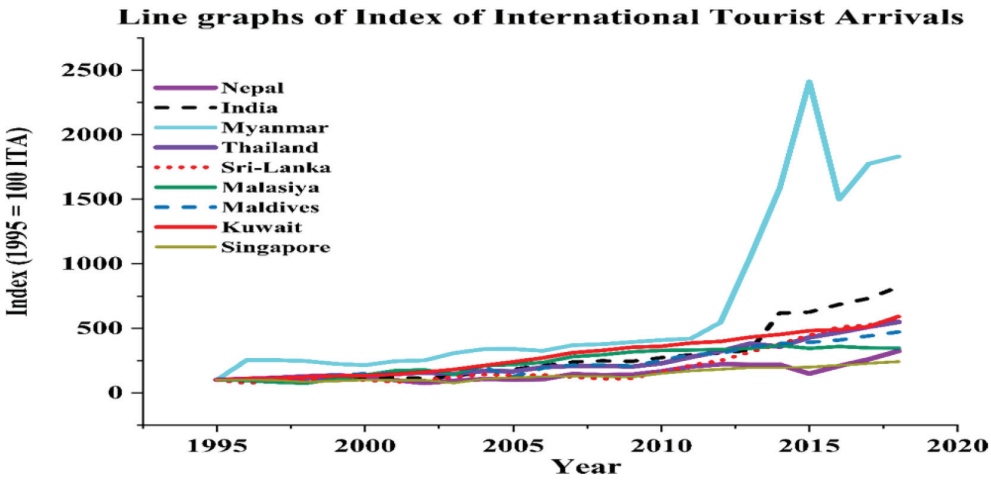

Figure 2: *Trend lines of index of ITA for nine countries*

This shows simply the trend of the indices of nine countries for 23 years starting from the base index of 100. The different color in the legend indicates the different countries. With reference to Nepal with pink color, Myanmar has a greater tendency of international tourists' arrivals. The year 2015 is the peak year for the outbound tourists in Myanmar. This index shows the dramatic growth of ITA throughout this period at the regional level. The highest index-ITA has reached about 2500 across all other eight countries in 2015. It was followed by India (more than 500 in 2018), then by Kuwait and Sri-Lanka. The position of Nepal (less than 500) is slightly higher than Singapore. Malaysia has seemed to meet Nepal in 2018. The discriminations seen among the nine countries may have consequences of different factors to increase or decrease the index-ITA. Malaysia has a smooth tendency in upward direction. But Kuwait is showing a declining pattern and after 2015, gained some stable rise.

Nevertheless, the growth patterns of all the countries are apparent throughout this period despite the growth rate being different. The factors like rise of disposable income, establishment of paid vacation, reduction of travel time and costs and less bureaucratic impediments are among the well-known factors that account for this growth. Besides these, there may be some other factors like air-connectivity to a larger number of countries, the area/size of the country, tourist destinations, purpose of visits, a greater number of tourists attraction, etc. play crucial role in increasing the outbound tourists in the country (Papatheodorous & Song, 2005).

Data on RPCITR can provide a useful insight by showing the contribution of each tourist in real, i.e. deflated terms. A high RPCITR means that tourism is beneficial for a country as it is associated with quality and high expenditure tourists and potentially a high tourism multiplier. On the other hand, a low RPCITR may be related to low income mass tourists; if the number of the latter is substantial, then a destination is likely to suffer from a lethal combination of

low returns and high arrivals – this may prove unsustainable and lead to the eventual decline of tourism. On these grounds, RPCITR can offer a useful indicator for policymakers. Interestingly, however, RPCITR appears very rarely in tourism publications.

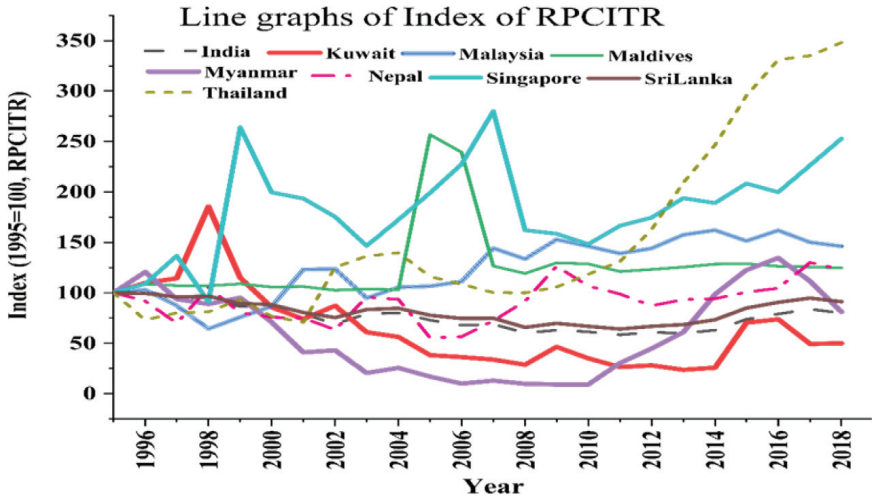

Figure 3: *The line charts of index of real per capita international receipts at the regional levels*

Figure 3 presented below a rather rosy aspect of international tourism evolution. From an economist point of view, however, it is important to gain insight on the real financial benefit of tourism. On this ground, the graphical analysis focuses on deflation most importantly on a per capita basis. Figure 3 shows the evolution of regional RPCITR from a relative index perspective. In this context, Thailand has performed slightly better than Singapore after 2010. The unstable patterns of Maldives and Singapore show signs of reversion to the initial 1995 value, while Nepal, Sri Lanka and India stabilize after the 2007 respectively.

Time series regression model

The econometric model is built using a time series regression model. It is necessary to carry out a stationarity test before carrying out the regression analysis because Granger and Newbold (1974) found that regression models for non-stationary variables give spurious results.

Stationarity test

Table 1: Augmented Dicky-Fuller test for stationarity

Period	Dependent variable	ADF test statistic (t-Statistic)	P-value
1995-2018	D (Index-ITA-India, 1)	-4.213085	0.0019
1995-2018	D (Index-ITA-Kuwait, 2)	-4.929697	0.0039
1995-2018	D (Index-ITA-Malaysia, 1)	-5.087899	0.0026
1995-2018	D (Index-ITA-Maldives, 1)	-5.465149	0.0013
1995-2018	D (Index-ITA-Myanmar, 2)	-6.666629	0.0002
1995-2018	D (Index-ITA-Nepal, 1)	-3.636494	0.0497
1995-2018	D (Index-ITA-Singapore, 1)	-4.879732	0.0040

1995-2018	D (Index-ITA-Sri-Lanka, 2)	-5.164957	0.0024
1995-2018	D (Index-ITA-Thailand, 1)	-6.235714	0.0002

Note: D (Index-ITA, 1) is the first differenced. D (Index-ITA, 2) is the second difference.

Table 1 has been depicted as a test for stationarity test by applying ADF test. India, Malaysia, Maldives, Nepal, Singapore, Thailand have shown significant stationarity at their first or second differenced values of index of ITA. On the other side, Kuwait, Myanmar and Sri-Lanka have also shown significant stationarity but at their second differenced values of index of ITA. Now the time series regression has been carried out for each country using the first differenced index of ITA in order to make uniformity and comparable. The results are presented in Table 2. The coefficients of the regression models are comparable across themselves. However, this model does not use some explanatory variables as they are not available for this study. The pattern of index-ITA of the line graphs in Figure 2 is relatively supported by the results of simple linear time series regression in Table 2. Out of nine countries, only three countries India, Thailand and Singapore have significant coefficients. Myanmar has the greatest coefficient (7.307) among them. It is followed by India (3.98), Thailand (1.954), Maldives (1.704), Nepal (1.372), Kuwait (1.252) and Singapore (0.737), and they all have positive coefficients. This implies that each of these countries has an increasing rate of international tourist arrivals. Nepal has the fifth position among them.

Table 2: Summary results of simple linear regression models for differenced index of International Tourist Arrivals

Country	Regression coefficients	F	R^2 (%)
India	3.98**	5.257*	20.1
Kuwait	1.252	8.377*	28.5
Malaysia	-0.3921	0.5978	1.34
Maldives	1.704	2.129	9.20
Myanmar	7.307	0.566	2.62
Nepal	1.372	2.334	10.0
Singapore	0.737**	4.629**	18.0
Sri-Lanka	-0.165	0.042	0.21
Thailand	1.954*	8.878*	29.7
Dependent variable: Index-ITA. Independent variable: Year *P-value is significant at less than 1%. ***P-value is significant at less than 5%.			

However, the result shows that Malaysia (-0.3921) and Sri-Lanka (-0.165) have a decreasing rate of ITA. Furthermore, Malaysia is relatively showing a decreasing rate of ITA. It is followed by Sri-Lanka. Myanmar has sudden jump in ITA between 2010 and 2015. This is because it possesses great tourist potential and attractions in many respects; much of the industry remains to be developed. After the junta transferred power to the civilian government, the tourism sector saw an increase in tourism arrivals, and in 2012, tourist arrivals surpassed the one million mark for the first time. In 2013, the Tourism Master Plan was created, targeting 7.5 million arrivals (Mon, 2014). Tourism has been developed mainly by Myanmar's government, which has encouraged tourism since 1992. Private enterprises also exist, catering

to a wide range of tourists. Further it has been promoted by advocacy groups. The group has provided economic benefit to Burmese civilians, and to avoid isolating the country from the rest of the world (Pills, 2019). In common practice, a sizable ITA can be a good indicator of the role of tourism in the economy both in terms of GDP and foreign exchange generation.

Table 3: Augmented Dicky-Fuller test for stationarity

Period	Dependent variable	ADF test statistic (t-Statistic)	P-value
1995-2018	D (Index- RPCITR –India, 2)	-4.850011	0.0046
1995-2018	D (Index- RPCITR –Kuwait, 1, 2)	-3.803436(-6.413566)	0.0371(0.0002)
1995-2018	D (Index- RPCITR –Malaysia, 1,2)	-4.230848(-7.430721)	0.015(0.0000)
1995-2018	D (Index- RPCITR –Maldives, 1,2)	-4.950773(-4.950773)	0.0038(0.0038)
1995-2018	D (Index- RPCITR –Myanmar, 1,2)	-4.948437(-7.430721)	0.0035(0.0000)
1995-2018	D (Index- RPCITR –Nepal, 2)	-5.276939	0.0019
1995-2018	D (Index- RPCITR –Singapore, 1,2)	-6.264250(-9.180727)	0.0002(0.0000)
1995-2018	D (Index- RPCITR -Sri-Lanka, 2)	-2.071514	0.5294
1995-2018	D (Index- RPCITR –Thailand, 2)	-5.280775	0.0021

Note: D (Index- RPCITR, 1) is the first difference. D (Index- RPCITR, 2) is the second difference.

This helps policymakers subsequently convince them to assist tourism development and increase profitability from tourism activities, further able 5 has been depicted as a test for stationarity test by applying ADF test. Kuwait, Malaysia, Maldives, Myanmar and Singapore have shown significant stationarity at their first differenced values of index of RPCITR. On the other side, India, Nepal, Thailand and Sri-Lanka have also shown significant stationarity but at their second differenced values of index of RPCITR. Sri-Lanka has not shown even significant stationarity at second difference values. So, a time series regression is not possible to carry out as it may give spurious results in trend detection for Sri-Lanka. Now the simple time series regression has been carried out for each country using the second difference index of RPCITR in order to make uniformity and comparable. The results are presented in Table 4.

Table 4: Summary results of simple linear regression models for differenced Real Per Capita International Tourist Receipts

Country	Regression coefficients	F	R^2 (%)
India	-0.3615	0.8323	0.39
Kuwait	1.3291	0.6479	0.31
Malaysia	0.3933	0.2711	0.13
Maldives	-0.4468	0.0466	0.23
Myanmar	1.667	9.271	32.0
Nepal	1.315	1.217	5.73
Singapore	-1.630	0.251	1.24
Sri-Lanka	None	None	None
Thailand	-0.633	0.552	2.82

Dependent variable: Index-RPCITR. Independent variable: Year. *P-value is significant at less than 5%

Table 4 shows the coefficients of the regression models. All the models have insignificant coefficients. When all the coefficients are compared, Myanmar (1.667) shows the greatest value. It is then followed by Kuwait (1.3291), Nepal (1.315) and Malaysia (0.3933). They all have positive coefficients with varying values. This indicates that RPCITR has a good status in those countries. In this regard, Nepal has attained the third position achieving better RPCITR.

On the other hand, the pattern of India, Maldives, Sri-Lanka and Thailand is a negative sign in their coefficients. This implies that each of them has a downward tendency of RPCITR. Thailand has the least RPCITR compared to all the countries.

ARIMA model

Under this section, several ARIMA models are calibrated on the basis of identification of the models. Among them, the best one is selected for forecasting purposes. The target variables ITA and RPCITR are considered instead of index-ITA and index-RPCITR since the ARIMA model is only built for Nepal. The results of the stationarity test are carried out for the variables ITA and RPCITR for calibration ARIMA model (See Table 5).

Table 5: Augmented Dicky-Fuller test for stationarity

Period	Dependent variable	ADF test statistic (t-Statistic)	P-value
1962-2019	D (ITA, 1)	-8.088532	0.0000
1962-2018	D (ITA, 1)	-7.573104	0.0000
1962-2017	D (ITA, 1)	-8.473981	0.0000
1995-2018	D (RPCITR, 1)	-4.485292	0.0097

In Table 5, the p-values of the variables ITA and RPCITR are significant at 1% level of significance. Thus, the time-series of those variables are all stationary. This condition provides suitability to build the ARIMA model. Four steps are carried to build and use the model. They are identification, estimation, diagnostic checking and forecasting. However, Eviews 10.0 (Evaluation Version) (Quantitative Micro Software, 2010) offers an automatic ARIMA forecasting series procedure that allows a user to quickly determine an appropriate ARIMA specification and helps use it to forecast the series into the future. This method includes identification, estimation, diagnostic checking and forecasting at the same time.

In order to build a parsimonious forecasting model for the ITA, the time period 1962-2019 is divided into three different periods, viz. 1962-2017, 1962-2018, and 1962-2019. When the model is run for these different periods, the software has automatically produced sixteen different possible models for each period. So, there are altogether $3 \times 16 = 48$ possible ARIMA models. Figures 4, 6 and 8 show these models (see Appendix). Using minimum AIC, three best ARIMA models are selected and displayed in Table 6. Among these three models, the best of the best models is ARMA (0, 1) (0, 0) of the period of 1962-2017 since it has the smallest AIC (25.38) and the significant smallest SigmaQ (5.32E+09). It has no AR terms but has two MA terms MA (1) and MA (2) with the significant coefficients. Although the model ARMA has covered a longer period of 1962-2019, it contains only a constant term but no AR and MA terms. It means that it cannot capture the process of Differenced ITA

behavior. It has forecasted the ITA with a constant increasing rate for the period of 2019-2022 with the forecasted ITA between 11 lakhs and 15 lakhs. It's AIC and SigmaQ are more than that of the model ARMA (0, 1) (0, 0) of the period of 1962-2017. The best ARIMA model has the forecasted ITA between 8 lakhs and 10 lakhs (see Figures 5, 7 & 9 at Appendix).

Table 6: Summary results of ARIMA models for Idifferenced ITA and Rdifferenced of log of RPCITR

Period	Model	AIC	C	AR(1)	AR(2)	MA(1)	MA(2)	SigmaQ
I1962-2019	ARMA(0,0) (0,0)	25.51	20894.95**					
I1962-2018	ARMA(2,2) (0,0)	25.53	18884.81***	1.1691*	-0.9439*	-1.3710	0.9999	5.26E+09
I1962-2017	ARMA(0,1) (0,0)	25.38	15365.15*			-0.3108*	-0.2233***	5.32E+09*
R1995-2018	ARMA(2,0) (0,0)	0.126	0.04997	-0.0352	-0.4222***			0.046426**
R1995-2018	ARMA(0,2) (0,0)	0.134	0.051123			-0.05225	-0.4305	0.0464267*
R1995-2018	ARMA(0,0) (0,0)	0.059	0.050665					

Dependent variable: ITA/RPCITR. Independent variable: Year.

*, **, *** P-values are significant at less than 1% or 5% or 10%.

I indicate ARMA models for Differenced ITA.

R indicates ARMA models for Differenced log of RPCITR

Table 7: Actual and forecast for International Tourist Arrivals from ARMA (0,1) (0, 0) using the period of 1962-2017

Year	Actual	Forecast	Percent of absolute forecast error	Remarks
2018	1173072	879638.3	25.01	Actual ITA was impacted by COVID 19 during 2019-2020.
2019	1197191	860459.0	28.13	
2020	*230085	875824.1	287.33	
2021	None	891189.3	None	
2022	None	906554.4	None	

* Source: www.nepalisansar.com for ITA in 2020.

Table 8: Forecast for RPCITR from ARMA (2,0) (0, 0) using the period of 1995-2018

Year	Actual	Forecast
2019	None	687000000
2020	None	727000000
2021	None	807000000
2022	None	845000000

Table 7 demonstrates actual and forecast of ITA along with percent of absolute forecast error. The errors for 2018 and 2019 are about 25-28 percent. But that error in 2020 is dramatically larger (287.33%). This is due to the fact that the ITA was much affected by COVID-19 during 2019-2020. The forecast of ITA would be 891189.3 and 906554.4 in 2021 and 2022

respectively if there were no impact of the second and third wave of COVID-19 and other adverse factors.

Similarly a parsimonious forecasting model is built for the RPCITR using the time period 1995-2018. When the model is run using the software, there are automatically produced sixteen different possible models (see Figure 11 at Appendix). From Table 6, on the basis of minimum AIC, the best ARIMA models are found to be ARMA (2, 0) (0, 0). It has two autoregressive terms, AR (1), not significant, and AR (2), significant with the significant lowest sigmaQ. Table 10 demonstrates the forecast of RPCITR in dollars for four periods. The forecast of RPCITR is 687000000 in 2019, 727000000 in 2020, 807000000 in 2021, and 845000000 in 2022. These forecasted RPCITRs are expected to be precise if there is or will be no impact of the factors like COVID-19, WAR, etc.

Conclusion and recommendation

Graphical illustration shows that the position of Nepal is slightly higher than Singapore. In international tourist arrivals during the period of 1995-2019, the simple regression analysis has also supported the same scenario for Nepal. Nepal has the fifth position among them. Myanmar has the greatest coefficient (7.307) among them. It is followed by India (3.98), Thailand (1.954), Maldives (1.704), Nepal (1.372), Kuwait (1.252) and Singapore (0.737), and they all have positive coefficients. This implies that each of these countries has an increasing rate of international tourist arrival.

Graphical illustration shows that Nepal, Sri Lanka and India stabilized in the index of RPCITR after 2007 respectively in the period of 1995-2019. Then after, the index of RPCITR of Nepal is slightly increasing. It is also supported by the results of time series regression analysis. Nepal has attained the third position in the increasing rate of index of RPCITR among nine countries. However, Myanmar has attained the highest position in this regard.

ARMA (0, 1) (0, 0) of the period of 1962-2017 is the best model for forecasting the international tourist arrivals in Nepal. It has forecasted 879638.3 in 2018, 860459.0 in 2019, 875824.1 in 2020, 891189.3 in 2021, and 906554.4 in 2022.

ARMA (2, 0) (0, 0) of the period of 1995-2018 is the best model forecasting the real per capita international receipts in dollars The forecast of RPCITR are 687000000 in 2019, 727000000 in 2020, 807000000 in 2021, and 845000000 in 2022. The forecast of ITA and RPCITR for 2020 or 2021 may not match due to the impact of the world-wide pandemic of COVID-19.

The results of this study have recommended that Nepal has to give more efforts for tourist attraction. Then it can be expected that Nepal will gain substantially more growth in ITA and RPCITR. Consequently, this improvement and development in tourism in Nepal will contribute more to the gross domestic production as an indicator of economic growth of Nepal.

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Appendix

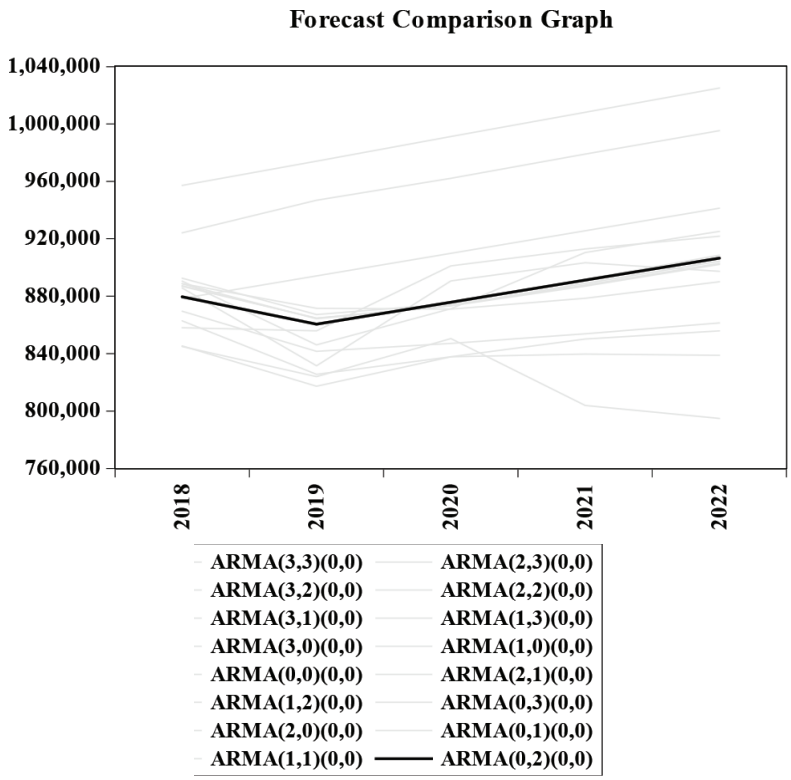

Figure 4: *Sixteen different ARIMA models with the best model of ARMA (0, 2)(0, 0) for the period: 1962 - 2017*

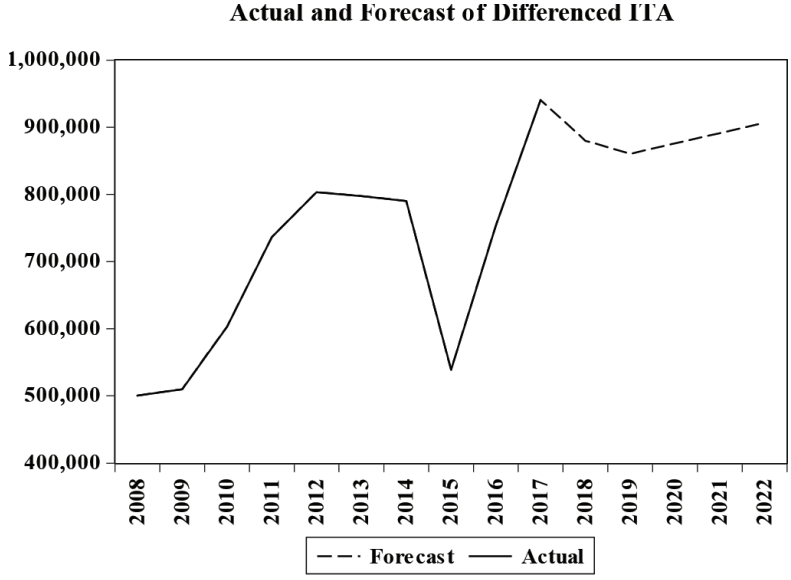

Figure 5: *Forecast of differenced ITA from ARMA (0, 2)(0, 0) for the period: 1962 - 2017*

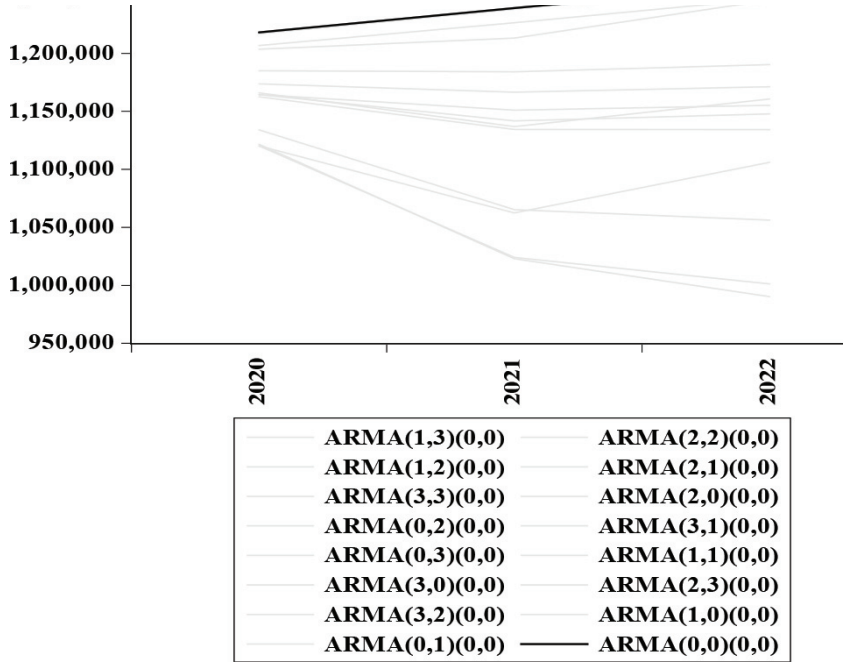

Figure 8: *Sixteen different ARIMA models of differenced ITA with the best model of ARMA (0, 0)(0, 0) for the period: 1962 - 2019*

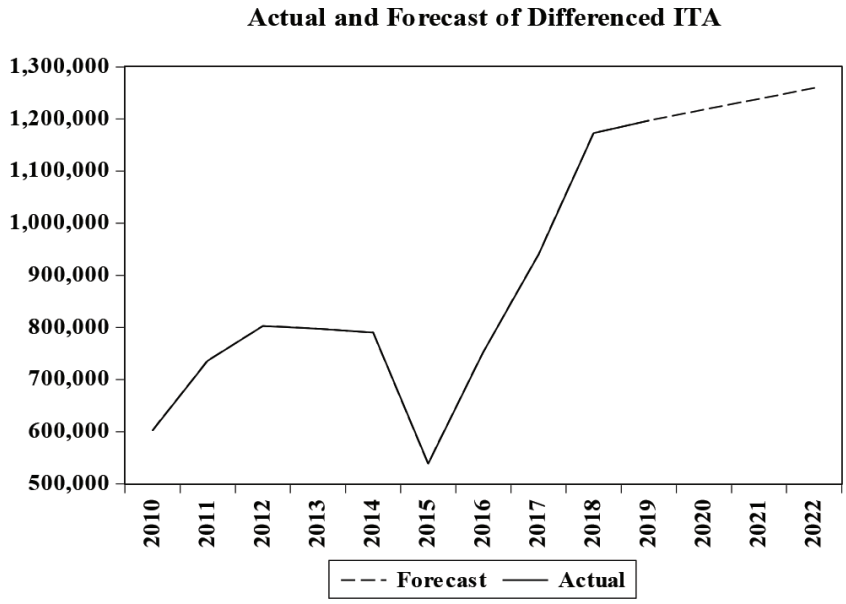

Figure 9: *Forecast of differenced ITA from ARMA (0, 0)(0, 0) for the period: 1962 - 2019*

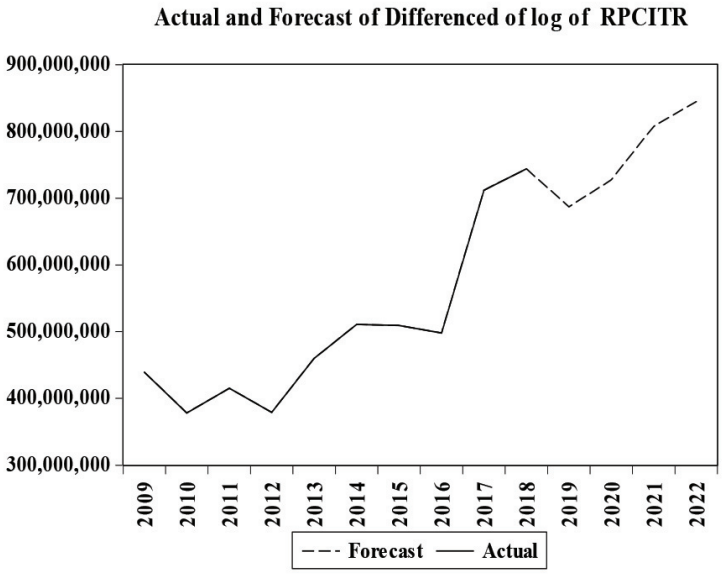

Figure 10: *Forecast of differenced of log of RPCITR from ARMA (2, 0)(0, 0) for the period: 1995 - 2019*

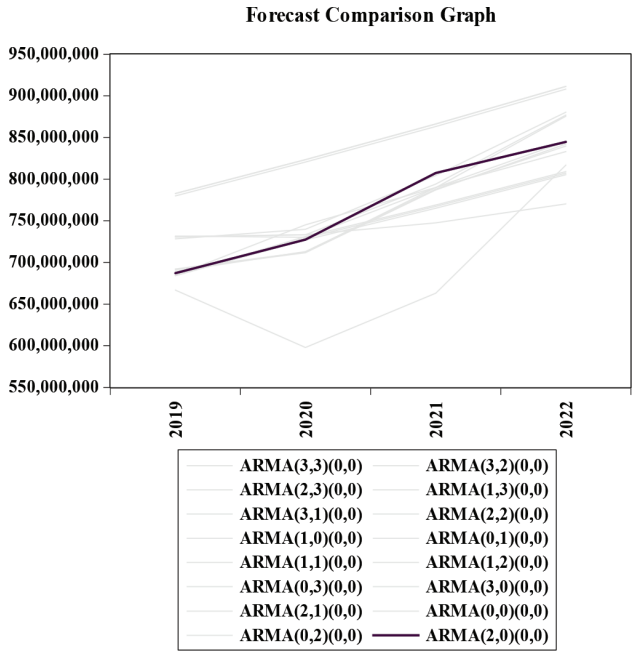

Figure 11: *Sixteen different ARIMA models of differenced of log of RPCITR with the best model of ARMA (2, 0)(0, 0) for the period: 1995 - 2018*