The Relation between Tourism Industry and CO2 Emission in Nepal

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Abstract

Tourism is one of the emerging service industries to enable the economic situation of the country. Protecting renewable resources can be a very important step to get more benefits from tourism industry. Tourism industry helps to increase energy emission in all most of the countries. Research studies have shown positive correlation between tourists' arrival and energy emission. This is a quantitative study based on the secondary data available from economic survey of Nepal and websites of ministry of tourism department. The result shows tourist's arrival by air helps to increase energy emission in Nepal more than tourists' arrival by land. It also shows that observing 43 years tourists' arrival number and energy emission (1971 -2014) using ARDL model to show significant relationship between tourist arrival and energy emission in Nepal. This study also implies that Nepal will be more benefited from tourism industry exploring new renewable resources than use of non-renewable resources.

Key words: Tourism, renewable resources, CO2, ARDL, tourists arrival

1.1 Introduction

Tourism is an emerging service industry in the world. The business or occupation which provides different kinds facilities to the tourists is called tourism industry. It provides different kinds services to the tourists such as hotel lodge management, travels agencies, trekking agents, rafting and many more services to tourists. It provides employment opportunities nearly 1,78,000 persons in Nepal (Economic Survey 2019/20).

Tourism is an industry where a person has totally freedom to visit one place to another (freedom to spend, to movement, to experience); they have to develop the relationship one to other communities for the exchanging culture, religious, business etc. (Kunwar, 2017, p.5).

Since past 40 years, approximately 30% foreign currency has been generated from the tourism industry)MOCTCA, 2018(. However, the trend of tourist's arrival rate moves upward and downward due to the natural calamities in 2015 and pandemic situation of COVID-19 in 2020. Moreover, the private institution is also playing effective role to promote the tourism industry in Nepal.

Nepalese economy is based on import-based economy, the tourism industry is only one sector to generate the foreign exchange earnings. In 2019, this industry contributes NPR 240.7 billion and generated 1.05 million jobs directly and indirectly (WTTC). Moreover, this industry's average contribution as a percentage was 7.9 %overall.

The largest population of the two countries in the world; China and India are emerging economies countries demanding more energy than the rest of the world. These two countries have used half of energy in the world.it is expected it will be double in coming year 2030 A. D (BPP&IEA). The government of China has announced, minimum $363 billion amount have been spent on expanding its renewable resources by 2020(IEA).

Lumbini is situated western part of Nepal, it is about 300km west of capital city of Nepal. Although it is 105 meters above the sea level. Siddhartnagar is the nearest town of Lumbini. It is located in the terai region so that in the summary season the trend of tourist's rate is very low than other seasons. The temperature in April, May and June is more than 40 degrees centigrade and during the period of January it is fall down up to 9 degrees centigrade (Nepal tourism Board.2000)

Nepal Government has allocated sufficient budget to make two international airports in Pokhara (beautiful city of the lake) and Lumbini (birthplace of Siddhartha Gautam Buddha) by launching a new Airbus 330-220 to severe a large number internal and external tourists. (MOF.2009)

Regarding the relationship between tourism and economic growth, Pablo-Romero and Molina (2013) state that literature on the causal relationship between tourism and economic progress is expanded since 2002. Similarly, Anto, nakakis et.al, (2016) have put the similar view that shows that the relationship between tourism and economic growth encompasses four key areas for tourism-led, economic-driven tourism growth, which are bizarre or unreasonable causes. Seeing the view from the researchers mentioned above, I draw the impression that the study area was broad and open to discussion because of its adequate and clear consensus on

the exact nature of the relationship between tourism and economic development. Thus, the main objective of this paper is to show the relationship between tourists arrival and CO2 emission

2 Literature Review

Tourism is the largest sector providing of well -being and employment in the world, it is also help to encourage to generate energy power for economic growth, both in low-earning income and highly earning income countries (Blazevic,2007).

It has play overall positive role on economic growth and employment opportunities. According to the European commission institution data, tourism industry is the third largest socio-economic activity in the European countries market than the construction and trade sectors. In the last decades, Europe plays a significance role in the overall international tourism flow, with a share of 51.40 (UNWTO,2015) in 2014.

Renewable energy is play importance role conservation natural resources without depleting existing resources for coming generation. If the human being uses it properly, it helps to fulfill the energy crisis in many countries. All most renewable energy farmhouses have been set up all over the world (Waugh D 2009).

The government of Nepal aims to obtain universal access to clean, dependable and affordable renewable energy solutions by 2030.Nepal government declared to provide subsidy who are interest to use renewable resources for their household and business purposes. It is expected to decrease dependence on traditional and imported energy by increasing access to renewable energy. Literature on the causal relationship between tourism and economic growth has been raised since 2002 and well summarized (Nepal, et.al 2019)

Therefore, renewable energy is inevitable for quality life and sound environment. It is because the well-educated people of any locality are conscious to generate and use renewable energy rather than imported and nonrenewable resources for their better and ensured future so that their life will also be cheap, healthy and independent. It is therefore, human civilization and society develop along with the availability of natural resources mostly of renewable resources. So, there is a deep relationship between human beings and renewable energy. Renewable resources preservation is necessary in order to preserve ecosystems as it is not only necessary to preserve ecosystem but also necessary equally to promote tourism sector as well (Munasinghe, M. 2007)

Similarly, in the Annapurna region of Nepal, people are aware about the renewable resources than non-renewable resources, observed 489 tourist's guesthouse, remote areas now regarded more luxurious than before, while tourists see renewable renewable energy as a cleaner alternative to burning paraffin or wood heat.   Tourism is recognized as a resource-intensive industry, so it is necessary to be accountable to sustainability on both local and global scale (Nepal SK, et .al 2008).

2.1 Sustainable Tourism

The concept of sustainable development was developed after the late 19th century to protect the sustainable resources. National Park in Australia and North America began to protect renewable resources. Sustainable development is possible without the depleting the existing resources. Environmentalism has been focused to use resources systemically. (Hall,1998). In the 20th century, governments of many countries were seriously concerned about the protecting the environment and the world conservation union was established in 1948 for the conservation existing resources.

Resources have been overused to meet needs of human beings which are increasing every day. Butler (1999) said that there is absence of specificity of human wants and human emerging needs are increasing day by day according to time, but resources are limited to fulfill their increased needs. Therefore, there is a great challenging of proper management of the resources today in the world. For Wall (1997) sustainable tourism focuses on single aspect rather than multiple one regarding maintaining order. On the other hand, sustainable tourism is considered with multidisciplinary concept dealing with sustainable development.

It is one of the unique tourism industries which might work in the favor of sustainable development work (Hunter,1995). Furthermore, sustainable tourism is not only limited with the environmental problems but also concerned with economic, social, political power and social equality (Hunter,1997). In addition to that sustainable development is also defined in wider view. It is the process of converting the fundamental principles of sustainable growth into the situation of tourism needs (Hardy &Beeton,2002).

2.2 Tourists Arrival and Co2 Emission

Tourism industry is also an accountability producing 5% carbon emission (Peeters & Dubois,2010). Moreover, there has been seen the uni-directional relationship between the tourist's arrival and CO2 emission in Pakistan during 1972 to 2013 (Sharif, et. al2017). In addition to that they have also added positive cause effect relationship between CO2 emission and tourists' arrival. Policy makers have advised to the government   to grow the economic activities for reducing the harmful effects of tourist's activities.

The variables have positive impact on financial development, energy used, Sub-urbanization and real GDP. To support the idea presented by the scholars, Solarin (2010) considered that   CO2 emission determines macroeconomics variables and tourists flow in Malaysia. As a result, there is proportionate relation between tourists' arrival with CO2 emission. Similarly, Durbarry and Seetanah (2014) also focused on the effect of tourist's arrival on CO2 emission by applying time series data of Mauritius over the period of 1978-2011.To obtain the result, they used autoregressive distributed lag (ARDL) model and finally they concluded that tourists' arrivals have a direct crucial effect on CO2 emission in short run-as well as long run.

Moreover, Moutinho, et. al (2015) developed the concept of energy effectiveness, economic productivity and CO_2 emission in tourism industry of Portugal. The disintegration analysis was supported out for CO_2 emission from 2000 to 2012.The result showed to institute an important impact in transport and apply a positive effect in CO_2 emission in tour operators and travel agencies. Policy makers are recommended to prepare categorical energy and tourism growth strategies for sustainable development for long period.

Recently, De Vita, et. al. (2015) come to conclusion that due the higher-level income level of people, especially tourism growth rate, the level of environmental degrading rate increases day by day in the world. To get the result, they have been used Environmental Kuznets Curve (KEC) model. Similarly, Lion et. al. (2015) shows relationship between trade -off, energy consumption efficiency and economic effectiveness, where in economic growth and development is seen more priority.

The world is fronting expanding in the investigation of petroleum product producing CO_2 emission grown by the of 6% annually during the period of 1990-2008 (Boden, et. al.2011).

3 Methodology

The study is mainly based on secondary sources of data. Tools for data collection in this research study includes reviewing various Government publications, public records, historical and statistical documents, journals articles published by Ministry of Culture, Tourism and Civil Aviation. As this study is mainly focused on secondary data i.e., data are already collected by researcher or sources other than the primary user. The tools in secondary data collection involves searching, internet surfing various publicly available documents, report published by government, central statistical bureau and review of articles journal published by researcher and scholars

3.1 Procedure for Selection of Model

After performing Unit root test and finding the integration order of variables, according to variable's stationarity and non-stationarity we select the appropriate model for analysis. As shown in flow chart below:
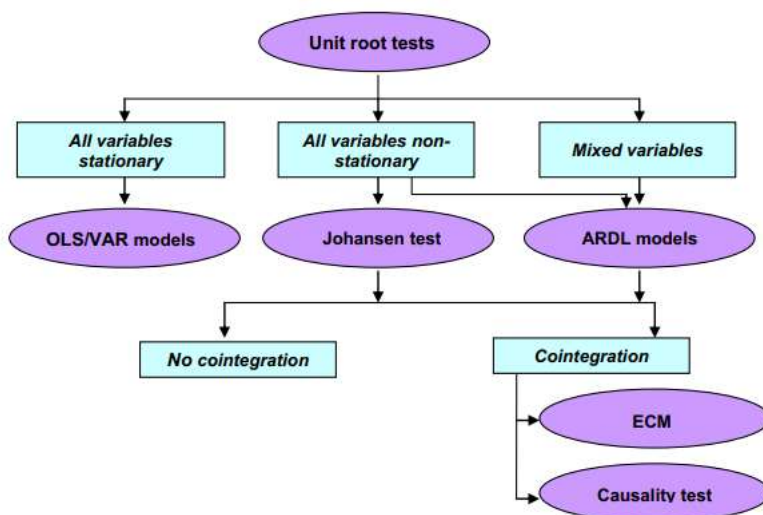
Note: According to variables or data's nature we can pivot and use alternative model in relation to nature of data and test required.

3.2 Model Selection

1.   If the all variables are stationary at levels, we will be using OLS (ordinary least square) model / VAR (vector auto regression) model.
2.   If the all variables are non-stationary, we will have to use Johansen test which is further categorized into co-integration and no co-integration models according to the presence of co-integration equation between the variables.
3.   If the variables are mixed (i.e., some variables are stationary at levels and other are non-stationary), then we have to use ARDL (autoregressive distributed lag) model, it is also further categorized into co-integration and no co-integration according to the presence of co-integration equation between the variables.

3.3 Model

Form the result of unit root testing and stationarity of the variables, we can conclude which econometric model we can apply for our proposed model which has been depict in model section. From the result of unit root testing, we found that the variables are mixed (i.e., some variables are stationary at levels and other are non-stationary), which means we can use ARDL (autoregressive

distributed lag) model to show relation between tourists' arrival and CO2 emission. and the presence of co-integration equation between the variables.

3.4 Autoregressive Distributed Lag Model (ARDL)

ARDL model is considered as the best econometric method compared to others in case when the variables are stationary at I (0) or integrated at order I (1) or mixture of both. Based on the study objectives, it is better model than others to capture short run and long run effect of macroeconomic variables on Nepalese stock market development.)Pesaran, Shin, & Smith, 2001(in their study concluded that auto regression distributed lag model can be applied to time series irrespective of whether the series are stationary at first difference or at levels or a mixture of both. The ARDL approach is appropriate for generating short-run and long run elasticities for a small sample size at dame time and follow the ordinary least square approach for cointegration between the variables. ARDL provides flexibility about the order if integration of the variables. However, it fails in the presence of second order integration or I (2) in any variable. A general autoregressive distributed lag model can be expressed as;

$$Y_t = \gamma_{0i} + \sum_{i=1}^{P} \delta_i Y_{t-i} + \sum_{i=0}^{q} \beta_i X_{t-i} + u_t$$

Where, Y_t is vector and the variables in X_t are allowed to be purely I (0) 0r I (1) or co-integrated; δ_i and β_i are coefficients; γ_{0i} is the constant; i=1,...., k; p, q are optimal lag orders; u_t is the white noise.

4 Finding/Result

The researcher collected the data of tourist's arrival number in Nepal from 1971 -2014 by air flight and by land to find out the relation between tourist's arrival and CO2 emission in Nepal. According to Ministry of Cultural, Tourism and Civil Aviation (2020), around 80% tourists from the third countries use airflight to visit Nepal and 20% tourists visit Nepal by land transportation.

Table . **Unit Root Result**

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	7.224289	10%	2.08	3
k	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

Selected Model: ARDL (2,1,1,0,1,1)

Dependent Variable: CO2

Dynamic regressors (2 lags, automatic): ENERGY _USE TABAIR TABLAND

GDPPCA, DCP_GDP

Selected model: Co2 = f (energy use, tabyair, tabyland, gdppca, dcp_

 GDP)

Thus, all the unit root test results shows that the variables are either integrated at levels or at first difference, that is, variables are either I (0) or I (1) but none of them are at I (2). Hence, mixed variables suggest ARDL model is applicable to the variables.

There exists long run relationship between the variables as F statistics> I(0) and I (1). Long run coefficients

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ENERGY_USE	0.002143	0.000852	2.515196	0.0206
TABAIR	5.34E-07	1.68E-07	3.183073	0.0047
TABLAND	-4.12E-07	2.26E-07	-1.824129	0.0831
GDPPCA	-0.000669	0.000489	-1.368948	0.1862
DCP_GDP	0.002199	0.001578	1.393646	0.1787
C	-0.499579	0.160103	-3.120358	0.0054

EC = CO2 - (0.0021*ENERGY_USE + 0.0000*TABAIR -0.0000*TABLAND
-0.0007*GDPPCA + 0.0022*DCP_GDP - 0.4996)

Significantly relates with Energy use and tourists' arrival by air (flight) because there is P-value are less than 0.05. Other are insignificant.

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CO2(-1))	-0.409171	0.107604	-3.802569	0.0011
D(ENERGY_USE)	0.000288	0.000139	2.074359	0.0512
D(TABAIR)	1.47E-07	3.21E-08	4.581631	0.0002
D(GDPPCA)	0.000280	0.000123	2.284611	0.0334
D(DCP_GDP)	-0.000278	0.000342	-0.814060	0.4252
CointEq(-1)*	-0.451582	0.055695	-8.108084	0.0000

Significant with CO2 and tourists arrival by air at the land because P- value is less than 0.05.

Testing of the time series properties of the model
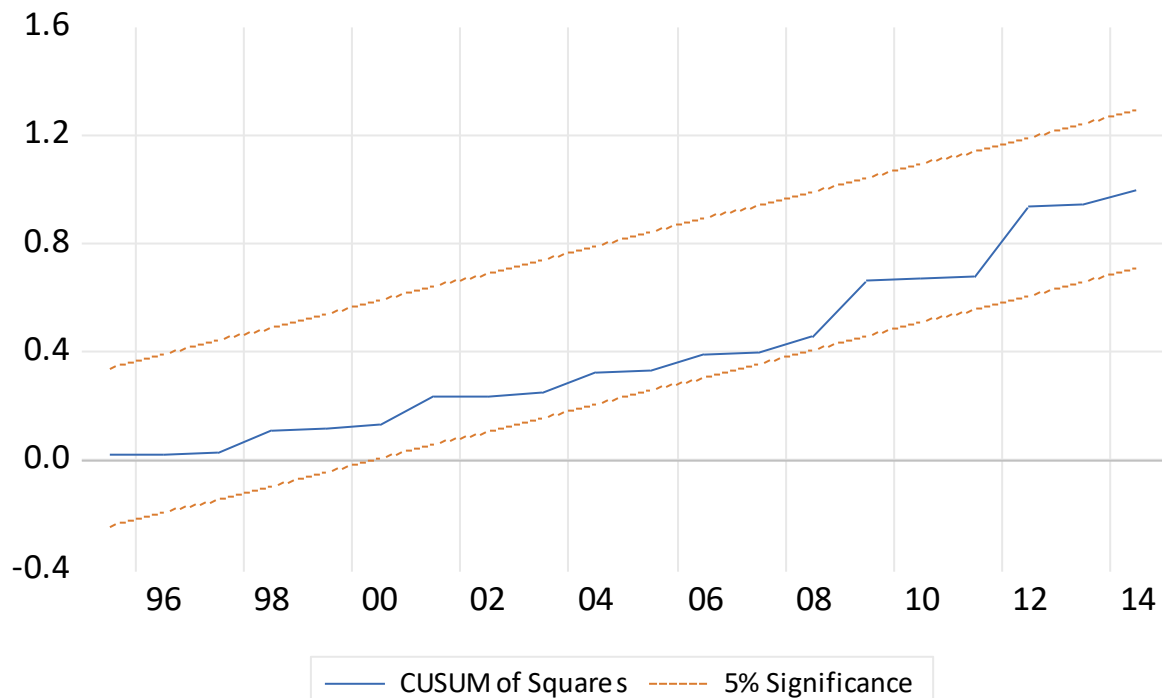
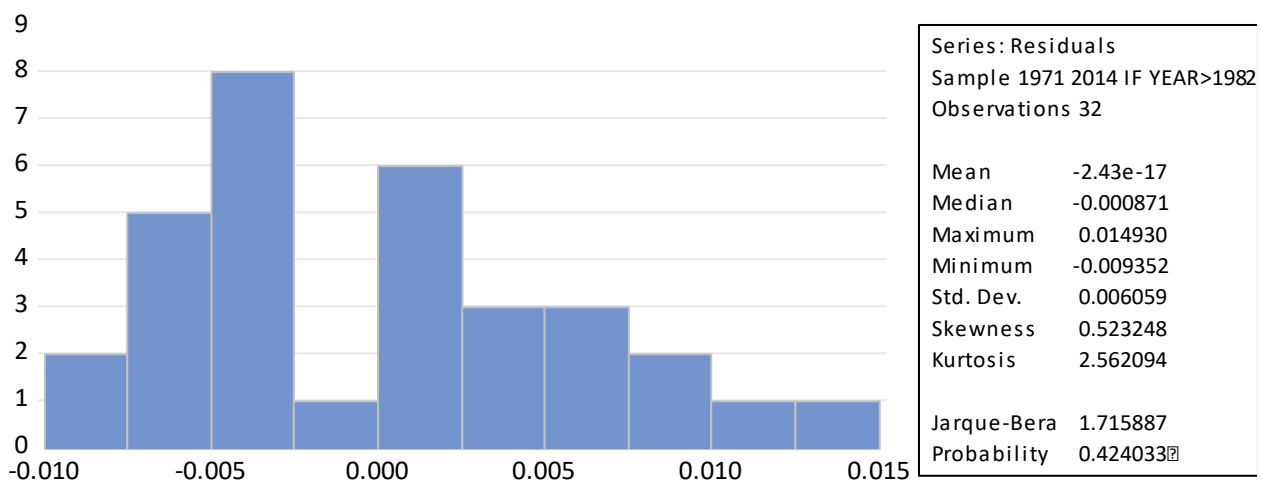It indicates that the model is stable.

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Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	0.849830	Prob. F(11,20)	0.5976
Obs*R-squared	10.19282	Prob. Chi-Square(11)	0.5131
Scaled explained SS	3.109792	Prob. Chi-Square(11)	0.9892

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

F-statistic	0.445672	Prob. F(2,18)	0.6473
Obs*R-squared	1.509845	Prob. Chi-Square(2)	0.4700

Normality test

Series: Residuals	
Sample 1971 2014 IF YEAR>1982	
Observations 32	
Mean	-2.43e-17
Median	-0.000871
Maximum	0.014930
Minimum	-0.009352
Std. Dev.	0.006059
Skewness	0.523248
Kurtosis	2.562094
Jarque-Bera	1.715887
Probability	0.424033

The model satisfies the all-time series properties.

The large influx of visitors in some mountain destination resulted in the accumulation of garbage left behind by trekkers and mountaineers including food cans and wrappers, bottles, empty oxygen cylinders, spent batteries and ropes. These materials increase stress on environmental by posing disposable problems. Trail erosion caused by increased trekking traffic is another adverse impact of adventure travel activities. Such activities help to increase CO_2 emission in Nepal. This finding also implies that increase in the tourist arrival has increased unmanaged pollutants especially in the areas of heavy tourists visiting destinations like Annapurna sites, Pokhara. Sauraha , Lumbini etc. The above presented tables and figures of data have shown this fact.

5 Conclusion

Based on the observation tourists' arrival and CO_2 emission from 1971 to 2014 of Nepalese data, it was concluded that there is positive relation between the tourists' arrival CO_2 emission in Nepal. CO_2 emission needs to take place more for the benefit in the tourism industry. At present, many tourism-based industries use non-renewable resources which cause tourists stay more days in comparison to other tourism-based economy countries. However, using renewable resources such as electricity, bio-gas, solar energy tec tourism industry can be reduced their operation cost in the long run. Policy maker should be serious about the existing environmental conditional of Nepal.

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