Please cite the Published Version

RESEARCH ARTICLE

How Strong Is the Linkage between Tourism and Economic Growth in Sri Lanka; Evidence From 1971-2020

E.V.D. Dilhani [1]*, N.R. Abeynayake [2]

[1] *Department of Economics, Faculty of Humanities and Social Sciences, University of Ruhuna, Matara, Sri Lanka*
[2] *Department of Agribusiness Management, Faculty of Agriculture and Plantation Management, Wayamba University, Sri Lanka*

Abstract: In the late twentieth and early twenty-first century, tourism is one of the leading industries in the world economy, including a number of employees, participation in social products, national income, and total consumption. This study was conducted to examine the relationship between tourism and the economy of Sri Lanka by considering the structural changes of both sectors during the 1971-2020 period. Quantitative research Methodology has been applied with preliminary and secondary time series analysis. Annual Gross Domestic Product and Annual Official Tourist Receipts were modeled in the study. Dummy variables were included to present the structural changes in the estimated time series models. Annual time series data were examined by estimating the time series regression model. The backward step-wise regression estimations were applied to find the best model with Minimum Absolute Percentage Error value for forecasted values. The selected model among all estimated models was significant under all model adequacy statistical tests and that was sound enough to provide appropriateness of the tourism-led growth hypothesis to Sri Lanka. Sri Lanka is facing an economic crisis basically due to the excessive exchange rate for the US$ and the lack of Dollars in Sri Lankan reserve funds. It is possible to keep more attention on the tourism development of Sri Lanka as an immediate action to recover Sri Lanka from this rapid economic instability.

Keywords: Gross Domestic Product, Official Tourist Receipts, Structural Changes, Ordinary Least Square estimations.

Introduction

The tourism sector is a leading sector of economic growth in many countries. Tourism is one of the top six export earners to Sri Lanka (Ranasinghe and Sugandika, 2018). After ten years of civil war Sri Lanka was recognized as the best country in the world to visit in 2019 by Lonely Planet (As cited by Karunarathne et all, 2021; Suresh and Senthilnathan., 2014). In 2019, the contribution of tourism to the local Gross domestic product was 4.3% (SLTDA, 2020). Tourism increases employment opportunities, infrastructure facilities, and foreign remittance to the economy (SLTDA, 2020). Asia and the Pacific region is the second-largest area in tourist arrivals and tourist receipts (UNWTO, 2008; as cited by Ranasinghe and Sugandika, 2018). Tourism makes a significant effect on the economy of Asia and the

Pacific region. As a small country, Sri Lanka is rich in many sources to attract tourists to the country. The expansion of tourism affects economic growth directly and indirectly. The development of infrastructure facilities in tourism courses increases tourist demand, employment opportunities, and the income level of the people who work in the tourism sector. Tourism affords foreign investments, the latest knowledge, and new technological knowledge to the host country. Directly and indirectly those courses to the economic development in the host country. The World Tourism Organization said tourism is the fourth-largest industry in the world in 2008 (Ertugrul & Mangir, 2015). Many developing countries invest their human capital in tourism. WTO stated that tourism is the leading industrial channel 83% out of developing countries (Ertugrul & Mangir, 2015). Tourism has two deviations as National tourism and International tourism. According to the

corresponding author: danushka@hss.ruh.ac.lk https://orcid.org/0000-0002-7660-3241

United Nations World Tourism Organization (UNWTO, 2008, as cited by Ranasinghe and Sugandika, 2018), International tourism is defined as "International tourism comprises the activities of people traveling to and staying at places outside their usual places of residence for a period not exceeding 12 months for leisure, business and other purposes (p.67)". The research examined the international tourism sector along with the Official Tourist Receipts to model the effect of international tourism in Sri Lanka. The Gross Domestic Product (GDP) of Sri Lanka has been utilized to estimate the economic sector of Sri Lanka in the research. There were various socio-economic incidents during the considered period in Sri Lanka. Some of those incidents are Tsunami natural disaster in 2004, the Civil war which ended in 2009, the Easter Sunday bomb attack in 2019, and the COVID-19 global pandemic from January 2020 onward. The study was limited to study the data from 1971 to 2019 due to the unusual behavior of the tourism sector during the COVID-19 pandemic situation. The general pathway of tourism has been changed under the effect of Covid 19 pandemic in Sri Lanka. There were some policies and actions during the pandemic period to close the country. Tourist arrivals from April 2020 to November 2020 have been zero (SLTDA, 2020). The National Human Resource Development Council of Sri Lanka found that many people had lost their jobs in the tourism industry as a result of COVID- 19 pandemic situation in 2020. According to the statistics, 36% of low-skilled workers, 36% of semi-skilled workers, and 28% of, middle and junior level lost their jobs in the tourism industry in Sri Lanka. The objectives of the research were to model the empirical relationship between tourism and the economic development of Sri Lanka under the various socioeconomic incidences to identify the appropriateness of the tourism-led growth hypothesis to Sri Lanka as a sustainable development strategy. Among Various studies in the field, the majority did not consider the structural changes of variables in their estimated empirical models (Jayathilake, 2013; Govdeli and Direkci, 2017; Stryzhak, 2019; Tabash, 2017; etc.). Some authors have addressed the structural changes in the model but they did not consider breaks of variables in the unit root tests (Jacobson & Mustafa, 2019; Ranasinghe & Sugandika, 2018; Lelwala & Gunarathne, 2008; Allare et al, 2011; etc.). The potential confusion of structural breaks in the series is evidence of non-stationary and those are providing spurious results. This research constructed a sound empirical background for accurate statistical estimations in the field. The structural breaks of variables were considered in unit root tests for the first time in the

field and the statistical models as well. The findings and conclusions of the research can be assumed as more precise and accurate than the other previous studies in the field. That identification increased the significance of the research in the tourism field and economic sector too. The major limitation of the study was the COVID-19 pandemic. There were zero tourist arrivals to the country due to the travel restrictions to Sri Lanka during the 2020 to 2022 period. The empirical analysis was limited to the data from 1971 to 2019.

Methodology

Quantitative methods have been used to study the empirical relationship between time series variables. The study used annual time series data from 1971 to 2019. The economic sector has been presented in the statistical models by the Gross Domestic Product (GDP) of Sri Lanka and the effect of tourism on the economy has been presented in the model by Official Tourist Receipts (OTR) of Sri Lanka. Both variables were in US$ Millions and both variables were from 1971 to 2019. The central bank annual report of Sri Lanka (CBSL, 2020) and the Annual reports of the Tourism Development Authority of Sri Lanka (SLTDA, 2020) was the secondary data sources of the study. Log transformation of the bot variable has been applied to convert the exponential behavior of both variables into additive form before the model estimations. Dummy variables were included in the model to represent the structural breaks in the time series models. The adaptation of dummy variables as structural changes in variables into the models adapted the biggest advantage of the present study, especially in unit root tests. Several researchers have studied the relationship between tourism and Economic growth empirically (Stryzhak, 2019; Tabash, 2017; Ranasinghe & Sugandika, 2018; etc.). Some of them are from Sri Lanka. Some have addressed the structural changes in the model but did not consider it at the unit root test (Mustafa, 2019; Ranasinghe & Sugandika, 2018; Lelwala & Gunarathne, 2008; etc.). A well-known weakness of some traditional unit root tests is their potential confusion of structural breaks in the series as evidence of non-stationary. They may fail to reject the unit root null hypothesis if the series has a structural break. For the series that are found to be I(1), there may be a possibility that they are in fact stationery around the structural break(s), I(0), they may erroneously be classified as I(1). The ordinary Least Square linear estimation model has been applied to model the behavior of tourism in the Economic sector of Sri Lanka. Some authors have mentioned that multiple linear regression estimations

for time series analysis may generate spurious results often (Lelwala & Gunarathne, 2008). But it is possible to apply a regression analysis for time series variables under the stationary situation I (0) of all-time series variables of the model. All assumptions of a regression model should be considered carefully for time series models. The Ordinary Least Square estimation technique was developed as a stepwise-backward analysis. The higher-order model with all possible variables has been estimated first. The rejected variables have been removed and estimated the models again and again until the best model is below. Finally, the best-fitted model among all estimated models has been selected to conclude the research. The higher-order model of the research was as follows.

$$LGDP_t = \mu_t + \beta_0 LOTR_t + \beta_1 LGDP_{t-1} \\ + \beta_2 LOTR_{t-1} + \beta_3 LGDP_{t-2} \\ + \beta_4 LOTR_{t-2} + \beta_5 D_{gdp1} \\ + \beta_6 D_{gdp2} + \beta_7 D_{gdp3} + \beta_8 D_{gdp4} \\ + \beta_9 D_{OTR1} + \beta_{10} D_{OTR2} + e_t$$

(Eq. 01)

Where,

$LGDP$=Log transformed Gross Domestic Product of Sri Lanka

μ_t= Intercept

β_k = Coefficients of variables(K=0,1,2,3,4,5,6,7,8,9,10)

$LOTR$=Log transformed Official Tourist Receipts to Sri Lanka

$D_{gdp(i)}$= Dummy variable to capture structural breaks in GDP (i=1,2,3,4)

$D_{otr(j)}$= Dummy variable to capture structural breaks in OTRj, where (j=1,2)

e_t=Residual

The conclusion of the study was based on the best-fitted model among all estimated models in back-word step vice estimation. The model adequacy was tested along the residual analysis, R squared value, Adjusted R squared value, AVOVA test, Durbin Watson (DW) statistic, and CUSUM squared recursive estimation test. The Mean Absolute Percent Error (MAPE) of the forecast of the model has been

used as the criteria for the best model. There were some zero tourist arrivals to Sri Lanka during the Covid 19 epidemic due to the international travel restrictions to Sri Lanka. Many countries closed their borders and urged their citizens not to travel abroad or to minimize foreign travel and Sri Lanka also was closed.

Results and Discussion

Preliminary analysis

The preliminary analysis of the study was about the summary statistics of the variables. Table 1 shows the descriptive statistics of the variables. The deviation of GDP has more deviation than the OTR in Sri Lanka during the study period. The graphical representation of variables explains more about the variables in Fig. 1 and Fig. 2.

Table 1: Descriptive statistics of GDP and OTR

Variable	Mean	Max. value	Min. value	St. dev.
GDP	25138.49	88385.00	2365.000	28232.20
OTR	645.7837	4380.600	3.4000	1128.154

The time series line graphs of the annual GDP and annual OTR of Sri Lanka were presented in Figure 01 and Figure. 2 respectively. Time series line plots were used as a part of the preliminary study and as an approach to identify the stationary.

Fig. 1 and Fig. 2 were variance stationery and the mean was not stationary in both variables there. And it seems that there is exponential behavior in both variables.
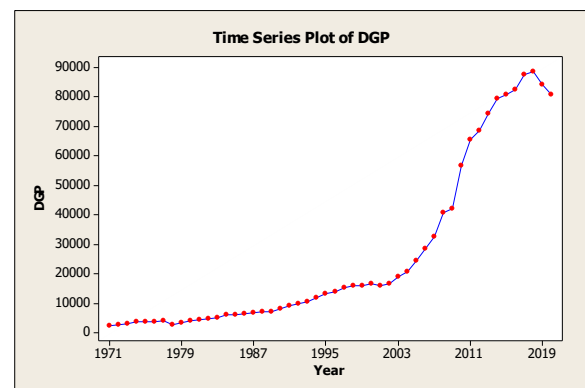

Figure. 1 Gross Domestic Product of Sri Lanka from 1971 to 2019 in US$
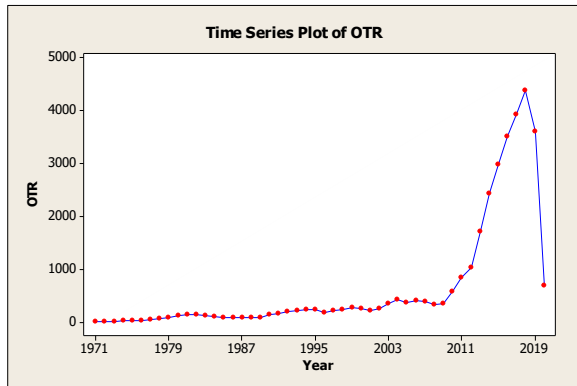
Source- Central Bank Annual Report 2019

Figure. 2 Official Tourist Receipts to Sri Lanka from 1971to 2019 in US$

Source- Tourism Development Authority of Sri Lanka

The autocorrelation function (ACF) and partial autocorrelation function (PACF) can be used to identify the stationary variables as a graphical method. Both figures provided a tentative idea that there may be some structural breaks in both variables which were in Fig. 1 and Fig. 2.

Fig. 1 to Fig. 2 presented an upward trend in both series for a long time and that has turned to a downward trend at the end of the graphs in 2019 suddenly. There were special incidences since 2019 such as the Easter Sunday bomb attacks and the beginning of the COVID-19 global pandemic. Those cases have directly affected the tourism sector in Sri Lanka evidenced in Figure 02. This study paid the attention to making significant accurate empirical conclusions for the field of tourism as a sustainable approach to increasing the economy of the country. Tourism makes many improvements for the host country. Employment opportunities generation is a leading function (Dilhani et al., 2022).

LGDP and LOTR annual data bivariate analysis

Both variables were converted into a Log model to convert the exponential behavior into an additive approach. Then stationary variables were checked under the s unit root test. The effect of structural breaks on both variables has been examined under the CUSUM square stability test and the best model was selected using the mean absolute percentage error value of the estimated models. The Break unit root test confirmed that both series were stationary at their level forms. Test results of the Augmented Dickey Fuller break unit root tests are presented in Table 2.

Table 2: ADF unit root test results of variables with structural breaks at level form.

Variable	T Statistic	Test Critical Value		P Value
		α=0.01	α=0.05	
LGDP	-4.990737	-5.347598	-4.859812	0.0341
LOTR	-3.946372	-3.984043	-3.436170	<0.025

The significance of structural breaks of both variables was tested under the Bai-Perron tests of L+1 vs. L sequentially tests and the suggested breakpoints have been confirmed using Recursive estimation CUSUM square tests. There are some approaches to study about the structural changes in a time series variable. Chow test, Chow test with Toyoda mechanism, Quandt test, Andrews Sup F test, Bai-perron class of test, Sup Walt test, and CUSUM of the squared test are some of them (Muthuramu & Maheswari, 2019; Lin & Lee,2013). The Bai-Perron test of L+1 vs. L sequentially determined breaks for both variables were presented in Table 3 and Table 4. There are some classifications in structural break tests also as single breaks, multiple breaks, unknown structural breaks, and unknown structural breaks. Unknown multiple structural breaks have been estimated here.

Table 3 shows that there were four structural breaks in GDP and three of them were significant in the study period. Those breaks were in 1982, 1990, 1997, 2004, and 2011.

Table 3: Bai-Perron test of L+1 vs. L sequentially determined breaks for LGDP

Break Test	F-Statistic	Scaled F-Statistic	Critical Value**
0 vs. 1 *	127.53	127.53	8.58
1 vs. 2 *	61.17	61.17	10.13
2 vs. 3 *	38.09	38.09	11.14
3 vs. 4 *	24.45	24.45	11.83
4 vs. 5 *	18.33	18.33	12.25
* Significant at the 0.05 level.			
** Bai-Perron (Econometric Journal, 2003) critical values.			
Break dates:		Break dates:	
1		1982	
2		1990	
3		1997	
4		2004	
5		2011	

Table 4: Bai-Perron test of L+1 vs. L sequentially determined breaks for LOTR

Break test	F-statistic	Critical Value**
0 vs. 1 *	77.60	8.58
1 vs. 2 *	53.15	10.13
2 vs. 3 *	25.48	11.14
3 vs. 4	7.28	11.83
* Significant at the 0.05 level.		
** Bai-Perron (Econometric Journal, 2003) critical values.		
Break dates		Repartition
1		1980
2		1992
3		2011

Table 4 shows that there were two structural breaks for the OTR of Sri Lanka during the study period. The breakpoints of OTR were in 1980, 1992, and 2011.

Linear ordinary least square estimations for the higher order model in equation 01 have been done first. The best model has been developed as a result

of backward stepwise regression estimations. The model which confirms more accurate details has presented in Table 5 below. The T statistics and their respective p values, ANOVA test of the model (F statistic and its respective p-value), R^2 Value, Adjusted R^2 Value, Durbin Watson value, CUSUM square test for Recursive estimations test and forecasts and Mean absolute percentage error value have been presented below. The best Ordinary Least Square estimated model has been mentioned in equation 02 and the estimated model has presented in Table 5.

$$LGDP = C + LOTR + LOTR(-1) + LGDP(-1) + LOTR(-2) + LGDP(-2) + D1 + D2 + D3 + D4 + e$$

……………….(Eq. 02)

Table 5 says R^2 and Adjusted R^2 of the model in equation 02 is evidently explaining 99% of the variability of the dependent variable by the independent variables of the model. The ANOVA model of the equation is also significant. The overall validity of the model has been confirmed via the F statistic of the model. The DW value is close to 2.

The recursive estimation CUSUM square graph presented in Fig. 3 shows a significantly stable behavior of the estimated model for equation 02.

Table 5: Estimated Regression Model for equation 02

| Variable	Coefficient	Std.error	T-statistics	P value
C	2.356	0.637	3.698	0.001
LOTR	0.190	0.092	2.056	0.047
LOTR(-1)	-0.179	0.139	-1.291	0.205
LGDP(1)	0.640	0.153	4.183	0.000
LOTR(-2)	0.037	0.091	0.401	0.690
LGDP(-2)	0.120	0.149	0.801	0.428
D1	-0.574	0.144	-3.987	0.000
D2	-0.415	0.114	-3.628	0.001
D3	-0.292	0.090	-3.229	0.003
D4	-0.261	0.071	-3.661	0.001
R^2		0.994		
Adjusted r^2		0.992		
F statistics		633.480		
P (f statistics)		0.000		
Durbin Watson Test Statistic		2.218		
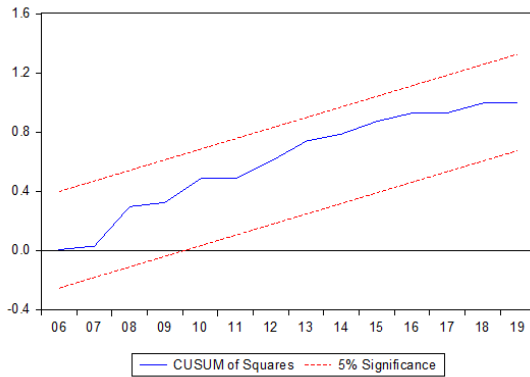
Figure. 3 Recursive estimation, CUSUM square test for estimated equation 02 (Y axis- CUSUM square values/ X axis-years)
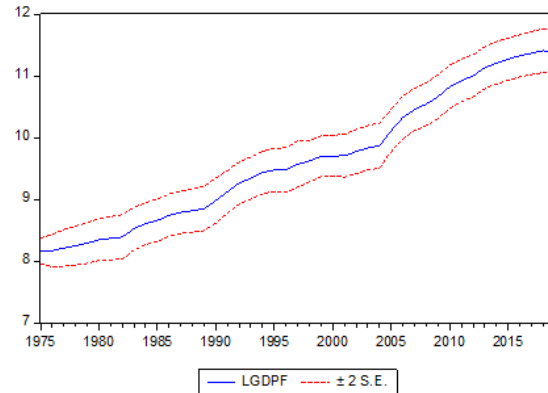Source- Eviews 09

Figure. 4 Forecast Values for estimated equation 02 (Y axis-CUSUM square values/ X axis-years)
Source-Eviews 09

Fig. 4 presented the forecasted model for equation 02. The Mean Absolute Percent Error (MAPE) of the model is 0.6447. There was enough statistical evidence to prove that the selected model among all estimated models was the best model to represent the relationship between GDP and OTR in Sri Lanka during 1971-2019. From the conclusions, it was clear that the dummy variable represented the structural break in the tourism sector and the third dummy variable of GDP have been rejected from the model. Included two auto regressive variables of GDP and OTR also have been rejected. OTR has a positive impact on GDP. When OTR changes the GDP of SRI Lanka is changing in the same direction.
That says the increase of OTR creates a positive impact on GDP and vice versa. The structural breaks were tested in the research as unknown structural breaks. The significant breakpoints are approximated to the socio-economic problems ware in Sri Lanka during the study period. The significant two dummy variables made negative impacts on GDP. There was enough statistical evidence to prove the positive significant effect of the tourism sector on the GDP of Sri Lanka from 1971 to 2019 period.

Conclusion

The main objective of the study was to examine the relationship between the tourism and economy of the country under the various impacts of structural changes in tourism and economic fields in Sri Lanka

during the study, period to find out the appropriateness of the Tourism led growth hypothesis to Sri Lanka. The study was focused on empirical time series statistical analysis. The major finding of the research was OTR has a positive impact on GDP. When OTR changes the GDP of SRI Lanka is also changing in the same direction. The national human resource development council of Sri Lanka found that many people lost their jobs in the tourism industry in 2020 (Udani, 2021). As a result, 36% of low-skilled workers, 36% of semiskilled workers, and 28%of middle and junior-level management lost their jobs in the tourism industry in Sri Lanka in 2020 (Udani, 2021). Tourism makes many improvements for the host country. Employment opportunities generation is a leading function (Dilhani et al., 2022). Tourism invests foreign direct investment to the host country and it is a major foreign remittance inflow to the country. Finally, the study provided enough statistical evidence to prove that the tourism-led growth hypothesis is appropriate to Sri Lanka empirically. Nowadays, Sri Lanka suffered from an economic crisis due to the excessive exchange rate for the US$ and the lack of Dollars in Sri Lankan reserve funds. It is possible to keep more attention on the tourism development of Sri Lanka as an immediate action to recover Sri Lanka from this rapid economic crisis.

Acknowledgment

Reference

Allaro, H. B., Kassa, B., & Hundie, B. (2011). A time series analysis of structural break time in the macroeconomic variables in Ethiopia. *African Journal of Agricultural Research*, *6*(2), 392–400. https://doi.org/10.5897/AJAR10.016

Brida, J. G., & Pulina, M. (2010). A literature review on the tourism-led-growth hypothesis Spanish Hotel Industry View project. https://www.researchgate.net/publication/2543 99592

Central Bank Annual Report (2017), 2018, Sri Lanka

Dilhani, E. V. D.,Gamage, A. & Jayasekara, A. J. (2022). Impact of Tourism on Generation of Employment in Sri Lanka: A Time Series Analysis Demographic Studies View project Tourism Modeling View project. https://www.researchgate.net/publication/3584 02195

Ertugrul, H. M., & Mangir, F. (2015). The tourism-led growth hypothesis: empirical evidence from Turkey. Current Issues in Tourism, 18(7), 633–646. https://doi.org/10.1080/13683500.2013.868409

Govdeli, T., & Direkci, T. B (2017). The Relationship between Tourism and Economic Growth: OECD Countries. *International Journal of Academic Research in Economics and Management Sciences*, *6*(4), 104–113. https://doi.org/10.6007/ijarems/v6-i4/3489

Jacobson, D., & Mustafa, N. (2019). Social Identity Map: A Reflexivity Tool for Practicing Explicit Positionality in Critical Qualitative Research. International Journal of Qualitative Methods, 18, 1–12. https://doi.org/10.1177/1609406919870075

Jayathilake, P. M. B. (2013). Tourism and economic growth in Sri Lanka: evidence from cointegration and causality analysis. Intrnational Journal of Business, Economics and Law, 2(2), 22–27. http://ijbel.com/wp-content/uploads/2014/06/Tourism-And-Economic-Growth-In-Sri-Lanka-–-Evidence-From-Cointegration-And-Causality-Analysis-P.M.-Bandula-Jayathilake.pdf

Karunarathne, A. C. I. D., Ranasinghe, J. P. R. C., Sammani, U. G. O., & Perera, K. J. T. (2021). Impact of the COVID-19 pandemic on tourism operations and resilience: stakeholders' perspective in Sri Lanka. *Worldwide Hospitality and Tourism Themes*, *13*(3), 369–382. https://doi.org/10.1108/WHATT-01-2021-0009

Lelwala, E. I., & Gunaratne, L. H. P. (2008). Modelling Tourism Demand using Cointegration Analysis : A Case Study for Tourists Arriving from United Kingdom to Sri Lanka. Tropical Agricultural Research, 20, 1997–2006.

Lin, C. J., & Lee, T. S. (2013). Tourism Demand Forecasting: Econometric Model based on

Multivariate Adaptive Regression Splines, Artificial Neural Network and Support Vector Regression. In Advances in Management & Applied Economics (Vol. 3, Issue 6). Online) Scienpress Ltd.

Muthuramu, P., & Uma Maheswari, T. (2019). Tests for Structural Breaks in Time Series Analysis: A Review of Recent Development. Shanlax International Journal of Economics, 7(4), 66–79. https://doi.org/10.34293/economics.v7i4.628

Ranasinghe, R., & Sugandhika, M. G. P. (2018). The Contribution of Tourism Income for the Economic Growth of Sri Lanka. *Journal of Management and Tourism Research*, *I*(II), 67–84.

Sharma, N. (2018). Tourism led growth hypothesis: empirical evidence from India. In African Journal of Hospitality, Tourism and Leisure (Vol. 7, Issue 2). http//:www.ajhtl.com

SLTDA. (2020). Annual Statistical Report of Sri Lanka Tourism. 1–120. https://www.sltda.gov.lk/storage/common_media/Annual Stastistical Report 2021 -Final 25.4.20223624932970.pdf

Stryzhak, O. (2019). Assessment of the relationship between the tourism sector development and other sectors of economy. *Economics of Development*, *18*(2), 10–18. https://doi.org/10.21511/ed.18(2).2019.02

Suresh, J., & Senthilnathan, S. (2014). Relationship between Tourism and Economic Growth in Sri Lanka. *SSRN Electronic Journal*, *January*. https://doi.org/10.2139/ssrn.2373931

Tabash, M. I. (2017). The Role of Tourism Sector in Economic Growth: An Empirical Evidence From Palestine. *International Journal of Economics and Financial Issues*, *7*(2), 103–108. https://www.econjournals.com/index.php/ijefi/article/view/3893

Udani, B. A. K. (2021). Analysing the impact of Covid-19 on Sri Lanka Economy https://www.semanticscholar.org/paper/Analysing-the-Impact-of-COVID-19-on-Sri-Lanka-Udani/9ee1422385807c06338ce3f6a94453fb210703e2