



Effect of Natural Disasters and Terrorism on Tourism Growth: Evidence from Top Ten Tourist's Destination

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ABSTRACT

Tourism is influenced by a wide range of factors and forces including exogenous ones that have no direct link to the tourism industry. Terrorism and natural disasters are two examples of such factors. Individuals, organizations and culture, all are affected by them. This study analyzes the impact of natural disasters and terrorism on tourism growth by using a panel data for the period 1995-2019 collected from a variety of sources. Tourism is the dependent variable whereas natural disasters, terrorism are independent and economic growth, tourism employment, tourism investment and alcohol consumption are the control variables of the study. This study used pooled mean group and robust least square estimation. The findings show that natural disasters and terrorism have varying degrees of impact on tourism growth. While there is a positive outcome in some situations, the overall influence is negative. Findings of the study suggest that understanding the relationship between natural disasters, terrorism, and tourism is beneficial to destination operators who are responsible for rehabilitation, restoration, and promotion.



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1. Introduction

Tourism is one of the great industrial sectors of the world (Sofronov, 2018). Tourism is a billion-dollar sector that ranks among the top three businesses in most countries worldwide regardless of their level of growth (Bojanic & Lo, 2016). The World Travel and Tourism Council (WTTC) predicts that, due to the Corona virus disease of 2019 pandemic, hundred million jobs are at risk and US\$2.7 trillion in sales may be lost globally in 2020 (WTTC, 2020). Due to persistent mobility constraints, the travel & tourism sector's contribution to the global GDP fell from 10.3% in 2019 to 5.3 percent in 2020. The percentage increased to 6.1 percent in 2021. Domestic and international visitor spending climbed by 31.4 and 3.8 percent respectively in 2021, after falling by 47.4 percent and 69.7% respectively in 2020 (WTTC, 2021). Tourism contributes to the development of local communities and the reduction of poverty (Manzoor, Wei, Asif, Haq, & Rehman, 2019). Travel and Tourism is not only the main source of employer in some

island economies, it is the only employer effectively (Budeanu, 2005). Broadly speaking, tourism planning can optimize tourism benefits for local communities and economies can facilitate the sound use of resources (Rahmafritria, Pearce, Oktadiana, & Putro, 2020). In addition, tourism has long been considered as a way of enhancing understanding and peace among nations (Nawaz & Hassan, 2016). The biggest annual human migration in history is due to tourism (Budeanu, 2005).

Tourism is important for social development, cultural exchange, improving living standards, fostering cultural preservation (e.g. museums, monuments) and promoting local people's interest in their birthplace (Budeanu, 2005). Earnings from tourism enhance the trade in goods and services in overseas countries. The sector also finances the imports of capital goods to grow the manufacturing sector of the economy (Manzoor et al., 2019). The contribution of tourism to employment appears to be marginally higher (Habibi, Rahmati, & Karimi, 2018). In many nations around the globe, international tourism has become increasingly significant. Third world countries began tourism in the age of globalization to advance their economies, foster stability, improve human capital and to reduce the level of poverty (Manzoor et al., 2019). Tourism planning is heavily focused on problem solving, and because of the importance of considering contextual problems, such planning approaches should be able to provide strategic insights (Rahmafritria et al., 2020). In most countries, tourism revenues are regarded as a replacement for export earnings and they contribute a great deal to the balance of payment of the countries (Manzoor et al., 2019).

WTTC is working to increase awareness that travel and tourism is one of the largest economic sectors in the world, cultivating one out of ten jobs (330 million) worldwide and producing 10.3% of global Gross Domestic Product (GDP). WTTC has been conducting research on the economic effects of Travel and Tourism in 185 countries for the past 30 years. The Travel and Tourism sector witnessed growth of 3.5 % in 2019, surpassing the global economy growth by 2.5% for the ninth consecutive year. The sector has generated one in four new jobs over the past five years, making Travel and Tourism the best job-generating partner for governments (WTTC, 2019). According to United Nations World Tourism Organization International (UNWTO, 2020), tourism is decreased to 22 percent and could decrease to 60-80 percent across the whole year. 67 million less foreign visitors up to March converts into US\$ 80 billion in lost exports. This is the worst downturn international tourism has encountered since records started by far (1950). For at least six to nine months, the effects of the pandemic would decrease demand for tourism and transport facilities, and the rebound is expected to take two times as long (Twining Ward & McComb, 2020).

Experts in the America are least optimistic and prepared to accept recovery in 2020, while in Europe and Asia, the outlook is mixed, with half of experts anticipating change by 2020. The impact will be felt to varying degrees and at different periods in different global areas, with Asia and the Americas expected to rebound first. The supply of tourism products and services at destinations needs the participation of a variety of economic activities, which constitute a decentralized value chain, allowing various links and connections to be formed within local and regional economic structures (Romão, 2020). Europe is not the world's fastest-growing continent, but its market share in terms of foreign tourist arrivals and income is shrinking. Tourism businesses in the EU are dealing with a range of changes in visitor profiles and behaviors. Tourists in the EU are, on average, older than they have been in previous decades. Geographically, emerging nations are responsible for an increase in tourists to the EU, although EU source markets continue to account for the majority of tourists (Juul, 2015).

Globally, natural disasters such as earthquakes, tsunamis, floods, forest fires, hurricanes, droughts, and heat waves, as well as man-made challenges such as conflicts and terrorist

attacks, have all wreaked havoc on tourism (Barbhuiya & Chatterjee, 2020). Unexpected changes in the tourism industry's system are known as disasters (Rosselló, Becken, & Santana-Gallego, 2020). Natural disasters have harmed tourist and non-tourist destinations in the past, resulting in the destruction of travel opportunities and the collapse of the tourism industry (Okuyama, 2018). The forms of crises and the animation of the affected mechanism are determined by the extent and scope of the negative consequences. Many disasters have serious effects for individuals, organizations, and communities, as well as for tourism operations. A disaster's direct impacts on tourism is likely to be in the destination area, but indirect effects on travel to and from the affected area are also possible (Rosselló et al., 2020). Risk attracts human attention due to health and property concerns. It is also a part of the natural world that tourists ignore the occurrence of natural disasters, disruption, loss and death because of them (Rucińska & Lechowicz, 2014).

Terrorism has become a global phenomenon and a threat worldwide. In fact, one of the most critical issues for societies suffering from this issue is terrorist attacks (for example, Ireland and Spain). While it is easy to observe terrorism, its evaluation is a difficult job. In terms of economic or utility losses, the conventional calculation of terrorism based on the amount of terrorist attacks and/or injuries does not recognize the implications for citizens (Prieto-Rodríguez, Rodríguez, Salas, & Suarez-Pandiello, 2009). Like in other areas, terrorism or political unrest can affect both demand and supply in the tourism industry. The absence of terror or criminal acts is universally recognized as a criterion for the construction of destinations. Terrorism has become a greater danger to the world in recent decades, and incidents of violence have increased in many countries, including those that are becoming more popular as vacation destinations at the same time (Araña & León, 2008).

Soft targets for terrorist attacks have always been tourist attractions and visitors. In evaluating terrorism risks in their holiday packages, visitors typically prefer to foresee worst-case scenarios and concentrate on the tragic consequences of a terrorist attack rather than on the possibility that it will occur (Paraskevas & Arendell, 2007). Different types of catastrophes and tragedies can make tourism susceptible, preventing visitors from visiting impacted areas (Rosselló et al., 2020). This might have a negative impact on tourism demand (Barbhuiya & Chatterjee, 2020). Changes in the destination's image will eventually cause the tourist attraction to stagnate and deteriorate (Seabra, Reis, & Abrantes, 2020). Local activity whose physical form is determined by local factors has the ability to aid in the formation and consolidation of territorial local networks (Romão, 2020).

Terrorism has been a significant and recurring topic in public debate in terms of tourism in recent decades as a result of the growing frequency of terrorist acts. It is now evident that the tourist sector need greater attention in order to expand sustainably (Surugiu, Surugiu, Breda, & Dinca, 2012). In developing countries, more than 90% of deaths occur due to natural disasters, according to the United Nations International Strategy for Disaster Mitigation (UN/ISDR, 2004). Statistics show that their effect show a global trend, with a rise in the number of disasters, though a decrease in the number of deaths, but a substantial increase in the number of affected people and economic losses. Latin America and Central America and Mexico in particular have no exception (Alcántara-Ayala, 2009).

One of the areas of the world that is most vulnerable to natural disasters is Latin America and the Caribbean Latin America's geographic location is vulnerable to great geological failures, which result in regular and extreme earthquakes. Unpredictable seismic events affect the entire area, particularly during fault lines. In this area (Mexico, Haiti, Chile) some of the most violent and destructive earthquakes were reported, along with volcanic eruptions, generating typically health problems and major economic and social disturbances (Caruso, 2017). Europe has experienced hundreds of damaging floods in recent decades alone which have led to thousands

of deaths, millions of displacements, and billions of insured and uninsured financial losses. There have probably always been floods in Europe: old records beginning with the sad tales of tens of thousands of European people drowned around the world more than 2000 years ago (Martinez, Costas, & Ferreira, 2020b).

Therefore, the main objective of the current study is to get the fresh insights into the effect of natural disasters and terrorism on tourism growth evidence from top ten-tourist destination additionally Americas and Europe top ten tourist destinations over 1995-2019 period. The study applies panel estimation techniques of Robust Least Squares and Pooled Mean Group to carry out empirical estimations. Past studies have examined either the impact of natural disaster or the impact of terrorism on tourism in single country/destination. None of the studies investigated the effect of both natural disaster and terrorism for panel of countries. This study contributes to the literature by examining the effect of both natural disasters and terrorism together in panel of world's top ten tourist destinations worldwide, Europe's top ten tourist destinations and in America's top ten tourist destinations. The findings of the study will be helpful in providing relevant information and relevant policies to promote tourism growth in studied destinations.

This study is arranged as follows: section 2 describes the literature review. The variables of the study, model and data description are presented in section 3. Section 4 comprises of empirical findings and discussion. Summary of the findings and policy recommendations are provided in section 5.

2. Literature review

The literature review is categorized with respect to the linkages of natural disasters, terrorism and tourism.

2.1 Tourism Growth and Natural Disasters

Hystad and Keller (2008) analyzed the long-term experiences of the local tourism industry by using secondary data obtained from disaster owners of sixty tourism companies in Kelowna, from December 2005 to February 2006. They found that disasters and crises were having increasingly negative effects on tourism. Ghaderi and Henderson (2013) discussed the possible effects of the debris resulting from the tsunami earthquake, which struck Japan with particular references to sustainable tourism in Hawaiian island taking the secondary data from year 2011. Their study found the negative impact of tsunami earthquake on sustainable tourism.

Moreover, Biran, Liu, Li, and Eichhorn (2014) examined the motivation and purpose of potential national tourists to visit Sichuan, China, following an earthquake, using the self-governed questionnaires in April 2013. Their research explored different ways in which tourists dealt with the pressures of visiting dark places and negative emotions. Likewise, AlBattat and MatSom (2014) researched the impacts of various disasters and crises on the Malaysian hospitality and tourist industry in the competitiveness of Malaysia's top 10 arrivals markets taking into account the figures from 2000 to 2012. They found qualitative detrimental effects of disasters on Malaysian tourism.

Moreover, Cró and Martins (2017) estimated the number of systemic breaks in the international market for tourism in 25 countries, taking data from 1995 to 2014 period. They found that the structural breaks had a negative effect on demand for tourism using Bai and Perron estimation. Likewise, Wijaya and Furqan (2018) identified the visitor's perception concerning their understanding of the risk of disasters related to the climate change problem

and its effect on coastal tourism activity by taking into account statistical data on 115 participants from 28 April to 5 May 2017. The study reviewed the negative impact of disasters on various tourists destinations in descriptive analysis statistics. Furthermore, Songwathana (2018) analyzed 168 cross-country data from 1990 to 2016 period to examine the relationship between natural hazards and economic growth across the countries. They found negative relationship between natural disasters and economic development in random effect model estimation.

Lan, Yang, Shao, Luo, and Zhong (2021) estimated the impacts of natural disasters on inbound tourism. that study integrated 258,401 bilateral tourist movements and 9892 natural disasters in 177 countries between 1995 and 2018 and analyzed the data using a panel regression. The data have been obtained from the United Nations World Tourism Organization (UNWTO). That results showed that disaster severity deters tourists from visiting destinations, but disaster frequency indicates a positive effect. Furthermore Zhang (2021) investigated the Visiting post-natural disaster sites has been burgeoning in recent years. Dark tourism at those settings has been utilized as part of relief and recovery strategies after natural disasters. That research, undertaken at four post natural disaster sites, used the onsite experience of 196 participants used semi-structured interviews and participant-generated photos. Due to the exploratory nature of the study, that research adopted a qualitative approach, aiming at capturing the meanings that individuals attach to a particular problem, situation and their experiences of the world.

Similarly, Barbhuiya and Chatterjee (2020) investigated the impact of natural disasters and political conflicts on domestic and foreign tourist arrivals of 22 Indian states taking the data of seven years from 2008 to 2014 period. on the basis of the results obtained through random effects model, they concluded that natural disaster effected tourism negatively but conflicts did not. Contrarily, Okuyama (2018) analyzed the optimal timing of recovery of tourism demand from natural disasters of 18 major cities of Japan taking the data from February 2012 period. They found that income effect would change from negative to positive during recovery process through contingent behavioral method.

Likewise, Rosselló et al. (2020) analyzed the impact on international tourism of natural disasters in global analysis of 177 countries taking panel data from 1995 to 2013. They found that impact of natural disasters on tourism in some cases was positive but negative in general using fixed effect model. On the other hand, in the Lithuanian case, Barkauskas, Barkauskienė, and Jasinskas (2015) made a deeper look into macro environmental factors and to analyze their impact on the rural tourism. They found that most significant impact on the development of Lithuanian rural tourism made by these economic factors in systematic logical comparative and structural analysis.

2.2 Tourism Growth and Terrorism

Sloboda (2003) studied the effect of terrorism on tourism growth over 1998 to 2001 in the USA. Their study reviewed that negative effect of terrorism on tourism growth by applying ARMAX technique. Paraskevas and Arendell (2007) analyzed the strategic framework for terrorism presentation and mitigation in tourism destinations. Analysis based on interviewers with 16 experts on tourism and terrorism, the study found that negative major challenge overcoming the mentality of terrorism between distinguished stakeholders.

Similarly, Yaya (2009) investigated the effect of terrorism on tourism in turkey using time series data from 1997 to 2006. the study reviewed the negative but small impact of terrorism from the results obtained by using ARMA technique. Similarly, Araña and León (2008) analyzed whether the terrorism and threats to national security had any impact on tourism demand taking the data of September 2011. Their study reviewed that terrorism had strongly negative impact

on the image and attractiveness of some destinations based on the results of conditional logit model. Likewise, Thompson (2011) investigated how terrorism affected tourism growth in developed and developing countries using cross sectional data of 60 countries from 1999 to 2003. They found that Terrorism hampered tourism in developing countries relative to developed. Furthermore, Feridun (2011) investigated the casual impact of terror attacks on tourism industry in Turkey using the data from 1986 to 2006. They found the for the existence of negative casual effect of terrorism on tourism in long run and short sun parameter estimates in ARDL estimation.

Likewise, Raza and Jawaid (2013) analyzed the impact of terrorism activities on tourism in Pakistan. Study used annual data over 1980 – 2010 period. They found a negative relation between terrorism and tourism by using Johansen and ARDL bound test co integration approach to confirm the long term relation. Santana-Gallego, Rosselló-Nadal, and Fourie (2016) investigated the effect of terrorism, crime and corruption on tourism by taking the data of 171 countries from period of 1995 to 2013. They found that negative relation between terrorism and tourism in fixed effect technique. Furthermore, Ajogbeje, Adeniyi, and Folarin (2017) investigated the impact of terrorism on Nigeria's tourism industry using quarterly time series data. They found that negative response of terrorism on tourism using WAR test.

Corbet, O'Connell, Efthymiou, Guiomard, and Lucey (2019) estimated the influence of terrorist attacks on European tourism through the short term post hoc response of airline industry and passengers taking the data of 28 countries analysis spanning over the period 2011 to 2018. They found terrorist incidents damages and revenues lost occurring in the short run meaning that there was negative relation between them. On the other hand, Lanouar and Goaid (2019) investigated the impact of terrorist attacks and political violence on the number of tourist arrivals and overnight stay in Tunisia. Taking the data set consisting of a monthly data that covered the period from January 2000 to September 2016, Internal shocks were found to leave a highest positive impact on tourism activities. Likewise, Seabra et al. (2020) analyzed the effect that tourist attacks with a representative group of European countries had on tourism in European countries having no record of terrorism attacks taking the occurring data from 2002 to 2016. They found that terrorists' attacks had a powerful positive effect on tourist arrivals and confirmed the presence of terrorism spillover effect using vector auto regressive model.

Polyzos, Papadopoulou, and Xesfingi (2021) explored the link between tourist demand and terrorism in Egypt using monthly data for the period from 1995 to 2018. That study used Vector Autoregressive Model with Error Correction. Study found the evidence of a long-term cointegrating relationship between tourism and terrorism. Empirical results showed that the direction of this causal relationship is from terrorism to tourism only, meaning that policymakers should not expect a rise in terrorist activity during periods of increased tourist arrivals. Buigut, Kapar, and Braendle (2022) analyzed the impact of terrorism on Malaysia's tourism demand. The study used panel data from the 25 top source countries, covering the period from 2000Q4 to 2017Q4 is obtained from the Global Terrorism Database, and the Malaysian Tourism Board. The study used a panel Fully Modified OLS (FMOLS) procedure. The results indicated that an increase in terrorism activity in Malaysia depressed international arrivals to the country. Increase in terrorism activity in Philippines generally creates a negative effect on Malaysia tourism arrivals except for fatalities which induced a positive effect from North America and Oceania.

3. Data and Methodology

3.1 Model Specification

The main objective of the present study is to investigate the effect of natural disaster and terrorism on tourism over 1995-2019 period. To accomplish this objective, the study formulates

regression model on the basis of endogenous growth theory. In regression model for panel data analysis GDP, alcohol consumption, tourism investment and tourism employment are regressed on tourism. Two control variables, natural disasters and terrorism are also included in model. According to endogenous growth theory, growth is the function of both capital and labor i.e.

$$Y_t = f(K, L) \tag{1}$$

Where, capital and labor is the investment and employment. The tourism industry's business size grows as the number of tourist increases. Unemployed people are thus provided with job opportunities in the tourism industry (Fang, Ye, & Law, 2016).

There are broader implications of improved growth or productivity gains for the relationship between tourism and the economy, which cannot be underestimated. Intensive capital use disparities and labor differences also have major effects at sector level (Inchausti-Sintes, 2015). Tourism is also used as a medium for promoting marginal economies and encouraging growth by building employment and incomes.

Though not often clearly articulated, it is always hoped that difficulties would be minimized by encouraging upward mobility (Liu & Wall, 2006). Increased investment in tourism improves the growth of tourism. This means that tourism investment in the short term benefits from the increase in tourism production (Alam & Paramati, 2017). The functional form of model is as follows:

$$TOU = f(ND, TERR, (TE, TI), GDP, AC) \tag{2}$$

Disasters have a major effect on families, organizations and societies and thus on tourism. The effect of a catastrophe will affect tourism directly in a destination area. However, indirect effects are also possible on travel to and from the affected region (Rosselló et al., 2020). The effect on the tourist behavior of the terrorist attack is high. Moreover, the extent of effect of terrorism on tourism behavior, educational, personal encounters and risk avoidance costs (Corbet et al., 2019).

The formulation of the endogenous model can therefore also be interpreted as an equation for tourism,

$$TOU = f(ND, TERR, TE, TI, TRD, AC, GDP) \tag{3}$$

TOU	Tourism
ND	Natural Disasters
TERR	Terrorism
TE	Tourism Employment
TI	Tourism Investment
AC	Alcohol Consumption
GDP	Economic Growth

Where;

Below the equation which is used for the empirical assessment of study. Estimation of natural disasters and terrorism in world's top ten tourist's destinations.

$$TOU_{it} = \beta_0 + \beta_1 ND_{it} + \beta_2 TERR_{it} + \beta_3 TE_{it} + \beta_4 TI_{it} + \beta_5 AC_{it} + \beta_6 GDP_{it} + \varepsilon_{it} \tag{4}$$

Table 1 below provides the measurement of all variables. Source of data of each variable is also mentioned.

Table 1
Measurement of Variables and Data Source

Variables	Measurement	Source of data
Tourism	Direct contribution to percentage growth	World travel and tourism council
Natural disasters	Deaths - Exposure to forces of nature - Sex: Both - Age: All Ages (Rate) (deaths per 100,000)	Our world in data
Terrorism	Terrorism fatalities (GTD, 2018) (deaths)	Our world in data
Alcohol consumption	Deaths - Alcohol use disorders - Sex: Both - Age: All Ages (Number)	Our world in data
Economic growth	GDP growth (annual %)	Worlds development indicators
Tourism employment	Direct contribution to employment, jobs (thousands)	World travel and tourism council
Tourism investment	Capital investment US\$ (Billions)	World travel and tourism council

4. Results and Discussions

Before empirical analysis, we applied the Im, Pasaran, and Shin (1997) (IPS) test unit root test to check the stationarity of the variables. The technique assumes both common and individual unit root processes. The unit root test results are displayed in Table 2 (in Appendix).

In model 1, the IPS test shows that TOU, ND and GDP are stationary at level whereas TERR, AC, TE and TI variables are stationary at 1st difference. For model 2, the results show that TOU, ND, GDP and TERR are stationary at level whereas AC, TE and TI were stationary at 1st difference and for model 3, IPS test shows that TOU, ND, TERR, AC and GDP are stationary at level but TE and TI are stationary at 1st difference.

To find cointegration in panel study, we use Pedroni and Kao cointegration evaluation strategies. We use a definitive interception and trend for the trend assumption. The findings of Kao cointegration test shown in table 4 suggest that there is cointegration among variables and long-term possibilities as the result rejects the zero cointegration hypothesis at 1% and 5% level of significance. The Kao approach to integration indicates 1 percent significance.

Table 3
Kao Residuals Cointegration Test (1999)

Model 1: World's Top Ten Tourist Destinations		
	t-statistics	p-value
ADF	-2.9132	0.0018
Residuals variance	57.8172	
HAC variance	14.8612	
Model 2: Europe Top Ten Tourist Destinations		
	t-statistics	p-value
ADF	-3.2125	0.0007
Residuals variance	43.4355	
HAC variance	15.8634	
Model 3: Americas Top Ten Tourist Destinations		
	t-statistics	p-value
ADF	-3.9706	0.0000
Residuals variance	53.9677	
HAC variance	32.1049	

The Pedroni panel cointegration estimations for the models are given in Table 4. The findings of the pedroni co-integration for the model 1 reveal that model has a long run co-integrated relation between the pp/statistic panel (level/weighted) and the ADF-statistic panel [level/weighted] variables at confidence interval of 1% and 5%.

Table 4
Pedroni Residual Co integration Test

	Model 1 World's Top Ten	Model 2 Europe Top Ten	Model 3 Americas Top Ten
Alternative hypothesis: common AR coeff. (within-dimension)			
Panel v-Statistic	-1.6697 (0.9525)	-1.2666 (0.8974)	-1.9946 (0.9770)
Panel rho-Statistic	0.7980 (0.7876)	1.8790 (0.9699)	0.5333 (0.7031)
Panel PP-Statistic	-4.7708 (0.0000)	-1.3298 (0.0918)	-3.9556 (0.0000)
Panel ADF-Statistic	0.2045 (0.5811)	1.9145 (0.9722)	0.4328 (0.6675)
Alternative hypothesis: individual AR coeff. (between-dimension)			
Group rho-Statistic	1.7749 (0.9620)	2.6751 (0.9963)	1.6249 (0.9479)
Group PP-Statistic	-6.3446 (0.0000)	-5.0136 (0.0000)	-4.1241 (0.0000)
Group ADF-Statistic	-0.2196 (0.4131)	1.4527 (0.9268)	2.1075 (0.9825)

The findings of Model 2 show a long run and co integrated association between PP statistical panel (weighted) and ASD statistical panel (Weighted and level form). The results were verified by 1 percent and 10 percent confidence and integrated relationship between the variables in the PP statistical and ADF statistical categories. Findings of model 3 from Pedroni revealed that the PP-statistical (both dimensions) and ADF-statistic group variables had a longer, co-integrated relationship of 1 percent to 10 percent. The PP-statistical community also demonstrated the co-integrated connection between at a 1% and 10% confidence intervals and the long term relation of the variables. Table 5 below presents the results of robust least square estimation of all the three models: world's top ten tourist destinations, Europe top ten top tourist's destinations and America's top ten tourist's destinations.

Table 5
Estimations of Model 1, Model 2 and Model 3 using Robust Least Square

Variables	Model 1 World Top Ten	Model 2 Europe Top Ten	Model 3 Americas Top Ten
ND	-1.9995 (0.0005)	-0.3897 (0.0257)	-3.1209 (0.0388)
TERR	-0.1161 (0.0000)	-0.0074 (0.0408)	-0.0073 (0.0017)
GDP	-1.1069 (0.0019)	0.6850 (0.0000)	-0.6831 (0.0000)
AC		1.99E-05 (0.5061)	-0.0077 (0.0000)
TE	0.0201 (0.0000)	-8.92E-05 (0.8734)	0.0289 (0.0000)
TI	2.5299 (0.0000)	0.0290 (0.5083)	2.3827 (0.0000)
R- squared	0.5330	0.0942	0.7788
Adjusted R squares	0.5253	0.0703	0.7722

From the analysis it is revealed that the effect of natural disaster on tourism growth is negative and significant in all the three models but the magnitude of effect is different in all models. A one percent decrease in natural disasters causes a decrease in tourism growth by 1.99 in model of world's top ten tourist destination, 0.0074 in model 2 of Europe top ten tourist destinations and 3.1209 percent in model 3 of America's top ten tourist destinations. It implies that disasters impose a detrimental and important effect on tourism. In other words, economic harm from disasters, such as infrastructure damage, is likely to decrease tourist arrivals. They attribute to disruptions in the host nation's infrastructure, major attractions, and economic weakening. All of these factors reduce destination capability, lowering tourism supply spending and, at the very least, lowering destination attractiveness in the short term.

Lost revenue, productivity, employee's non-attendance, and harms to property and businesses are also mentioned as the adverse effect of natural disasters on tourism. People are unable to manage their company, and this situation has a greater negative effect on natural disaster on tourism. The results are in line with Barbhuiya and Chatterjee (2020); Fourie, Rosselló-Nadal, and Santana-Gallego (2020); Martinez, Costas, and Ferreira (2020a) but in contradict to Ruhet (2018) who argued that a tourist destination will transform a natural disaster situation into an incentive for potential investment in the area by improving community support and crisis management. Natural disasters, according to Genç (2018) can also stimulate community efforts, resulting in increased potential investments or other types of social benefits.

The effect of terrorism on tourism is negative and significant in all models, but the magnitude of effect is different in all models. A one percent increase in terrorism decreases tourism growth by 0.1161 percent in model 1, 0.0074 percent in model 2 and 0.0073 percent in model 3. One possible explanation for the finding is that if tourists see the chance of injuries or death or even a risk of just involving them in a stressful environment, they simply want to go to safe locations and avoid the risky destination. Tourists quickly move to other destination in the face of terror in the country. Terrorism has a detrimental impact on visitors from safer nations. However, the destination country can moderate the adverse impact of a high degree of terrorism on tourism in the country's destination. For example, Peru has million activities on tourism destinations.

In 1989 Peru had a value of around US\$430 million and more than 350,000 visitors. It is estimated that Peru got no more than 30 000 visitors from outside the country in 1991. The practices of Sendero Luminoso were a big reason for this decline (Ryan, 1993). The results of our study are in line with Neumayer (2004) and Ryan (1993) but in contradiction to the positive effect of terrorism advocated by Yap and Saha (2013) who suggested that terrorist attacks can draw both domestic and foreign visitors to see devastation or reconstruction after terrorist attacks. The terrorist attack on the World Trade Center in New York City on September 11,2001 is a perfect example of this positive effect. New York City visitors are tempted to now visit the renovation of the Twin Towers.

From the analysis, it is revealed that effect of GDP on tourism growth in world's top ten tourist destinations and America's top ten tourist destination is negative and significant with somewhat different magnitude. For one percent increase in GDP decreases tourism growth by 1.1069 percent in model 1 and 0.0683 percent in model 3. Thus, it shows that the expansion of tourism because of economic growth reduces both the employment and welfare in practical circumstances because of increasing costs. For instance, Islands have a considerably higher total national income dependent on real GDP per capita than non-Icelandic countries, largely due to the presence in non-Icelandic countries of the least developed countries, and of the most vulnerable developed countries.

However, the annual growth rate of GDP per capita in the islands is considerably smaller. The less developed developing countries are not affected by relying too much on tourism. However, the more developed countries suffer from a higher reliance on tourism. These results are consistent with of Chou (2013) and Bojanic and Lo (2016). In contrast, the effect of economic growth on tourism growth is positive and significant in model 2. A 1% increase in economic growth increases tourism growth by 0.6850 percent in Europe top ten tourist's destinations. This shows that the economic expansion affects development of infrastructure and tourism resorts that ultimately affect tourism growth. In many countries, potential tourism destinations demand for additional investment from the established economic growth to transform the direction of tourism to enhance economic development thereafter. Our results are similar to Habibi et al. (2018) and Yalcin Arslanturkb (2012) from existing literature.

The impact of alcohol consumption on tourism is negative and significant in model 3 but statistically insignificant and positive in model 2 (Europe top ten tourist destinations). A one percent decrease in alcohol consumption decreases the tourism growth by 0.0077 percent in model 2. The five percent increase in alcohol consumption increases the tourism by 1.99E-05 in model 3. This is so because heavy drinks would probably contribute to high tourism risk, not only for sex, but also for sun bathing and other activity. Alcohol poisoning increases the chance of car accident and threats for oneself and others from fire and other wounds. Our findings validate the earlier findings of (Josiam, Hobson, Dietrich, & Smeaton, 1998).

Next, the effect of tourism employment on tourism is found to be positive and significant in model 1 and model 3. A one percent increase in tourism employment increases tourism growth by 0.0201 percent in model 1 and by 0.0289 percent in model 3. The reason of the finding is that to meet the increased demand for food brought by tourist influx more restaurants are required. Unemployed people are also offered job opportunities in the tourism industry. The public sector helps in creating favorable socio-economic and political environment for the private investment in order to achieve sustainable development in tourism industry. The increasing number of tourists increases the market size of the tourism industry. The results are in line with the Law, Leung, Lo, Leung, and Fong (2015) and Nawaz and Hassan (2016). However, the effect of tourism employment on tourism is negative and insignificant in Europe top ten tourist's destination.

And last, from the analysis, it is revealed that effect of tourism investment on tourism is positive and significant in world's top ten tourist destinations and America's top ten tourist destinations but negative and insignificant in Europe top ten tourist destinations. One percent increases in tourism investment increases the tourism by 2.5299 percent in model 1 and the one percent increase in tourism investment increases the tourism growth by 0.0289 in model 3. This is so because sustainable tourism investments in the tourism sector have been launched in many countries to support tourism industry without harming the climate. This result is consistent with the results of Alam and Paramati (2017).

Table 6 shows the results of pooled mean group analysis for world's top ten tourist destinations. The findings reveal that effect of natural disaster on tourism growth is positive and significant. A one percent increase in natural disaster increases tourism growth by 2.0710 percent in short run. But in long run effect of natural disasters on tourism is negative and insignificant. A 5 percent decrease in natural disasters decreases the tourism growth 6.7298 percent in the long run. In general, the natural disasters are statistically positive and significant in the short term. This is also because disasters had lower and shorter-term effects, according to Rosselló et al. (2020). The reason is that disasters cause economic disruption and a detrimental and substantial association may be created, meaning that harm to facilities and developed properties as well as to company capability is likely to limit tourist arrivals. Moreover, certain forms of disasters, such as an unseen illness, a landslide, a cold wave, or a heat wave,

are likely to have a short term significant impact on arrivals. However, long term and more subtle disasters, such as a drought, can obstruct a destination's ability to appeal to tourists. The water shortage in Cape Town, South Africa, is a recent example, which resulted in a decline in tourism and a major drop in income for local businesses.

According to the short-run findings, terrorism has a statistically significant and positive impact on tourism development in line with the short run results. A one percent increase in terrorism increases the tourism by 0.0133 percent in short run and by 0.0611 percent in the long run. Hence it is implied that terrorist attacks can draw both foreign and domestic visitors who want to see the devastation or rebuilding activities following the attacks. The terrorist attack on the World Trade Center in New York City on September 11, 2001, is a prime example of this long-term positive impact. Tourists are now enticed to see the Twin Towers restoration as they visit New York City. Our results are consistent with Fourie et al. (2020) and Yap and Saha (2013).

Moreover, the effect of tourism employment on tourism growth is positive and insignificant in short. In long run tourism employment is statically significant and positive. A one percent increase in tourism employment causes an increase in tourism growth by 0.0008 percent in short run and one percent increase in tourism employment causes an increase in the tourism growth by 0.0319 in the long run. The reason is that more restaurants are needed to satisfy the increased demand for food brought on by the influx of tourists. Employment opportunities in the travel sector are also provided to unemployed citizens. The law's findings are linked to a rise in the number of visitors which raises the tourism industry's business share as advocated by Fang et al. (2016).

Table 6
Pooled Mean Group (PMG)
Model 1: World's top ten tourists destinations

Long run coefficients				
Variables	Coefficients	Std error	T statistics	P value
ND	2.0710	0.2795	7.4090	0.0000
TERR	0.0133	0.0019	6.9051	0.0000
TE	0.0008	0.0005	1.5356	0.1284
TI	0.0599	0.0116	5.1414	0.0000
GDP	0.5651	0.0563	10.032	0.0000
AC	-0.0020	0.0003	-5.9217	0.0000
Short run coefficient				
ECT	-0.8922	0.2228	-4.0043	0.0001
D(DC_PG(-1))	-0.0090	0.0827	-0.1092	0.9133
D(ND)	-6.7298	4.8822	-1.3784	0.1718
D(ND(-1))	-14.5215	9.1167	-1.5928	0.1150
D(TERR)	0.0611	0.0662	0.9227	0.0588
D(TERR(-1))	0.1018	0.0953	1.0681	0.2886
D(TE)	0.03192	0.0125	2.5372	0.0130
D(TE(-1))	0.0041	0.0125	0.3309	0.7415
D(TI)	-0.2180	0.3162	-0.6893	0.4925
D(TI(-1))	-0.0547	0.1603	-0.3414	0.7336
D(GDP)	-0.1736	0.5706	-0.3043	0.7616
D(GDP(-1))	-0.2890	0.6048	-0.4778	0.6340
D(AC)	0.0222	0.0109	2.0384	0.0447
D(AC(-1))	-0.0023	0.0155	-0.1490	0.8818
C	1.5636	2.1094	0.7412	0.4606

From analysis it is revealed that tourism investment has significant and positive effect on tourism growth in short run. a one percent rise in tourism investment cause a 0.5 percent increase in tourism growth, while a 5 percent increase in tourism investment cause 0.25 percent

decrease in tourism growth. Tourism investment is statistically insignificant and negative in the long run. The outcomes are related to the Alam and Paramati (2017) that many countries have initiated sustainable tourism investments to promote the tourism industry without damaging the environment.

Economic growth has a positive and significant effect on tourism growth in short run. But in long run economic growth has statistically negative and insignificant effect. In the short run, a one percent rise in economic growth leads to a 0.5 percent increase in tourism growth, while a ten percent increase in economic growth leads to a 0.17 percent decrease in tourism growth in long run. Our findings matched with the findings of Okumus, Altinay, and Arasli (2005) show that tourism industry requires a lot of attention in order to develop. This outcome is unsurprising in countries like Sri Lanka, where prospective tourism destinations initially seek increased investment from current economic growth in order to shift the direction of tourism and thereby improve economic development.

And last, alcohol consumption is found to exert negative and significant effect on tourism in short run. The effect of alcohol intake is statistically significant and positive in the long term. In the short run, one percent rise in alcohol consumption results in a 0.02 percent decrease in tourism growth, and a five percent increase in alcohol consumption results in a 0.02 percent increase in tourism growth in long run. According to Josiam et al. (1998) in short run heavy drinking raises the likelihood of tourism, not only for sexual activity, but also for tourism, driving, sunbathing, and other activities. Intoxication of alcohol increases the risk of car accidents, as well as hostility and abuse against one self and others burns. But in long run people equate alcohol with same qualities that they want in a pleasurable pastime. Increased social spontaneity and personal convenience, as well as assistance in detaching from obligations and stress, are among the traditional perceptions Westerners have of drinking alcohol.

Moreover, alcohol is used as a promotion tactic for many travel companies to attract visitors. Because of the duty-free beer industry and free alcohol beverages served on planes, travel and alcohol are inextricably connected from the moment of departure. Tourist destination advertisements also use alcohol or photos of alcohol as part of the experience. For example, In February 2009, Thailand's Tourism Authority designated the Siam Sunray as the country's official signature cocktail. Alcohol is also used as a marketing tactic for travel companies. According to Örnberg and Room (2014), deals for holidays often encourage depictions of heavy drinking.

5. Summary of the Findings

The study investigates the impact of natural disasters and terrorism on tourism in top ten tourists destinations including world's top ten, America's top ten and Europe's top ten destinations over 1995-2019 period . The first goal of the research is to study the effect of natural disasters on tourism development in the top ten tourist destinations. In empirical findings, the effect of natural disaster on tourism is negative in all models. The chaos theory is underlined that relatively orderly processes are always at the verge of chaos. Obviously minor developments may suffice to accelerate instabilize and shift to a degree that seems to endanger the consistency and coherence of the structure.

It could well be lost as an entity, returned to a pre-crisis/catastrophe state configuration or emerged a whole new and more efficient configuration. The system may also be forced beyond its criticality by any crisis or disaster. The ability to unleash the turmoil associated with emergencies and disasters both negative and positively creative powers is seen. The second aim of the research is to examine the effect of terrorism on the development of tourism in the top ten tourist destinations. In models, terrorism has a negative impact on tourism. Our findings are linked to the social hypothesis that terrorism is concerned with a free flow of information about

human life and tourism. Tourism calls for globalization, and criminals cannot be globalised, tourism promotes cultural integration and knowledge sharing. Tourism calls for concern and human kindness that alone promote the ideals of true humans. Under the Jihadi clause, tourism must be seen not only as a fair-playing but as a positive step against the attack on tourism as an instrument that contains much of the globe.

The results of this study which concludes the negative relationship between the nature of disasters and tourism and the negative relationship between terrorism and tourism, serve as basis for the recommendations presented in the present research strategy. Natural and unforeseen disasters are stressful occurrences for residents and can inflict permanent harm to destination facilities requiring adequate and adaptive tourism management. The first thing to do is to implement the strategies to prevent natural disasters to mitigate the risk and to minimize the impacts.

The introduction, zoning rules and emergency planning and preparedness for core players provide examples of this. Additional funding can be needed for new policies and initiatives but long-term investing in readiness will yield good returns. Impacts of safety and image management at destinations should be anticipating and preventing large-scale events, terrorist threats and their repercussions in an increasingly unsafe and endangered environment. The governments should be instrumental in reducing terrorist activity and in reducing tourism activities in the countries that lead to increased tourism income.

5.1 Limitations and Recommendations for Future Research

Data access is one of the limitations of our research. Many more volatile countries do not have related statistics on terrorism. The actions or action plan to minimize impact and risks is routine communication updates and improvement of the infrastructure environment like the early warning system. Improved education, capacity building and climate change adaptation mainstreaming are also critical for the growth of tourism planning. The times of emergency are when people come together and unite to solve suffering in a destination, as everybody, no matter their socioeconomic, racial or cultural status, is adversely affected by the tragedy.

Public-wide decisions about preparations for natural disasters, such as mandatory building supplies, annual safety checks, evacuation planning for a potential natural disaster, organizing a group action can also be made jointly. In all natural disasters the entire population of a region will also need cooperation, mutual assistance and joint efforts to resolve the negative consequences of a catastrophe. In order to analyze the complexity or catastrophe at varying scales, we propose complexity or chaos theory (local, regional, national and even transnational).

Authors Contribution

Anam Aziz: introduction, data analysis and interpretation, drafting the article

Muhammad Atif Nawaz: design of the work, critical revision, incorporation of intellectual content

Sobia Hanif: data collection, literature search, drafting the article

Conflict of Interests/Disclosures

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Appendix

Table 2: Panel Unit Root Test using Im, Pesaran & Shin (1997)

Variables	Model 1		Model 2		Model 3		1 st Difference		Level		1 st Difference		Level		1 st Difference	
	Level		1 st Difference		Level		1 st Difference		Level		1 st Difference		Level		1 st Difference	
	Intercept	Intercept & Trend	Intercept	Intercept & Trend	Intercept	Intercept & Trend	Intercept	Intercept & Trend	Intercept	Intercept & Trend	Intercept	Intercept & Trend	Intercept	Intercept & Trend	Intercept	Intercept & Trend
TOU	-6.0612 (0.000)	-3.9954 (0.000)	-11.3120 (0.000)	-9.2099 (0.000)	-6.1952 (0.0000)	-4.3864 (0.0000)	-12.0289 (0.0000)	-9.9946 (0.0000)	-6.5925 (0.0000)	-5.0867 (0.0000)	-13.1355 (0.0000)	-11.0549 (0.0000)				
ND	-10.0173 (0.0000)	-8.5779 (0.0000)	-15.1142 (0.0000)	-13.0358 (0.0000)	-9.9104 (0.0000)	-8.7878 (0.0000)	-15.5635 (0.0000)	-13.5359 (0.0000)	-7.3689 (0.0000)	-6.1807 (0.0000)	-14.4938 (0.0000)	-12.5451 (0.0000)				
TERR	-2.4827 (0.0065)	-0.4185 (0.3378)	-11.9042 (0.000)	-9.9728 (0.000)	-2.9869 (0.0014)	-0.5913 (0.2772)	-11.2891 (0.0000)	-9.9350 (0.0000)	-3.4693 (0.0003)	-3.5087 (0.0002)	-44.1668 (0.0000)	-28.0976 (0.0000)				
AC	0.8534 (0.8033)	1.2711 (0.8982)	-1.9562 (0.0252)	-0.0707 (0.4718)	-0.0124 (0.491)	1.3853 (0.9170)	-2.5783 (0.0050)	-0.7248 (0.2343)	3.8034 (0.9999)	-1.5806 (0.0570)	-3.3566 (0.0004)	-1.0693 (0.1425)				
GDP	6.9287 (0.0000)	-5.6918 (0.0000)	-13.7769 (0.0000)	-11.7720 (0.0000)	-6.3871 (0.0000)	-4.7252 (0.0000)	-13.6255 (0.0000)	-11.7784 (0.0000)	-6.7238 (0.0000)	-5.3424 (0.0000)	-13.5312 (0.0000)	-11.8010 (0.0000)				
TE	-1.3777 (0.0841)	-1.0425 (0.1486)	-6.5578 (0.0000)	-4.4568 (0.0000)	0.6400 (0.7389)	0.5864 (0.7212)	-6.4593 (0.0000)	-4.8968 (0.0000)	0.1030 (0.5410)	-0.6117 (0.2703)	-6.1820 (0.0000)	-4.1446 (0.0000)				
TI	1.1980 (0.8845)	-0.2071 (0.4179)	-8.9913 (0.0000)	-7.6168 (0.0000)	-0.0180 (0.4928)	-0.3559 (0.3609)	-10.1229 (0.0000)	-8.7555 (0.0000)	2.7350 (0.9969)	-0.2213 (0.4124)	-6.2364 (0.0000)	-4.4116 (0.0000)				

Model 1: World's top ten tourist destinations, Model 2: Europe's top ten tourist destinations and Model 3: Americas's top ten tourist destinations.