

How the 2014 Air Malaysia crashes affected international tourism within the region

Pomona College

Martin Fuchs

Econ 190: Senior Seminar in Economics

Dr. Gary Smith

April 2022

Introduction

An average year will feature multiple airline crashes, but the average person does not hear of these plane crashes. Select crashes, however, feature extensive news coverage and the Air Malaysia crashes of 2014 were some of them. Attention to these events were so prominent that Boeing led the most expensive search in aviation history in an attempt to find the missing Flight MH370 aircraft (BBC 2022). Given that it has been eight years since the dual airline crashes of 2014, we are finally able to assess the long-term consequences that these crashes have had on Malaysian Tourism. We hypothesize that the dual airline crashes of 2014 had a negative effect on long term tourism not necessarily due to the severity of the events, but due to the public nature that surrounded them. For this reason, we will not only be studying the effect of the Air Malaysia crashes on Malaysian tourism but also the effects of other airline crashes on their respective countries' tourism. If there is a statistically significant difference between the Malaysian and other countries' effects on tourism, we can conclude that Malaysia differs because high levels of negative publicity associated with the crashes led to an increased perceived risk of traveling to Malaysia.

This study will be divided into the following sections. The first section, the literature review, will feature analysis from other authors tying negative publicity and negative risk perceptions with a corresponding drop in tourism. The second section, methodology, will outline the study regression equations as well as all the variables involved. Then the data section will explain the origin of these variables. Finally, in the results and discussions section, we will discuss the implications of our results and whether they prove or disprove our hypothesis.

Literature review

There has been ample evidence from prior research indicating how large negatively charged news events have an adverse impact on the affected countries. Foo, Chin, Tan & Phuah (2021) discuss the covid pandemic and how it caused tourists to cancel their bookings and delay travel plans to Malaysia due to fears of the virus. However, there are more applicable comparisons than covid because the pandemic caused the Malaysian government to impose travel restrictions which also influenced tourism. If we were to look at other examples, Sonmez & Graefe (1998) find that risk perceptions influence future travel behavior. They also find that negative perceptions of risk have a stronger influence on avoidance of regions than positive perceptions of risk do. This study was based off a random sample of 500 US citizens who expressed interest in international travel. The idea that perceived risk is an important factor in international travel has been supported by other authors as well (Kozak, Crotts, & Law, 2007; Lepp & Gibson, 2003; Reisinger & Mavondo, 2005; Cetisoz & Ege 2013). Some authors went further and found that perceived risk increases the likelihood of prospective tourists canceling their destination plans (Kozak, Crotts, & Law, 2007, Cetisoz & Ege 2013). On the topic of airline risk and its effects on travel, Fan, Pu, Powpaka, and Hao (2019) argue that the perceived risk of flying a particular airline (Air-Malaysia in this case) indirectly affects attitude toward visiting the country (Malaysia) via attitude toward flying the airline. A study by Yang, Pun, and Tijiptono (2014) comes to a similar conclusion as Fan, Pu, Powpaka, and Hao: that perceived risk of air travel is positively related to consumers' tendency of airline avoidance.

Our study seeks to apply this principle of travel avoidance due to higher perceived risk to the specific scenario of the Air Malaysia crashes of 2014. We will be observing tourism in

Malaysia as it compares to other Southeast Asian tourist countries to determine whether the 2014 events have indeed led to a drop in Malaysian tourists compared to its peers. Next, we will observe Malaysia's peer countries that have also experienced a plane crash during the study period. The Malaysia plane crashes were far more prominent than plane crashes that happened to peer countries during this period. If the impacts of airline crashes on Malaysian tourism are statistically significant without that being the case for other sample countries that experienced airline crashes, then there is ample evidence to support our hypothesis that the high levels of negative publicity associated with the Air Malaysia crashes were what caused the decline in tourism.

Methodology

Table 1: Explanatory Variables

Variable	Variable definitions
Time:	Years; Time = 0 is the year 2000
Covid Impact:	1 if covid was present that year, 0 otherwise
Sample tourism:	Sum of annual tourists visiting Malaysia, Indonesia, Thailand, Cambodia, Vietnam, Burma, The Phillipines, and Sri Lanka
Malaysia Tourism:	Number of annual international tourists visiting Malaysia; in millions
Indonesia Tourism:	Number of annual international tourists visiting Indonesia; in millions
Thailand Tourism:	Number of annual international tourists visiting Thailand; in millions
Airline Crash Malaysia:	1 for every year after 2014, which marked the dual airline crashes in Malaysia, 0 otherwise
Airline Crash Indonesia:	1 for ever year after 2005, which marked the first Indonesia airline crash of our study period, 0 otherwise
Airline Crash Thailand:	1 for every year after 2007, which marked a major airline crash in Thailand, 0 otherwise
Malaysia Tourism/Tourism Index:	Number of annual Malaysian tourists divided by the annual number of tourists visiting the the sample index countries, including Malaysia; in % terms
Indonesia Tourism/Tourism Index:	Number of annual Indonesian tourists divided by the annual number of tourists visiting the the sample index countries, including Indonesia; in % terms
Thailand Tourism/Tourism Index:	Number of annual Thailand tourists divided by the annual number of tourists visiting the the sample index countries, including Indonesia; in % terms
Malaysia Freedom Index:	Value between 0 and 100. The higher the value the more politically and economically free the country is
Indonesia Freedom Index:	Value between 0 and 100. The higher the value the more politically and economically free the country is
Thailand Freedom Index:	Value between 0 and 100. The higher the value the more politically and economically free the country is

Equation 1

$$\text{Malaysia Tourists/Index Tourists} = \beta_0 + \beta_1 * \text{Time} + \beta_2 * \text{Malaysia_Freedom_Index} + \beta_3 * \\ \text{Malaysia_Airline_Crash} + \beta_4 * \text{Covid_Impact} + e$$

We are measuring the long-term impact that the 2014 airline crashes had on Malaysian tourism as it compares to tourism in peer countries. The main variable whose impact we are measuring is Malaysia Airline Crash. We expect the Malaysia Airline Crash variable to have a negative correlation with the dependent variable. All other variables serve as controls. Of those controls, the Malaysia Freedom Index is expected to yield a positive correlation with the dependent variable.

Equation 2

$$\text{Indonesia Tourists/Index Tourists} = \beta_0 + \beta_1 * \text{Time} + \beta_2 * \text{Indonesia_Freedom_Index} + \beta_3 * \\ \text{Indonesia_Airline_Crash} + \beta_4 * \text{Covid_Impact} + e$$

Equation 2 measures the long-term impact of the 2005 Mandala airline crash on Indonesian tourism as it compares to tourism in peer countries. The main variable whose impact we are measuring is Indonesia Airline Crash. We expect the Indonesia Airline Crash variable to have a negative correlation with the dependent variable. All other variables serve as controls. Of those controls, the Indonesia Freedom Index is expected to yield a positive correlation with the dependent variable.

Equation 3

$$\text{Thailand Tourists/Index Tourists} = \beta_0 + \beta_1 * \text{Time} + \beta_2 * \text{Thailand_Freedom_Index} + \beta_3 * \text{Thailand_Airline_Crash} + \beta_4 * \text{Covid_Impact} + e$$

Equation 3 measures the long-term impact of the 2007 One-Two-Go crash on Thai tourism as it compares to tourism in peer countries. The main variable whose impact we are measuring is Thailand Airline Crash. We expect the Thailand Airline Crash variable to have a negative correlation with the dependent variable. All other variables serve as controls. Of those controls, the Thailand Freedom Index is expected to yield a positive correlation with the dependent variable.

Data

The crash of flight 17, which was the first of the dual air-Malaysia crashes, happened in 2014. Further information about this crash can be found in Encyclopedia Britannica (2021) and BBC (2022). The first major airline crash that happened in Indonesia during our sample study is the Mandala Airlines plane crash in the city of Meden in 2005. Multiple other major airline crashes happened in Indonesia during the sample period, namely one in 2007, 2014, and 2018 (BBC 2022). For the purposes of this regression, the Indonesia airline crash variable will be represented as a 1 for all years after the first crash on record, which happened in 2005. Thailand experienced a major airline crash in the province of Phuket in 2007 (BBC 2022). There may have been other crashes during the sample period, but the listed crashes are what we consider to be major airline crashes. We define major airline crashes as those that killed at least 50 people

and we acknowledge that the long-term impact of airline crashes fades after a certain period. This period will be defined as 15 years following the event.

Next, [Data.worldbank.org](https://data.worldbank.org) has data for the number of international arrivals in Malaysia from the year 2000 to the year 2020. Data for international tourists after 2020 was unavailable. I will also be using [Data.worldbank.org](https://data.worldbank.org) for the number of international arrivals in Vietnam, Cambodia, Burma, The Philippines, Thailand, Indonesia, and Sri Lanka between the years 2000 and 2020. The one exception to this is Thailand, where [Data.worldbank.org](https://data.worldbank.org) only has tourism numbers up until 2019. I will be using [Statistica.com](https://www.statista.com) for the number of international tourists in Thailand in 2020. Based on the regression, the dependent variable will be either Malaysian, Indonesian, or Thai annual tourism divided by the annual tourism of an index of comparable destinations which includes: Vietnam, Cambodia, Burma, The Philippines, Thailand, Indonesia, and Sri Lanka. Because of this methodology, large tourist destinations such as Indonesia and Thailand will compose the majority of index weight. The countries within this index were chosen because they are also tourist countries (which I define as countries where tourism constitutes more than 3% of GDP) with tourism based around coastal/beach tourism, located around the area of Southeast Asia, that have relatively large populations (at least half a million population).

There are other variables that could be correlated with the dependent variables (Malaysia tourism/index, Indonesia tourism/index, and Thailand tourism/index). One of them is the Freedom Index by the Heritage foundation, a conservative-leaning think-tank based in Washington. The Freedom index measures economic and political freedoms within a country according to twelve different variables including: property rights, government integrity, judicial effectiveness, tax burden, government spending, fiscal health, business freedom, labor freedom, monetary freedom, trade freedom, investment freedom, financial freedom. The score on this

index for each country can range anywhere from 0 to 100, with higher scores indicating more economic and political freedoms.

Results

Table 2: Summary

	Obs	Mean	SD	Min	Max
Time	21	10.00	6.21	0.00	20.00
Covid Impact	21	0.05	0.22	0.00	1.00
Sample tourism	21	63.57	29.64	23.15	121.40
Malaysia Tourism	21	20.26	6.79	4.33	27.44
Indonesia Tourism	21	7.90	3.72	4.05	16.11
Thailand Tourism	21	19.65	10.36	6.70	39.92
Airline Crash Malaysia	21	0.29	0.46	0.00	1.00
Airline Crash Indonesia	21	0.76	0.44	0.00	1.00
Airline Crash Thailand	21	0.62	0.50	0.00	1.00
Malaysia Tourism/sample	21	33.58	7.19	18.70	43.51
Indonesia Tourism/sample	21	12.75	1.95	10.66	17.50
Thailand Tourism/sample	21	30.32	2.40	26.04	33.58
Malaysia Freedom Index	21	66.49	5.12	59.90	74.70
Indonesia Freedom Index	21	56.90	4.52	51.90	67.20
Thailand Freedom Index	21	65.10	2.32	62.30	69.40

Through table 2 we can observe the underlying characteristics behind important variables. There are several notable attributes to observe. First, sample tourism, Malaysia tourism, Indonesia tourism, and Thailand tourism have high deviations between the minimum and the maximum. This can be explained by the impact of covid which reduced tourism approximately fivefold in most index countries and the primarily positive growth in annual tourism that most index countries exhibited during the sample period. Another variable that stands out is Malaysia Tourism/Index Tourism. At its peak, Malaysian tourism encompassed

43.51% of index tourism but since then it has fallen to a low of 18.70% during the covid pandemic. Annual data for the sample period of Malaysia tourism/Index Tourism can be found in *Figure 1* of the Appendix. There, it can be observed that in the year 2000, Malaysian tourism was approximately 33.70% of index tourism. This number rose steadily and peaked in 2009 at 43.50%. By 2014 (the year of the airline crashes), Malaysian tourism as a percent of the index had fallen to 32.81% and since then it has decreased every year to a 2020 value of 18.70%. This indicates that, although Malaysian tourism compared to its peers declined since the airline crashes, it had already been in a state of decline for five years prior.

Table 3: Main Findings

Dependent Variable: Country Tourism/Tourism Index			
	Malaysia	Indonesia	Thailand
	(1)	(2)	(3)
Observations	21	21	21
R squared	0.847	0.913	0.526
R adjusted	0.808	0.891	0.408
Time	0.264 (0.359)	-0.286 (0.006)	0.406 (0.009)
Freedom Index	-0.838 (0.063)	0.458 (0.000)	0.471 (0.033)
Airline_Crashes	-7.436 (0.027)	-1.488 (0.059)	-2.878 (0.098)
Covid Impact	-5.581 (0.130)	3.411 (0.001)	-6.679 (0.010)
Constant	89.063 (0.003)	-9.479 (0.076)	-2.300 (0.846)

P value given in parenthesis

(1) Dependent variable is Malaysia tourism/index tourism

(2) Dependent variable is Indonesia tourism/index tourism

(3) Dependent variable is Thailand tourism/index tourism

Table 3 outlines the results of the three regression equations. R squared is significant in the cases of Malaysia and Indonesia but is lower for Thailand, indicating that there are other explanatory variables that have not been factored in for Thai tourism as it relates to tourism of index countries. For Malaysia, we can see that the Freedom Index has a negative effect on Malaysia Tourism/Index Tourism with a statistical significance of 10%. This result is counterintuitive as one would expect more political and economic freedom to be associated with higher levels of tourism. The impact of airline crashes on Malaysian tourism as it compares to peers is negative and statistically significant at the 5% level. The coefficient for Malaysian Airline Crash is -7.436, indicating that the airline crash variable has an effect of -7.436 on the Malaysian share of tourism from the wider sample of index countries. We have seen previously that the Malaysian share of tourism as a percent of the index was 32.8% in 2014 and had declined to 18.7% by 2020. Of this 14.1 percentage decline, 7.436 percentage points are attributed to the Malaysian airline crash variable according to our model.

In the case of Indonesia, the Time variable is statistically significant at the 1% level. This indicates that for every year, Indonesian tourism relative to the index fell by 0.286 percentage points. This equates to a more than 5 point drop over twenty-one years. The Freedom Index for Indonesia is also statistically significant at the 1% level. Given the relatively high standard deviation of the Indonesia Freedom Index (as evidenced in Summary: Table 2), we conclude that increased political and economic freedom in Indonesia has a strong positive relation to Indonesian tourism as it compares to peer countries. The Airline Crash variable for Indonesia is also statistically significant, but only at the 10% level. The coefficient for the Indonesia Airline Crash variable is negative as in the case of Malaysia, but it is approximately fivefold lower than in the case of Malaysia. This is a significant reduction, even when the difference in tourism

amounts is factored in (average Malaysian tourism as a percentage of index tourism is 2.5 times higher than average Indonesian tourism as a percentage of the index as evidenced in Summary: Table 2). Covid had a positive and statistically significant impact (significant at the 1% level) on Indonesian tourism as it compares to the broader index. Malaysia and Thailand both experienced a negative impact from covid in relation to the broader index.

In the case of Thailand, the time variable impact on Thailand Tourism/Index Tourism is positive and statistically significant at the 1% level. It is highly impactful as well. Over a twenty-one period, the effect of time on Thai tourism as it relates to the broader index is approximately 8.12% points. The Freedom Index was also statistically significant but at the 5% level. There is a positive relationship between the Thai Freedom Index and Thai tourism as a percentage of the broader index. However, unlike in the case of Indonesia, the standard deviation for Thai Freedom Index is relatively low so the Freedom Index effect is not as pronounced as in the case of Indonesia. The Airline Crash variable for Thailand is statistically significant at the 10% level, but it barely reaches that threshold (p-value = 9.8%). Average Thai tourism as a percentage of the index is close to the average Malaysian tourism as a percentage of the index (As evidence in Summary: Table 2) while the impact of the airline crash variable for Malaysia is threefold higher than in the case of Thailand. The covid variable has a negative impact on Thai Tourism as a percentage of the index and this is statistically significant at the 1% level.

Discussion and limitations

The main study findings show that there is an impactful and statistically significant negative correlation between the airline crashes of 2014 and Malaysian tourism as it relates to tourism within similar countries. Two other countries that we characterize as similar to Malaysia

also experienced major airline crashes during the sample period. These countries -- Indonesia and Thailand -- also had a negative correlation between the airline crash variable and tourism in relation to an index of peers. This supports the hypothesis that airline crashes negatively impact tourism for the countries affected. The Malaysian airline crash, however, had higher order statistical significance and a much larger coefficient than the airline crash variables for Indonesia and Thailand. It is evident, therefore, that the Malaysia airline crashes of 2014 had a larger impact on tourism than the impact of airline crashes in similar countries. This information, when combined with previous studies that discuss the negative impact of risk perception and unfavorable publicity on tourism, provides ample evidence in support of the main study hypothesis: that the Air Malaysia crashes of 2014 negatively impacted Malaysian tourism in large part due to the higher levels of risk perception caused by extensive negative publicity.

On the other hand, the negative correlation between the Malaysian Freedom Index and Malaysian tourism as it compares to similar tourist destinations is slightly less obvious. Common sense would have us believe that higher levels of political and economical freedom would result in more tourists visiting Malaysia compared to other tourist destinations. More economic freedom means that amenities such as hotels, restaurants, and entertainment venues should be easier to build and maintain leading to a higher number of tourists within the country. The negative correlation between the Freedom Index and our dependent variable suggests otherwise, but there are several reasons to have skepticism of this result. The correlation is only significant at the 10% level and therefore there is some room for error. Secondly, regression equation 1 does not measure the Freedom Index for countries similar to Malaysia. It could be that economic and political freedom increased in the countries similar to Malaysia during the study time-period (which is highly plausible considering the economic development of these countries over the 20-

year period) leading to a distortion in how the freedom-index actually impacts the dependent variable. Further studies into this would be useful to determine whether the negative correlation between the Freedom Index and Malaysian tourism as it relates to other countries is a statistical anomaly or some larger issue.

Our study also found statistically significant correlation (although less than in the case of Malaysia) between the 2005 Mandala Air crash in Indonesia and tourism within the region as it compares to similar countries. There are some limitations to these results, however. Indonesia experienced several significant airline crashes during the sample period—one in 2005, one in 2007, one in 2014, and one in 2018 (BBC 2022). Our study framework makes it so that the airline crash variable is a zero before the first airlines crash in the study period and a one for the next fifteen years. Indonesia had multiple airline crashes after its first crash in 2005 but the methodology technique does not recognize any of these new crashes as separate events. There is high likelihood, however, that this limitation does not impact our results to a significant extent. If anything, the fact that there were multiple airline crashes in Indonesia after 2005 should make the 2005 airline crash-variable have a higher coefficient. This has not happened, presumably because none of the Indonesia airline crashes received such large amounts of publicity as the 2014 Air Malaysia crashes.

The main limitation of the Thailand data is that R-squared was found to be significantly lower than in the cases of Malaysia and Indonesia. This indicates that there were other factors influencing Thai tourism in relation to the index of peers. This is another critique of our methodology, because control variables were based off influential factors for Malaysian tourism, but they needed to be constant across all sampled countries. Therefore, there may have been

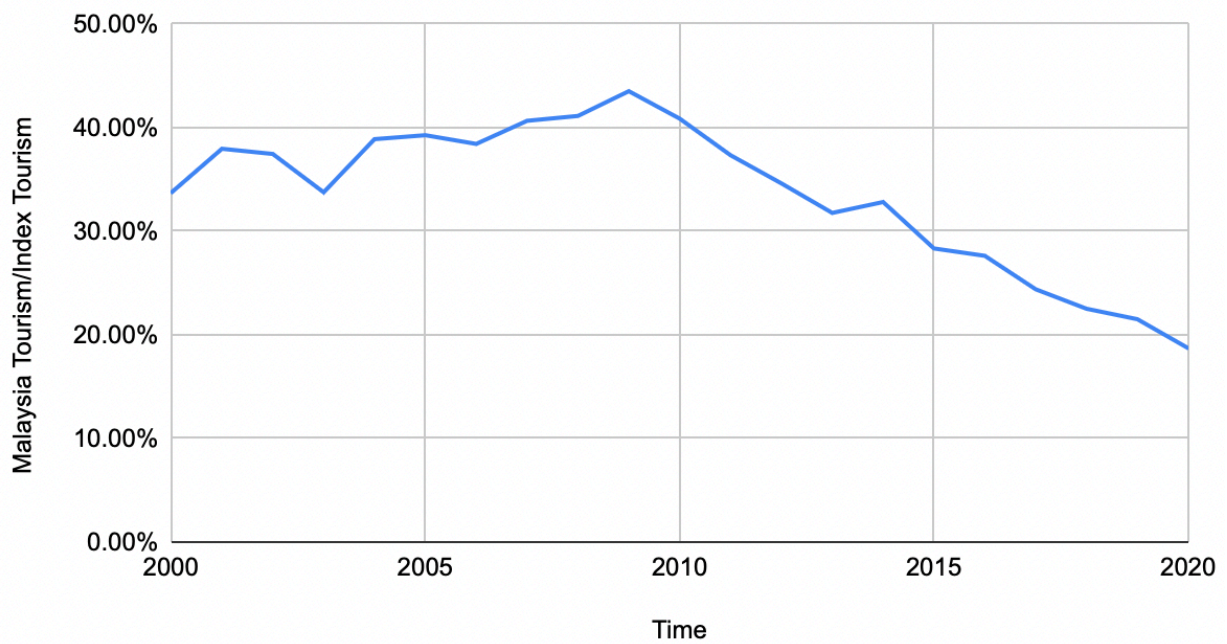
other events that were impactful specifically to Thailand tourism whose influence has since been misidentified as belonging to one of the control variables.

Another limitation to the study is the lack of a crime and safety control variable. While there is the possibility that higher crime and instability would negatively affect tourism numbers, it is unclear how Malaysia, Thailand, and Indonesia have changed in terms of crime during the twenty-year sample period in comparison to the other index countries. We encourage this comparison in future studies as more crime and safety data becomes available.

Appendix

Figure 1

Malaysia Tourism/Index Tourism vs. Time



Annotated Bibliography

Cetinsoz, B. C., & Ege, Z. (2013). Impacts of perceived risks on tourists' revisit intentions.

Anatolia, 24(2), 173–187. <https://doi.org/10.1080/13032917.2012.743921>

Development and importance of tourism for Malaysia. (2020). Worlddata.Info.

<https://www.worlddata.info/asia/malaysia/tourism.php>

Foo, L. P., Chin, M. Y., Tan, K. L., & Phuah, K.T. (2021). The impact of covid-19 on tourism industry in malaysia. *Current Issues in Tourism*, 24(19), 2735–2739.

<https://doi.org/10.1080/13683500.2020.1777951>

Foundation, H. (2022). *Explore the data.* Economic Data and Statistics on World Economy and Economic Freedom. Retrieved April 23, 2022, from

<https://www.heritage.org/index/explore?view=by-region-country-year&u=637862784681996030>

Fan, T., Pu, B., Powpaka, S., & Hao, L. (2019). The Impact of Disaster of a National Airline on the Nation's Tourism: An Empirical Investigation. *Sustainability*, 11(5), 1233.

<https://doi.org/10.3390/su11051233>

Kozak, M., Crotts, J. C., & Law, R. (2007). The impact of the perception of risk on international travelers. *International Journal of Tourism Research*, 9(4), 233–242.

<https://doi.org/10.1002/jtr.607>

Lepp, A., & Gibson, H. (2003). Tourist roles, perceived risk and international tourism. *Annals of Tourism Research*, 30(3), 606–624. [https://doi.org/10.1016/S0160-7383\(03\)00024-0](https://doi.org/10.1016/S0160-7383(03)00024-0)

Malaysia Airlines flight 370 disappearance | Description & Facts. (2022, March 1).

Encyclopedia Britannica. <https://www.britannica.com/event/Malaysia-Airlines-flight-370-disappearance>

Malaysia Airlines flight 17 | Background, Crash, Investigation, & Facts. (2021). Encyclopedia

Britannica. <https://www.britannica.com/event/Malaysia-Airlines-flight-17>

Reisinger, Y., & Mavondo, F. (2005). Travel anxiety and intentions to travel internationally: implications of travel risk perception. *Journal of Travel Research*, 43(3), 212–225.

Sonmez, S. F., & Graefe, A. R. (1998). Determining future travel behavior from past travel experience and perceptions of risk and safety. *Journal of Travel Research*, 37(2).

Thailand: Number of International Tourist Arrivals. (2020) Statista. Retrieved April 23, 2022,

from <https://www.statista.com/statistics/994693/thailand-number-international-tourist-arrivals/>

Yang, Tjiptono, & Poon. (2018). Will you fly with this airline in the future? an empirical study of airline avoidance after accidents. *Journal of Travel & Tourism Marketing*, 35(9), 1145–1159. <https://doi.org/10.1080/10548408.2018.1476301>