Article

Tourists' Perception of Haze Pollution and the Potential Impacts on Travel: Reshaping the Features of Tourism Seasonality in Beijing, China

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Abstract: Haze pollution has worsened and has received close attention by news agencies in the past two years. This type of environmental pollution might have a great effect on tourism image and the entire tourism industry of a destination. This study aimed to reveal the potential impacts of haze pollution on the tourism industry. Based on a case study in Beijing using questionnaires for potential tourists, awareness of haze pollution, impacts of haze pollution on travel and attitudes toward the impacts were discussed. The results indicated that haze pollution has a considerable potential impact on travel, and there are distinct differences among travel elements and tourism market segments. Due to its impacts, haze pollution could be taken into account in tourists' decision-making processes, causing a portion of potential tourists to cancel tourism plans. As a result, tourist arrivals to similar destinations could decrease by a small margin, but the most significant impact could be on the temporal distribution of tourist arrivals, namely tourism seasonality, due to tourists' "avoiding" psychology.

Keywords: haze pollution; potential impact; perception; tourism seasonality; Beijing

1. Introduction

The core of any tourism product is the physical plant, which refers to the site, natural resources, facility and conditions of the physical environment, such as weather and climate [1]. It is the physical environment alone that provides the basic external conditions for tourists' activities. In an era when people are under heavy pressure, one of the major motivations for travel is to avoid the resident environment and seek a site with a pleasant environment for releasing psychological stress/pressure, recovering from fatigue and relaxing the mind [2]. Therefore, environmental quality must be taken into account as an important factor in potential tourists' decision-making process, and it can have an important effect on tourism competitiveness of destinations [3]. From this point of view, destinations need to maintain high environmental quality to attract tourists. However, the environments of some large tourism destination countries, such as Egypt, China and India, are deteriorating with the procession of urbanization and industrialization. Several "traditional" environmental problems, such as garbage disposal and water pollution, still threaten the sustainable development of these areas. Meanwhile, the problem of haze pollution has risen in recent years, and air quality has become a universal concern [4].

According to a recent data analysis conducted by the World Health Organization [5], annual average concentrations of PM2.5 and PM10 have reached an unhealthy and even hazardous range in many cities in Southeast Asia and the Eastern Mediterranean, which demonstrates the severity of haze pollution. Compared with that of water pollution or soil pollution, the harmfulness of haze pollution is more profound [6]. As one type of air pollutant, inhalable particles can move freely with airflow and permeate all of the lower parts of the atmosphere in local areas [6,7]. When confronted with haze pollution, no inhabitant can avoid being affected by the pollutants. Haze pollution results in health risks for local people and has great impacts on people's daily lives [8]. Given the harmfulness of "haze days", it is reasonable to believe that tourists may have negative tourism experiences and may consider abandoning their travel plans when haze weather becomes unacceptable. From this point of view, haze pollution may be taken into account in potential tourists' specific plans, and the level of PM2.5 may be adopted as an indicator of environmental quality during travel season. As a result, new temporal characteristics of tourist arrivals may be presented in similar destinations with intermittent haze weather. As far as tourism research is concerned, few studies have been performed to explore the impacts of haze pollution on tourists and the tourism industry. This gap motivated us to conduct the present study.

Among the cities suffering from haze pollution, Beijing, the capital of China, has received the most attention due to its high level of this type of pollution. According to statistics reported by the National Meteorological Center of China Meteorological Administration (CMA), the number of haze days, during which PM2.5 concentrations exceed local air quality standards, reached 189 in Beijing in 2013. In January 2013, for example, the daily average concentrations of PM2.5 ranged from 340 $\mu g \cdot m^{-3}$ to 446 $\mu g \cdot m^{-3}$, greatly exceeding the allowable concentration specified in the Chinese Ambient Air Quality Standards, formatted by Ministry of Environmental Protection of China. In addition to health risks, haze pollution also leads to a negative impact on visibility [9], which also affects sightseeing activities for tourists. As joked by users on China's online communities [10], "Standing in smoggy Tiananmen Square in Beijing, you can't even see the portrait of Chairman Mao". The high concentration of PM2.5 in Beijing has received close attention and has negative effects on tourists' experience. In some online travel communities, such as Tripadvisor.com, many tourists complain about the heavy haze on their trips

to Beijing [11]. However, no study has demonstrated that haze pollution truly has a direct impact on tourists' travel intentions, plans and experiences, especially for domestic tourists. Domestic tours are the main tourism market for Beijing. The purpose of the study is to investigate potential tourists' perception of haze pollution's impacts on tourism experience, their attitudes and behavior intentions towards the impacts, and finally reveal the potential impacts of haze pollution on tourism industry in Beijing. Results and conclusions of the present study can contribute to tourism management in similar destinations around the world.

2. Literature Review

The majority of publications related to air quality/pollution's impacts have focused on health risks, and the conclusions indicate that air pollution is closely linked to increases in premature mortality, incidence rate and hospitalization induced by respiratory disease or other diseases [12–16]. As a result of short- and long-term exposure to air pollution, two types of effects on health risks, acute effect and chronic effect, emerge [17]. Compared with residents in polluted areas, tourists are more susceptible to acute effects. As proposed by Sönmez and Graefe [18], health risk is an important component of travel risks, and perceived travel risks have negative impacts on potential tourists' intention to visit destinations [19]. Thus, it is legitimate to suggest that haze pollution affects potential tourists' travel due to their perceived health risks. In addition to health risks, visibility is directly impaired by air pollutants, especially by particulate matter. Poudyal [20] estimated the impact of impaired visibility on the demand for visits to the Great Smoky Mountain National Park and found that monthly park visitation was significantly affected by the cumulative effect of poor visibility conditions. Therefore, the impacts of haze pollution must be analyzed from several perspectives, at the very least in terms of health risks and impaired visibility.

With respect to previous studies directly focusing on air quality/pollution's impacts on tourism, Anama and Looi [21] made an early attempt to estimate the impact of haze-related air pollution on tourism using multiple regression analysis through the case of Brunei Darussalam. However, in the study, haze pollution was limited to an accidental event cause by forest fires, thus, the study focused on the impact of accidents similar to earthquakes. Cheung and Law [22] surveyed the impacts of air quality on tourism in Hong Kong and found that Asian tourists appear to be more conscious of air quality than Western visitors, in contrast to the common belief that the majority of Westerners who have environmentally friendly mindsets are more likely to be influenced by air quality than Asians. Another study conducted by Law and Cheung [23] found that many visitors were willing to pay an additional departure tax to fund air quality improvements. Also using Hong Kong as a case study, Li *et al.* [24] scrutinized the conditions of air quality in shopping malls. The air pollution measurements far exceeded the Hong Kong Indoor Air Quality Objective. The findings demonstrated the potential negative impact on tourism development, given that shopping tourism is the core tourism market segment for Hong Kong.

Because global climate change has caused concern around the world, tourism climatology has received increasing attention from tourism experts and climate scientists. One branch of related publications has sought to assess the consequences of changes in climate variables for tourist industries for various nations, attractions and activities [25]. To respond to climate changes and the corresponding impacts, the climate information system (CIT) was established to facilitate tourists' interpretation of

climate information. De Freitas [26] outlined a framework of the CIT in which air quality was taken as a core index of climate conditions. The author later revised the index for the CIT, and atmospheric environment was comprehensively incorporated [27]. The aim in devising the index was that tourists would respond to air quality and select the best time and place with expected weather conditions for vacation travel or planned activities, which provides great insight for the present study regarding the role of haze pollution in reshaping the temporal features of tourist arrivals.

Overall, the impacts of air pollution on tourism have been discussed in several previous studies, but few of these studies have focused directly on the impacts of haze pollution on tourism. As one type of air pollution, haze caused by particulate matter can be easily perceived through the visibility condition by tourists and residents, unlike the pollution caused by SO_2, NO_2 or CO, though NO_2 can produce a brownish haze at elevated concentrations. Thus, the impacts of haze pollution on tourists may vary. In terms of study subjects, on-site tourists have received the most attention, but no study has focused on potential tourists. "Potential" means "the future", and whether air pollution affects the identity transformation from potential tourists to tourists determines future tourism development. In addition, due to the use of regression analysis in some current studies, the pathway through which air pollution matters to tourists is not yet sufficiently clear.

3. Study Area and Methodology

3.1. Beijing and Its Haze Features

As the capital, Beijing is one of the most important tourism destinations in China. It is extremely rich in tourism resources, including six world heritage sites and more than two hundred tourism sites. Given with frequent festival activities, international sports events and national conferences hosted by the city, the number of yearly tourist arrivals is very large. It is reported that tourist arrivals to Beijing amount to 252 million in 2013, and the domestic arrival portion amount to 247 million. The domestic tours represent the major tourism market, thus, impacts on domestic tourists are more concerning. According to Chinese Ambient Air Quality Standards, days when the average PM2.5 concentration exceeds 75 $\mu g \cdot m^{-3}$ are identified as "haze days". In 2013, the average number of "haze days" in China reached 29.9, whereas in Beijing it was 189. Beijing has become one of the most polluted cities in China, and the pollution situation has received close attention by national and even international news agencies. This pollution challenges residents' daily lives, especially outdoor activities.

Haze pollution in Beijing has distinct features. Generally (Figure 1), Beijing is located in North China where the northwest monsoon prevails. In addition, in terms of topography, the city is surrounded by mountains on three sides. Affected by monsoons and the topography, air pollution, including haze, in South Beijing is always worse than that in the north [28]. Low elevation, flat areas in Beijing experience worse air quality than mountainous areas to the north and west that would experience higher winds at higher elevations and therefore greater dispersion of pollutants.
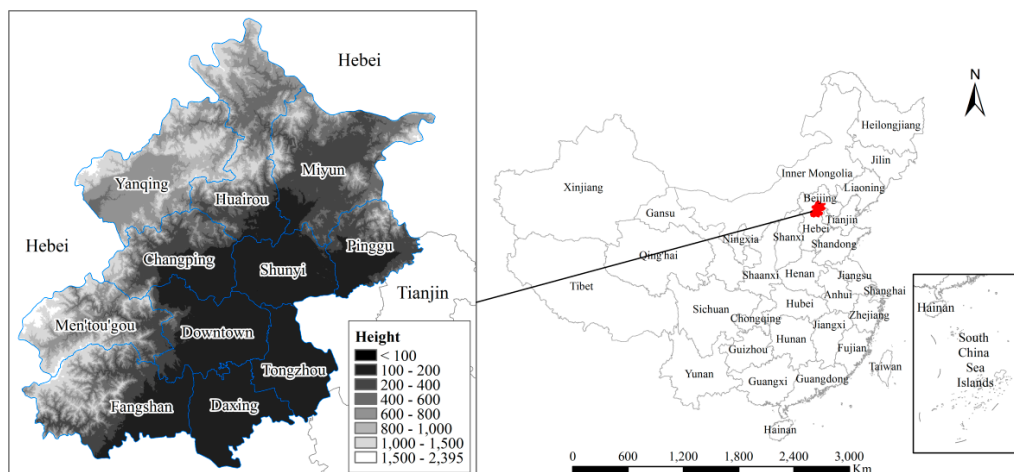
Figure 1. Beijing topographic map and location.

Haze pollution exhibits distinct seasonality, similarly to tourist arrivals. Figure 2 shows the average monthly tourist arrivals from 2011 to 2013 and monthly PM2.5 and PM10 concentrations in 2013. It is clear that the trend of the two curves associated with haze pollution is opposite to that of tourist arrivals. Several factors affect the concentrations of PM2.5 and PM10, including human factors, such as burning of raw materials, and climate variables, such as temperature, air humidity, rainfall and wind. The peak seasons of haze pollution in January, February, March, November and December are attributed to residential heating using raw materials on the one hand and to low temperature, low rainfall and light winds on the other, while that in June is attributed to high levels of air humidity and light winds. In June, "warm air mass" envelops Beijing and makes air convection insufficiency. So, air pollutants are easy to be accumulated and hard to be dispersed. Compared with June, the rainfall in July (174.8 mm) is much higher than that in June (114.3 mm) due to air convection, and the rainfall is frequent, but with short duration. Therefore, in addition to be in summer vacation, July with few haze days is a good month for travel. Besides, the temporal mismatch between the peak seasons of tourism and haze forms the perception that tourism is not or is only slightly influenced by haze pollution in Beijing, just as some officials have stated.
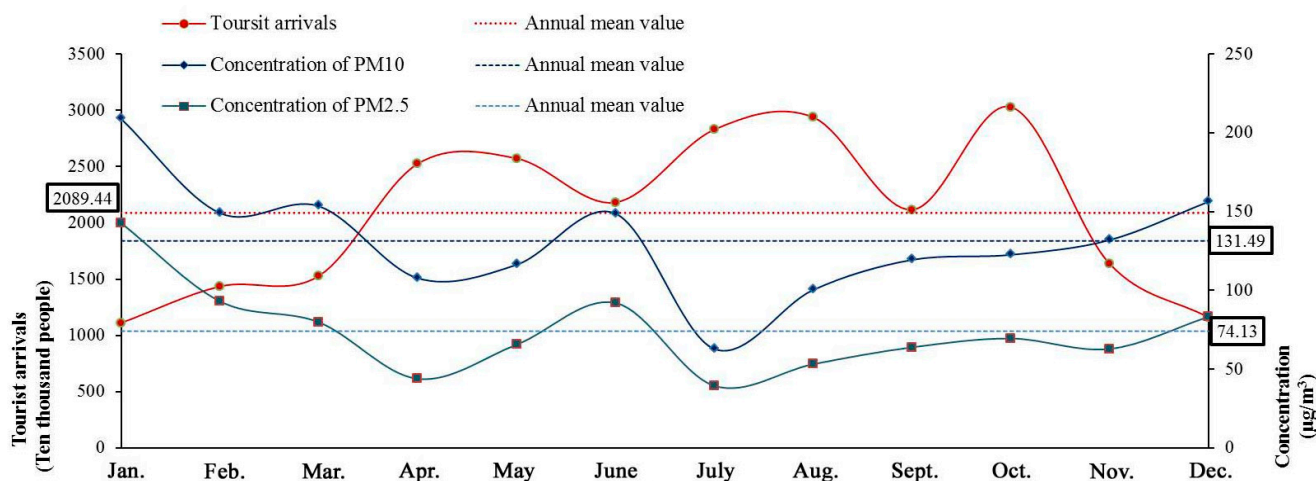

Figure 2. Monthly mean tourist arrivals and monthly concentration of haze in Beijing. Source: Beijing Tourism Bureau and Beijing Environmental Protection Bureau.

3.2. Methodology

3.2.1. Measures

Empirical research was performed based on a questionnaire survey which was composed of six parts: (a) intentions to travel to Beijing; (b) awareness of haze pollution; (c) impacts of haze pollution on travel; (d) attitudes toward the impacts of haze pollution; (e) consequences caused by different attitudes; and (f) personal information (refer to the Appendix for details). Several measuring methods were used. For instance, a five-point Likert scale was used in part (b) and (c), whereas a comparison method was used in part (d).

In addition, an experimental method was implemented in part (e). The last question in part (e) required respondents to select two preferred months of traveling to Beijing in the near future according to the concentration map of PM2.5 offered in the questionnaire and their own situations, such as spare time and previous plans. However, the specific departure time is influenced by many factors. To further understand the role played by haze, two questionnaires were designed. The concentration maps offered in questionnaire (A) and those offered in questionnaire (B) are different (Figure 3). Because the future condition of haze pollution in Beijing is unknown, the monthly PM2.5 concentration in 2013 was offered in questionnaire (A), and a subjectively assumed monthly concentration was presented in questionnaire (B). It is worth noting that the assumption made in questionnaire (B) is not arbitrary. Due to news media attention, many people have recognized the fact that haze pollution often occurs during cold seasons. Thus, the PM2.5 concentration in winter cannot be distinctly lower than that in summer; otherwise, the reliability of the survey would be questioned. The most obvious difference between the two maps is the concentrations from March to July.
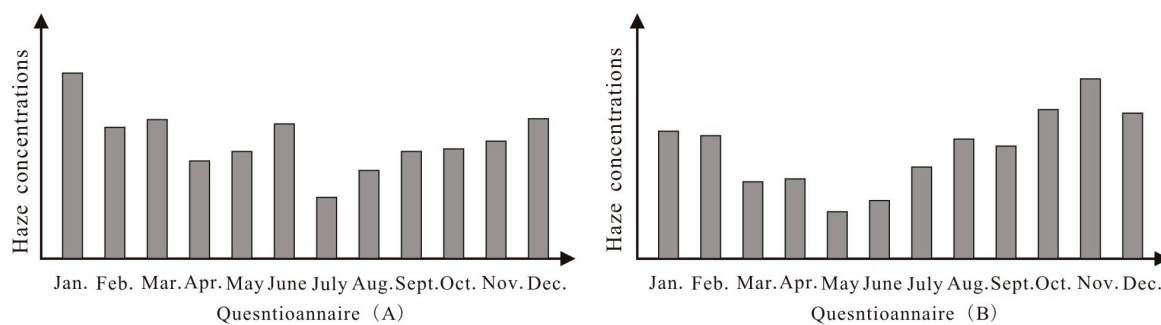
Figure 3. Different diagrams of haze concentration in questionnaire (**A**) and (**B**).

3.2.2. Sample Design

The target population comprises the valid potential tourists who have intentions to travel to Beijing in the next two years because the perceptions and attitudes of these individuals about haze are most important for the development of Beijing tourism in the near future. Thus, the question "Do you have the intention to travel to Beijing in the future two years?" was asked first, depending on which the interview and survey were conducted. In terms of the survey method, one city (Qingdao) in Shandong Province and one city (Jinzhou) in Liaoning Province were selected as the locations for surveying. According to the yearbook of Beijing tourism statistics, Shandong and Liaoning are both major tourist-generating areas. The cities are close to Beijing, and their air quality is considered to be fine [7].

The basic sample was selected through random sampling procedures because people's tourism intentions were unknown, and the survey was carried out in May and June 2014. A total of 648 valid responses were collected, 258 for questionnaire (A) and 390 for questionnaire (B). In addition, during the entire survey process, 32 people expressed abundant personal views regarding haze pollution and the corresponding effects, which was helpful in obtaining more in-depth qualitative data for this study. The socio-demographic characteristics and travel intentions of the sample are shown in Table 1. Given the features of tourism products in Beijing, the sample characteristics are similar to those of tourists in Beijing, such as travel purpose, duration of stay and number of tourism trips.

Table 1. Socio-demographic characteristics and travel intentions.

Socio-Demographic Characteristics			
Gender	Male		Female	
	45.8%		54.2%	
Age	Under 30 years old	31–40 years old	41–50 years old	50 years old or older
	42.1%	39.5%	16.0%	2.4%
Level of education	Primary	Secondary	University	-
	20.3%	36.9%	42.8%	-
Household	Single	Married, no kids	Married, have kids	-
	33.5%	28.4%	38.1%	-
Times has toured Beijing	None	One time	Two times	Three times or more
	50.2%	20.2%	8.6%	21.0%
Intentions to Travel to Beijing			
Departure time	Within one month	Within three months	Within half a year	within two years
	10.5%	15.0%	22.1%	52.5%
Duration of stay	1–2 days	3–4 days	5–6 days	One week or more
	12.5%	42.6%	25.2%	19.8%
Travel purpose	Sightseeing	Leisure	Business	Visiting friends and relatives
	53.5%	11.7%	9.9%	10.7%
	Shopping	Other purpose	-	-
	5.5%	8.7%	-	-

4 Results and Analysis

4.1. Awareness of Haze Pollution

Respondents' awareness provides a basis for their understanding the impacts of haze. The mean values associated with potential tourists' awareness are shown in Table 2. First, the level of respondents' concern about haze pollution is not high (2.77 on a scale of 1 to 5, similarly hereinafter). In the survey, many respondents indicate that they are located in areas with few haze days, and there is no need to be concerned about haze or PM2.5 concentrations in daily life. As a result, the basic knowledge about haze acquired by potential tourists is limited, and the mean value of knowing about the concept is 2.76. Almost all people had an ambiguous idea of what haze is, and most respondents believe that PM2.5 is identical to haze pollution because the term "PM2.5" is always mentioned with haze pollution on TV and

the Internet by news agencies. With respect to health risks, the mean value is very high (4.58), which means that almost all people agree that haze pollution is very harmful to health. According to personal views expressed by potential tourists, they also know how to take measures to protect themselves. In a word, potential tourists just passively accept information about haze through news reports, but health risks have been of deep concern to potential tourists.

Table 2. Measurement of potential tourists' awareness of haze pollution on a scale of 1 to 5.

	Mean	Standard Deviation
Daily concern	2.77	0.93
Concept of haze	2.76	1.27
Cause of haze	2.59	0.88
Health risks	4.58	0.84

4.2. Impacts of Haze Pollution on Travel

Does haze pollution have an impact on travel overall? The proportions of selection over the series from no impact to great impact are as follows: 1.4%, 4.9%, 19.0%, 27.8% and 46.9% (Table 3). Only less than one-tenth of respondents believe that haze pollution has no or slight impact on their future trips, with a mean value of 4.14 on a scale of 1 to 5. Thus, haze pollution has a considerable impact on travel of potential tourists.

The values of impacts on travel vary among potential tourists with different purposes. As shown in Table 3, the highest percentages of people with the purposes for sightseeing and leisure appear on the type of Great impact (32.1% and 6.9%, respectively), while that of people with the purposes for business and VFR appear on the type of Moderate impact (3.5% and 4.2%, respectively). As for the percentages of people who say that haze would have no or slight impact on their trips, people with the purposes for business and VFR account for large proportions (1.4% and 1.8%, respectively), while the percentages of people for sightseeing and leisure are only 0.6% and 0.2%. Consequently, it is necessary for us to analyze the different impacts of haze pollution among various groups classified by travel purposes.

Table 3. The percentages of respondents with different travel purposes based on their rating of the impacts of haze on travel from No impact to Great impact.

Travel Purpose	No Impact	Slight Impact	Moderate Impact	Considerable Impact	Great Impact	Total
Sightseeing	0	0.6%	4.9%	15.7%	32.1%	53.4%
Leisure	0	0.2%	1.4%	3.2%	6.9%	11.7%
Business	0.3%	1.1%	3.5%	2.2%	2.8%	9.9%
VFR	0.3%	1.5%	4.2%	2.0%	2.6%	10.6%
Shopping	0.3%	0.8%	2.2%	0.9%	1.4%	5.6%
Other purpose	0.5%	0.8%	2.8%	3.7%	1.1%	8.8%
Total	1.4%	4.9%	19.0%	27.8%	46.9%	100.0%

According to the differences of tourism motivation and travel purpose, tourists could be divided into various groups, referred to as "tourism market segments". Previous research on market segmentation in the field of travel and tourism have mainly aimed at dividing markets into different groups, then

designing appropriate marketing strategies to benefit destinations or specific products [29–31]. In this study, the purpose of focusing on market segmentation is to measure the stability of each segment. According to China's Tourism Sample Survey Data (2012) carried out by the China National Tourism Administration, the domestic tourist market has four major segments: Sightseeing tourism, leisure/vacation tourism, visiting friends and relatives (VFR) tourism, and business tourism. For Beijing, shopping tourism is supplemented in this study (Table 1). Based on the differences of major tourism activities with respect to the five segments, it is easy to measure the impacts of haze pollution on potential tourists (Figure 4).
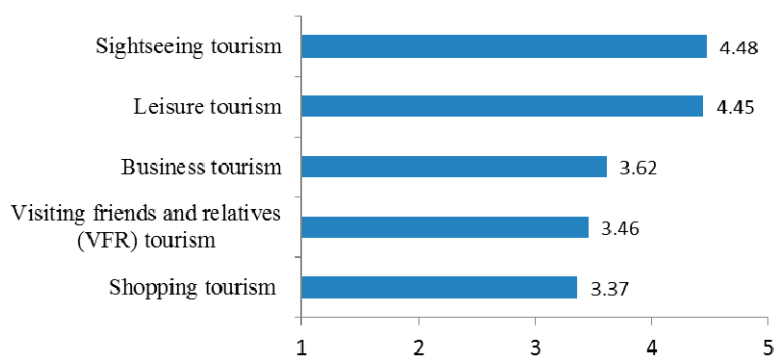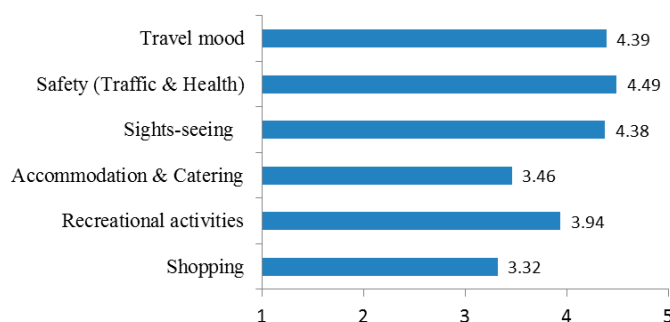

Figure 4. The rating scores of the impacts of haze pollution on travel among various tourism groups on a scale of 1 to 5.

There are clear differences of impacts among the five segments. The impact on sightseeing tourism is the greatest (4.48), followed by that on leisure tourism (4.45). These two segments are the main types of regular tourism in Beijing, and whose sample share is 72.7% (Table 1). Impacts on business tourism, VFR tourism and shopping tourism are remarkably minor. Compared with sightseeing and leisure tourism, freedom in tourism choices, such as departure time and activity content, is rather low in business tourism and VFR tourism. For business tourism, departure time, duration of stay, and even daily schedule are often prearranged by corresponding organizations. Therefore, business tourism is less affected by weather and other unfavorable factors [32], which contribute to better stabilizing the market segment of business travel as well. Similarly to business tourism, VFR tourism is weakly affected by environmental factors because trips are motivated by a sense of social obligation, such as attending anniversaries [33,34]. Another feature of VFR tourism is the lack of seasonality, which can smooth the peaks and valleys of tourism seasonality caused by regular segments. As for shopping tourism, shopping are the main tourism activities, and these activities are usually conducted indoors and slightly affected by climate and weather, thus minimizing the mean value (3.37). So, knowing about the features of each tourism group and the impacts of haze pollution on tourism activities and elements is essential to understanding the different impacts of haze pollution on travel among various groups.

The impacts of haze pollution on tourism activities and elements are also different (Figure 5), and the impact on safety, consisting of traffic safety and health, is the greatest (4.49). This finding implies that tourism safety is, and will always be, the most important factor for destinations. According to Maslow's hierarchy of needs, safety and security needs are always the most basic needs for individuals. Furthermore, haze pollution has a considerable impact on travel mood and sightseeing. For the impacts on mood, three explanations are presented by respondents: (a) tourists will be exposed to a dirty

environment; (b) due to worries about health, tourists will be difficult to devote themselves to enjoying tourism experiences; and (c) due to the impacts of haze pollution on visibility, quality of tourism experience will be greatly reduced. These impacts will cause further impacts on tourism destinations. After all, one of the major tourism motivations is to relax. The poor visibility conditions caused by haze pollution have a great impact on sightseeing, as proposed by Poudyal [20]. The quality of the experience of sights-seeing activities depends in great part on air transparency, and visibility associated with air quality is significant to sights-seeing activities. However, the impacts on accommodation and catering, recreational activities and shopping are much smaller, because these tourism activities are mainly conducted indoors.

Figure 5. The rating scores of the impacts of haze pollution on travel elements on a scale of 1 to 5.

4.3. Attitudes toward the Impacts of Haze Pollution

Tourism decision-making is a process that involves many factors, such as travel expense/cost, spare time and popularity of destination. Now that it has been reached that haze pollution has noticeable impacts on travel, is haze pollution taken into account as a factor in the tourism decision-making process? According to the survey, 43.5% of all the respondents definitely agree, and the mean rating score is 3.29 (Table 4). Respondents' attitudes imply that haze pollution will affect potential tourists' choice of tourism destination and departure time due to its impacts on travel. According to the correlation analysis between the ratings of respondents' attitudes and the impacts, the coefficient (0.43) is positive and significant at the 1% significance level.

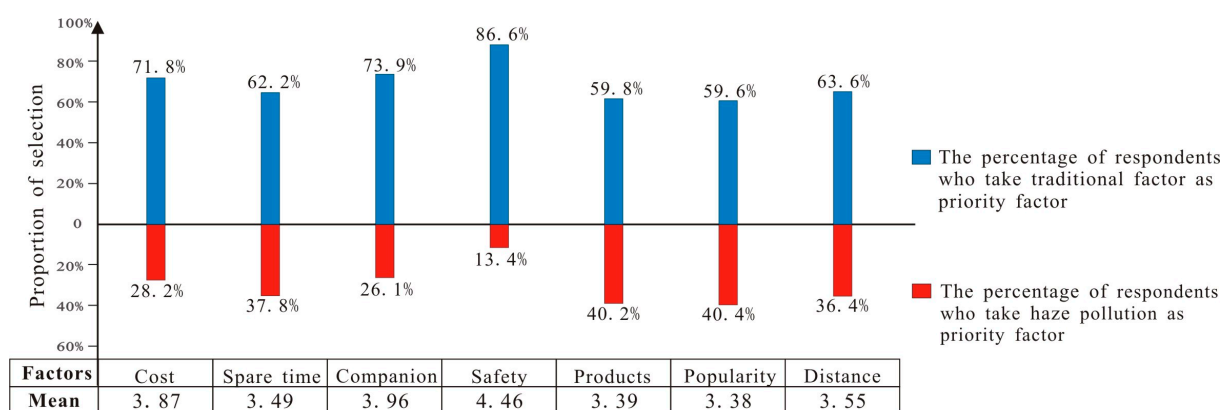**Table 4.** Investigation results of potential tourists' attitudes towards haze pollution.

	Percentages of Respondents		Rating Scores		Correlation with the Levels of Impacts	
	Agree	**Strongly Agree**	**Mean**	**Standard Deviation**	**Coefficient**	**Significance**
All the respondents	39.6%	3.9%	3.29	0.83	0.43	0.00
Sightseeing and leisure tourists	53.8%	4.5%	3.53	0.76	0.30	0.00
Business, VFR and shopping tourists	14.3%	2.6%	2.86	0.78	0.42	0.00

Notes: The number '0.00' represents significance at the 1% statistical level.

The impact on sightseeing tourists is similar to leisure tourists, and the impacts on business tourists, VFR tourists and shopping tourists are close to each other. It is necessary to explore the differences of

attitudes of the two categories of tourists. As for sightseeing and leisure tourists, more than half of them (58.3%) will take haze pollution as a factor in tourism decision-making, and the mean rating score is 3.53, which is higher than that of all the respondents (3.29). For business, VFR and shopping potential tourists, the mean rating score (2.86) is much lower than that of sightseeing and leisure tourists (3.53), and only 16.9% of respondents will take haze pollution as a factor. Hence, travel itineraries of sightseeing and leisure tourists are prone to be affected by haze pollution, and to a certain extent, they will make tourism decision according to the condition of haze pollution in the near future. Besides, the strong correlation in the two categories of tourists means such attitudes stem from the levels of haze's impacts on travel.

Sightseeing tourism and leisure tourism are the main tourism segments in Beijing, so the potential tourists need to be paid more attention to. In terms of tourism decision-making behavior, several factors influence where and when sightseeing and leisure tourists will travel, such as tourism economic cost, spare time, influence of companions, *etc.* Thus, which is the priority factor to be considered in decision-making process, haze pollution or traditional factor? The comparison results of respondents' selection are presented in Figure 6.

Factors	Cost	Spare time	Companion	Safety	Products	Popularity	Distance
Mean	3. 87	3. 49	3. 96	4. 46	3. 39	3. 38	3. 55

Figure 6. The percentages of respondents who take haze pollution as priority factor or take a traditional factor as priority factor.

On the one hand, Figure 6 shows that haze pollution has become a remarkable and important factor in tourism decision-making of potential tourists, because more than 10% of respondents prioritize haze pollution rather than any one of the seven traditional factors, and even more than 40% of those polled think that haze will be considered as the priority factor in their decision-making process when compared haze pollution with tourism products and with popularity of a destination, respectively. Although all the percentages associated with prioritizing haze are less than 50%, they cannot be ignored.

On the other hand, by comparing haze pollution with each of the seven traditional factors, larger percentages associated with traditional factors means that the seven traditional factors will be priority factors to be considered in tourism decision-making process for most potential tourists, and haze pollution will be considered later in the process, just as respondents stated, "the traditional factors, such as economic cost and spare time, are the basis of forming a trip and need to be considered firstly in decision-making process". Among the seven traditional factors, the priority of social safety over haze pollution is the most outstanding (86.6%), followed by that of companions' influence (73.9%), tourism expenses (71.8%), distance (63.6%), spare time (62.2%), products (59.8%) and popularity (59.6%) of a destination.

Overall, for most potential tourist, haze pollution will be taken into account as an important factor in tourism decision-making process. Haze pollution will influence the selection of destinations and travel itineraries as well as traditional factors. Traditional factors, such as economic cost, social safety and spare time, influence decision-making process firstly, and then haze pollution is considered, which means that initial tourism decisions based on traditional factors could be changed and adjusted according to haze conditions of destinations.

4.4. Consequences Caused by Different Attitudes

Since all the respondents are those who intend to travel to Beijing in the next two years, their initial travel intentions may be influenced by their attitudes towards the impacts of haze pollution, which could lead to two different consequences. One is cancelling their initial travel plans, and the other is trying to avoid the haze during their itineraries. If respondents intend to cancel travel plans, these potential tourists could be altered into non-potential tourists instead. This alteration comes from respondents' improving understanding of impacts of haze by re-learning in the process of answering the questionnaire.

As expected, 3.9% of respondents declared that they would dismiss their travel intentions, while 14.7% indicated that they may cancel their travel plans. Assumed all the 14.7% respondents end up with travel plans cancelation due to haze, then the number of domestic arrivals in Beijing will decrease by 18.6%. Therefore, haze pollution will reduce the number of domestic arrivals, potentially by the range of 3.9%–18.6%. By contrast, there are 81.4% of respondents will still stick to the initial travel plans, and 74.3% of them will consider adjusting their itineraries according to haze conditions in Beijing. That means most potential tourists would try to avoid going out in haze days during their future trip.

De Freitas [21] proposed that tourists will select the best time and place for travel if climate conditions are offered. Thus, for respondents who still intend to travel to Beijing, potential tourists may select the best time for travel if the conditions of haze pollution in the future are offered. To test this hypothesis, monthly concentration maps of PM2.5, as shown in Figure 3, are offered, and the statistical results are presented in Figure 7.
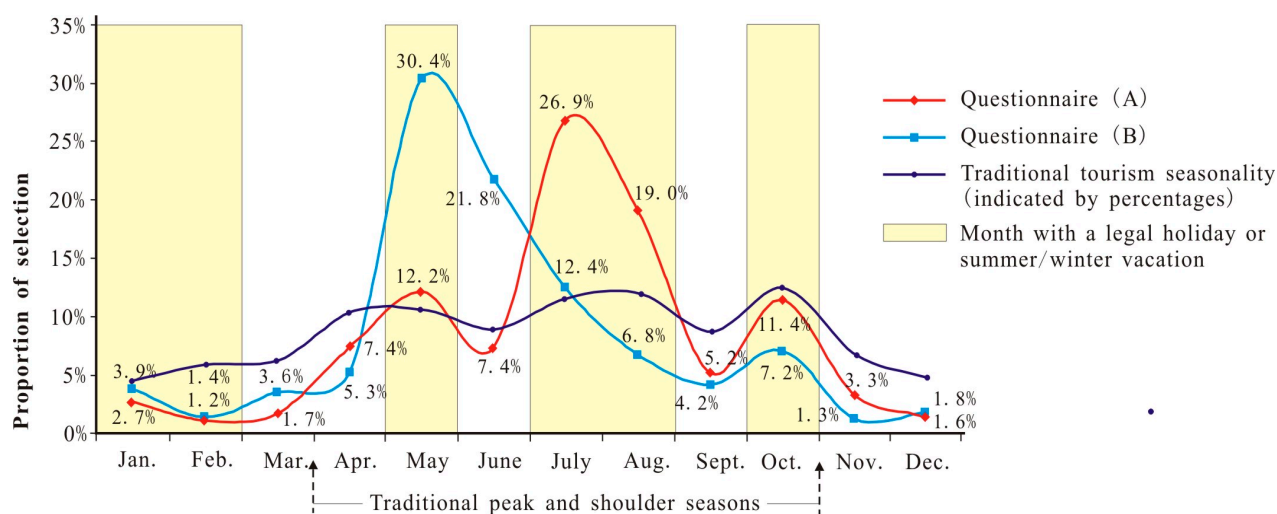
Figure 7. The percentages of respondents who select any month as their best times for travel are as shown, if potential haze conditions are offered.

Firstly, the figure shows that haze conditions play a clear guiding role in the selection of travel time because potential tourists hope to avoid going out in heavy haze days during their future trips. As for questionnaire (A), the three peaks of the curve appear in four months (May, July, August and October), which belong to the traditional peak season of Beijing tourism seasonality. Moreover, the average proportion of respondents who select July and August as their travel time (23.0%) is almost twice of May (12.2%) or October (11.4%) for questionnaire (A), while the number of actual tourism arrivals in July and August is near to that in May and October for traditional tourism seasonality (Figure 2).

Secondly, Chinese legal holidays play an important role in the selection of the time for travel. By comparing with monthly PM 2.5 concentrations, the concentrations in May and October are slightly higher than that in April and September in questionnaire (A), but the percentages in May and October are remarkably higher, because May and October are both months with a legal holiday. It should also be noted that the percentages in January or February are very low. That is because January or February is Chinese New Year when family reunions at home, in addition to the heavy haze pollution.

Additionally, the hypothesis that traditional factors are prior to haze in decision-making process has been proved. Comparing the results of questionnaires (A) to (B), they clearly vary with each other in the period from April to October, even though the PM2.5 concentration indicated for each month in questionnaire (B) is different from that indicated in questionnaire (A). Regardless of haze pollution, most potential tourists will still prefer traveling during April to October, which are traditional peak and shoulder seasons in Beijing determined by traditional tourism factors. Taking haze into account, tourists will select the time with low haze concentrations to travel to Beijing during preferred travel time. Therefore, haze pollution will reshape the "peaks" and "valleys" of the curve of traditional tourism seasonality.

5. Conclusions and Discussions

Haze pollution has worsened and has received close attention by news agencies in the past two years, especially in 2013. This type of environmental pollution might have a great effect on tourism image and the entire tourism industry of a destination. Based on potential tourists' perceptions, the potential impact of haze pollution on tourism industry was discussed in this study. The analysis of this study was composed of four parts: Awareness of haze pollution, impacts of haze pollution on travel, attitudes toward the impacts of haze pollution and the consequence caused by attitudes. The results provide early warnings for similar destinations.

Most potential tourists perceive the health risks of haze. Therefore, whether a tourist could travel to Beijing during "haze days" depends partially on three factors: The importance attached to his or her health, the freedom of tourism choices and the impacts of haze pollution on his or her experience. The first factor varies from one person to another, whereas each tourism market segment has unique characteristics for the other two factors, such as the low freedom associated with business tourism and VFR tourism, and the lower impact on experience associated with shopping tourism. Thus, understanding the structure of market segmentation well is crucial for similar destinations, depending on which local managers can forecast general tourist arrivals and allocate reception resources when confronting haze pollution. In addition, different levels of the impacts of haze pollution on tourism activities indicate that impacts on indoor activities are significantly different from those on outdoor activities. It can be envisioned that many tourists will frequent indoor sites, such as museums, theatres

and malls, on "haze days". Therefore, lifting the capacity of indoor tourist receptions and enhancing the quality of service could offset the loss of tourists' experiences.

The impact of air pollution on tourist arrivals has been observed to be one of the important focuses by tourism experts, and previous studies, such as that by Anama and Looi [21], have tried to prove the priority of this type of impact. Indeed, haze pollution would cause a small portion of potential tourists to cancel their tourism plans, and tourist arrivals for similar destinations would decrease by a small margin. However, for most potential tourists, the major concern is when they should travel rather than whether they should travel to Beijing. Therefore, the most remarkable impact of haze pollution is that on the temporal distribution of tourist arrivals, rather than on the total number of tourist arrivals. In other words, haze pollution will play an important role in tourism seasonality. Traditional factors give rise to the basic features of tourism seasonality, with haze pollution further reshaping the "peaks" and "valleys". The role of haze pollution is mainly due to the "avoiding" attitude of potential tourists. It can be concluded that many potential tourists would pay close attention to the haze pollution levels of destinations when tourism plans are approaching, and travel time would be adjusted to avoid terrible weather.

In summary, haze pollution may have far-reaching impacts on the tourism industry through every aspect of tourist travel, and the most remarkable impact is that on the seasonality of travel. This would bring about a phenomenon in similar destinations that reception facilities and other resources are excessively vacant in the new off-season but tourism sites are overcrowded with tourists in the new peak season. Moreover, even in the peak season, the quality of tourist's experience may decline due to crowdedness and the corresponding difficulty in finding a vacant room or table. That is, the worst result due to haze pollution is that all the quality of tourists' experiences would not be high, regardless of when they arrive, which is fatal to destinations' tourism development in the long run. Thus, releasing information timely about tourism arrivals, dispersing tourist flows effectively and strengthening tourist management are crucial for tourism destinations.

When confronted with haze pollution, tourism managers could try their best to smooth the impacts, for example, by rendering targeted services, releasing information about tourism and haze and allocating reception resources. However, reducing or governing haze pollution is not within the duties of tourism authorities. For instance, Green Commuting has been vigorously pioneered, but such commuting is an ineffective countermeasure for tourists during "haze days". Self-driving tourists may refuse to travel on foot because a car creates a small space that prevents tourists from being directly exposed to haze weather.

Experts must pay closer attention to the impacts of haze pollution. In future research, the spatial distribution of the impacts of haze or air pollution also needs to be better understood. Using Beijing as a case study, differences in spatial distribution in the spatial distribution of PM2.5/PM10 concentrations may encourage tourists to travel towards the north, especially for weekend travel or rural tours for local residents. Searching rural tourism sites in Google Maps reveals that newly built sites all appear in North Beijing, which means that air pollution might affect the spatial distribution of rural tourist flows and influence the scouting locations of rural tourism enterprises.

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Author Contributions

Design of the questionnaire, data analysis and writing of the article were done by Aiping Zhang. Date collection and analysis were done by Linsheng Zhong, Yong Xu and Hui Wang. The results interpretation and English editing was done by Lijuan Dang. All authors have read and approved the final manuscript.

Appendix

Questionnaire for this study.

Intentions to Travel to Beijing
1. My expected travel date. □within one month □within three months □within half a year □within two years
2. My expected duration of stay. □1–2 days □3–4 days □5–6 days □One week or more
3. My travel purpose. □for sightseeing □for leisure □for business □for visiting friends and relatives □for shopping □for other purpose
Awareness of haze pollution
4. I often pay attention to haze pollution or PM 2.5 concentration in daily life. □strongly disagree □disagree □neither agree nor disagree □agree □strongly agree
5. I know the concept of haze pollution exactly. □strongly disagree □disagree □neither agree nor disagree □agree □strongly agree
6. I know the reason why haze pollution forms. □strongly disagree □disagree □neither agree nor disagree □agree □strongly agree
7. I know some factors or countermeasures reducing the level of haze pollution. □strongly disagree □disagree □neither agree nor disagree □agree □strongly agree
8. Haze pollution has harmful effect on health. □strongly disagree □disagree □neither agree nor disagree □agree □strongly agree
9. Some protective measures could be taken to protect my health. □strongly disagree □disagree □neither agree nor disagree □agree □strongly agree
Impacts of haze pollution on travel
10. Do you think haze pollution has impacts on travel? □no impact □slight impact □moderate impact □significant impact □very great impact
11. Haze pollution would affect my travel mood during my trips. □strongly disagree □disagree □neither agree nor disagree □agree □strongly agree
12. Haze pollution would affect travel safety, including health and traffic during my trips. □strongly disagree □disagree □neither agree nor disagree □agree □strongly agree
13. Haze pollution would affect my sights-seeing activities during my trips. □strongly disagree □disagree □neither agree nor disagree □agree □strongly agree

14. Haze pollution would affect accommodation and catering during my trips.
   □strongly disagree □disagree □neither agree nor disagree □agree □strongly agree
15. Haze pollution would affect recreational activities during my trips.
   □strongly disagree □disagree □neither agree nor disagree □agree □strongly agree
16. Haze pollution would affect shopping activities during my trips.
   □strongly disagree □disagree □neither agree nor disagree □agree □strongly agree

Attitudes toward the impacts of haze pollution

17. I will take haze pollution into consideration in decision-making process.
   □strongly disagree □disagree □neither agree nor disagree □agree □strongly agree
18. Compared economic cost for travel with haze pollution, which is your priority factor to be considered?
   □economic cost □haze pollution
19. Compared spare time with haze pollution, which is your priority factor to be considered?
   □spare time □haze pollution
20. Compared social safety with haze pollution, which is your priority factor to be considered?
   □social safety □haze pollution
21. Compared products of destinations with haze pollution, which is your priority factor to be considered?
   □tourism products □haze pollution
22. Compared popularity of destinations with haze pollution, which is your priority factor to be considered?
   □popularity of destinations □haze pollution
23. Compared distance to destinations with haze pollution, which is your priority factor to be considered?
   □distance to destinations □haze pollution

Consequences caused by different attitudes

24. Since haze pollution will continue for several years, whether you will cancel your initial travel plans?
   □I will cancel the travel plan □I may cancel the travel plan □I will stick to my initial travel plan
25. If you will stick to your initial travel plan, will you consider adjusting your itinerary according to haze conditions?
   □Yes, I will □No, I will not
26. Which two months do you prefer to tour Beijing, according to the concentration map of PM2.5 offered and your needs? _____ and _____

Personal information

Gender. □Male □Female
Age. □Under 30 years old □31–40 years old □41–50 years old □50 years old or older
Level of education. □Primary □Secondary □University
Household. □Single □Married, no kids □Married, have kids
How many times have you toured Beijing?
□None □One time □Two times □Three times or more

Conflicts of Interest

The authors declare no conflict of interest.

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