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Abstract: Abstract

Ash emitted from the Eyjafjallajökull Icelandic volcano and which drifted into UK airspace resulted in the airspace being closed between the 14th and 20th of April 2010. The airport closure resulted in over a million travellers being affected and highlighted the shortcomings of airlines, travel agencies and governments to respond adequately to such crisis. In the current (2010) economic climate, where airline and travel companies are declaring themselves bankrupt with increased frequency, it is imperative that passengers do not lose confidence in the industry, which may impact directly on the industry's continuing economic viability. Understanding passengers' experiences is crucial to remedying negative experiences and harnessing 'good practice' for the advancement of the industry. To gain a better understanding of the crisis and its impact, a questionnaire was administered to members of the UK air-travelling public immediately after the airspace was re-opened. This research highlights the problems faced by passengers throughout the crisis and the way it impacted on their lives and livelihoods. Analysis of the survey results indicates two general themes regarding passengers' support during the crisis. First, the needs for accommodation support during the crisis, and second, the need for effective, efficient, timely and reliable communication during the crisis, particularly to those stranded overseas. The latter is the dominant theme and the one that caused passengers the most stress, anxiety and inconvenience. Just over 90% of all those surveyed highlighted the failure of airline, travel agencies and/or government to provide timely and appropriate information as the major issue during the airspace closure. The airspace closure also caused adverse health impacts, with seventy-percent of respondents highlighting this as a concern. Although passengers were greatly inconvenienced and found their insurance cover insufficient during the crisis, fifty-six percent indicated that they would not take out additional ash cloud cover, with most citing the risk as too low to warrant it and/or the additional expense too much. Seventy-nine percent of respondents indicated that the crisis had little or no impact on their decision to fly in the future.

Figure 1
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Maximum extent of volcanic ash cloud during the April, 2010 Iceland volcanic eruption

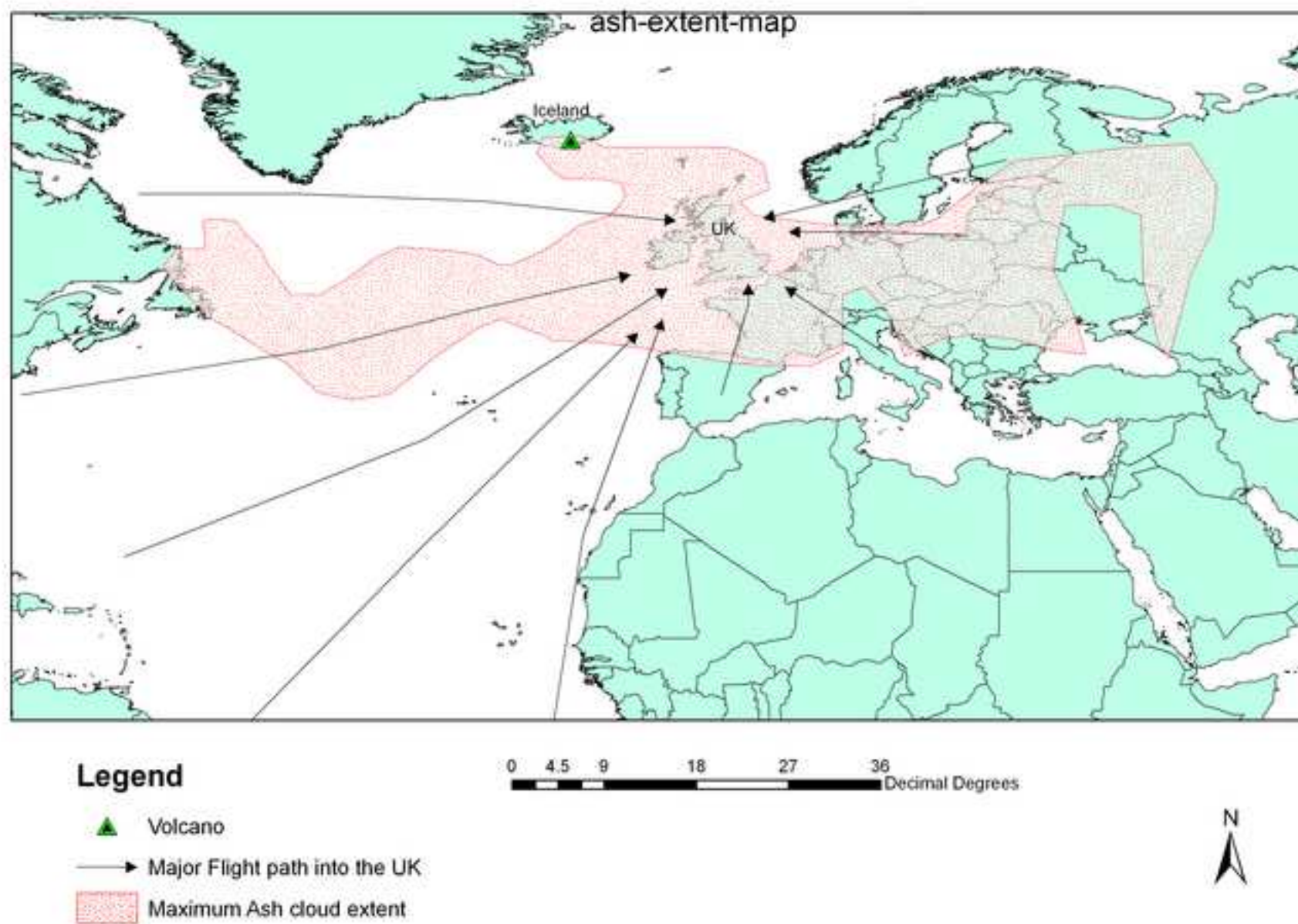


Figure 2

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13:01	Flight	Remarks
12:00	LY214	Estimated at 21:30
12:20	EZY2085	Cancelled
12:20	EZY2305	Cancelled
13:00	EZY2203	Cancelled
13:15	EZY2075	Cancelled
13:20	EZY2125	Cancelled
13:30	EZY2103	Cancelled
13:30	FR3511	Cancelled
13:40	FR2306	Cancelled
13:50	W6602	Cancelled
14:05	W6672	Cancelled
14:10	ZB074	Cancelled
14:25	FR3452	Cancelled
14:30	W6404	Cancelled
14:45	BE164	Cancelled
14:45	ZB856	Cancelled
15:00	EZY071	Cancelled
15:00	EZY2323	Cancelled

Figure 3

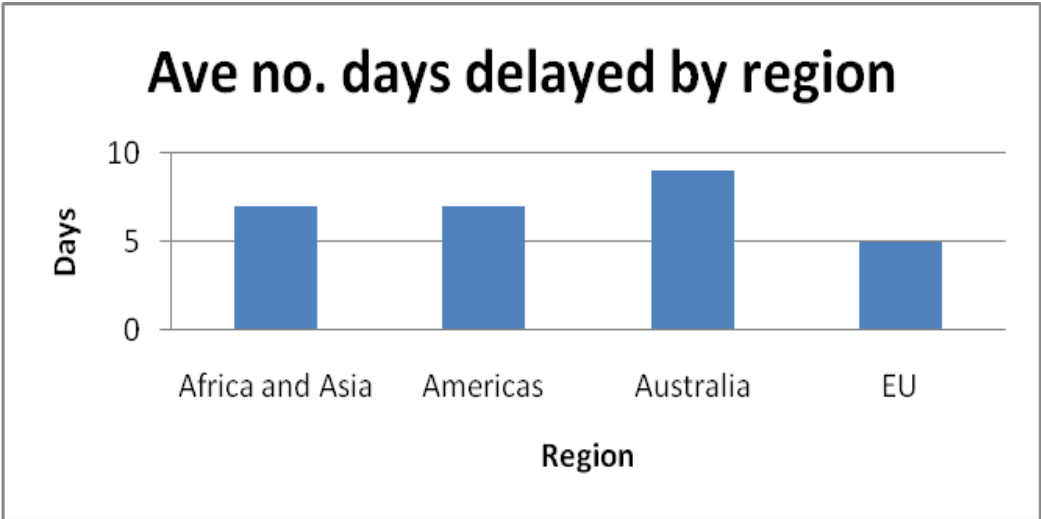


Figure 4

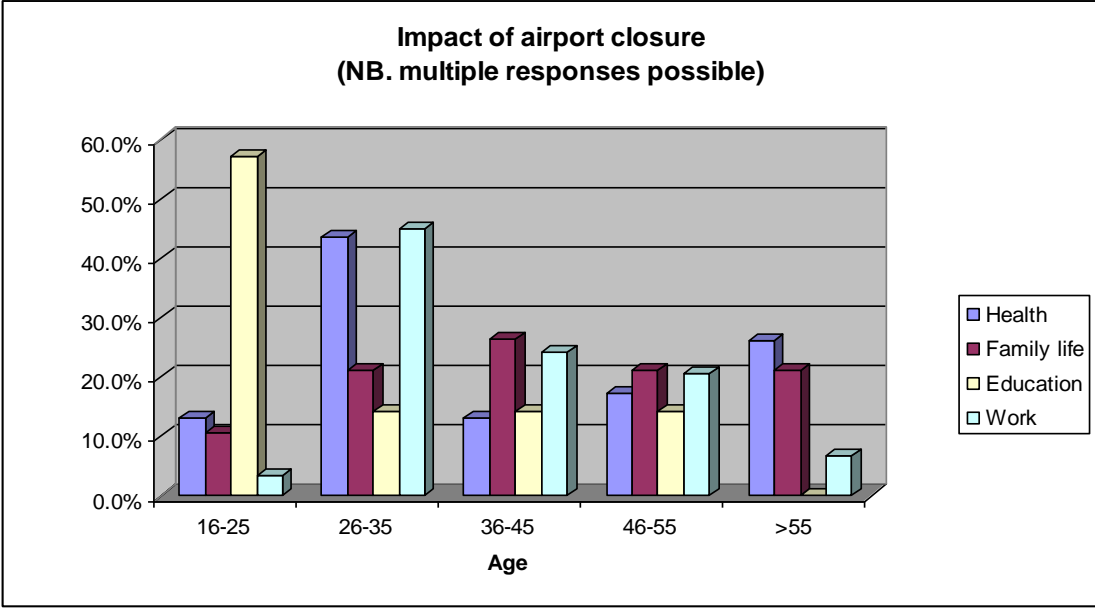


Figure 5

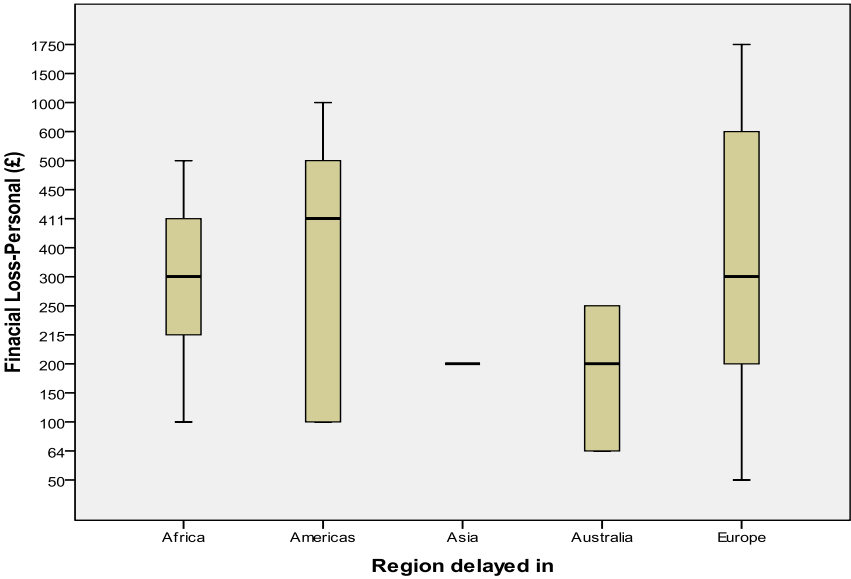
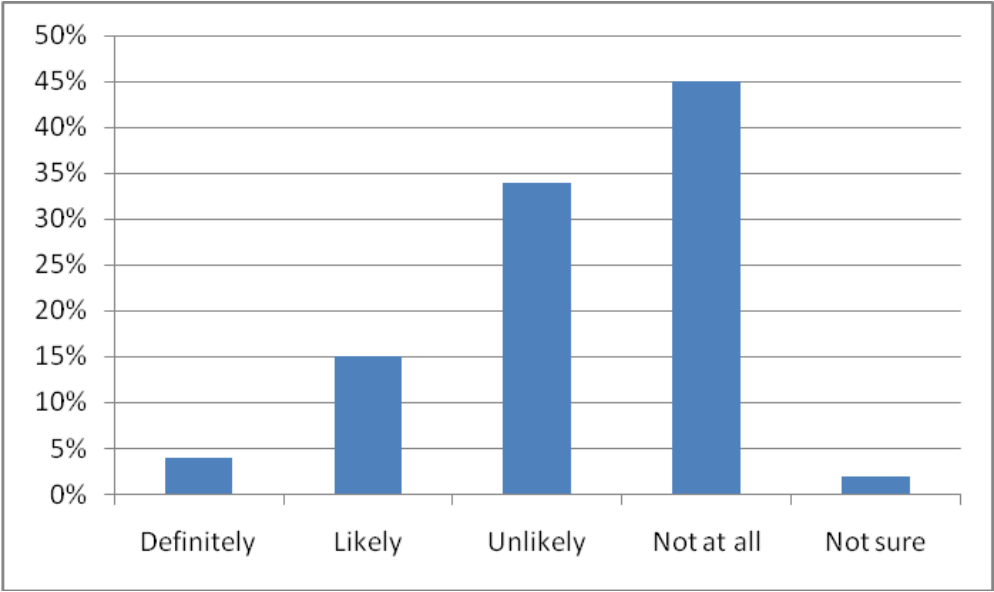


Figure 6



Research Highlight

This research highlights the problems faced by passengers throughout the crisis and the way it impacted on their lives and livelihoods. Analysis of the survey results indicates two general themes regarding passengers' support during the crisis. First, the needs for accommodation support during the crisis, and second, the need for effective, efficient, timely and reliable communication during the crisis, particularly to those stranded overseas. The latter is the dominant theme and the one that caused passengers the most stress, anxiety and inconvenience. Just over 90% of all those surveyed highlighted the failure of airline, travel agencies and/or government to provide timely and appropriate information as the major issue during the airspace closure. The airspace closure also caused adverse health impacts, with seventy-percent of respondents highlighting this as a concern. Although passengers were greatly inconvenienced and found their insurance cover insufficient during the crisis, fifty-six percent indicated that they would not take out additional ash cloud cover, with most citing the risk as too low to warrant it and/or the additional expense too much. Seventy-nine percent of respondents indicated that the crisis had little or no impact on their decision to fly in the future.

April 2010 UK Airspace closure: Experience and impact on the UK's air-travelling public and implications for future travel.

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Abstract

Ash emitted from the Eyjafjallajökull Icelandic volcano and which drifted into UK airspace resulted in the airspace being closed between the 14th and 20th of April 2010. The airport closure resulted in over a million travellers being affected and highlighted the shortcomings of airlines, travel agencies and governments to respond adequately to such crisis. In the current (2010) economic climate, where airline and travel companies are declaring themselves bankrupt with increased frequency, it is imperative that passengers do not lose confidence in the industry, which may impact directly on the industry's continuing economic viability. Understanding passengers' experiences is crucial to remedying negative experiences and harnessing 'good practice' for the advancement of the industry. To gain a better understanding of the crisis and its impact, a questionnaire was administered to members of the UK air-travelling public immediately after the airspace was re-opened.

This research highlights the problems faced by passengers throughout the crisis and the way it impacted on their lives and livelihoods. Analysis of the survey results indicates two general themes regarding passengers' support during the crisis. First, the needs for accommodation support during the crisis, and second, the need for effective, efficient, timely and reliable communication during the crisis, particularly to those stranded overseas. The latter is the dominant theme and the one that caused passengers the most stress, anxiety and inconvenience. Just over 90% of all those surveyed highlighted the failure of airline, travel agencies and/or government to provide timely and appropriate information as the major issue during the airspace closure. The airspace closure also caused adverse health impacts, with seventy-percent of respondents highlighting this as a concern. Although passengers were greatly inconvenienced and found their insurance cover insufficient during the crisis, fifty-six percent indicated that they would not take out additional ash cloud cover, with most citing the risk as too low to warrant it and/or the additional expense too much. Seventy-nine percent of respondents indicated that the crisis had little or no impact on their decision to fly in the future.

Key words: Ash cloud, airspace closure, crisis, aircraft, passengers, experience

Introduction

Service disruption to the airline and travel industry has the potential to severely undermine the economic viability of the industry as dissatisfied customers may lose confidence in the service provider and as such they may withdraw or reduce their patronage (Chang and Chang, 2010, Gustafsson, 2009). When this service disruption occurs over a long period of time, resulting in a crisis, this could have far-reaching implications for an already economically fragile industry, which has seen record number of travel companies and airlines going bankrupt (Arnott, 2010a; Klophaus, 2005). Ash emitted from the Eyjafjallajökull Icelandic volcano in 2010 resulted in wide scale airspace closure throughout the European Union (EU) between the 14th and 20th of April 2010 and caused major service disruption to the airline industry. On the 14th of April, due to the ash cloud from the volcano entering the United Kingdom airspace (see Figure 1), the National Air Traffic Services (NATS) took 'appropriate action to ensure safety in accordance with international aviation policy' by closing most of the UK airspace (NATS, 2010a).

The resulting airspace closure resulted in mass cancellation of flights (see Figure 2) throughout most EU airports causing a major crisis not seen since the 9/11 terrorist attack. As noted by Siomkos (2000; p1), a crisis impacting on the airline industry may 'inflict large financial or reputational losses on companies, and may even threaten their very survival'. The global airline crisis of 2001/2002 resulted in a massive slump in air traffic demand and eventually industry-wide capacity reduction and collapse of some companies (Hatty and Hollmeier, 2003). If a crisis is managed in a professional and effective manner it has the potential of not only restoring the pre-crisis state but also forming a more healthy business environment (Hatty and Hollmeier, 2003). As Gustafsoon (2009; p1) states 'a company turning a potential negative situation into a positive one is a good service recovery... service recovery is about using tools to turn a mistake into a positive and profitable one'. It is clear from the media reports at the time of the crisis (see Atherton, 2010; BBC, 2010a, b & c; McConnel, 2010; Wardell, 2010; and The Daily Mail, 2010) that there were mistakes made and many airline passengers were dissatisfied with the response from airline and travel companies to the crisis.

The European market has a high number of companies operating within very small profit margins, especially the Low Cost Carriers (LCCs), therefore customer satisfaction and retention is vital to their survival (Klophaus, 2005; Gustafsoon, 2009). Effective service recovery and customer responsiveness (the ability to respond effectively in addressing the needs and concerns of passengers affected have been shown to be significant contributors towards service quality and customer retention during a crisis (Menon and Dude, 2004; Karatepe, 2006; Gustafsoon, 2009; and Chang and Chang, 2010). Two key factors in effective service recovery and customer responsiveness are, first, contingency planning for crisis situations; and second, understanding customers' (passengers') needs and issues that they experience during a crisis in order to address similar issues in the future (Choularton, 2001; Hattie and Hollmeier, 2003; Park et al., 2004; Rithie, 2004; Lukszewski, 2005 and; Karatepe, 2006).

With the Icelandic volcano (which produced the ash cloud prompting airspace closure) continuing to show intermittent activity with the possibility of a long-term eruption in the future (Met Office, 2010), it is important that the impact of the April 2010 UK airspace crisis and its impact on the UK's air-travelling public be assessed. This will provide an understanding of passengers' experiences and the level of airline/travel industry and government responsiveness that have the potential to contribute to the development of future crisis contingency plans.

By using questionnaires to gather information from affected passengers, this research evaluates passengers' experience (including financial loss, health issues, impact on lives and livelihood) during the airspace closure; discusses and analyses affected passengers' views on how the impact could be reduced in the future; and examines good practices employed by airlines/tour operators during the crisis; as well as discussing how these practices could be adapted to such future events, and making recommendations on factors that should be considered in the development of future crisis contingency plans. This research also explores the affected air-travelling public's perception of their decision to fly in the future and ash cloud travel insurance.

Figure 1. Maximum extent of volcanic ash cloud that created No-fly zone in UK airspace cloud during April 2010 (compiled from data from Met Office, 2010).

Figure 2. Arrival and departure board at a UK airport during the airspace closure

Ash cloud and its impact on aeroplanes

Volcanic ash in the atmosphere has been known to have an adverse impact on aircraft performance and has compromised the safety of numerous aircraft in the past (Touret,

2010). During a volcanic eruption the collapse of the volcano's eruptive column results in the formation and distribution of tephra (>50µm diameter volcanic particles). Depending on the wind velocity and direction tephra can remain suspended in the air or be carried great distances and heights in some instances as much as 45km within the cruising altitude of jet aircraft (Guffani et al, 2005; Dunn and Wade, 1994). These particles travel at speeds of several km/minute and have the potential to cause damage to aircraft windscreens, fuselages, turbine engines and fans. For example, during the 1982 Ganungung volcanic eruption in Indonesia over 80 airplanes were damaged when they inadvertently flew through ash clouds (Touret 2010). During this event, a number of aircraft lost engine power and barely avoided crashing (Schmincke, 2004).

Impact highlighted by media

The April 2010 UK airspace closure had a significant and far reaching impact on the lives and livelihoods of the UK air-travelling public with over one million UK travellers either left stranded and/or having their travel plans affected (BBC, 2010a, The Daily Mail, 2010). In some instances, passengers were left stranded for several days, resulting in high levels of difficulty, inconvenience and financial loss. Businesses were significantly affected, including airlines, which lost millions of pounds (BBC, 2010a&b and Wardell, 2010) and tourist destinations like London, which experienced a significant loss in visitor arrivals and spending (BBC, 2010b).

It was estimated that airlines operating in EU airspace were losing as much as 200 million Euros per day due to flight cancellations (Wardell, 2010; Page, 2010) with some individual airlines losing as much as twenty million Euros per day (Smith, 2010; Reuters, 2010). The total direct loss to the aviation industry and tour operators was estimated to be up to 2.5bn Euros (BBC, 2010b). During and immediately after the airspace closure a number of airlines experienced a decrease in share value. For example, British Airways, Lufthansa Airlines, Air Berlin KLM, Ryanair, SAS and Air France had decreases in share values of between 2 and 4% in the immediate aftermath of the airspace closure (Arnott, 2010a; Reuters, 2010 and Wardell, 2010). Such losses have the potential to affect the financial viability of these airlines.

The financial losses to individual airlines could be significant as most airlines were neither insured against business interruption at airports nor against cancellation due to ash clouds (Reuters, 2010). Although the UK Prime Minister at the time -Gordon Brown, did allude to some level of compensation to airlines (BBC, 2010), there has been little support from governments and E.U. related to financial losses from airspace closure. Airline companies believe their respective governments and/or the EU Transport Ministry should compensate them (Arnott, 2010a & b), however, most find themselves bearing the financial losses incurred during the April 2010 airspace closure without any recourse to compensation. It is this type of impact of airspace closures due to volcanic eruption that could jeopardize the long term economic viability of airlines (Flight Global, 2010). In order to maintain a level of economic viability under future crisis scenarios, airlines need to maintain custom and therefore implement measures to improve passenger confidence. To do this an understanding of the public's

experience during the airspace closure is needed which will inform how strategies will be implemented to address such concerns.

The review of media articles indicated that a common complaint cited by affected passengers throughout the crisis was neglect and poor customer service by airlines and holiday companies. There is the potential for media reports to be biased towards negative rather than positive experiences, however, these negative experiences must be considered as they may have serious implications to the sector. As highlighted above, effective service recovery and customer responsiveness contributes significantly to service quality and customer retention during a crisis (Menon and Dude, 2004; Karatepe, 2006; Gustafsoon, 2009; Chang and Chang, 2010 and Kim and Lee, 2010). When dealing with crisis, airlines will need to provide response and support during what is often a stressful time for customers. Customers expect service providers to respond in a supportive manner to both their negative and positive emotions (harness 'good practice'). When service providers respond in a supportive manner, this leads to high customer satisfaction (Menon and Dude, 2004). Customers' experiences need to be understood and analysed to ensure that crisis situations are managed effectively to maintain service quality. In order to achieve this, a questionnaire was designed to garner the views of passengers affected. The results were analysed both quantitatively and qualitatively and are discussed below.

Customer experience- Data collection methodology

This research was undertaken during and immediately (one week) after the April 2010 airspace closure. It is worth mentioning that the data gathering exercise (questionnaire distribution/ return, review of print and electronic media) was limited to one week post-airspace closure. It was important to undertake the survey in that short time window while the issue was still immediate and people's knowledge and recollections of the impacts were still fresh.

The questionnaire was designed to gain understanding of: (1) the direct economic losses both to individuals and businesses; (2) the impact on wellbeing, lives and livelihoods and finally and, (3) the perception of affected passengers regarding the impact of the April event on future travel.

The questionnaires were distributed using three general methods. Firstly, by 'email networking' ('snowball sampling'), which involved initially emailing the questionnaire to friends, colleagues and individual within businesses, schools and government offices, that were known to be affected and asking them to complete it as well as passing it on to others and as such building up a national network of respondents. Secondly, a website was set up which could be searched for via common search engines using key trend words of the time period ('ash cloud', airport closure'). Respondents could then fill the questionnaire in on online. One of the key benefits of using this type of website (see SurveyMonkey, 2010 and Survey Console, 2010) was its ability to provide summary statistics and consequently for reports to be produced. This method of data collection also automatically logged the country and county, assigning a unique code to each respondent. In this way it could be ensured that respondents were UK based.

The final method of data collection was to distribute hard copies of the questionnaire to returning passengers at airports, known individuals affected and within businesses and schools to known members of their staff directly affected. Pre-paid, self addressed envelopes were provided with the questionnaires to facilitate their return.

From the three methods of data collection a total of 89 questionnaires were completed. The most effective method was via 'email networking' (accounting for 65% of questionnaires) compared to hard copy questionnaires (5%). The remaining 30% of questionnaires were completed by online survey.

Customer experience - Passenger support during the crisis

A key focus of this research was to gain an understanding of the issues passengers faced during the crisis, particularly those stranded overseas. This may not only help service providers (e.g. airlines and travel companies) to develop and modify their customer service programmes but also to help in the development of contingency plans during 'crisis' situations.

Analysis of the survey results indicates two general themes regarding passengers' support during the crisis. First, the need for the service provider to respond to their need for accommodation support during the crisis, with approximately 73% of respondent indicating this as a serious concern they faced. Second, the need for effective, efficient, timely and reliable communication during the crisis, particularly for those stranded overseas. The latter is the dominant theme and the one that caused passengers the most stress, anxiety and inconvenience. Approximately 90% of all those surveyed highlighted the failure of airlines, travel agencies and/or government to provide timely and appropriate information as the major issue during the airspace closure. To explore these two themes in more detail the data from this study has been analysed both qualitatively and quantitatively to highlight passengers' experiences, expectations and suggestions of how services could be improved. Following the argument of Menon and Dube (2004), both negative and positive emotions to a crisis should be explored to develop an effective response. This paper first explores and discusses the negative emotions of passengers during the crisis and, second, discusses the positive emotions experienced and how this may be adapted as 'best practice'.

Customer experience -Communication issues

In a crisis, effective communication to passengers is of paramount importance. If this is done in a supportive and efficient manner it may greatly reduce the negative impact of the disaster (Ennis-Holcombe, 2006) and service users are more likely to think positively about the provider (Menon and Dube, 2004). Poor communication strategies during a crisis can often make the crisis worse (Ritchie, 2004). It is therefore imperative that service providers develop effective communication to reduce the impact of a crisis on their customers and employees. The lack of timely, accurate, reliable and appropriate information was highlighted by respondents as the major deficiency by airlines/service providers during the crisis. The comments of one affected passenger (stranded in Spain for eight days) summarises the general mode of passengers:

Communication is key. Regular, accurate updates that are as helpful and informative as possible. It is also important that they do not cost a fortune to access and that you are not kept waiting on a helpline for 25+ minutes when calling from abroad to an 0870 number. Ensure customers are safe and basic needs are provided for. Perhaps to give information of a local contact person/office for help and reassurance.

Key phrases/themes/words from customers' responses were summarised and analysed to decipher the communication issues they were experiencing. The analysis was able to determine that there were five general concerns highlighted by respondents in this respect. These were: difficulty in contacting service providers (72%); conflicting information provided by service provider (39%); inadequate/insufficient information provided on website (74%); telephone personnel not knowledgeable and/or responsive to queries (55%); and it was not possible to communicate with the service provider (24%).

Airline passengers are becoming increasingly more dependent on the internet to plan and monitor their travel itinerary. Airlines and travel agencies are also actively encouraging passengers to use the internet for booking and managing their travel plans (O'Connell and Williams, 2005; Lugge, 2007). It is therefore not surprising that affected passengers turned to the internet for information during the April 2010 UK airspace crisis. It is therefore noteworthy that 74% of respondents in this study felt that the information provided on the internet during the UK airspace closure in April 2010 was either inadequate and/or insufficient. For example, two passengers affected, one stranded in France and the other in Spain, highlight the general concern about information available on websites when they states;

No advice given of how to proceed (e.g. Go to airport, stay in hotel, make alternative travel arrangements)' and; '[airlines should] update web sites when they say they are going to.'

'Ryanair website and phone lines were of no use.'

Some of the key problems highlighted by affected passengers regarding service providers' websites during the crisis include: timely information about flight cancellation/resumption; need and/or failure to provide information on accommodation/alternative modes of transportation; inability to access customer care numbers provided on websites; lack of relevant information on a timely basis on websites (as highlighted above); lack of adequate information on compensation and; conflicting information being provided. These issues were regarded by the respondents to be unacceptable and they generally believed that airline/travel companies should have had better duty of care. This view is highlighted by a mother who was stranded in Madrid, Spain with her three young children, when she states:

'Update on information is vital and key as far as I am concerned. They should have a duty of care to ensure that the passenger is safe and secure. They should also look at working together to provide passengers with more creative solutions or alternatives.'

As noted by Ritchie (2004), consistency of response is a key element in effective crisis communication. If service providers are able to provide a clear, concise and consistent message to all stakeholders, this will build and preserve the credibility of that organisation (Coombs, 1999). Different players, particularly the media, have different motives to produce

different types of information (or at least spins thereon). It is therefore imperative that clear, concise, current and correct information emanates from service provider. As indicated above, 39% of the respondents who indicated that poor communication by service providers was an issue mentioned conflicting information provided on providers' websites and/or from customer service representatives. Whilst not directly stated by some respondent, this confusion may be also being due to information they received from the media and government sources. Respondents often refer to the various information sources and the confusion it caused, without always explicitly stating it was the service provider who provided conflicting information. The confusion in information dissemination may have been inherent in the nature of the crisis and the multitude (and in some case conflicting) players (i.e. airlines, airports, NATS, Met Office, government) involved. Regardless of this, effective crisis communication involves timely liaison with the relative players and communicating the information to all stakeholders, including the media (Ritchie, 2004).

Customers need to know that concerns are being heard and service providers are listening and supportive (Menon and Dube, 2004). As noted above, passengers have come to depend on the internet to plan and manage their travel. However, in times of crisis, service users and the general public expect more direct means of communicating with service providers (Ritchie, 2004). As shown above, 72% of the respondents who indicated that poor communication by service providers was a problem during the crisis highlighted that they experienced difficulty contacting service providers and when they managed to do so, 55% felt that the individual contacted was not sufficiently knowledgeable to address their concerns. This view expressed by a stranded businessman in Barcelona, Spain is typical:

[I was] 'unable to contact [the] airline company for 3 days due to high level of calls, very poor information on their web pages...0800 number does not work.'

In some cases, respondents (24% of those who highlighted communication issues) indicate that they were unable to contact their service provider throughout the whole of the crisis. This was particularly prominent amongst travellers who did not book their flight/accommodation directly through airlines and/or a traditional travel agent. It is not surprising then that 'price comparison' sites and 'third party' booking sites are harshly criticised by respondents. A passenger stranded in Tenerife states:

'I had booked my flight on line with Expedia - they were completely hopeless. I received no communication from them at all and found it impossible to contact them by telephone or the internet.'

Customer experience -Accommodation and food

On average, passengers were left stranded for more than five days (see Figure 3). This meant that they unexpectedly had to find alternative accommodation and spend additional money for food and other amenities that they may not have planned for. This is reflected in the 73% of respondents who indicate that issues related to accommodation and food impacted negatively on their experience during the airspace closure. Some of the strong negative emotions (see Menon and Dube, 2004) experienced by passengers may also be linked to the inadequate communication strategy by providers highlighted above. Passengers were unsure about airline policy regarding accommodation and found it difficult

to contact service providers to clarify their policy. For example, it was difficult to determine; if they should wait on service provider to contact them and offer to provide accommodation; if they found their own accommodation what would they be compensated for; what would be reasonable to claim for and where should they stay (lack of local knowledge). One passenger's statement summarises the prevailing view of most passengers regarding uncertainty and inadequate information related to accommodation:

'Up to date information and regular contact [is] vital, this lessens the stress. Ensuring safety in a strange place e.g. -recommending good local places to stay - and making quick provision for those who have financial difficulty.'

The prevailing perception among respondents is that if their flights are cancelled the airlines are responsible for providing adequate accommodation. Passengers allude to the European Union (EU) regulations, which stipulate that airlines are responsible to provide support to their passengers during such delays. EU regulation number 261/2004 provides common rules on compensation and assistance to passengers in the event of denied boarding, cancellation and/or long delay of flights (OJEU, 2004). Clause 12 of the EU Regulation states *'Passenger whose flights are cancelled should be able either to obtain reimbursement of their tickets or to obtain re-routing under satisfactory conditions, and should be adequately cared for while awaiting a later flight'* (OJEU, 2004; pL46/2). It is the deemed failure of particularly the airlines to provide adequate care (both in providing accommodation and in communicating their policy) during the airport closure that respondents cite as impacting negatively on their experience and a factor they believe to have caused them undue stress and hardship. As a student stranded in Amsterdam, The Netherlands and a researcher stranded in Murcia, Spain, indicated:

'the least they [airline] could [do is to] ensure you have somewhere to sleep in comfort and food, plus keep one informed.'

and

'If stranded abroad people should be entitled to hotel accommodation/ food plus any urgent medical supplies.'

Some passengers appear to recognise that due to the magnitude of the crisis and the number of people affected that it would be highly improbable that airlines could arrange accommodation for all those affected. Such respondents did, however, highlight that if airlines had had contingency plans for such a situation it may have been more useful for them to prioritise groups (e.g. based on vulnerability, those in-transit and vulnerable groups) in providing for accommodation. Respondents generally express views that whilst airlines could not always provide accommodation, they could make recommendations for suitable accommodation and/or make arrangements with local hotels/guest houses to ensure prices were not inflated. Inflated prices by hoteliers and making only the premier product (e.g. 5 star hotels) available may later result in issues during compensation claims (e.g. not 'reasonable cost', if a 5 star hotel was booked, due to unavailable rooms). The degree of expectation by passengers that airlines should arrange/secure hotel accommodation on their behalf may not be a realistic one. There does, however, need to be a clear contingency plan for accommodating passengers during such crises that is clear to both the service provider and the affected passengers.

Twenty-two percent of respondents allude to the need to provide financial support during the crisis to those affected passengers who needed it. Responses indicate that not all passengers had access to available funds for accommodation, food and medication. As such, some passengers believe that those who need financial help should be supported via the airline in the form of, for example, emergency loans, vouchers, and medical/food supplies. The extent to which the airline is responsible for the financial welfare of its passengers in a time of crisis is unclear, however, it is pertinent to note that with such a high proportion of respondents tending to see the airline as responsible this is a factor that needs to be further explored.

Figure 3 Showing the average (mean) number of days that passengers were stranded by global/international regions (n=89)

Passenger s experience- Good practices

The high level of negative emotions attributed to poor communication and insufficient consideration of accommodation needs appears to reflect poor responsiveness and inadequate crisis planning by some service providers as well as government agencies. Studies have shown that effective communication and complaints handling may convert aggrieved customers into loyal and satisfied ones (Karatepe, 2006; Gilly and Hansen, 1992). It is important therefore not to focus only on negative experiences but also to examine the positive to highlight good practices by a number of airlines/travel agencies, which may be adapted by others for future contingency planning and customer support strategy development. Analysing the comments from these respondents in a qualitative manner indicates that in terms of communication strategies, good practice may be summarised as: early (initial) communication, periodic updates, 'keeping their promise' to communicate, personalised communication, and be sympathetic.

The length of time taken to deal with customers' concerns is strongly related to complainant perceptions of 'procedural' justice (Karatepe, 2006). Promptness of response has been proven to be one of the key factors in justice and manifests itself in the service provider being viewed in a positive light (Davidow, 2003; Karatepe, 2006). From the responses garnered, passengers appear to feel more valued when they are informed from the onset of the problem, even if they were not due to travel on the particular day the crisis started. Being kept updated and informed at various stages of the crisis would appear to make passengers more relaxed probably because they feel part of the whole process rather than victims. These reasons are only speculative, but what is apparent is that the affected passengers value this communication strategy and are more likely to see the service provider in a positive light following a crisis. There were a number of positive responses from

respondents, for example, one from a paediatrician stranded in Rome, the other from a retired schoolteacher stranded in Antalya, Turkey:

'Jet2.com were fantastic the morning that it all happened, they kept us informed and were very helpful.'

and

Thompson kept us informed at each stage. They also provided accommodation and alternative transport. I was really impressed with how they dealt with us and we were informed all the time.'

It was passengers who reported on their experience during the crisis in a more positive light who also relate to the need for organisations to provide updates at the time when they say they would. As one passenger laments:

'They should have provided updates when they say they would, it drove me crazy checking and waiting.'

When service providers appear to be sympathetic, affected passengers also appear to be more positive about their experience. Passengers, do not always expect service providers to have all the answers and some respondents have stated that it was OK not to know all the answers, just as long they listen and acknowledge their concerns. Providing accurate and truthful information was highly appreciated by these passengers.

The confusion and inadequate information provided by some airlines/booking agents led affected passengers to depend strongly on electronic media, particularly major media websites such as BBC and CNN. Passengers affected, especially those stranded outside of Europe, indicated that the local British Embassy was another good source of accurate information if not a little slow in reacting to the situation. Again, the effort of the British Embassies should be noted as 'good practice' which can be drawn upon for contingency planning by the UK Government, but also for service providers to effectively communicate with such agencies to ensure consistency of information.

Finally, in terms of good practice in communication strategies, the need for innovative communication techniques should be acknowledged. Three respondents that had a positive experience valued highly the text messages that they received from the service provider during the crisis that updating them of changes. This prompted the researcher to analyse the responses looking for text messaging/message/text/texting as a key phrase. In total, these key phrases were mentioned by a third of the respondents. Generally it is in statements that implied that the service provider had their cell phone number and could have provided them with text updates. With the use of SMS being adapted as an innovative tool in emergency management scenarios (EA, 2010 and; Jaeger, et al, 2007), this may be a useful strategy for service providers to explore and to evaluate in its applicability and feasibility.

The good practice related to the provision of accommodation was much more straightforward than that of communication. If passengers were cared for and accommodation provided, then respondents were more positive about their experience and service providers were viewed in a more favourable light. A university lecturer stranded in the United States after a conference, summarises her experience in the statement below:

'We were put up in a very nice hotel, all inclusive, could not ask for more... We were lucky because BA paid accommodation and food for us for 4 nights... I think the airline [should have continued to] put us up for all five nights.'

Analysis of positive responses regarding suitable accommodation provided by airline/booking agents indicates that there was an association between method/type of flight booked (e.g. scheduled flight, charter flight, low budget airline, online booking, and travel agency) and passengers' experience. Approximately 11% of respondents booked charter/long haul/national flights and/or booked through travel agents. Generally, these passengers were less likely to mention issues related to a lack of or poor quality in the provision of accommodation and were more likely to be complimentary about the customer care provided by the airline/booking agents. It is likely that this is due to the smaller number of passengers that charter airlines/travel agencies had to deal with in comparison to those passengers who booked through an internet site and/or with low budget airlines, where a high percentage (approximately 65%) mentioned having issues associated with accommodation during the crisis.

Customer experience -Impact on lives and livelihood

As indicated above, media news reports (e.g. BBC, 2010c; McConnel, 2010 and Atherton, 2010) and trade publications (e.g. ICCA, 2010) highlighted the impact that the airspace closure had on people's lives and livelihoods. The ineffective responses highlighted above and the extended delay inevitably exacerbated this impact. This is explored below by analysing respondents' responses both quantitatively and qualitatively.

Customer experience -Impact on; health, work, family life and education

Analysis of responses identifies five impacts of the airspace closure on passengers' lives and livelihoods: (1) health (increased anxiety and stress, exacerbation of existing health problems and lack of access to medication); (2) impact on work (fear of loss of job, loss of annual leave, pay deduction, decline in productivity); (3) impact on education (exam attendance, failure to submit assignments); (4) impact on family life/relationships; and, (5) economic losses.

The unexpected delays, particularly for extended periods as occurred with the April 2010 airspace closure, have the potential to contribute to elevated stress levels, psychological trauma and aggravation of health problems (Brickers, 2005 and; Leggat, 2006). Elevated stress levels promote 'negative emotion' experienced by passengers who are then less likely to hold a favorable opinion of the service provider (Menon and Dube, 2004). It is more than likely that vulnerable groups such as the elderly are more predisposed to have pre-existing health issues (for example diabetes, pulmonary diseases, arthritis and hypertension), and are therefore more susceptible to health-related problems when faced with adverse situations such as crises (Leggat, 2006). During crisis such as the April 2010 UK airspace closure, it is important to identify such vulnerable groups in order to mitigate any elevated health problems and manage their issues effectively. Service providers for example airlines and travel agents may play a key role in identifying likely vulnerable groups in order to better provide advice to travellers (Lawson and Page, 1997).

It is interesting that health-related issues are the most cited, with approximately 76% of respondents indicating that they experienced some form of adverse health issues during the crisis. By far the majority of the respondents refer to personal increased stress and anxiety. For example, a student states:

'it was a total meltdown for me.. I was losing it.'

Analysis and cross-referencing of replies indicates that respondents in the 25-35 age category are more likely to identify with some form of impact on their health (45% of 25-35 category) in comparison to other age categories (see Figure 4). This group was almost twice as likely to report health issues compared to all the other age groups (see Figure 4). This is counter-intuitive given the association between age and health problems indicated in the literature. It is however evident that the health problems in the 25-35 category refer to stress-induced problems due to jobs, job security and financial commitments. This link between increased stress and work/family life within the 25-35 category is highlighted by an accountant's response:

'for the first time I started experiencing stress pains, I felt I was having a heart attack' and 'worrying about the family and work, really freaked me out.'

There appears to be high level of concern about job security and remuneration. Younger people may actually have less disposable income, as well as less job security, hence their concerns. There is evidence that such individuals were unaware of company policy and as such were 'stressed' as they did not know whether they would lose their jobs/and/or pay. These concerns were highlighted by two part-time workers:

'my boss won't understand... I just need to get back to work and see what they [company/boss] will do.'

and

'that's a whole weeks salary I am likely to lose... I have bills to pay.'

Figure 4. Summary of impact of the airport closure on the air-travelling public by age

The over-55's are generally deemed to be a vulnerable group and more likely to experience health related issues (Copper, 2006). However, only 24% of respondents in this category mention health as an issue. Although this is higher than for all the other age categories (except the 26-35s), this is unexpected as previous research shows that such groups are more likely to experience health-related problems during such crisis. One possible reason for

this may be the likelihood that health advice is more likely to be provided to such a group by for example travel agents and/or the service provider (e.g. SAGE) who are more experienced with dealing with such a group, so may have taken steps to address these issues (Leggat, 2006). In so doing they may have reduced their health risk during the crisis and as such it was rarely mentioned. A second possibility may simply be down to the type of health related issues reported. Whilst there are reports of aggravated existing health problem e.g. hypertension, diabetes, arthritis, cardiac conditions, most of the health problems reported are elevated stress levels, resulting in symptoms such as chest pain, headache and depression would appear to be more associated with the under 36 age category. Whilst the respondents' past experience of travelling was not explored as part of this research, there is the possibility that older (over 35s) passengers may have been less likely to report stress-related problems simply as a result of them being more experienced travellers (in terms of frequency, resilience, preparation/planning and mode of travel) and therefore less likely to experience elevated stressed levels. Research shows that more experienced air-travellers are subject to less stress than the less experienced (Briker, 2005; Copper, 2006; Trevorrow, 2006). Their experience may also have contributed to their choice of mode booking. The over 55s mainly booked their flights/holiday through travel agents and/or flew with larger national/long haul airlines (for example British Airway). Generally, those individual who booked their holiday/flight through larger national/long haul airlines /travel agency were less likely to report health-related and other issues (lack of communication, accommodation as discussed above) than those who booked using the internet and/or with low budget airlines. Older respondents, who booked their flight/holiday through larger national/long haul airlines commonly, had positive comments about the airline/travel agency. The lower than expected stress and related issue may also be due to high percentage (over 65%) who indicated they were retired and therefore did not have the added stress of worrying about returning to work, education and/or families. Some of the over-55s respondents saw the inconveniences as an added holiday and as one retired respondent said

'the tour company was excellent, they paid for everything, it was great having an extended holiday in Dubai... I would definitely travel with Thompson again but am now even more scared of flying and I would now try to avoid budget airlines after seeing how they treated some of their passengers.'

The high stress and related health issues observed within the younger age groups (for example the 26-35s) are not uncommon within populations exposed to such crisis. Research by Boscarino, Richards and Figley (2004) which examined mental health issues around the World Trade Centre disaster, showed that young people are more prone to post stress disorder when exposed to such crises. This again may be down to experience. Younger members of society are less likely to have experienced such a situation and as such may not have developed appropriate coping strategies and resilience. However, most of the reasons for the various health problems discussed here are partly speculative and may be an area for further research.

The factors contributing to impact on health varies between groups. For the 16-25s it appears to be worries about their education; for the 26-35 it appears to be work, and for all categories over 36 it appears to be family life. The understanding of factors contributing particularly to elevated stress amongst the various age groups may help service providers in

creating bespoke messages and/or developing a targeted contingency plan during future crises.

The impact on education is a particularly high concern among the 16-25 age category, with over 55% of this group indicating this as a major impact (see Figure 4). Whilst respondents report the missing of classes as a concern, their major issue is missing assignment submissions and failure to attend exams which could mean re-sits during the summer, at additional cost to them and impacting on booked summer holidays. For students in their final year of study, there is a strong concern that it would affect their degree class and/or delay their degree, which they perceive will have implications for future employment.

Customer experience - Financial impact

As indicated earlier, the financial loss of the UK airspace closure in April 2010 to airlines and major destinations have been reported widely in the media and in trade reports, however, there has been little or no report on individual financial loss. This research attempts to quantify the direct financial loss that individuals were not able to recoup. Analysis of the survey data indicates that both individuals and organizations reported direct financial losses. Direct financial losses in the context of this research are defined as costs that could not be reclaimed through travel insurance and/or from the airlines and/or credit card companies, for example, train/bus tickets, non-refundable hotel bookings, conference bookings, telephone bills, child care and medication.

Based on analysis of the responses, personal financial loss varies from £50 to £1750. Of those losses it was those people travelling within the EU and Americas who suffered highest losses (see Figure 5). On average those individuals in the EU report a loss of £359 and those in Americas (North/South America and Caribbean) a loss of £411, compared to those who travelled to Asia and Australia who suffered approximately £200 in financial losses (see Figure 5). The range in financial losses with regions is likely to reflect the duration for which individuals were delayed in the EU and Americas. However, analysis of the average duration that individuals stayed in each region shows that for the EU it was 5 days, Australia 9 days, Americas 7 days and Africa/Asia 7 days. The delays experienced in the EU and Americas are therefore unlikely to be the dominant factor contributing to higher financial losses. Whilst it cannot be quantified or directly determined, based on the general trend observed from the responses this could be a result of:

- 1. Nature of the trip:** Many of those people in affected in the EU and America were on business trips, short weekend breaks and/or conferences. They were more likely to find alternative modes of transport to get home (mostly in the EU) some of which were not refundable. They were also more likely expected to report to work and as such had to incur communication costs (video conferences), again not refundable. They were also more likely to have to book train/bus tickets for the date of return, some of which were not refundable. For those who were not able to travel, some had prepaid for conferences and hotels, costs for which they could not be refunded either.

2. **Mode of booking:** Those individuals who travelled to Asia, Africa and Australia were more likely to be on long vacations and have either booked their holiday through travel agencies and/or with long haul/international carriers. As indicated above, these individuals had less issues finding accommodation/transport and were more likely to be reimbursed by their airline/travel agency and such may have reported lower financial losses.

Figure 5. A Boxplot illustrating the financial losses by passengers by region due to the April 2010 airspace closure.

Perception - Insurance and future flight

During and in the immediate aftermath of the April 2010 airspace closure, there was mass confusion over seeking compensation and filing in claims from airlines and/or insurance companies (BBC, 2010d). In part this was related to the confusion over whether insurance policies considered delays due to weather-related events or not and, if they did, whether volcanic ash disruption could be considered as being weather-related. The uncertainty surrounding the 'weather-related' issue and the potential for future specific 'natural hazard related' insurance claims has prompted at least two insurance providers to offer 'ash cloud' insurance (Insley and Brignall, 2010). This research explored affected passengers' attitudes towards 'ash cloud' insurance cover and whether they consider it is a feasible option for the air-travelling public.

Analysis of the results shows that that 56% of passengers would not take out specific 'ash cloud' insurance cover. Should there be an option, 30% would likely opt for such an insurance and 14% are unsure whether this would be a viable option. Due to extent of the hardship encountered by stranded passengers, one would initially expect a higher percentage of respondents to consider taking out 'ash cloud' insurance should there be such an offer in the future. However, this is not the case and those respondents indicating that they would not consider this specific insurance policy were very strong in their views. Some cited the fact that the EU regulations are quite clear and passengers should be compensated for delays:

'The E.U. Directives (261) helped me on this occasion'; the risk is very low to warrant such an insurance', and;

'Don't like paying more insurance for an event that is unlikely to re-occur' and 'I believe insurance will be more expensive - events are rare';

The very strong opposition to such insurance may also be due to passenger being led to believe that they were covered for such hazardous events and that 'ash cloud' impacts should be part of standard travel insurance. Such beliefs are expressed in responses such as,

'It should be part of the normal insurance policy (act of god is a way out by the airlines)' and;

'I would expect that it should be covered in the holiday insurance - our policy states that Earthquakes are covered'.

Other respondents allude to the uncertainty of paying for extra travel insurance, as reflected in one respondent's statement:

'at the time I would probably think the premium would be too expensive'.

For those who would take out 'ash cloud' insurance cover, the emerging theme was the security it provides ('for peace of mind, especially when travelling with a child') and for others it is down to their negative experience and their desire not go through such a harsh experience again. As one respondent stated:

'Having been caught up in the episode then yes I would certainly want to look at additional cost to cover myself in the future'.

There is an opportunity to implement 'ash cloud' cover by insurance provided and some have capitalised on this. However, the low risk perceived by travellers and the additional cost may be barriers to successfully marketing such a policy. Including it as standard component (e.g. natural hazard risk - earthquake, floods, ash clouds etc) or an optional add-on to the number of natural hazard risks covered may be a more viable option than as a separate policy. Insurance provided should also make a concerted effort to ensure there is not a significant increase to premiums to ensure a competitive edge.

Perception – Future decision to fly

The September 11, 2001 terrorist attack on America event saw a drastic reduction in the number of air passenger in the immediate aftermath of this event (Goodrich, 2002). Whilst this was an extreme crisis and a disaster for the airline industry, crises within the sector impact significantly on air passenger numbers (Richie, 2004). It is interesting then that this research indicates that 79% of respondents believe the airspace closure will not and/or is unlikely to affect their decision to fly in the future (see Figure 6). Respondents believe that the impact on the aviation industry of the April 2010 closure was linked to 'nature' and should be expected occasionally. In addition, this did not result in loss of lives, therefore, they perceive the risk as much less in comparison to airport closures related to, for example, the terrorist attacks of September 11, 2001. Generally respondents viewed the April 2010 closures as much less likely

to 'create fear' and as such less likely to affect their decision to fly. Within this study, approximately 19% believed that their future travelling decisions would be affected from the airport closures, and whilst this is a low percentage it could still have significant implications on airline financial viability. Whilst this is a very small percentage, this could be a significant number in an industry operating with small profit margins. It is clear from this research that it is essential that airlines implement measures to maintain and restore passengers' confidence in the airline sector.

Figure 6. Passengers' responses to the April 2010 airspace closure and its possible influence on their decision to fly in the future.

Conclusion and Recommendations

The April 2010 airspace closure resulted in severe inconvenience to the UK air-travelling public and significant economic losses to individuals and businesses. During the airspace closure one of the main issues highlighted by respondents was insufficient and in some cases poor communication between passengers and the airlines, travel agencies and booking agencies. In addition, respondents felt they were poorly treated by authorities during the crisis.

It is evident that insurance providers have identified an opportunity to implement 'ash cloud' insurance cover. However, as it is considered a low risk to the public it is viewed as unnecessary extra expenditure. Overall respondents had a negative experience during the crisis but were not necessarily deterred from flying in the future, which is good news for the already struggling airline industry, particularly in the light of the severe economic loss they suffered during this period. This study does, however, demonstrate that up to a fifth of respondents would reconsider travel plans. When projected across the nation this has the potential to have detrimental implications for the small profit margins of some airlines. It is clear that customer retention is key to the economic survival of the airline industry.

Whilst the EU regulation (Clause 12) stipulates that passengers should be informed in advance of cancellations of flight (OJEU, 2004), there is no stipulation to inform passenger of continuous changes in a timely and accurate manner, which is the concern expressed by a large proportion of affected passengers during the crisis. This is a possible amendment to the current EU regulations that may warrant future consideration. However, airlines/travel agencies/booking agencies could become more proactive by implementing contingency plans, which could include:

1. Continue to development communication tools, for example text/email messaging systems that send timely and accurate updates to affected passenger (e.g. preventing passengers wasting time and money to show up at airports due to the lack of online information).
2. Ensure that information is placed on websites in a timely and accurate manner.
3. Mobilise more support staff during future crises and provide local contacts where possible.
4. Provide information on alternative transport options and on accommodation for those stranded overseas.
5. Work more closely with British Embassies overseas and with news channels, for example the BBC, which numerous passengers came to depend on.

Individual passengers can better equip themselves to deal with such a crisis by carrying out their own risk assessment and depending on their personal circumstances develop a customised strategy to implement in such a crisis. For example, covering work/school, additional funds or specialised healthcare support.

The April 2010 airspace closure due to the ash cloud was an unprecedented crisis in the UK aviation industry but one which could have been managed more effectively by adequate contingency planning and therefore reducing the impact. It is in the best interests of airlines and other travel sector industries to implement such plans to reduce their economic loss and to restore passenger confidence in the travel industry.

References

Arnott, S. (2010a) Collapse of Kiss shows strain on travel industry. *The Independent*, Business News, 19 August 2010.

Arnott, S. (2010b) Easyjet and Tui Travel hit hard by Iceland's ash cloud. *The Independent*, Business News, 12 May, 2010.

Atherton, J. (2010) Ryanair's profit plunge as ash cloud takes its toll', *Metro*, Business and Finance (20/07/10). Manchester Weekly Newspapers Ltd.

BBC (2010a) *Iceland volcano cloud: The economic impact*. 20 April. British Broadcasting Corporation online news. Retrieved from: <http://news.bbc.co.uk/1/hi/business/8629623.stm>

BBC (2010b) *Volcano Ash : Europe puts pressure on airline*. British Broadcasting Corporation online news. Retrieved from <http://news.bbc.co.uk/1/hi/business/8645981.stm>. 27/04/2010.

BBC (2010c) *Volcanic ash flight ban 'cost London £100m'* . British Broadcasting Corporation online news. Retrieved from: [Http://news.bbc.co.uk/1/hi/England/London/86242616.stm](http://news.bbc.co.uk/1/hi/England/London/86242616.stm) (25/04/2010)

BBC (2010d) *Iceland Volcano: Travel Insurance confusion*. British Broadcasting Corporation online news. Retrieved from: <http://news.bbc.co.uk/1/hi/business/8624717.stm>. 19 April, 2010.

- Chang Y-W. and Chang, Y-H (2010) Does Service recovery affect satisfaction and customer loyalty? An empirical study of airline services. *Journal of Air Transport Management* 16: 340-342.
- Boscarino, J., Adams, R. and Figley, C. (2004) mental health service use 1-year after the World Trade Centre disaster: implications for mental health care. *General Hospital Psychiatry* 26; 346-358.
- Bricker, J. (2005) Development and evaluation of the Air Travel Stress Scale. *Journal of Counselling Psychology*. Vol. 52, Issue 4. p615-628. Elsevier.
- Choularton, R. (2001) Complex learning: organizational learning from disaster. *Safety Science* 39 (2001): 61-70. Pergamon.
- Coombs, T. (1999) *Ongoing crisis communication: Planning, managing crisis*. Thousand Oaks, CA: Sage.
- Cooper, M. (2006) The elderly travellers. *Travel Medicine and Infectious Disease*; 4, 218-222. Elsevier.
- Davidow, M. (2003) Have you heard the word? The effect of word of mouth and perceived justice, satisfaction and repurchase intentions following complaint handling. *Journal of Consumer Satisfaction, Dissatisfaction and Complaining Behaviour* 16, 67-80.
- Dunn, M.G., wade, D.P. (1994) *Influence of volcanic ash cloud on gas turbine engines*. US Geological Survey Bulletin 2047, 107-118.
- EA [Environment Agency] (2010) *Sign up to our free flood warnings service*. The Environment Agency, department of the Environment, Food and Rural Affairs, UK. available at: <http://www.environment-agency.gov.uk/homeandleisure/floods/38289.aspx>
- Ennis-Holcombe, K.D. (2006) Disaster Communications. *Medicine* (First Edition), pp.229-231.
- Flight Global (2010) *Airline industry comes to terms with ash cloud impact*. Accessed from: <http://www.flightglobal.com/articles/2010/05/13/341922/airline-industry-comes-to-terms-with-ash-cloud-impact.html>.
- Goodrich, J.N. (2002) September 11, 2001 attack on America: a record of the immediate impacts and reactions in the USA travel and tourism industry. *Tourism Management* 23: 573-580. Elsevier.
- Gilly, M.C., Hansen, R.W., (1992) Consumer complaint handling as a strategic marketing tool. *The Journal of Product and Brand Management* 1 93), 5-16.
- Guffanti, M.; Ewert, J., Gallina, G.M., Bluth, G., Swanson, G. (2005) Volcanic-ash hazard to aviation during the 2003-2004 eruptive activity of Anathan volcano, commonwealth of the Northern Mariana Islands. *Journal of Volcanology and Geothermal research* 146: 241-255.
- Gustafsson, A. (2009) Customer satisfaction with service recovery. *Journal of Business research* 62:1220-1222.
- Hatty, H and Hollmeier, S. (2003). Airline strategy in the 2001/2002 crisis-the Lufthansa example. *Journal of Air Transport Management* 9: 51-55.
- Insley, J and Brignall, M. (2010) *Aviva launches volcanic ash insurance.-Insurance policy add-on will cover air travellers for cancelled flights and closed airspace due to volcanic ash or terrorism*. The Observer, 23 May, 2010.

ICCA (2010) *ICCA Survey Report- Impact of the no Fly zone due to volcanic ash on the international meeting industry*. International Congress and Convention Association, April 2010 report.

Jaeger, P., Shneiderman, B.; Fleischmann, K., Preece, J.; Qu, Y., Wy, P.F., (2007) Community response grids; E-government, social networks and effective emergency management. *Telecommunication Policy* 31 (2007) 592-604.

Karatepe, O-M., (2006) Customer complaints and organisational responses: the effects of complainants' perceptions of justice on satisfaction and loyalty. *International Journal of Hospitality Management*.

Kim, Y.-U., & Lee H.-R., (2010) Customer Satisfaction using low cost carriers. *Tourism Management* xxx: 1-9 . Elsevier.

Klophaus, R. (2005) Frequent flyer programs for European low-cost airlines: Prospects, risks and implementation guidelines. *Journal of Air Transport Management* 11: 348-353.

Leggat, P. (2006) Risk Assessment in travel medicine. *Travel Medicine and Infectious Disease*. (2006) 4, 127-134. Elsevier

Lawson, G. and Page, S. (1997) Evaluating travel agents' provision of health advice to travellers. *Tourism Management*, vol. 18, No. 2 pp. 89-104. Elsevier Science Ltd.

Lugge, B. (2007) The effect of Internet apprehension and website satisfaction on air travellers' adoption of an airline's website. *Journal of Air transport Management* 13(2007) 75-80.

McConnell, I. (2010) *Volcanic ash cloud casts pall on service sector rise*. Herald Scotland, 7/05/10).

Menon, K. and Dude, L. (2004) Service provider responses to anxious and angry customers: different challenges, different payoffs. *Journal of Retailing* 80(2004) 229-237. Elsevier.

Met Office (2010) *Icelandic Volcanic Blog*. The Met office.

http://www.metoffice.gov.uk/weather/europe/volcano/volcano_blog.html. Accessed. 27 July 2010.

NATS (2010a) *Volcanic incident updates made in April 2010*: News Release, Wednesday 14.April. Retrieved from www.nats.com

NATS (2010b) *Ash cloud reduces April air traffic by more than 20 percent*. News Release, Thursday 20 May, 1700. Retrieved from www.nats.com

O'Connell, J-F. and Williams, G., (2005) Passengers' perceptions of low cost airlines and full service carriers: A case study involving Ryanair, Aer Lingus, Air Asia and Malaysia Airlines. *Journal of Air Transport Management* 11 (2005) 259-272.

OJEU (2004) Regulation (EC) No 261/2004 of the European Parliament and the Council of 11 February 2004. *Official Journal of The European Journal*, 17.2.2004, L 364 , p0001 – 0011.

Page, P. (2010) Airport closure Spread in Worsening Ash impact. *The Journal of Commerce* (26/April)

Park, J.-W., Robertson, R., & Wu, C-L. (2004) The effects of airline service quality on Passenger's behaviour intentions: a Korean case study. *Journal of air transport Management*, 10: 435-439.

Reuters (2010) *Fackbox: Impact of the Volcanic ash cloud on Europe*. Reuters Online news, 16 April, 10. www.reuter.com/article/idUSTRE63F65A20100416.

Ritchie, B. (2004) Chaos, Crisis and disasters: a strategic approach to crisis management in the tourism industry. *Tourism Management* 25(2004) 669-683. Elsevier.

Schmincke, H (2004) *Volcanism*. 324p. Springer

Smith, O. (2010) *Volcanic ash cloud and rising oil prices to hit the cost of air travel*. Daily Telegraph 26/04/2010.

Siomkos (2000) Managing airline disasters: the role of consumer safety perception and sense making. *Journal of Air Transport Management* 6:101-108. Pergamon.

Survey Console (2010) SurveyConsole.com...Online Surveys Made Easy TM. Available from: <http://www.surveyconsole.com/info/aboutUs.html>

SurveyMonkey (2010) SurveyMonkey. Available from: <http://www.surveymonkey.com/>

Thouret, J-C. (2010) Volcanic hazards and risks: a geomorphical perspective. In Alcantara-Ayala and Goudie (ed), *Geomorphological Hazards and Disaster Prevention*. Cambridge.

Trevorrow, T. (2006) Air travel and seizure frequency for individuals with epilepsy. *Seizure* 15, 320-327. Elsevier

The Daily Mail (2010) *Volcano: No BA flights until Monday at the earliest as airports remain shut and ash falls across the UK*. Daily Mail newspaper, 17 April

Wardell, J. (2010) *Volcano is become a major business headache*. MSNBC news, 16/04/10)