VOLCANIC ASH CLOUD DISRUPTION TO AIR TRAVEL

Dr Juliet Jain

Senior Research Fellow

Centre for Transport and Society, Department of Planning and Architecture, University of the West of England, Bristol, Frenchay Campus, Coldharbour Lane, Bristol BS16 1QY

Dr Jo Guiver

Research Fellow

Institute of Transport and Tourism, University of Central Lancashire, Preston PR1 2HE

Abstract
The severity and suddenness of disruption to European air travel caused by the volcanic ash cloud in April exposed the current reliance on air travel for maintaining social, family and business networks. This paper presents the results of an on-line survey of those affected, conducted during and just after the event. It shows how ICTs were used to inform choices, but sometimes failed because service providers were overwhelmed and people away from home could not access them. The impact of the disruption 'rippled' through the home networks of the stranded travellers, as they supported the traveller with practical assistance, information searches and fulfilled the duties they were unable to perform. The paper discusses whether the findings can provide insights into the consequences of reducing the volume of flights for environmental reasons and if the price of fuel increases.

Introduction

The ash cloud from the Eyjafjallajökull volcano in Iceland caused an unprecedented suspension of aviation over much of Europe. Four days into the disruption the Institute of Transport and Tourism launched an on-line survey for people whose travel was affected. The findings provide insights, not only into how people cope with an unforeseen travel problem, but into the normal flows of people flying to, from and within Europe.

When their journeys are suddenly arrested, travellers rely on a number of technologies and networks to help them. The survey provides evidence of the use of different forms of communication to different agencies, their relative effectiveness and failings. The responses show how travellers often depend on back-up from their home networks who often 'absorbed' the problems by supporting and standing in for the absent member, exhibiting '*glocalness'* (Lassen 2009), the concept of how the global life of the traveller impacts upon and is impacted by their networks, obligations and relationships in and around their home.

Increasing numbers of people flying have developed business, kinship and friendship networks which rely on aviation to sustain person-to-person relationships, yet the environmental cost of flying and its ever-hungry demand for dwindling reserves of fossil fuels mean that flying is likely to become restricted by price and/or legislation within the next decade.

After a brief review of the relevant literature, explanation of the methodology and description of the main findings, this paper discusses whether the insights from this abnormal event can help understand the potential consequences and reactions to reductions in air travel.

Literature Review

The large scale disruption to flights caused by the volcanic eruption was unprecedented in Europe, although the United States endured a five day closure of air space after the terrorist attacks of 9/11 in 2001 (see Hätty 2003). Air travel delays and disruption have mainly been

written about from the perspectives of scheduling (Thengvall, Bard &Yu 2000), logistics (Lan, Clarke & Barnhart 2006), or industry economics and structure (Drakos 2004). The passenger generally appears through generalised figures or monetary values, in equations calculating, for instance, the value of travel or waiting time (e.g. Billette de Villemeur et al., 2005). While such approaches serve a purpose, there is little indication about the wider social effect of disruption or delay to individual travellers, with which this paper is concerned.

Over the last decade, research into the social impact of air travel e.g. how business and social networks have become global, changes in tourist destinations, and dilemmas about sustainability, has begun to emerge. Arguably 21st century society has become locked into flying to sustain global networks (Cwerner, et al, 2009; Hares, et al., 2010), in the same way as the 20th century saw the automobile become a necessity to sustain daily life for many on a national level (Illich, 1974; Jain and Guiver 2001). Globally distributed business, family and friendship networks demand face-to-face encounters (Mason 2004) (from trade negotiations to weddings) in order to maintain and authenticate spatially distant relationships, which have been enabled and driven by growth in air services (Budd and Graham 2009; Larsen et al. 2006; Cwerner et al. 2009). Social capital is enhanced through international travel, which is perceived as advantageous to business practices, as well as within social networks (Barr et al. 2010; Lassen 2009). Notably, cheap air travel has also generated growth in global tourist travel and destination development (Duval 2007).

Increasing international mobility has social and environmental costs. The social costs are usually attributed to the 'glocal' lifestyle of highly mobile business personnel (Elliot & Urry 2010). Such people juggle multiple identities in domestic and international networks; both of which carry obligations and relationships in multiple locations (Lassen, 2009). For example, domestic responsibilities such as childcare are maintained by others when the traveller is absent, while information and communication technologies (ICTs) facilitate frequent at-a-distance communication with home and office (Brown & O'Hara 2003). Some of these 'back home' responsibilities and commitments also extend to tourists.

The environmental costs of increasing air travel have been well documented (see: Bows et al. 2006; Dubois et al. 2010; Hares et al. 2010; Parliamentary Office for Science and Technology 2003). Not only are the CO_2 and other greenhouse gases emitted by aircraft more damaging because they are emitted at altitude and so subject to radiative forcing (Lee, 2009), but flying is associated with air pollution, creating contrails which are climate changing, (IPCC 1999) noise and other environmental costs (Parliamentary Office for Science and Technology 2003). Because of the speed of travel, it increases the distance travelled as well as replacing less damaging forms of travel, yet only 2-3% of the world's population travel by air annually (Peeters et al. 2006).

Major disruption as experienced in April 2010 unveils the social interdependences, which ripple globally beyond the air industry and stranded passengers, bringing sharply into focus the potential social impacts of any future challenges to air travel, whether environmental, political or economic.

Methodology

The on-line survey was launched on 19th April 2010, the fourth day after flights began to be suspended. It asked a number of questions about the booking, origin, destination and purpose of the flight, the composition of the travel party and at what stage in the journey it was affected. There were detailed questions about who was contacted, how and how helpful they were, the costs of the disruption, who was expected to pay and about the responses of different agencies. There were also attitudinal questions about flying and their options if flying were prevented for a long period. Because of the haste in which the survey was designed and the lack of precedents for the situation, there were numerous open text-boxes for people to record alternative responses and add their reflections, which provide the quotes used in the paper.

The survey was circulated through a number of networks, advertised through press releases and on Facebook sites dedicated to the event. Open until the end of May, the survey was

completed by 507 people and although it was circulated widely, there is no claim that the respondents are a representative sample of air travellers or those caught up in the disruption. SPSS was used to analyse the results and the responses to open questions were coded and sorted using Excel spreadsheets.

Respondents and Flights

Women (201: 54%) slightly outnumbered men (172: 46%) amongst the respondents who gave details of their gender. Women also had a slightly younger profile than men, but this was not found to be significant. Over a third of the people (38%) were travelling on their own, 29% were travelling as a pair, 8%, 10%, 4% and 2% were in parties of three, four, five and six respectively and 9% in larger parties. Family groups accounted for 18% of the valid responses, 11% of respondents were travelling with friends 10% with colleagues, 4% were on an educational trip and 2% were in an organised party. Most party sizes were small; two thirds were of one or two people, three quarters of three of fewer.

The main reason for the flight was 'Business' (45%) closely followed by 'Holiday' (41%) and then 'Visiting friends and/or family' (14%). All but one of the flights were to, from or within Europe; 47% were intercontinental and the remainder were within Europe. A higher proportion of the business travellers (54%) were making inter-continental flights than holiday makers (41%) and those visiting friends and family (44%). 62% of valid responses were from people normally resident in the UK and the remainder from a variety of European and other countries.

Half of the respondents heard about the suspension of flights while they were at their destination, 26% before they left home and 17% heard at the return airport. Just 5% were at the airport on their outward journey and 3% on a stage of their outward journey. The most common way of hearing about the ash-cloud was through a news report (48%), 28% of respondents were contacted by friends or family, 13% were contacted by the airline, 11% were told by contacts at the destination, 4% by their tour company or travel agent and 2% were contacted by their employer.

Decisions about Actions

How people responded to the unpredicted travel situation depended on where they were both geographically and the stage of their journey. For many who had yet departed, the best solution was often to delay or cancel the trip: 20% of passengers intending to make flights within Europe and 12% intending to make intercontinental journeys cancelled their trips, while 43% and 62% respectively delayed travel. For those stranded in Europe, there were choices about whether to attempt to return by surface travel or wait for normal flights to be resumed and 39% of them used surface travel, compared to only 8% of intercontinental passengers. The most popular surface modes were rail (19%) and ferry (11%) almost entirely within Europe. For people stranded on different continents, there were sometimes flights to other destinations in or near Europe. Often there were uncertainties about the duration, provision of service and cost of staying or returning and other factors such as the French rail strike, or difficulties with visa regulations further complicated the choices. Reliable and up-to-date Information in a rapidly changing situation was important for deciding the course of action.

Who contacted, how and their helpfulness

Respondents were asked who they contacted and how they contacted them. Figure 1 shows the percentage of respondents contacting different agencies and individuals and how they did it. Figure 2 indicates who was most difficult to contact and Figure 3 which people were most willing and able to help. The most contacted and most helpful were the airlines and other service providers, although they were also the most difficult to contact. Friends, family and employers were the most willing to help and were rarely difficult to contact. The most used method of communication was a mobile phone, although people in airports, naturally, visited airline offices.

Communication problems arose in both the dissemination and receiving of information. Service providers', particularly airlines', resources were overloaded resulting in difficulties getting through on the telephone, being held in queues for long periods, cut off or receiving messages too late to act. People away from home without computers, broadband or paying

large tariffs for long-distance phone calls encountered difficulties receiving information and often relied on people at home to help.

Figure 1: Contacts made and method of contact

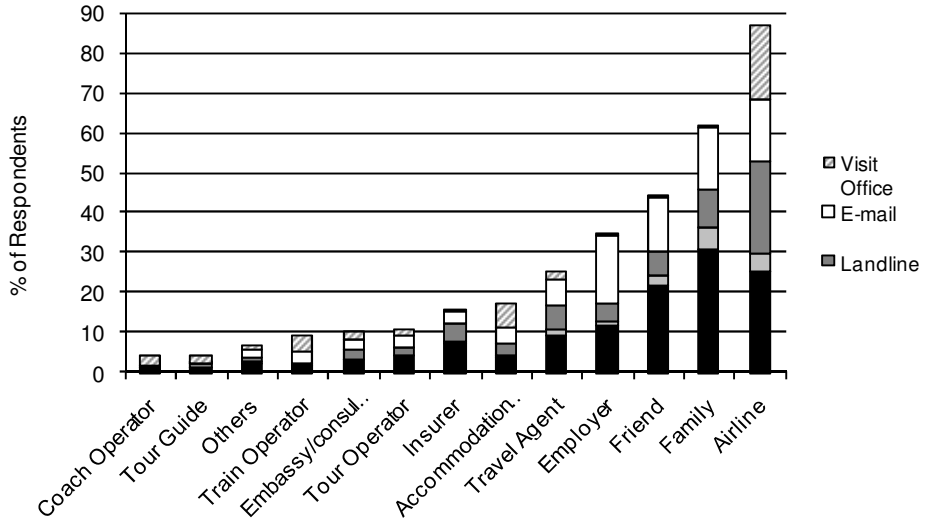


Figure 2: Who was difficult to contact

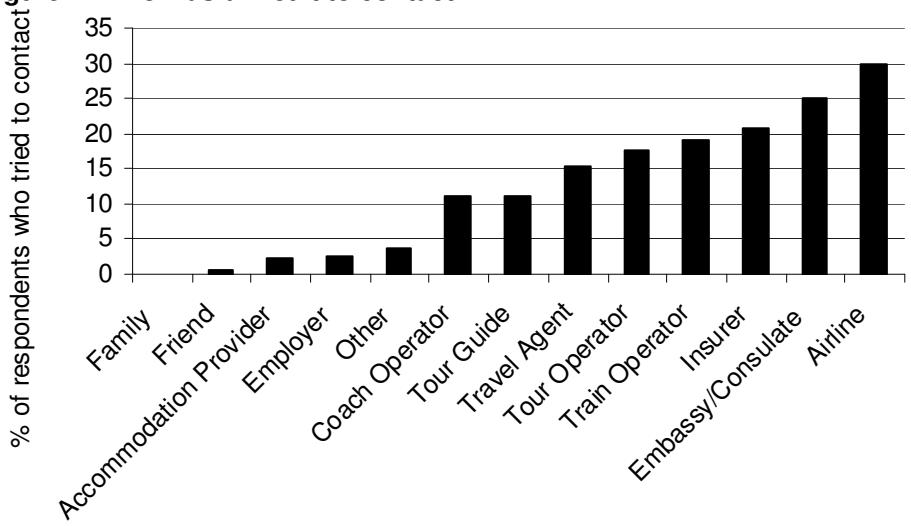
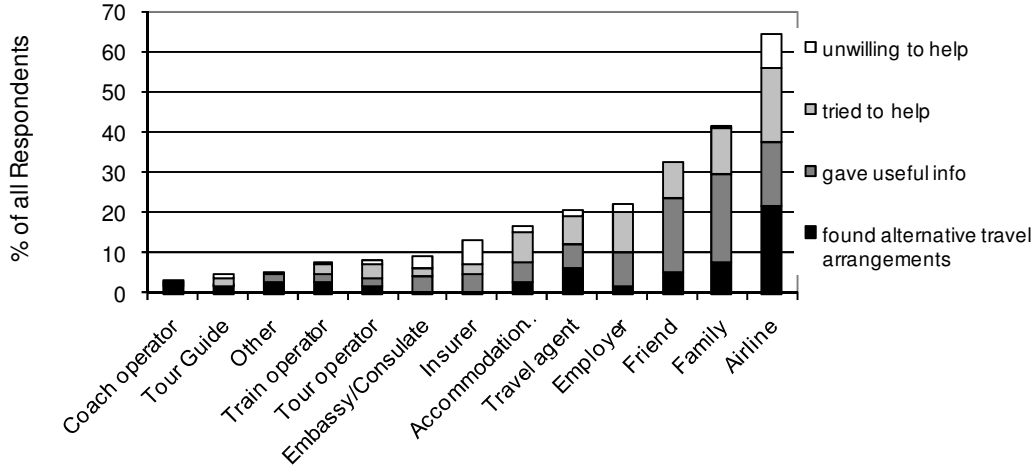


Figure 3: Helpfulness of those Contacted



These comments illustrate some of the difficulties:

…we spent a fortune on mobile phone coast (calls and internet) … you had to go through the whole 'press 1 for..' thing first. often we just got cut off.

I never received any text messages or e-mails from Ryanair about my flight disruption until AFTER the original flight time had passed.

There were three internet terminals at hotel, so had to queue to use them.

Mum spent a lot of time trying to find out more about the situation and researching alternatives.

Because I was in a remote part of Borneo communications were difficult - I had to rely on my husband to call me to update me on the situation - compounded by the time difference ... .

Social Networking Sites facilitated informal networking and travel arrangements demonstrating a potential area for innovative responses towards international travel. For example respondents indicated the use of Facebook for putting people in touch with one another to offer services.

Found a group on Facebook dedicated to car pooling. One person … had found a hired car and was going from Paris to Gothenburg …. I contacted him and that's how I got home.

The colleagues of the AAG proposed very soon to accommodate stranded attendees to the conference via a Facebook page that revealed to be very useful and efficient.

Also at least one agency took the initiative to help its clients.

Girona tourist information were dynamic, practical, efficient and very kind … (They) *recruit*(ed) *coach passengers which they then booked(.It) was simple and very successful - they sent coaches to Calais, Milan, Norway and Denmark that we know of.*

Although they are often not mentioned, mobile phones would seem necessary for the logistics of picking up stranded passengers in Europe such as the case described below:

A friend of a colleague has driven us from Madrid to Biarritz. From Biarritz we took the train to Brussels with a stop in Bordeaux and Paris. ... In Brussels my dad collected us and we drove back to Cologne.

My husband collected me from the station (in France)*; he had travelled from Aberystwyth by car and ferry* (A woman travelling from Spain after being delayed five days in Madrid).

Impacts of disruption

Some passengers were relieved to find they were relatively well equipped to cope with the situation, while recognising that others were not.

…I have a high limit on my personal credit card so was able to book accommodation etc. Younger colleagues … may not have been able to pay upfront for accommodation whilst stranded.

We were lucky (a) to speak the language (b) to have online access as we'd taken an iphone and a notebook computer with us (c) to have (weak) wifi in our accommodation

On our coach to Calais were 2 very young girls who had been found on a beach in Southern Spain with no money, no credit cards and a dead mobile phone. Had a family not taken them under their wing, they would have been very vulnerable.

The immediate impact was paying for alternative accommodation or travel arrangements along with buying food, paying for telephone and computer use. There were often also additional costs such as airport parking, extending kennel care or interest on credit cards, unpaid store cards, etc. Most people expected to pay the majority of these costs, although business travellers anticipated that, on average, that they would pay 37% and their employers 34% of the costs, while holiday makers on average thought they would pay 68% of the costs. Over a quarter (27%) of the travellers were uninsured, but only half of the insured passengers believed they would be compensated at all for their extra expenditure, thus only

21% anticipated compensation from their insurers. A few respondents also reported losing money by being away from work or others missing work because of their absence.

loss of income as self-employed approx £750. Friends and family at home had … expenses

Some domestic disruption as my partner had to take time of work to deal with some things that I might have dealt with.

Many people missed important family or business events, which caused some of them great regret. They included weddings, funerals and birthdays as well as conferences, business meetings, interviews. There were also worries about missing exams and exam preparation, health appointments and other obligations in addition to education and work. Some had made efforts to work while away, such as buying a computer. Others were working through the backlog or dreading facing it when they returned.

After 3rd re-booking with Finnair I had to cancel as I'd missed all my meetings.

We missed the funeral of our Grandad

We were due to get married on the 27th of April in Florida but have had to rebook for the 18th of May. We have had to reschedule our wedding evening for 130 guests at home too!

The biggest problem is that everything is uncertain. I cannot work today, because there is a small chance that I will fly later this day.

Guilt was expressed by people conscious that others at home had been forced to take on their duties, especially when their conditions were quite agreeable, also for their hosts by people staying with friends or family members.

The biggest problems were not for me but for my family and colleagues. I'm staying with friends, have a hire car at my disposal, and am actually having a very nice time. But my wife is having to manage the children and her job on her own, she has had to cancel a trip she was going to make … since I'm not there to take care of the children and my colleagues have had to cover for me which is of course extra work for them.

I feel uncomfortable about missing work. Also I have been here for almost 3 weeks, which is a bit long to impose on family.

Three questions asked respondents to evaluate the inconvenience and distress the event had caused them and the distress it had caused other people, not travelling with them. On average, the inconvenience to them was rated higher than the distress, but the highest ratings were for the distress to others.

Reasons for flying and alternatives

Respondents were asked why they chose to fly and what they would have done if flying had not been possible for a long time before their journey. Figure 4 shows the responses to the first question, confirming the view, that flying is largely seen as instrumental travel, rather than travel for its own enjoyment.

Both indicate that flying is prized for the distance it covers as well as its convenience, speed and low cost. Figure 5 suggests that at least some of the journeys could be transferred to different destinations. However, the comments after these questions indicate that some people feel the destination is critical, although it would be impractical to reach it by any other means.

Figure 4: Why did you fly?

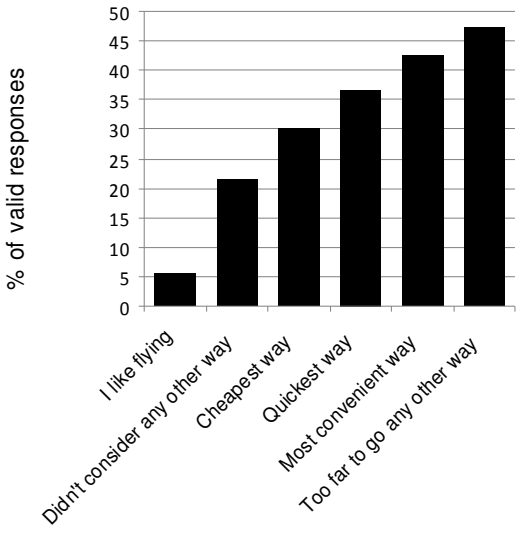
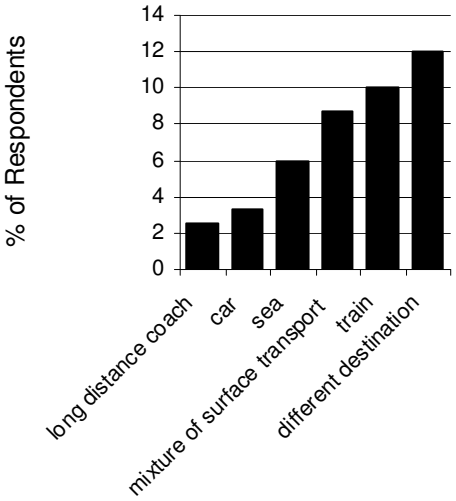


Figure 5: What would you have done with no flights?



There isn't much of an alternative way to get to Iceland except in the summer months.

Not really possible to get from Australia to anywhere

Some respondents explained that cheap air fares had put alternative surface travel services out of business, so there were not now as many options, when it was impossible to fly.

Most ferries from Scandinavia to the UK have closed in recent years because of competition from low price airlines.

However, some respondents who were successful in finding other travel modes enjoyed the experience while others did not relish the experience.

My friend's anxiety was taken away by the knowledge that we could get onboard the cargo ship … absolutely loved the 6 day journey at sea. We got back home refreshed and relaxed.

The long journey by sea and further on a crowded train or coach through Europe mainland did not seem very tempting

Discussion

The findings demonstrate the creativity and resources that people can bring into play when required; they include different forms of information and communication technology, social networks as well as finances. Despite the fears, few people were left totally stranded with no means to return home. There are obviously questions about who should bear (or share) the risk of an 'Act of God': air lines, insurers, tour operators or passengers. While further analysis of the survey results will not doubt increase our understanding of the impacts of such an abrupt halt to travel flows, it is the flows themselves which provide the most interesting findings.

At a time when the environmental costs of travel and aviation in particular are causing grave concerns about the possibility of reducing CO2 emissions to below levels which threaten the viability of the planet, air travel is increasing. (The number of Britons travelling abroad by air increased both absolutely and as a proportion of international travel from 32.4 million trips (69%) in 1998 to 56.0 million trips (82%) in 2008 (Office for National Statistics, 2010)). Like the car before it, the aeroplane has raised expectations about how far and how fast one can travel. This has increased the distance travelled and, as some of the respondents noted, reduced the offering of alternatives such as international ferry and train services.The

availability of cheap, fast travel has helped establish networks which then rely on that travel to sustain them. What will happen to those networks if flying becomes more expensive because of fuel price rises or less available through climate change mitigation measures? Such developments are likely to affect different types of networks differentially.

Tourists are the group with least dependency on the destination; their needs may be satisfied by alternative destinations reachable by surface travel. They may even be enticed by packages which include the travel as part of the tourist experience as already offered by companies such as the Orient Express. The slow travel movement (see Dickinson & Lumsdon 2010) is an example of people seeking quality in the experience rather than prioritising how far they can get. However, whether this would appeal to majority of travellers is questionable.

Several business people answered the question about alternative ways of travelling by saying their employer would not contemplate the time it would take to reach the destination by surface travel. This raises interesting questions about the trade-offs of time, cost and importance of meetings should air travel be restricted or its costs increased. Alternatives to face-to-face meetings (mainly video-conferencing) are already being used by many organisations to reduce travel and associated environmental and economic costs. However, as Boden & Molotch (1994) point out face-to-face meeting are critical for establishing the trust necessary to 'do business'. If air travel became less available, making international meetings difficult to hold, would decentralisation of power with more decisions being devolved to more local levels result? An alternative would be slower, 'eqipped' journeys, but allowing the traveller to work on the journey, although these would still entail absence from families and work places.

The social and particularly the kinship groups would probably be the most resistant to reduced flying. Unlike the pioneers who set sail on the Mayflower not expecting to see the family they left behind, modern migrants often settle in distant locations knowing they can return or their relatives can visit them reasonably easily. For families with relations in different continents (Barrack Obama's family in Africa, Indonesia and USA, for example) there is not an easy way to reduce the travel to maintain family ties. A reduction in flying might dissuade others considering moving to a far-away location, but it is likely that the seeds sown in an era of cheap flights will continue to fuel the demand for long-distance travel for generations.

At the moment there is little research that maps the flows across the networks that support an individual's mobility – travel industry, professional, or home. When things go wrong, i.e. the travel system is disrupted or fails, these support networks become more visible as the individual taps into these networks to mitigate the effect of delay, as this paper illustrates (see also Guiver and Jain forthcoming). Increasingly, mobile devices (phones, email, internet) facilitate the flows of information that include sourcing alternative travel arrangements, making alternative arrangements for business activities and caring duties, and rescheduling of appointments (Brown and O'Hara 2003). The ability to mitigate consequences at-a-distance may have positive and negative impacts for the stranded passenger and those enmeshed in his or her network. While the home-back-up gives the traveller flexibility, it also reduces the flexibility of the home-back-up network who provide support for the absent traveller and assume their responsibilities.

However, in seeking alternative routes through such ICTs may be more challenging for the reasons highlighted in this paper. For those involved in intercontinental travel, alternative flight paths are an expensive choice, or require visas that take time to obtain. Circumnavigating the problem is not straight forward and many may be excluded by financial resource or by nationality. Choices for the traveller therefore become closed, with the only choice being to wait. Even in intra-continental travel alternative routes may be less accessible than initially assumed – again by cost and availability. In one respect this prompted innovative and collaborative behaviour as described on the web page 'Innovative Responses to Eyjafjallajökull (http://www.ideasintransit.org/wiki/Innovative_response

_to_the_closing _of_European_airspace), and demonstrates the potential for future alternative mechanisms to intra-continental travel e.g. long distance car-share.

Conclusions

The survey results suggest that travellers are best prepared when they travel equipped with mobile phones, laptops and have ready contact with a support network. The main problem for airlines was informing their passengers in a rapidly changing situation, because it was not possible to 'broadcast' every change, passengers contacted them, overwhelming their systems, so adding to the passengers' anxiety and frustration. There was also little consideration of the problems of people unable to access the internet.

For policy-makers, there are a number of conclusions. The event exposed the vulnerability of over-dependence on one form of travel and the way that cheap flights have put alternatives out of business, reducing redundancy in the travel network. Redundancy although costly reduces vulnerability.

The survey reveals both the reliance on air travel for a number of purposes and the dependence on social networks back-home to fill in for the traveller when they are away. It illustrates the problems which would be encountered if flying were to be reduced by price or rationing and how these would have different impacts on different types of traveller. However, it also demonstrates people's resourcefulness in adapting and dealing with extraordinary situations and there is no reason to doubt that these would also be exhibited in finding personal solutions to a reduction in flying. What the survey does not and cannot indicate is who should take responsibility for initiating reductions in the level of flying and how that should be achieved.

References

Barr, S., Shaw, G., Coles, T. & Prillwitz, J. (2010) 'A Holiday is a holiday': practicing sustainability, home and away. *Journal of Transport Geography*, 18, 474-481.

Billette De Villemeur, E., Ivaldi, M., Quinet, E. & Urdánoz, M. (2005) The Social Costs of Air Traffic Delays. Toulouse, Institut d'Economie Industrielle, Universite Toulouse.

Boden, D. & Molotch, H. (1994) The compulsion to proximity. IN FRIEDLAND, R. & BODEN, D. (Eds.) *Nowhere. Space, time and modernity*. Berkeley, University of California Press.

Bows, A., Anderson, K. & Upham, P. (2006) *Contraction & Convergence: UK carbon emissions and the implications for UK air traffic*. Tyndall Centre for Climate Change Research.

Brown, B. & O' Hara, K. (2003) Place as a practical concern of mobile workers. *Environment and Planning A*, 35, 1565-1588.

Budd, L. & Graham, B. (2009) Unintended trajectories: liberalization and the geographies of private business flight. *Journal of Transport Geography*, 17, 285-292.

Cwerner, S., Kesselring, S. & Urry, J. (Eds.) (2009) Aeromobilities, London, Routledge.
Dickinson, J. & Lumsdon, L. (2010) Slow Travel and Tourism, London, Earthscan.

Dubois, G., Ceron, J.-P., Peeters, P. & Gössling, S. (2010) The future tourism mobility of the world population: Emission growth versus climate policy. *Transportation Research Part A*, in press.

Duval, D., Timothy (2007) *Tourism and Transport: Modes, Networks and Flows*, Toronto, Channel View Publications.

Elliot, A. & Urry, J. (2010) *Mobile Lives*, Abingdon, Routledge.

Guiver, J. & Jain, J (forthcoming) Grounded: Impacts of and Insights from the Volcanic Ash Cloud Disruption, *Mobilities*

Hares, A., Dickinson, J. & Wilkes, K. (2010) Climate change and the air travel decisions of UK tourists. *Journal of Transport Geography*, 18, 466-473.

Hätty, H. & Hollmeier, S. (2003) Airline strategy in the 2001/2002 crisis--the Lufthansa example. *Journal of Air Transport Management*, 9, 51-55.

Illich, I. (1974) *Energy and Equity*, London, Marion Boyers Publishers Ltd.

International Panel on Climate Change (1999) *Aviation and the Global Atmosphere: Summary for Policy Makers.*

Jain, J. & Guiver, J. (2001) Turning the Car Inside Out: Transport, Equity and Environment. *Social Policy & Administration*, 35, 569-586.

Larsen, J., Axhausen, K., W & Urry, J. (2006) Geographies of Social Networks: Meetings, Travel and Communications. *Mobilities*, 1, 261 - 283.

Lassen, C. (2009) Networking, Knowledge Working and Aeromobilities. *Geografiska Annaler, Series B Human Geography*, 91, 229-243.

Lee, D., S (2009) Aviation and Climate Change. IN GÖSSLING, S. & UPHAM, P. (Eds.) *Climate Change and Aviation.* London, Earthscan.

Lassen, C. (2009) Social perspectives on aeromobility and work in knowledge organizations. IN CWERNER, S., KESSELRING, S. & URRY, J. (Eds.) *Aeromobilities*. London, Routledge.

Mason, J. (2004) Managing Kinship over Long Distances: The Significance of The Visit. *Social Policy & Society*, 3, 421-429. Parliamentary Office of Science and Technology (2003) Aviation and the Environment.

Peeters, P., Gössling, S. & Becken, S. (2006) Innovation towards Tourism Sustainability: Climate Change and aviation. *International Journal of Innovation and Sustainable Development*, 1, 184-200.