



## Note

## A framework for evaluating the European airline costs of disabled persons and persons with reduced mobility



Deborah Ancell\*, Anne Graham

University of Westminster, 35 Marylebone Road, London NW1 5LS, UK

### ARTICLE INFO

#### Article history:

Received 7 July 2014

Received in revised form

7 August 2015

Accepted 1 October 2015

Available online 31 October 2015

#### Keywords:

airlines

disabled persons

persons with reduced mobility

costs

### ABSTRACT

In recent years, airlines have been servicing a greater variety, and increasing numbers, of disabled persons and persons with reduced mobility (PRMs), particularly associated with ageing, obesity and medical needs. With the quantity of PRMs likely to increase in the future, there will be a growing impact on the airlines' associated actual and opportunity costs, about which there is minimal literature and data. Therefore the aim of this paper is to identify standard functional key factors (FKFs) with which airlines could audit their PRMs costs, and which could be used by other interested bodies, such as governments, when considering relevant aviation policy. These FKFs are related to nine areas, namely PRMs' transfers; mobility aids; aircraft delays/diversions costs; staff training costs; staff health, safety and welfare; aircraft fixtures and equipment costs; airport costs; transaction costs; and opportunity costs. Further research is needed to obtain the data for these FKFs.

© 2015 Elsevier Ltd. All rights reserved.

### 1. Introduction

The majority of airline passengers are able-bodied and require no assistance. However there are some who are disabled either temporarily (because of unfamiliar surroundings, distances, noises and processes) or permanently (because of ageing, obesity, medical or mental problems or self-declared disabilities) and who will require airline assistance. The exact number of disabled persons or persons with reduced mobility (hereafter referred to as PRMs) who travel by air is not known but in Europe Steer Davies Gleave (2010) estimated it to be in the range of 0.2–1.2% of the total air passengers in 2009. Specifically within the United Kingdom (UK) numbers vary from around 650,000 at London Heathrow (0.95% of the total), 324,000 at London Gatwick (0.93%), 75,000 (0.32%) at London Stansted and 181,000 (0.84%) at Manchester (Civil Aviation Authority (CAA), 2010).

According to the World Health Organisation (WHO), it is predicted that between 2000 and 2050, the proportion of the world's rapidly ageing population over 60 years old will double from about 11% to 22%, from 605 million to two billion (WHO, 2012). The WHO also estimated that in 2008 more than 1.4 billion adults were overweight, with more than half a billion obese, and that this

number doubled between 1980 and 2008 (WHO, 2013). In addition, there is a growing number of people who are travelling for medical needs. For example Lunt et al. (2014) examined UK medical tourism and noted that over 50,000 individuals from the UK each year elect to fund their own medical treatment abroad for reasons including cosmetic and dental, cardio, orthopaedic and bariatric surgery, and organ and tissue transplantation. For some countries, such as the UK, there may also be inbound medical tourists who use the National Health Service, with estimates of around 52,000 in 2010 (Lunt et al., 2014). Within Europe IPK (2013) found that health and medical travel represented 9.4 million trips in 2011 (by all transport modes), and highlighted that up to 53% of Europeans said they would travel abroad for medical treatment. Although no specific data could be found related to how many ageing, obese and medical travellers are treated as PRMs for air travel, it is considered reasonable to assume that as these groups grow, so will the number of PRMs. Depending on the level and type of disability, these PRMs often do not fit the mainstream passenger model on which airlines plan facilities and services from which they could leverage economies of scale.

The European Union Regulation No EC1107/2006 (Commission of the European Communities (CEC), 2006; European Commission, 2009) prohibits the refusal of airlines to carry passengers on the basis of reduced mobility (except for aircraft safety concerns) and requires that airports and airlines provide services and facilities for PRMs free of charge. It is therefore unlawful for an

\* Corresponding author.

E-mail address: [d.ancell@westminster.ac.uk](mailto:d.ancell@westminster.ac.uk) (D. Ancell).

airline to discriminate against a disabled person by refusing to provide a service in the standard or manner of service or on the terms on which the service is offered to members of the public. The EC definition of a disabled person or passenger with reduced mobility, which has been adopted for this paper is:

*'... any person whose mobility when using transport is reduced due to any physical disability (sensory or locomotor, permanent or temporary), intellectual disability or impairment, or any other cause of disability, or age, and whose situation needs appropriate attention and the adaptation to his or her particular needs of the service made available to all passengers'. (CEC, 2006, article 2a).*

Therefore this does not formally include those who are sick and need on-board medical attention, but this raises many of the same issues for airlines.

Airlines incur additional, unrecoverable expenses in providing for PRMs (Poria et al., 2010) which are currently neither collated nor quantified. This has received very little coverage in the literature. Related studies have instead focused on the quality and safety of PRM airport and airline service provision and meeting the needs of PRMs (Steer Davies Gleave, 2010; CAA, 2010; Chang and Chen, 2012; Chang, 2012). To fill this literature gap, a logical starting point is to identify standard functional key factors (FKFs) associated with handling PRMs. Therefore the aim of this paper is to establish a suitable FKF framework which can be used by airlines to audit and benchmark their PRM costs and by other stakeholders.

## 2. The economics of handling PRMs

### 2.1. PRMs' transfers

PRMs' costs are incurred at the airport and on board the aircraft. The airport operator in Europe has the responsibility for moving PRMs through the airport (unlike in the USA where it is the airline's responsibility) although this can be sub-contracted. Regulation allows for the airport costs to be recovered through transparent and cost-reflective charges levied for all passengers which are collected by the airlines. These may depend on the pre-notification level of PRMs at the airport. The on board costs are absorbed as general airline costs. The higher the level of physical disability, the higher the likely corresponding airline servicing cost. It is generally assumed by the International Civil Aviation Organisation (ICAO) that an average passenger weight including luggage is 100 kg (CAA, 2010). Where passengers and luggage exceed this weight extra fuel needs to be loaded and consumed. One obese PRM with one electric scooter can often weigh three-four times this weight. However the airline industry tends to be silent on obesity (Small and Harris, 2012) as it is regarded as a politically sensitive issue. One option is to have pay-as-you-weigh passenger pricing, according to the passenger's actual weight (Bhatta, 2012), which has successfully been used at Samoa Air since April 2013 (Johanson, 2013).<sup>1</sup>

### 2.2. Mobility aids

Increasing numbers of PRMs now have access to motorised mobility aids such as electric (battery powered) scooters. Some weigh in excess of 175 kg and require technically competent

disconnection and reconnection to enable safe flight. Some scooters do not dismantle to stow easily in the aircraft hold. The European regulations provide for complimentary cargo space for PRM medical equipment and up to two mobility aids.

### 2.3. Aircraft delay/diversions for PRMs

PRMs who are self-reliant can fly without an assistant and those with stable conditions do not need medical clearance. In contrast, most medical cases require airline approval to fly (often with an assistant) to ensure they are able to withstand the journey. This approval reduces the risk of an inflight medical emergency or expensive aircraft diversion and the inconvenience of fellow passengers. The additional costs from medical emergency diversions are not reimbursed by either the PRM or their insurance companies (assuming they are an insurable risk). Hung et al. (2013) conducted a retrospective cohort study of medical diversions of one Hong Kong carrier over five years and applied symptom-based categorisation for medical diversions. They found that the most common diversion cause was suspected strokes, followed by chest pains and deaths – conditions more likely to affect ageing or obese people.

### 2.4. Staff training

In order to fulfil the legislated requirements staff must be trained in multiple skills. Ground staff must be trained in dismantling/reassembling wheelchairs and safe stowage of batteries (Yau et al., 2004) as well as in lifting passengers safely and in the provision of services for PRMs who are not physically incapacitated. Airline crews must be trained to assist disabled passengers onto the on-board wheelchair as well as assisting with extra explanations for sensory deprived PRMs.

### 2.5. Staff health, safety and welfare

There are health and safety risks among staff. The lack of a goods lift beside the aircraft means that there is often no safe way to deliver mobility aids into the aircraft hold if the passenger remains in their own mobility device to the aircraft door. This presents a risk of musculoskeletal disorder (CAA, 2012). Staff must also be able to lift obese, immobile passengers into and out of their seats. While airlines limit the amount of luggage weight to prevent injuries among baggage loaders, there is generally no limit on passenger or mobility equipment weights. In addition airlines are also liable for compensation payments for employee injuries incurred carrying heavier PRMs or their equipment.

### 2.6. Aircraft fixtures and equipment costs

Other costs are associated with additional aircraft fixtures and fittings which include on board wheelchairs, lifting armrests and accessible toilet installations. There is the maintenance of these and the extra fuel costs and weight penalty.

### 2.7. Airport costs

Prior to the EU legislation being introduced, the airport costs associated with wheelchair passengers in Europe was estimated to be in the range of €24–30 (CEC, 2005). These are now recovered through a PRM departing passenger charge. Typically within Europe these are in the range of 10–90 cents per departing passenger, irrespective of whether there are any PRMs on board, with some of the higher charges being at Paris CDG (90c), Frankfurt (90c) and Copenhagen (around 80c) broadly representing a cost of between €20–100 per PRM (Steer Davies Gleave, 2010). At some

<sup>1</sup> Whilst Samoa Air appears to be the only airline using this pricing strategy, Sharma (2013) discusses how already people pay according to their size and/or weight in health and life insurance, clothing, cars and furniture and suggests that such pricing could also be used for cab rides, hotel rooms, gym memberships, amusement park rides and ball games.

airports the charges vary depending on the level of pre-notification from the PRMs themselves (CAA, 2010). For example at Heathrow airport in 2015 the PRM fee varied according to pre-notification between £0.52 and £2.40, which had to be paid for all passengers in addition to the standard passenger fee (e.g. £29.50 for European passengers). There may be other airline costs at airports related to the handling of mobility aids and medical equipment but this will vary according to whether the airline self-handles or sub-contracts normal ground handling activities to a third party.

### 2.8. Transaction costs

Transaction costs are incurred whenever a contract has to be created, monitored, compensated or terminated. In 2015 all passengers travelling on EU airlines, irrespective of air fare value will have all their rights protected by the airlines discharging their legal responsibilities. The EU (through the European Court of Justice (ECJ)) has recognised that the compensation claims could have substantial negative economic consequences (ECJ, 2012) for airlines.

### 2.9. Opportunity costs

The extra weight and freight space occupied by PRMs, mobility equipment and aircraft fixtures can have an impact on what else the airline can carry in busy situations. Sometimes, the airline might have to leave behind time-sensitive freight (e.g. fruit, flowers) or other passengers' luggage in order to accommodate a large and heavy mobility aid i.e. omissions which cause inconvenience and perceptions of inadequate customer service for freight shippers or passengers.

Therefore carrying PRM equipment (e.g. motorised scooters) could represent a hidden cost and a lost opportunity for the airlines to earn revenue from carrying freight. Furthermore, it is often recommended (e.g. in the UK – CAA, 2012) that motorised mobility aids are loaded into a compartment or container without other baggage or cargo to prevent damage creating a further hidden opportunity cost. Taking the above discussion into account, Table 1

is a summary of the FKF.

No common database is known to exist which would allow for all these different costs to be calculated and for their relative importance to be assessed. Whilst the data for some of these FKFs is already available, for others it would need to be collected or estimated. The three key data sources are likely to be:

- Readily available airport operator information (e.g. PRM passenger charges, pre-notification required).
- Airline information (e.g. level of service required, number and type of PRMs, frequency of dismantling/pre-notification, delay information, injuries, compensation payments, training costs). Much of this should be available, although for some areas (e.g. training costs) the specific data may have to be estimated.
- Aircraft operating costs (e.g. aircraft fixtures and fittings costs, opportunity costs). These would have to be estimated, using an aircraft operating cost model.

With this data the industry would be able to evaluate more accurately the relative importance of the different costs involved and to establish benchmarks for optimal performance for dealing with PRMs. Moreover the current legislation requires airlines to have a social responsibility by spreading the PRM costs across all passengers, but with growing numbers it is conceivable that other funds, perhaps government subsidies, could be considered for this purpose and these FKFs could help inform such discussions.

## 3. Conclusion

In recent years, airlines have been servicing increasing numbers and a greater variety of PRMs as the definition has evolved from the lone wheelchair traveller to diverse passenger groups, particularly associated with ageing, obesity and medical needs. This has been accompanied by the increasing weight and technological sophistication of mobility aids. With the numbers of PRMs set to increase in the future, this will have a growing impact on airlines' actual and opportunity costs. To begin the sensitive, yet much needed, PRM debate and develop a greater understanding of the issues, this

**Table 1**  
FKFs for measuring the airline costs of PRMs.

FKF	Examples of measurements
1. PRM transfers	<ul style="list-style-type: none"> <li>• Number and type of PRMs carried each flight</li> <li>• Level of service required by each PRM</li> <li>• Excess weight over 100 kg standard</li> <li>• Frequency of dismantling mobility scooters/wheelchairs, detachment and reattachment of batteries</li> <li>• Number of hours of airport pre-notification required for PRMs</li> <li>• Frequency of pre-notification of PRMs</li> </ul>
2. Mobility aids	<ul style="list-style-type: none"> <li>• Number, weight and dimensions of PRM mobility aids per PRM per flight</li> <li>• Additional fuel needed to carry heavier mobility aids</li> </ul>
3. Aircraft delays/diversions costs	<ul style="list-style-type: none"> <li>• Cause of diversions</li> <li>• Number of diversions</li> <li>• Delays caused to aircraft turn-round by loading and unloading heavy mobility aids</li> <li>• Aircraft delay owing to late notified or late-delivered PRMs</li> </ul>
4. Staff training costs	<ul style="list-style-type: none"> <li>• Cost of training staff to dismantle and reassemble mobility aids (at departure and destination)</li> <li>• Crew training for assisting PRMs on board</li> <li>• Airline ground staff training for PRMs</li> </ul>
5. Staff health, safety and welfare	<ul style="list-style-type: none"> <li>• Injuries to PRM helpers</li> <li>• Compensation payments to PRM helpers</li> </ul>
6. Aircraft fixtures and fittings costs	<ul style="list-style-type: none"> <li>• Capital and operating costs for additional aircraft fixtures and fittings to enable PRM travel (e.g. lifting armrests, on board wheelchairs, additional toilet fixtures, fittings and possibly space)</li> <li>• Additional fuel costs due to extra weight for additional aircraft fixtures and fittings</li> </ul>
7. Airport costs	<ul style="list-style-type: none"> <li>• PRM passenger charge (levied by airport operator to cover their costs)</li> </ul>
8. Transaction costs	<ul style="list-style-type: none"> <li>• Compensation to PRMs for mishandling them and/or their mobility equipment</li> <li>• Compensation to other passengers who may have been delayed by PRM events</li> </ul>
9. Opportunity costs	<ul style="list-style-type: none"> <li>• Loss of seating if required to enable accessible toilet compartment</li> <li>• Weight penalty for aircraft fixtures and fittings (e.g. onboard wheelchairs, lifting armrests)</li> <li>• Loss of freight space/weight if displaced by PRM equipment</li> </ul>

paper has identified a standard FKFs framework which can be used by airlines to audit and benchmark their PRM costs, and by other stakeholders, such as governments, for determining PRM policy. Further research is needed to obtain the data for these FKFs.

## References

- Bhatta, B.P., 2012. Pay-as-you-weigh pricing of an air ticket. available from: *J. Air Transp. Manag.* 18, 30–33 <http://www.sciencedirect.com/science/article/pii/S0969699711000846> (accessed 30.03.15.).
- Chang, Y.-C., 2012. Cabin safety behavioural intentions of passengers with reduced mobility. available from: <http://www.sciencedirect.com/science/article/pii/S0969699712001147> *J. Air Transp. Manag.* 25, 64–66 (accessed 30.03.15.).
- Chang, Y.-C., Chen, C.-F., 2012. Overseas travel choice for persons with reduced mobility. available from: <http://www.sciencedirect.com/science/article/pii/S0969699711001207> *J. Air Transp. Manag.* 20, 43–45 (accessed 30.03.15.).
- Civil Aviation Authority (CAA), 2010. Accessible Air Travel. available from: [www.caa.co.uk/accessibleairtravel](http://www.caa.co.uk/accessibleairtravel) (accessed 10.04.13.).
- Civil Aviation Authority (CAA), 2012. Civil Aviation Safety Notice Number: SN-2012-13 – Safety Requirements Applicable to the Carriage of Electric Mobility Aids. available from: <http://www.caa.co.uk/docs/33/SafetyNotice2012003.pdf> (accessed 27.01.14.).
- Commission of the European Communities (CEC), 2005. Proposal for a Regulation of the European Parliament and of the Council Concerning the Rights of Persons with Reduced Mobility when Travelling by Air. available from: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2005:0047:FIN:EN:PDF> (accessed 02.07.13.).
- Commission of the European Communities (CEC), 2006. Regulation (EC) No 1107/2006 of the European Parliament and of the Council of 5 July 2006 Concerning the Rights of Disabled Persons and Persons with Reduced Mobility when Travelling by Air. available from: <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32006R1107> (accessed 02.07.13.).
- European Commission, 2009. Interpretative Guidelines on the Application of Regulation (EC) N° 1107/2006 of the European Parliament and of the Council of 5 July 2006 Concerning the Rights of Disabled Persons. available from: [http://ec.europa.eu/transport/themes/passengers/air/doc/prm/2012-06-11-swd-2012-171\\_en.pdf](http://ec.europa.eu/transport/themes/passengers/air/doc/prm/2012-06-11-swd-2012-171_en.pdf) (accessed 02.03.15.).
- European Court of Justice (ECJ), 2012. Request for a Preliminary Ruling – Air Transport – Regulation (EC) No 261/2004 – Articles 6 and 7 – Connecting Flight(s) – Delay in Arrival at the Final Destination – Delay Equal to or in Excess of Three Hours – a Passenger's Right to Compensation. available from: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:62011CJ0011:EN:HTML> (accessed 04.07.13.).
- Hung, K., Cocks, R., Poon, W., Chan, E., Rainer, T., Graham, C., 2013. Medical volunteers in commercial flight medical diversions. available from: *Aviat. Space Environ. Med.* 84, 491–497 <http://www.ncbi.nlm.nih.gov/pubmed/23713215> (accessed 30.03.15.).
- IPK, 2013. ITB World Travel Trends Report 2012–13. available from: [http://www.itb-berlin.de/media/itbk/itbk\\_dl\\_all/itbk\\_dl\\_all\\_itbkongress/itbk\\_dl\\_all\\_itbkongress\\_itbkongress365/itbk\\_dl\\_all\\_itbkongress\\_itbkongress365\\_itblibrary/itbk\\_dl\\_all\\_itbkongress\\_itbkongress365\\_itblibrary\\_studien/ITB\\_World\\_Travel\\_Trends\\_Report\\_2012\\_2013.pdf](http://www.itb-berlin.de/media/itbk/itbk_dl_all/itbk_dl_all_itbkongress/itbk_dl_all_itbkongress_itbkongress365/itbk_dl_all_itbkongress_itbkongress365_itblibrary/itbk_dl_all_itbkongress_itbkongress365_itblibrary_studien/ITB_World_Travel_Trends_Report_2012_2013.pdf) (accessed 03.03.15.).
- Johanson, M., 2013. Samoa Air Pay-by-weight Scheme Hailed a Big Fat Success. available from: <http://www.ibtimes.com/samoa-air-pay-weight-scheme-ailed-big-fat-success-1506042> (accessed 14.06.14.).
- Lunt, N., Smith, R., Mannion, R., Green, S., Exworthy, M., Hanefeld, J., Horsfall, D., Machin, L., King, H., 2014. Implications for the NHS of inward and outward medical tourism: a policy and economic analysis using literature review and mixed-methods approaches. available from: *Health Serv. Deliv. Res.* 2 (2) <http://www.journalslibrary.nihr.ac.uk/hsdr/volume-2/issue-2/abstract> (accessed 30.03.15.).
- Poria, Y., Reichel, A., Brandt, Y., 2010. The flight experiences of people with disabilities: an exploratory study. available from: *J. Travel Res.* 49 (2), 216–227 <http://jtr.sagepub.com/content/49/2/216.abstract> (accessed 30.03.15.).
- Sharma, A., 2013. Should Airlines Weigh A 'Pay-as-you-weigh' Pricing Strategy? Troy Media, 14 April, available from: <http://www.troymedia.com/2013/04/14/should-airlines-weigh-a-pay-as-you-weigh-pricing-strategy/> (accessed 28.03.15.).
- Small, J., Harris, C., 2012. Obesity and tourism: rights and responsibilities. available from: *Ann. Tour. Res.* 39 (2), 686–707 <http://www.sciencedirect.com/science/article/pii/S0160738311001502> (accessed 30.03.15.).
- Gleave, Steer Davies, 2010. Evaluation of Regulation 1107/2006. available from: [http://ec.europa.eu/transport/themes/passengers/studies/doc/2010\\_06\\_evaluation\\_regulation\\_1107-2006.pdf](http://ec.europa.eu/transport/themes/passengers/studies/doc/2010_06_evaluation_regulation_1107-2006.pdf), 30 March 2015.
- World Health Organisation (WHO), 2012. Interesting Facts About Ageing. available from: <http://www.who.int/ageing/about/facts/en/> (accessed 10.04.14.).
- World Health Organisation (WHO), 2013. Obesity and Overweight Fact Sheet, No 311. September, available from: <http://www.who.int/mediacentre/factsheets/fs311/en/> (accessed 10.04.14.).
- Yau, M.K., McKercher, B., Packer, T., 2004. Travelling with a disability: more than an access issue. available from: <http://www.sciencedirect.com/science/article/pii/S016073830400074X> *Ann. Tour. Res.* 31 (4), 946–960 (accessed 30.03.15.).