Challenges facing regional airport operations in Great Britain: a case study perspective of the South West of England & Wales

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The deregulation of the European airline industry has had a dramatic impact on regional airports across the Union. Furthermore, the policy has changed the strategy of the so-called traditional full service network carriers, such as British Airways who as a consequence of this legislation have created powerful alliance networks and consolidated their position at fortress hubs. In comparison, low cost carriers have built a network presence around regional airports as they offer such carriers a variety of cost savings. The demise of charter airlines due to the continued fall in holiday makers booking package tours has further changed the management dynamics of regional airports. This paper examines the consequences of the above actions and evaluates how these issues have been played out within the South West of England and Wales.

Keywords | *Deregulation; consolidation; regional airports; full service network carriers; gini coefficient; low cost carrier; airline alliances*

The past two decades have created some of the most stimulating and yet challenging market conditions for regional airports within Great Britain. This process of change is as evident in the South West of England and Wales as it is anywhere else. The cause and effect of these changes are numerous but have been driven in no small part by the deregulation of the air services across the European Union. This paper examines the challenges faced by regional airports within the South West of England and Wales, namely Bristol (BRS), Cardiff (CWL) and Exeter (EXT), and how they have responded to these circumstances. Regional airports have been defined by the Transport Select Committee (1983, p.2) as a category B facility 'which provide a network of short-haul scheduled international services, a significant range of charter services and domestic services including links with gateway airports.'

The deregulation of air services within the European Union (EU) was initiated during 1987 when limited levels of competition were introduced to the market. This process of deregulation within Europe was an extremely protracted affair with the third package not being approved until almost a decade had passed. This first package concentrated on stimulating new entrant carriers to the market, banning capacity sharing strategies and removing airlines abilities to set fares based on past tariff systems. The second package of measures introduced by the EU in 1990 included further removal of price fixing practices and the creation of multiple designation carriers. Finally in 1993 full open access to the market was introduced with a relaxation on European ownership rules and harmonisation of licensing requirements. It was not just airlines however, who needed to learn and adapt to these new commercial characteristics, as airports across Europe underwent a steep learning curve with regards to how they treated current users (both airline and passenger) which used their facilities and how they fostered relationships with possible new entrants. Deregulation has undoubtedly created a period of volatility within airport traffic flows according to Burghouwt (2007) and increased levels of uncertainty for airport managers (de Neufville and Barker, 1991). The deregulation of air services within Europe changed the dynamics of the monolithic Full Service Network Carriers (FSNCs), such as British Airways, Lufthansa, Air France and Olympic. Here the need for change was

driven by price competition created by the introduction of Low Cost Carriers (LCC) which had started to eat into these carriers traditional passenger base as well as stimulating new markets of their own, with their low fares and mass market advertising campaigns. The FSNCs were not only having to take on LCCs to maintain their market share, but they also needed to develop strategies to protect themselves from the increasing levels of competition that they faced from the new Middle Eastern carriers such as Emirates, Etihad and Qatar Airways. This new breed of carrier cleverly exploited their geographical position and sixth freedom rights granted under various bilateral agreements to create super hub airports which channelled passengers from one international flight to another smoothly and at a lower price than was currently available on direct flights from Europe. FSNCs furthermore experienced intense competition from the established Asian carriers of Singapore Airlines, Cathay Pacific and Malaysian. Williams (2002, p.1) notes 'deregulation has radically altered the way in which airlines are operated and managed. The cosy world of the past in which carriers were protected from the onslaught of competition by the actions of regulators has been replaced by one in which each party has to ensure its own wellbeing.' With the inception of deregulation Reynolds-Feighan (2000) argues that smaller airports have become vulnerable due to the FSNCs changing their network characteristics due to the introduction of the free market and economic downturns.

The role of deregulation within the US and Europe is well understood from the work of Graham (1997); Hanlon (2007); Williams (2002); Doganis (2001) and Page (2005). Whilst these authors have tended to concentrate on the function deregulation has played within the major market areas particularly focusing on hub airports and FSNC versus LCC competition, scant regard has been paid to the impact of deregulation on regional airports across Europe. Burghouwt et al. (2003, p.310) emphasized that 'in contrast to the large amount of empirical studies regarding the changes in airline network structures in the deregulated US air transport market, the number of empirical studies with respect to changing airline network configurations in Europe is still somewhat limited.' Whilst the loss of any air service can have a major impact on all sizes of airport its effect will be most greatly felt at the regional airport level. Here Reynolds-Feighan (1995, p.467) warns that 'for small communities with limited air services, the danger is that competition and network reorganisation by the airlines will focus on the major airports and cities leaving the smaller communities with much reduced services or with a loss of all air services.'

To help protect their markets from deregulation and increase market share, FSNCs developed in the 1990s a range of cooperation agreements termed alliances which were aimed at reducing competition whilst at the same time offering passengers a multitude of global destinations. Doganis (2001) illustrates that as competition has increased, airlines have looked for greater protection from such commercial realities by grouping together and creating airline alliances. This strategy has impacted on regional airport facilities as airlines have been able to reduce the level of service offered as they have been able to code share with their alliance partners. This reduction of services has created vulnerabilities within airport operations as the level of destinations serviced may no longer support the revenue required to efficiently operate the facility or to invest in new infrastructure requirements.

Strategically FSNCs have not only opted to join alliances as a mechanism of protection from potential competition but have furthermore adopted a policy of network consolidation through the purchase of carriers which have allowed them to gain synergies as well as reduce potential competitors. The consolidation of European airlines is growing apace. This strategy has had implications for regional airports as again it raises the prospect of network duplication. This replication of air services may also be seen in the personnel found at the airport from check-in operatives through to maintenance staff. Examples of European FSNC consolidation is best evidenced through the merger of Air France and KLM and more recently the formation of the International Airlines Group formed by the merger between British Airways and Iberia. Whilst these two examples help to illustrate the level of merger activity which is currently impacting on regional airports within Europe, it is the development of the Lufthansa Group of Airlines which clearly demonstrates how a consolidated European airline industry will challenge regional airport strategies. Figure 1 illustrates the airlines which are currently found within the three major airline groupings within Europe. As this article goes to press the future of one of the Lufthansa Group of Airlines – BMI is somewhat uncertain. As of 4th November 2011 Lufthansa has signalled its

intention to sell the mainline operations of BMI to the International Airlines Group, the parent company of British Airways. The implications of this deal for competition at London Heathrow are numerous, including an increased share of the takeoff and landing slots by British Airways which currently has close to 43% of the market. This is expected to increase to over 54% if the deal is successful. Such dominance by a home carrier is still far less than the current 63% enjoyed by Lufthansa at Frankfurt or the 55% experienced by Air France at Paris Charles de Gaulle. It is expected that if successful, British Airways will use the slots gained to increase the level of services to long haul destinations and in particular to open up new destinations found within the growing BRIC economies. This strategy will, however, have implications for the number of domestic destinations served from Heathrow which are expected to decrease. Furthermore, the sale of BMI's Low Cost operation and its regional division could have widespread implications for regional airports across the UK including those based within the Southwest of England and Wales.

The future challenge faced by all three airports within the research area (BRS, CWL & EXT) is linked to the continued consolidation which is occurring within the FSNC sector. The economics of consolidation have centred on gaining synergies within the operation of these carriers. Based on the relatively small catchment area found between the competing airports of Bristol, Cardiff and Exeter (see figure 2) it is likely that at some point in the near future the Air France / KLM Group will review the current strategy of serving all three facilities. This could very easily leave two of the airports with no direct connection to the main transit airports of Amsterdam (AMS) and Paris (CDG) respectfully. Instead it is possible that the Southwest of England and Wales could be serviced by a super regional hub airport (Dennis, 2005). This strategy would reduce the level of duplication of routes and cost for the airlines involved. It would however have a profound impact on passenger journey times from the most peripheral regions found within the study area and create issues for local development agencies looking to attract new business to the region.

Figure 1 European airline groupings and alliance membership

Lufthansa Group	**Air France/KLM Group**	**International Airlines Group**
Lufthansa Lufthansa Regional Air Dolomiti Lufthansa Italia Austrian Airlines bmi * bmibaby * Brussels Airlines Eurowings Germanwings Luxair Swiss Sun Express (50%) Ukraine Airlines (22%) * to be sold **STAR ALLIANCE**	Air France Brit Air City Jet Air France Regional KLM KLM City Hopper Martinair Transavia.com Alitalia (25%) **SKYTEAM ALLIANCE**	British Airways British Airways City Flyer Iberia Air Nostrum Openskies Vuelling FlyBe (15%) Sun-Air **ONEWORLD ALLIANCE**

Figure 2 Close proximity of airports within study area

(Map created using GPSVisualiser.com)

The success of regional airports can in some instances be measured based on their level of global reach. This measurement is somewhat subjective but takes into account how many destinations passengers using the facility can reach by having just one transit point within their journey. To be successful regional airports need to attract FSNCs which are willing to operate flights into and out of the airport at times which will allow them to fit into the wave pattern of transfers offered at the airlines main hub. Here the route network of the Air France / KLM group has been fundamental to each of the airports within the study area ability to offer a range of long haul destinations. Table 1 illustrates which airlines service two of Europe's biggest hub airports AMS and CDG from Bristol, Cardiff and Exeter airports respectfully. The development of such Hub and Spoke operations has been called into question by Burghouwt (2007, p150) who based on the work of Dempsey (1990) states that 'airline hub and spoke operations and the freedom of route exit in deregulated markets have not been at all beneficial to airports at the lower end of the airport hierarchy.'

Table 1 Hub airport connections from Bristol, Cardiff and Exeter

Airport	Hub (Connecting) Airport	Airline
Bristol	Amsterdam (AMS)	KLM
Bristol	Paris (CDG)	Air France
Cardiff	Amsterdam (AMS)	KLM
Cardiff	Paris (CDG)	BmiBaby/FlyBe
Exeter	Amsterdam (AMS)	FlyBe (Codeshare with AF)
Exeter	Paris (CDG)	FlyBe (Codeshare with KL)

The introduction of deregulation across Europe has created challenges for regional airports not just through the reshaping of the FSNC's networks but also through the generation of new business from Low Cost Carriers. Through the introduction of Low Cost Carriers, deregulation within Europe has helped to create new markets and destinations which were in the past either seen as being unviable or unattractive to passengers. Low Cost Carriers had initially started within the United States of America where deregulation had occurred a decade prior to the European Union's first tentative steps into the process under the Deregulation Act of 1978. Here Low Cost Carriers such as Southwest Airlines and ValueJet had blazed a trail of success helping to obliterate household brands such as Eastern Airlines and Braniff Airways. This is not to say that Europe had not seen some initial experimentation with the low cost model. In particular, under the revised Bermuda II US – UK Bilateral Air Service Agreement of 1977, Laker Airways pioneered the idea of low fares for passengers who were willing to turn up and go on its Skytrain services to numerous destinations across the United States of America. Europe had nevertheless, to wait until the early 1990s for its first Low Cost Carrier to be initiated.

Whilst larger FSNCs, have favoured consolidating their position at fortress hubs, the new breed of LCCs have looked to establish themselves away from these primary airport facilities at more cost effective secondary or regional airports. As described by Page (2005) the main reasons behind this strategy include reduced congestion, less complicated airport infrastructure and most importantly lower airport charges. Here, however, is where the problems for regional airports begin. The rivalry between airports to attract carriers such as Ryanair, easyJet and Norwegian are immense. Airports have been found paying enormous sums of money and offering other such enticements to attract LCCs to their region. Often this drive to gain LCCs is motivated by local government involvement to help create jobs and help rejuvenate areas through the injection of potential tourists to their region. Tourism may not be the only type of employment which can be created by such ventures, however, as the Department of Transport's White Paper (2003, p.49) The Future of Air Transport states 'airports are an important focus for the development of local and regional economies. They attract business and generate employment and open up wider markets. They can provide an important impetus to regeneration and a focus for new commercial and industrial development.'

The development of such LCC models at regional airports has of course been evident within the South West of England and Wales. Here a variety of LCCs are to be found at the main airports of Cardiff, Bristol and Exeter. FlyBe currently has operations to all three facilities, whereas easyJet and Ryanair have concentrated their route network development at Bristol. Cardiff had previously been included within the Ryanair route network with a single service operated to Dublin; this was however cancelled after a disagreement between the airport and airline based on landing charges. The ruthless nature of LCC's footloose strategies is therefore a concern which regional airports have to take into consideration. During the summer of 2011 it was announced by BMIBaby that they would be withdrawing all operations from both Cardiff and Manchester airports. The removal of these low cost services from Cardiff are somewhat alleviated by the duplication of routes from other carriers, including charter airlines. There are concerns

nevertheless as to how Cardiff will be able to replace routes which have been lost and where there is no replication of service. The vulnerability of regional airports in this respect to the withdrawal of a LCC could be even more accentuated at Exeter where one carrier, FlyBe, provides the only scheduled services. Table 2 demonstrates the main low cost carriers operating from all three facilities based within the research region and the destinations served.

Table 2 Low cost carrier destinations served from Bristol, Cardiff and Exeter

(Source: Airport Summer & Winter 2011 Timetables)

Airport	Low Cost Carrier	Destinations Served
Bristol	Ryanair	Alicante, Bergerac, Béziers, Bratislava, Dublin, Faro, Gdansk, Girona, Gran Canaria, Ibiza, Katowice, Kaunas, Knock, Lanzarote, Limoges, Málaga, Malta, Marrakech, Milan-Orio al Serio, Palma de Mallorca, Poznań, Reus, Riga, Rzeszów, Seville, Tenerife-South, Valencia, Venice-Treviso, Wrocław,
	easyJet	Alicante, Amsterdam, Barcelona, Belfast-International, Berlin-Brandenburg , Berlin-Schönefeld, Bodrum, Bordeaux, Corfu, Dalaman, Edinburgh, Faro, Fuerteventura, Funchal, Geneva, Glasgow, Grenoble, Heraklion, Ibiza, Innsbruck, Inverness, Kraków, La Rochelle, Lisbon, Lyon, Madrid, Málaga, Marseille, Menorca, Murcia, Naples, Newcastle, Nice, Olbia, Palma de Mallorca, Paphos, Paris (CDG), Pisa, Prague, Rome-Fiumicino, Salzburg, Split, Tenerife-South, Toulouse,
	FlyBe	Belfast-City, Isle Of Man, Jersey
Cardiff	BmiBaby	Alicante, Belfast – City, Faro, Ibiza, Málaga, Menorca, Murcia, Palma de Mallorca,
	FlyBe	Belfast-City, Edinburgh, Glasgow-International, Jersey, Paris (CDG)
Exeter	FlyBe	Aberdeen, Alicante, Amsterdam, Avignon, Belfast-City, Bergerac, Bergerac, Chambéry, Dublin, Dubrovnik, Düsseldorf, Edinburgh, Faro, Geneva, Glasgow, Guernsey, Hannover, Innsbruck, Jersey, Leeds/Bradford, Málaga, Manchester, Newcastle, Palma De Mallorca, Paris (CDG), Rennes, Salzburg, Verona

Whilst most LCC networks have previously concentrated on leisure routes there has been a significant move by these carriers into the business markets due to the maturing of their past route operations and the need to drive expansion. The business markets which have been targeted were formerly flown only by those nations FSNC. Whilst this competition on routes has been welcomed by passengers it has caused bitter rivalry between LCCs and their FSNC counterparts. For regional airports the outcome of this competition has often resulted in one carrier leaving the route. This all too often has tended to be the FSNC which then reduces the airports ability to offer passengers the opportunity of transferring flights seamlessly.

The growth and importance of LCCs to regional airports within the study area is furthermore shown within table 3. Here, data has been analysed from the OAG (2010) highlighting the number of departure frequencies recorded at Bristol during the month of June 2010. What is clearly evident from the data is that LCCs have the greatest percentage of slots and have built up an unassailable lead at Bristol. Here, it can be seen that over 77 % of operations are by the two main LCCs found within the UK, Ryanair and easyJet. A similar picture emerges at Cardiff Airport where LCCs account for 56 % of all frequencies, these being operated by FlyBe and BMIbaby.

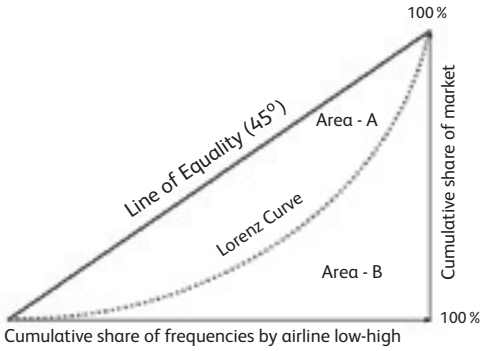
Table 3 Bristol Airport airline frequencies for June 2010

(Source: OAG)

Airline	Frequency	% of Firm
OLT-Ostfriesische Lufttra	26	1.274509804
Aer Araan	30	1.470588235
Aurigny Air Services	30	1.470588235
Continental Airlines	30	1.470588235
Flybe	47	2.303921569
Eastern Airways	58	2.843137255
BMI Regional	74	3.62745098
Air France	78	3.823529412
KLM Hopper	90	4.411764706
Ryanair	532	26.07843137
easyJet	1045	51.2254902

As further illustration of the dominance of LCCs at the regional airports within the study area a simple Gini Co-efficient (GIC) can be undertaken to show the level of concentration within the market. Whilst other measures are available the GIC has become the data analysis tool of choice for airport concentration studies first used by Reynolds-Feighan (2000) but having also subsequently being used by Burghouwt (2001, 2003, 2005, 2007) who employs the GIC to develop concepts based around concentration levels at both a spatial and temporal configuration of route networks. Burghouwt (2007, p.9) notes that 'concentration and dispersion measures have been used frequently in air transport studies to evaluate market concentration in air transport markets or to analyse the relationship between air fares and market concentration in the context of antitrust issues'. The GIC is calculated by analysing the level of inequality for a particular market based on the Lorenz Curve (Figure 3). The greater the curve produced the higher the level of inequality or concentration within that market.

Figure 3 Illustration of the GIC and the Lorenz Curve



Mathematically the GIC is represented by the following formula:

$$G = 1 - 2\int_0^2 L(X)dX.$$

Where:

$$\Sigma = \frac{\text{Area (A=B) - Area B}}{\text{Area (A=B)}}$$

$$= \frac{1 - \text{Area B}}{1}$$

Table 4 illustrates the results which were obtained from undertaking a GIC analysis on Bristol Airport for the month of June 2010. The GIC measures from 0 which represents equality between all carriers to 1 which represents total inequality with one carrier having a dominant position at that airport.

Table 4 GIC of Bristol Airport

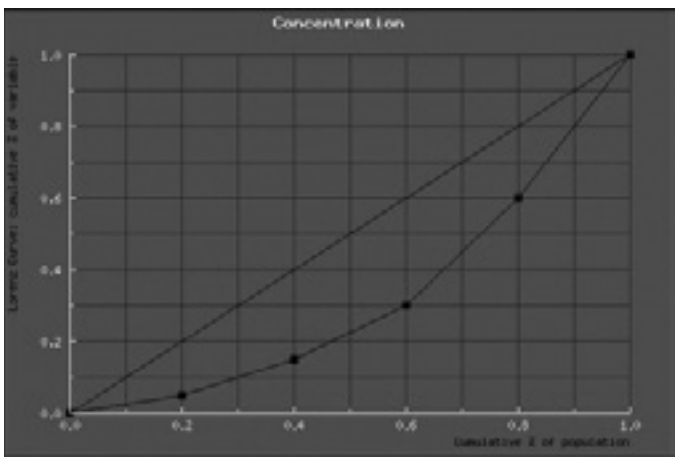
(Source: OAG)

Airline	Frequency	% of Firm	Cum %	Sum of (2)	Area
BOLT-Ostfriesische Lufttra	26	1.274509804	1.274509804	1.274509804	11.58645276
Aer Arann	30	1.470588235	2.745098039	4.019607843	36.54188948
Aurigney Air Services	30	1.470588235	4.215686275	6.960784314	63.2798574
Continental Airlines	30	1.470588235	5.68627451	9.901960784	90.01782531
Flybe	47	2.303921569	7.990196078	13.67647059	124.3315508
Eastern Airways	58	2.843137255	10.833333333	18.82352941	171.1229947
BMI Regional	74	3.62745098	14.46078431	25.29411765	229.9465241
Air France	78	3.823529412	18.28431373	32.74509804	297.6827094
KLM City Hopper	90	4.411764706	22.69607843	40.98039216	372.5490196
Ryanair	532	26.07843137	48.7745098	71.47058824	649.7326203
easyjet	1045	51.2254902	100	148.7745098	1352.495544

Total Freq	2040
% of Firm	9.090909091
Total	3399.286988
Area B	1699.643494
Gini index	0.660071301

Table 4 clearly identifies that Bristol has a high level of concentration at 0.66, with one carrier in particular easyJet, having over 51% of the market. This high level of concentration is furthermore clarified within figure 4 where the pressure on the Lorenz Curve is readily identifiable.

Figure 4 GIC for Bristol Airport for the month of June 2010



The growth of LCCs at regional airports created issues not just for FSNCs but has also impacted upon the past main income generators for such facilities – the charter airline. The package holiday market and the utilisation of charter airlines has been a highly lucrative revenue source for regional airports including Cardiff, Bristol and Exeter. The frequency of services during the summer sun and the winter ski period have in most part financially secured such regional facilities through their aeronautical charges. Furthermore, regional airports have been able to gain revenue from non-aeronautical charges such as duty free sales and food and beverage outlets supplied to the captive audience who are waiting for their charter flight. The charter market is however showing signs of decline, Williams (2001) suggests as more and more holiday makers are experimenting with tailor made vacations, thus leaving the traditional safety bubble of the package holiday and charter flight behind. This decline in charter activity at all three airports within the study area is illustrated within figure 5. Here data has been extrapolated from the Civil Aviation Authorities (CAA) data sets for the past five year period. The graph clearly shows a significant drop in charter passenger numbers at Bristol and Cardiff airports. Here in no small part the LCC sector can be seen to be stimulating demand to new destinations and allowing customers to pick and choose the number of nights away rather than being tied down to the 7 or 14 night contracts that in the past have so often been the industry norm. Table 5 illustrates the number of charter carriers operating from each facility and the destinations they serve.

Figure 5 Annual charter passenger carryings for BRS, CWL & EXT (Source: CAA)

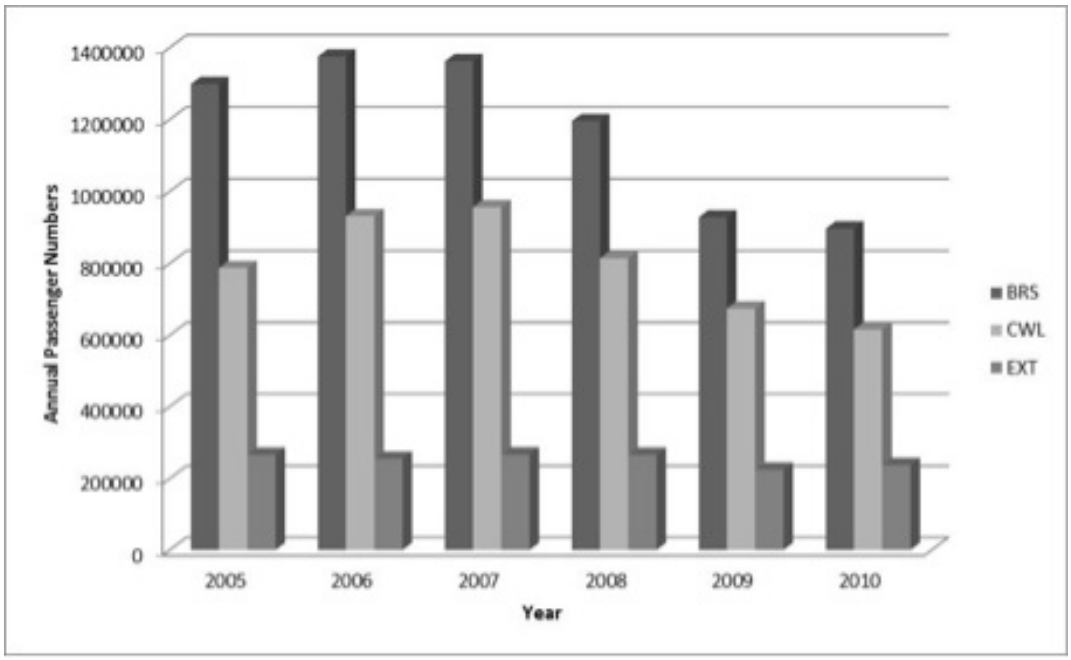


Table 5 Charter airline destinations served from Bristol, Cardiff and Exeter (Source: Airport Summer & Winter 2011 Timetables)

Airport	Charter Airline	Destinations Served
Bristol	Thomson	Alicante, Antalya, Bodrum, Cancún, Chambéry, Corfu, Dalaman, Fuerteventura, Geneva , Gran Canaria, Heraklion, Ibiza, Kefalonia, Lanzarote, Larnaca, Málaga, Menorca, Naples, Orlando-Sanford, Palma de Mallorca, Paphos, Reus, Rhodes, Salzburg, Sharm el-Sheikh, Sofia, Tenerife-South, Toulouse, Turin, Verona, Zakynthos
	Thomas Cook	Antalya, Bodrum, Corfu, Dalaman, Enfidha, Faro, Fuerteventura, Gran Canaria, Grenoble, Heraklion, Ibiza, Kos, Lanzarote, Larnaca, Menorca, Monastir, Naples, Palma de Mallorca, Paphos, Reus, Rhodes,Salzburg, Sharm el-Sheikh, Skiathos, Tenerife-South, Zakynthos
Cardiff	Thomson	Alicante, Antalya, Bodrum, Bourgas, Bridgetown, Corfu, Dalaman, Enfidha, Faro, Gran Canaria, Heraklion, Ibiza, Kefalonia, Kos, Lanzarote, Larnaca, Málaga, Minorca, Palma de Mallorca, Paphos, Reus, Rhodes, Sharm el-Sheikh, Tenerife-South, Zakynthos
	Thomas Cook	Antalya, Bodrum, Dalaman, Enfidha, Fuerteventura, Gran Canaria, Heraklion,Ibiza, Lanzarote, Larnaca, Palma de Mallorca, Paphos, Reus, Rhodes, Tenerife-South, Zakynthos
Exeter	Thomson	Antalya, Bodrum, Corfu, Dalaman, Enfidha, Enontekio, Faro, Funchal, Gran Canaria, Ibiza, Lanzarote, Larnaca, Malta, Menorca, Palma de Mallorca, Paphos, Sharm El-Sheikh, Tenerife-South,
	Thomas Cook	Antalya, Dalaman, Monastir, Palma de Mallorca

The development of a strong route network profile and a vibrant feel to the airports operation furthermore challenges regional airports. The national and regional pride felt by passengers and local residents alike has been highlighted in the work produced by Davidson, Ryley and Snelgrove (2010). Here, Wales was seen as having the most patriotic requirements with regards to an air link from the south of the country to the north. The development of this route was achieved through the use by the Welsh Assembly government of a Public Service Obligation (PSO) grant. Whilst this route was backed and supported fully by the Welsh Assembly Government it is interesting to note within the current Transport Strategy for Wales that very little attention has been given to air services and airport operations located within the Principality.

The role of local governments within the management of airports across the UK has however been reduced since the Airport Act of 1986. This act of parliament encouraged local councils to devolve their responsibility for operating regional airports. The sale of Bristol, Cardiff and Exeter airports to the private sector have been completed with a variety of backers currently looking after each facility as is shown in table 6. As can be seen from the table all three airports are currently controlled by large multinational infrastructure companies. Such organisations offer the airports a wide range of management skills and financial strength to help them develop competitive strategies.

Table 6 Regional airport ownership

Airport	Ownership
Bristol	South West Airports Ltd
Cardiff	TBI - Abertis Airports
Exeter	Regional & City Airports Ltd – Consortium of Balfour Beatty and London City Airport

Regional airports are not just facing challenges based on the type of airline operator who wishes to utilise their facilities, but the development of competing modes of transport have also to be taken into consideration. Lian and Ronnevik (2011, p.86) focus on the work of Fuellhart (2007) and Suzuki et al. (2003) in highlighting that passengers are willing 'to spend several hours on access drives to larger airports in order to take advantage of lower fares and more convenient airline services.' Fuellhart (2007) describes this process as airport or traffic leakage. Lian and Ronnevik (2011) elucidate that the level of traffic leakage will be based on access time and level of service a passenger can expect to gain from using the competing airport. Lian and Ronnevik (2011) address the issue of service level by scrutinising the works of Innes and Doucet (1990), Suzuki et al (2003), Phillips et al (2005), Zhang and Xie (2005) and Fuellhart (2007). These authors base service level on the following four key concepts – fare, direct versus indirect service, aircraft type (jet or turboprop) and frequency, timing and capacity of flights.

Airports in the study area are currently able to reduce the level of traffic leakage due to the current antiquated rail network which serves the area. Furthermore, the rail network currently misses the opportunity to link with London's Heathrow Airport which at one point is less than 10 miles from the track! Instead passengers for Heathrow have to disembark at Reading and catch a coach service to the airport which takes an average of 45 minutes. The current system therefore sees passengers either opting to take a connecting flight to their final destination from a local airport or use a car to reach one of the UK's bigger airports.

This latter point is reinforced by the work of Gjerdaker et al. (2008) who studied the impact of lower fares and improved road infrastructure on traffic leakage at regional airports found within Norway. One could argue here, however, that the perception of the road network has helped reduce traffic leakage at regional airports due to the high levels of congestion found on the M4 corridor which links the study region to London's main gateway facilities.

The work of Suzuki et al. (2003) found that leisure passengers were more likely to spend greater periods of time travelling by car to airports which offered them lower fares. This research illustrates that if regional airports wish to attract a mix of passenger types they need to invest in services which help the passenger experience: such as parking, restaurants and shopping facilities (Suzuki et al, 2003).

The situation with regards to competitive transport modes is however changing. Under the current government a number of proposals have been put forward which include the electrification of rail services from London to South Wales and the West of England, plus the development of High Speed 2. Here a new high speed rail line is proposed which will replace the current West Coast mainline for train services operating from London to Birmingham, Manchester and Glasgow. The rail developments proposed are likely in the future to have an impact on airports found within the study area. The creation of a London Heathrow rail hub has been suggested as a way of allowing regional passengers to use high speed trains to reach the UK's premier airport for international connections. This would help alleviate the pressure on Heathrow to operate domestic and short haul services into the airport and thus remove the need for a third runway. Whilst none of the airports within the study regional have flights operating to Heathrow, there could still be implications for these facilities as passengers may prefer to transfer flights within their home country. Furthermore, the use of rail may allow for a more convienient departure point from their local town or city rather than needing to travel to an airport (BRS, CWL or EXT) found within the catchment area.

The challenge for the regional airports located within the study area is not just based on the types of operator, user or traffic leakage but on competition between themselves. Frohlich and Niemeier (2011, p.44), highlight that little research has been undertaken with regards to the level of 'spatial competition' which occurs between airports.
This, they believe, is in many respects due to airports being traditionally viewed as natural monopolies. Morrell (2003) suggests that airports are able to compete based on a number of factors including destinations served. Frohlich and Niemeier (2011, p.45), note that 'competition for destination markets may develop because airports play an important role for the overall attractiveness of the destination it is located. Across the board competition refers to a situation when some airports, even if geographically separated, could be good substitutes for each other.' Morrell's paper (2003) continues to explain that competition is more likely for airports which serve the same catchment area. Forsyth (2006) suggests that airport competition will ultimately be based on overlapping or shared local market, transfer or connecting traffic, destination markets, across the board competition, non-aviation related markets and finally competition with other modes of transport.

When examining the airports within the study region it is clear to see that there is currently a high level of competition which exists between them. Figure 2 highlights that each airport is roughly within a 50 mile radius of each other - this does not take into consideration the vagaries of the road and rail network, which can increase these distances greatly. From a destination market perspective it is evident that all three facilities virtually replicate each other route networks. In the long run such a situation cannot be seen as tenable as FSNCs look to reduce cost and concentrate on their hub operations. Furthermore, the footloose nature of LCCs means that regional facilities need to constantly review costs so that they remain attractive to such operators. If not, even airports with a large range of routes may find that services are withdrawn and moved to a nearby competitor.

In conclusion, it can be seen that the regional airports of Bristol, Cardiff and Exeter have a number of challenges to face over the coming years. While all are currently able to justify their existence through the range of services that they operate, this situation is constantly changing. Here the role of deregulation and open skies agreements has been seen to play an important part. These policies have helped create and stimulate competition within the market and opened up new routes and destinations which would have been unthinkable only two decades ago. Herein however also lies the problem, as these policies helped create fortress hubs across Europe where FSNCs have consolidated their position and continue to do so through cost savings and synergies gained from merger and alliance strategies. These activities have reduced regional airports' ability to compete on price and range of destinations available. The successful development and expansion of the LCC sector has further created a number of opportunities for regional airports. LCCs have helped regional airports recover revenue lost through the reduced demand from charter carriers. Here again it is important to consider the footloose nature of these carriers and the impact which such policies can have on the airport if future terms and conditions no longer meet their requirements.

Strategically, regional airports found within the study area also have to consider the challenges faced from competition with larger airports which are found outside of their catchment area. Primary airports such as London Heathrow and Gatwick can be seen as being both attractive to business and leisure passengers due to the direct nature of the service, frequency and price. Here regional airports need to consider how they can attract local passengers to use services based on the attractiveness of their facilities, including less congestion and tailored services. Furthermore the changing nature of transport services to the Southwest of England and Wales needs to be considered by airport managers. The main challenge here revolves around greater accessibility to the primary airports in the UK, based on seamless electrified rail service linking the major towns within the region to a hub rail station located at London Heathrow. Again regional airports need to consider how they would be able to offset this development with marketing and operational strategies aimed at reducing this potential threat.

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