"Gimme a ticket on an aeroplane ...."
The Jet Engine and the Revolution in Leisure Air Travel, 1960-1975

Peter Lyth

Air transport for European tourists got off to a shaky start in the late 1920s.[1] But it was to be thirty years before leisure air travel was to appeal to anyone but the rich and adventurous. High cost, fear of flying and the absence of toilets in early airliners (an unfortunate combination) were the main deterrents; the unpressurized aircraft of the inter-war years were noisy, slow and not especially comfortable despite the efforts of some airlines to make aircraft cabins resemble the first-class state-rooms of an ocean liner. This changed fundamentally after 1958: with the introduction into airline service of the Boeing 707, the Douglas DC-8 and the de Havilland Comet 4, aircraft were capable of flying fast, high and with hitherto unknown smoothness. The jet age had arrived. This paper considers this "age" and its impact on tourism in the 1960s and 1970s. It argues that while the revolution in European leisure air travel that took place in these years was obviously the result of social and economic change (more disposable income, a greater propensity to take foreign holidays and the entry of new capital into the independent airline industry), there was also a critical *additional* factor. This was the breakthrough in transport technology represented by the jet engine and it is on this aeronautical artifact that the paper's main focus will lie.

I

Technological change was crucial to the process of economic and social modernisation in both the 19th and 20th centuries. New technologies of power generation, manufacturing, transport and communications changed the world and shrunk time and space. What is generally termed "Fordism" grew out of the mass production of automobiles to encompass a whole array of practices and institutions that now underpin modern Western society[2]. In the wake of Fordist mass production, a Fordist lifestyle of mass consumption set in after 1950 and this included the international tourist industry, the single largest and fastest-growing industry in the world[3].

The technological change that triggered and accompanied this explosion in tourist activity was the introduction of the jet engine. Indeed the jet engine has been as vital a part of social modernisation as mass tourism itself. The jet engine's evolution and dominance in aerospace propulsion since 1950 is traditionally described in terms of the transfer of technology from military to civilian usage: the turbo-jet grew out of the Second World War and the preparation for it, and was later installed in civil transport aircraft. Certainly all the early jet engines were intended for military aircraft and, as one of the leading researchers in the field has pointed out, the development of turbo-jets is "a striking example of the commercialization of military technology."[4] The point to be made here, however, is that the progression of jet engine use from military to commercial aircraft was not just a case of technological determinism; there is also a social dimension. International tourism became a mass industry in the 1960s because it became *fast* - it became what one might term "speed tourism" (the qualities of which we will return to later) - and it became fast because of jet aircraft. The theoretical background to this proposition lies in the idea of the *social construction of technology* pioneered by the sociologists Wiebe Bijker and Trevor Pinch. According to the social constructionist view, technological change is socially determined rather than technologically inevitable, in other words, it is social rather than technological processes that lead to a sole dominant meaning for a technical artifact. Initially a broad flexibility of interpretation will attach itself to a piece of technology - let us say the jet engine - but eventually, through action within the social and economic environment in which the artifact exists, a single meaning emerges[5]. The jet engine was conceived in an entirely military setting, its purpose was ill-

defined but seen more or less in terms of propelling fighter aircraft to higher speeds and altitudes. It was only in the late 1940s that the first engineers began to consider the possibility of commercial airliners being powered by jet engines and this was at a time when many scientists seriously doubted that human passengers would be able to withstand the "strains" of travelling at speeds in excess of 500 miles per hour.

What changed the jet engine's social environment was the advent of mass tourism in the late 1950s and 1960s, in particular the dramatic increase in foreign holidays taken by northern Europeans. Many Britons, for example, took their first holiday abroad at this time; and for the average working or lower-middle class Briton "abroad" was still an intimidating concept. The Inclusive Tour by air, promised direct travel to a beachside hotel on the Mediterranean, in what amounted to an hermetically-sealed tube, without the risk of encountering foreigners en route[6]. But the success of the "sealed tube" approach to travel depended on speed – only a jet aircraft travelling at high speed could make such a journey tolerable. With the speed provided by jet engines, the level of passenger comfort on board commercial airliners was less important, individual passenger space could be reduced and more seats crammed into the cabin. This, in turn, led to economies in unit operating costs for airline. I want to suggest therefore that jet engines not only changed the speed and size of the international tourist industry, they also changed its cost and its nature. As it became faster, tourism became cheaper and moved down market. Indeed, it became cheaper because it became faster. When civil airliners were relatively slow in the early 1950s, with an average cruising speed of around 250 miles per hour, they had to be comfortable – luxurious even. When they got faster, passenger comfort could safely be dispensed with.

The revolution in international tourism brought about by the jet engine not only changed spatial relationships between tourist generating and recipient nations, it has also changed the travel experience itself. Tourists no longer crossed a landscape on route to their destination, the approach was no longer gradual, and there was no need for the slightest degree of acclimatisation. Instead instant departure was followed by instant arrival. The tourist overflew everything and remained ignorant and oblivious of what lay between his point of departure and his destination. This might have led to severe culture shock as the stark contrast between, for example, a suburb of Manchester and Palma de Majorca, sank in. But this seems not to have happened. The speed tourism born out of the jet engine imparts to the traveller a sense of superiority which makes acclimatisation unnecessary. Speed tourists arrive as "masters" over their destinations. The historian David Nye has noted of tourist destinations and landscapes that "the tourist gaze ... is embedded in technological structure", so that the modern tourist exerts his or her mastery over sites and makes them man-made; where the 19th century tourist gazed at Niagara Falls or an Alpine peak, and allowed himself to be uplifted by nature, the modern tourist looks at a landscape and "thinks in terms of speed and immediacy: the strongest possible experience in a minimum of time."[7] It is the argument of this paper that this sense of speed and immediacy, this sense of mastery over tourist destinations, originated with the jet engine.

II

Although the turbo-jet engine was proposed, in theory, by the British Royal Air Force officer Frank Whittle in a patent he took out in 1930, it was the German physicist Hans von Ohain who built and ran the first jet engine with the help of the Heinkel aircraft company in 1935 and flew the first jet plane in 1939. Broadly speaking, the Germans were ahead of the British up until the middle of the Second World War with both the Junkers and BMW firms developing engines. Whittle's first engine, the W1, powered a jet aircraft in 1941. By the end of the war both Britain and Germany had operational jet fighters - the Gloster Meteor with Rolls Royce Derwent engines and the Messerschmitt Me.262 with Junkers Jumo 004s. The German engines were more advanced in that they had axial-flow compressors, the technology that was to form the basis of post-war jet engine development. The Americans were behind the British and Germans but caught up after they secured a Whittle engine in 1941 and both the General Electric and Pratt & Whitney companies were able to copy it[8].

After the war, with the Germans eliminated from all competition in engine and airframe manufacturing,

the British tried to consolidate their advantage in jets. The problem was that although they led the Americans in engine construction, they were well behind the United States in airframe design. This weakness showed itself with tragic consequences when Britain flew the first commercial jet airliner, the de Havilland Comet 1, in 1952. The Comet's short life ended with a series of crashes in 1954; it was not the beginning of the jet age as some Britons thought, but an unfortunate false start. The Comet was, of course, much faster than the fastest piston-engined airliners of the time – the Lockheed Super Constellation and the Douglas DC-7C, with their complicated radial engines – but it was too small (36 passengers) to represent anything approaching a vehicle for mass transport. The fulfilment of that task had to wait for another four years until the Boeing 707 entered service with Pan American Airways in 1958. The 707 – the first *big* jet passenger aircraft – was powered by the innovatory and highly successful Pratt & Whitney JT.3C, which had undergone a long period of development in military aircraft as the J-57. In Britain, the Rolls Royce equivalent to the JT.3C was the Avon, which powered a number of military types in Europe as well as the Comet 4 and the French Caravelle twin-jet airliner. The problem with the first generation of axial-flow jet engines like the JT.3C and the Avon was that they were noisy and costly to operate. Direct operating costs for advanced piston-engined passenger aircraft like the DC-7C had fallen to a point where they were close one US cent per seat-mile in the late 1950s and initially jet airliners were unable to compete with this, although their total unit costs were less because the much greater capacity of the 707 and its Douglas equivalent, the DC-8. What changed this, and brought the real commercial breakthrough for jet passenger aircraft, was the development in the 1960s of the by-pass engine[9]. The great merits of the by-pass engine to airline managers was that it added additional thrust to the jet, lowered fuel consumption and was substantially quieter than "straight" jets like the JT.3C with their deafening whine. The first engine to incorporate the by-pass feature was the Rolls Royce Conway, which had a low by-pass ratio of about 5 per cent. It entered service from 1960 on the Boeing 707, later on the Vickers-Armstrong VC-10. Interestingly, Pratt & Whitney initially opposed the by-pass idea, but relented when their archival GE threatened to provide the new engines to Pratt's customers and they added a front-fan to the JT.3C, creating the JT.3D turbofan[10]. The by-pass engine formed the basis of the commercial jet revolution in the airline industry. Their greater power meant that more passengers could be carried because bigger aircraft could be built around the new engines and existing ones "stretched". The jet airliners which appeared in the 1960s – the Boeing 727 tri-jet and the Boeing 737 and Douglas DC-9 twinjets – would not have been possible without them. Soon the three main engine manufacturers were going much further and increasing the "by-pass ratio" from the modest ranges of the Conway and the JT.3D to over 50 per cent, using huge front fans on the new generation of civil engines which finally entered service in the 1970s: Pratt &Whitney's JT.9D, the GE CF6 and the Rolls Royce RB.211.

Not all civil jet engine development, however, went in the direction of economy and quietness. In Britain the Bristol-Siddeley Company had built the Olympus engine – a powerful "straight" jet with an afterburner – for the Avro Vulcan V-bomber. In the 1960s it was chosen to power an airliner that was a veritable symbol of elitist travel: the supersonic Anglo-French Concorde. So, while the technology of the by-pass engine heralded air transport's coming-of-age as a mass transport mode, the Concorde and its military-style Olympus engines followed an alternative path and revived the old notion that the rich should be able to travel faster than the poor. The Concorde's Olympus engines not only used vast quantities of fuel but they were appallingly noisy. In operation with British Airways and Air France from the mid-1970s, the Concorde's engines were such an environmental hazard that they nearly destroyed the airlines' chances of operating commercially when the Americans refused to allow the plane to land in New York. Although it was undoubtedly an instance of bold technological initiative and collaboration, the Concorde seems to have proved to be a false path in aeronautical history[11]. By contrast, the by-pass engine was the catalyst for a mass transport revolution and the rapid expansion of the international tourist industry.

III

In the 1960s and 1970s Europe was the largest region for tourist arrivals and Europeans had the highest

propensity to travel. The key factor here was the spectacular increase in the number of inclusive tours (IT) operated by new charter airlines from northern Europe to the Mediterranean during these years, so much so that they often surpassed scheduled airline traffic on these routes. Many new resorts which grew up in the 1960s in Spain and Greece were virtually created by IT charter services. For the British, the earliest and most consistent consumers of airborne package tours, IT was nothing less than a revolution in national holiday habits[12]. By 1970 more than 50 per cent of British holiday-makers taking trips abroad, did so on inclusive tours[13].

It is important to recognise that the driving force in the expansion of European IT was the supply-led fall in the real cost of flying brought about by new airlines using jet aircraft and using them in a much more intensive way than was the practice with the scheduled carriers[14]. It is "one of the enigmas of international air transport", as a leading aviation authority has noted, that charter airlines can "sell seats at one-half or even one-third of the price charged by their scheduled airline competitors and still make a profit."[15] The explanation lies of course in the nature of the holiday market with its strong price elasticity of demand. The IT system, with its block booking of aircraft capacity and hotel beds, reduces costs fundamentally. Aircraft utilisation is maximised and high load factors are guaranteed. When these cost advantages are passed on to the customer in exceptionally low fares, the success of the IT package is clear: it offers the adventure of foreign travel, at a price within the reach of people for whom foreign travel had previously been impossible, and it offers it on an "escorted tour" so that the unsophisicated are made to feel more secure about their first venture abroad[16].

But low fares would have been impossible without the low costs of jet aircraft. Jet aircraft, with by-pass engines, were able to fly with substantially lower operating and maintenance costs than their piston-engined predecessors, indeed jets could fly half empty and still show a profit. Moreover with the introduction of jet aircraft, European charter airlines gained not only speed and but also range, so that up to three return flights per day could be achieved, for example, from Britain to the Balearic Islands. Early package tours from London to Palma with piston-engined aircraft like the Douglas DC-3 or Vickers Viking carried around 40 passengers and took over seven hours, including a refuelling stop at Lyon. Jet aircraft with over 100 passengers took half that time, thus ensuring much higher productivity and major cost savings – between 1967 and 1971, for example, the costs of IT flights to Palma fell 27 per cent in real terms[17].

The transformation of the European charter airline fleet to jets is shown in Table 1. In 1960, 93 per cent of European charter aircraft were piston-engined, most of them acquired second-hand at bargain prices from the national flag-carriers which were scrambling to acquire jets. Within the next fifteen years the change to jet aircraft was almost complete and 82 per cent of a total of 366 charter aircraft were jets by 1975[18]. In Britain, the independent airlines British Caledonian, British Midland and Dan Air were using BAC 1-11 twinjets, while Northeast Airlines was re-equipping with surplus HS Tridents from British Airways. Elsewhere in Europe charter operators like Martinair and Transavia (Holland), Condor and LTU (Germany) and Transeuropa (Belgium) were ordering the latest wide-bodied jets direct from the manufacturer. The largest European IT charter specialists, Britannia Airways (Britain) and Sterling (Denmark) were actually bigger, in terms of revenue per passenger-kilometre, in the Mediterranean region, than famous flag-carriers like Alitalia, Iberia, Sabena and Swissair[19].

Table 1

Jet Fleets in the main European Passenger Charter Airlines - 1975

Country	**Airline**	**Operations**	**Charter Passengers**	**Jet Aircraft**
Belgium	Sobelair	European IT	539, 383	2 x Boeing 707 3 x Caravelle
	Trans-European	European IT	462, 474	3 x Boeing707

Country	Airline	Operations	Charter Passengers	Jet Aircraft
				2 x Boeing720 2 x A300B
Finland	Kar-Air	European IT World charter Sched. Domestic	63, 196	1 x Douglas DC.8
France	Air Charter International	European IT World Charter	320, 000	2 x Boeing 727 7 x Caravelle
	Catair	European IT World Charter	128, 000	9 x Caravelle
	Euralair	European IT	83, 000	2 x Caravelle
Germany	Bavaria	European IT	568, 336	6 x BAC 1-11
	Condor	European IT World Charter	1, 853, 253	1 x Boeing 707 16 x Boeing 727 2 x Boeing 747
	Germanair	European IT	630, 081	1 x Airbus A300B 3 x BAC 1-11
	Hapag-Lloyd	European IT	445, 732	8 x Boeing 727
	LTU	European IT	599, 209	4 x Caravelle 2 x Lockheed L-1011
Netherlands	Martinair	European IT World Charter	626, 700	2 x Douglas DC-8 3 x Douglas DC-9 2 x Douglas DC-10
	Transavia	European IT World Charter	788, 742	1 x Boeing 707 5 x Boeing 737 2 x Caravelle
Scandanavia	Braathens	European IT Sched.domest.	415, 000	6 x Boeing 737
	Conair	European IT	615, 004	4 x Boeing 720
	Maersk	European IT Sched. domest	500, 000	5 x Boeing 720
	Scanair	European IT World Charter	737, 200	2 x Douglas DC.8 3 x Boeing 727
	Sterling	European IT N.Atlantic IT	1, 892, 225	5 x Boeing 727 13 x Caravelle
Spain	Aviaco	European IT Sched. domest.	875, 071	6 x Douglas DC.8 8 x Douglas DC.9 7 x Caravelle
	Spantax	European IT N.Atlantic IT Cargo charter	1, 556, 634	2 x Douglas DC.8 2 x Doulgas DC.9 14 x Convair CV-990

Country	Airline	Operations	Charter Passengers	Jet Aircraft
	TAE	European IT	412, 617	2 x Douglas DC.8 1 x Caravelle
	Trans Europa	European IT	387, 763	5 x Caravelle
Switzerland	Balair	European IT Sched. domest. World charter	136, 087	2 x Douglas DC.8 1 x Douglas DC.9
	Sata	European IT	325, 000	1 x Doulgas DC.8 4 x Caravelle
United Kingdom	Britannia	European IT European charter	2, 285, 000	13 x Boeing 737
	British Air Tours	European IT	830, 927	7 x Boeing 707
	British Caledonian	Sched. domest. /international World charter	609, 184	10 x Boeing 707 12 x BAC 1-11
	British Midland	Sched. domest. /European	193, 083*	6 x Boeing 707
	Dan-Air	European IT N.Atlantic IT Sched. domest European	2, 306, 373	2 x Boeing 707 5 x Boeing 727 12 x BAC 1-11 17 x DH. Comet
	Laker	European IT N.Atlantic charter	960, 800	3 x Douglas DC.10 2 x Boeing 707 5 x BAC 1-11
	Monarch	European IT World charter	778, 690	3 x Boeing 720 3 x BAC 1-11

* figure for 1974

Source: Taken from McDonnell Douglas Market Research Report, *The European Charter Airlines,* 2nd edition, Worldwide Horizons, Market Research Department, Douglas Aircraft Company, March 1977, MR-report, C1-800-4275.

Britannia Airways, which was to become Britain's largest independent airline by 1975, is taken here as an illustration. This should not give the impression that the contribution of charter airlines in Holland, Scandinavia and Germany to the development of tourist flows to the Mediterranean is being neglected; theirs is clearly documented. However the Britannia example is taken as a model for the critical link between technology – the jet engine – and the phenomenal growth in the tourist industry at this time. Britannia began operations as Euravia in May 1962 with 3 Lockheed Constellations at Luton Airport, flying tourists to Palma de Majorca for a week's package costing £53. In 1964. Euravia replaced the ageing Constellations with ex-BOAC turbo-prop Bristol Britannias and changed its name to Britannia Airways. It was the creation of the tour operator Ted Langton and J.E.D.Williams, an gifted and foresighted aviation consultant who more than anyone else at the time saw the huge potential market for properly "system-designed" air charter IT holidays in Britain[20]. Two features of Britannia's strategy are important: its use of the previously little-used Luton airport, which in future was to become the leading

departure point for charter air IT out of southern England, and its concentration on Spain as a holiday-making destination.

Luton Airport was small in the early 1960s, with minimal terminal facilities, and only one other airline was using it; however it had a long runway and an empty hangar in which to service Britannia's aircraft. The costs of using it for Britannia were far lower than if the start-up airline had chosen to operate out of Heathrow airport. The use of provincial airports like Luton was to be a significant characteristic of the British charter IT industry has it developed in the 1960s and 1970s. Luton itself became the main centre for IT to the Mediterranean because it was close to the new M1 motorway and therefore convenient for the northern English holiday markets of the Midlands and Yorkshire. Other, more northerly, provincial airports such as Manchester, Birmingham and Glasgow also grew swiftly on the strength of IT operations, the consequence of which being that flights to the Mediterranean became longer – a disadvantage for piston-engined aircraft but not, of course, for the longer-ranged jets. Spain was to be the other end of Britannia's flights from Luton and in this respect Langton and Williams were clear-sighted pioneers. By linking the new low-price resorts of Spain's Mediterranean coast to the holiday catchment areas of northern England, they both broadened and deepened the British leisure air market. Spain was quintessential high-speed tourist destination and by 1971 three quarters of all nights spent there by foreigners were at coastal resorts – moreover by 1979 no less than half of charter traffic entering Spain from Britain was originating in provincial airports and their surrounding regions[21].

The logic of the Britannia Airways approach to IT operations was to acquire jet aircraft. This was fully understood by Langton and Williams but initially they lacked the capital to make the investment in new jet aircraft and no second-hand jets were yet on the market. However in 1965 a legislative change to British regulations governing IT operations made the charter airline business and Britannia attractive to the media mogul Lord Thomson. Thomson wanted to diversify from his newspaper empire and acquire assets in the service sector that would give him a new cash flow source. He was aware of the potential of jet-borne holidays for the mass market and he bought both Langton's tour operation (Universal Air Tours) and Britannia Airways. With the Thomson take-over Britannia gained the means to buy the jets. Under William's guidance and insistence, Britannia placed orders for the aircraft which was to become the classic short-haul tourist vehicle – the twin-jet Boeing 737-200 – but which at the time was new and totally untried. Indeed Britannia practically bought the 737 off the Boeing drawing board[22]. Boeing had been late coming into the short-haul market in the 1960s, in which Douglas and BAC were already active with the DC-9 and the 1-11, and BAC's chairman expected Britannia (as a British airline) to order the 1-11. But Williams resisted overtures from BAC, and considerable pressure from the British government, and went ahead with the 737 purchase. A deciding factor was undoubtedly the 737's Pratt & Whitney JT8-D turbo-fan by-pass engines which were much more powerful than the Rolls Royce Spey units fitted to the 1-11. In 1968 Britannia took delivery of its first 737 and by 1983 it had no less than 31 examples of the type.

Equipped with efficient jet aircraft, and not afraid to work them hard (i.e. ten hours per day, as opposed to about six hours for British Airways), Britannia established itself as Britain's leading low-cost holiday airline. Jets delivered low cost operations and remarkably low fares. As Table 2 makes clear, the price of the Thomson IT package holidays flown by Britannia hardly changed between 1966 and 1977, an increasingly good deal for the British holidaymaker at a time of accelerating price inflation.

By the early 1980s Britannia had over 30 per cent of the market in charter traffic from Britain and was far and away the biggest non-scheduled carrier[23].

Table 2

Thomson's "Summer Sun" Holiday, Average Prices 1966-1977

	Actual Price	Index 1977=100	Price adjusted to 1977 values	Index 1977=100

	Actual Price	Index 1977=100	Price adjusted to 1977 values	Index 1977=100
1966	£48.9	33	£143.2	97
1967	£50.7	34	£145.0	98
1968	£51.3	35	£140.2	95
1969	£53.6	36	£138.4	94
1970	£55.7	38	£135.3	92
1971	£51.6	35	£115.0	78
1972	£54.2	37	£112.7	76
1973	£62.1	42	£118.0	79
1974	£78.8	53	£129.3	87
1975	£90.6	61	£118.7	80
1976	£116.9	79	£132.0	89
1977	£147.6	100	£147.6	100

SOURCE: Thomson Holiday Research Department

IV

The impact of charter air IT operators like Britannia/Thomson on the holiday-making habits of north Europeans, as well as on the tourist industry itself, is hard to exaggerate. To begin with, they had a profound effect on the tourist services of the national flag-carriers. In 1971 Knut Hammarskjold, the director-general of the airlines' cartel, the International Air Traffic Association (IATA), announced that IATA members' operating profits, as a percentage of total revenues, had dropped from 9.5 per cent in 1966 to 5.5 per cent in 1970. Meanwhile non-IATA members, i.e. the charter carriers, had increased their traffic in the six years between 1964 and 1970 by an annual rate of 58 per cent, while scheduled traffic had only managed 15 per cent. The answer, felt Hammarskjold (predictably perhaps for IATA) was for governments to limit the activities of the charter carriers through legislation[24]. To a certain extent this took place, but a more direct, market response was made by flag-carriers like British European Airways (BEA), which announced plans in 1971 for cheaper fares on many European routes to combat the loss of traffic to charter competition[25].

At a more fundamental level, the combination of jets and low-cost charter airlines forced the scheduled carriers to reassess their roles and objectives in international air transport – a process that was still continuing after the onset of deregulation in the 1980s.[26] What entrepreneurs like Langton and Williams had grasped – apparently well in advance of the flag-carriers' management – was the economic and also the *social* significance of jet aircraft. They had understood that if you carry passengers fast, you don't need to carry them in great comfort. Luxury carriage, the traditional product of the old scheduled airlines, was only necessary when aircraft were driven by piston-engines and therefore inherently slow. Jets brought speed and lower prices, but they also bought more spartan service, more democratic and *proletarian* conditions on board. The jet engine, and particularly the by-pass technology which began its development in the 1960s, was the catalyst by which the air transport

industry matured into the mass service undertaking it is today. It was the key artifact in the transformation of the airline business from a travel opportunity for the adventurous elite into a transport industry for the masses.

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[1] In 1928 Imperial Airways did launch what appears to have been the first inclusive package tour by air, but at a price (£435 per person) and with an itinerary which was clearly targeted at a wealthy and exclusive clientele. It was a winter holiday comprising a 35-day tour of France, Spain, Morocco, Tunisia, Algeria and Italy, and included de luxe accommodation in the best hotels all along the route. Imperial Airways, *About the First Winter Air Cruise*, November 1927.

[2] See David HARVEY, *The Condition of Postmodernity,* Oxford, Blackwell, 1989.

[3] In 1996 the World Travel & Tourism Council put the value of goods and services attributable to tourism at US$3.6 trillion, or over 10 per cent of gross global product. *The Economist,* 10 January 1998, Travel and Tourism Survey, p. 3.

[4] Virginia P. DAWSON, "The American Turbojet Industry and British Competition" in William M. LEARY (ed.), *From Airships to Airbus: the History of Civil and Commercial Aviation*, Vol.1, Washington DC, Smithsonian Institution Press, 1995, p. 127. Two cases will suffice to illustrate the point: the American Pratt & Whitney J-57 and the British Rolls Royce Avon axial-flow engines were equally at home in jet airliners (Boeing 707, de Havilland Comet) as they were in jet bombers (Boeing B-52, Vickers Valiant).

[5] Trevor PINCH and Wiebe BIJKER, "The Social Construction of facts and artifacts or how sociology of science and the sociology of technology might benefit each other" in *Social Studies of Science,* 14, 1984, pp. 399-441.

[6] Support for this notion appears to come from a survey carried out in 1967 in which 71 per cent of respondents claimed that the attraction of Inclusive Tours lay not only in the holiday's low price but the fact that they did not have to make any individual arrangements or deal with any foreign officials. *British National Travel Survey*, 1967, BTA January 1968.

[7] David E. NYE, *Narratives and Space, Technology and the construction of American culture,* University
of Exeter Press, 1997, pp. 22-23.

[8] For the race to get the jet engine operational see Edward W. CONSTANT II, *The Origins of the Turbojet Revolution*, Johns Hopkins University Press, Baltimore, 1980, esp. pp. 178-207. Also helpful is Ronald MILLER and David SAWERS, *The Technical Development of Modern Aviation*, London, 1968, pp. 157-161.

[9] By-pass engines add a stream of cold air, "by-passing" the compressor and turbine, and joining the gas jet at the rear. This addition of colder, slower-moving air increases the mass of the jet and thus its thrust. These engines have a ducted fan at the front which, unlike an open propeller, can spin at the slower speed of the turbine – hence turbofan engine. See, for example, John SNOW, "Airliner Propulsion" in Philip JARRETT (ed.), *Modern Air Transport.Worldwide AirTransport from 1945 to the Present,* London, 2000, pp. 62-64.

[10] John NEWHOUSE, *The Sporty Game*, Knopf, New York, 1982, p. 112.

[11] *The Economist,* 19 August 2000, "Time and Money: Why Concorde was never the right way to speed up air travel". In July 2000 an Air France Concorde crashed outside Paris, killing over a hundred people. The type was immediately withdrawn by Air France and subsequently by British Airways.

[12] The package tour was more or less invented by British independent airlines in conjunction with British tour operators, see *Annual Report of the British Independent Air Transport Association (BIATA)*, 1967, p. 18. The president of *BIATA* in 1967, the organisation's last year, was J.E.D.Williams, the head of Britannia Airways.

[13] *International Tourism Quarterly (ITQ),* Issues in the News, 2. 1971, Economist Intelligence Unit, London, p. 2.

[14] Allan M.WILLIAMS and Gareth SHAW, "Western European Tourism in Perspective" in Allan M.WILLIAMS and Gareth SHAW (eds), *Tourism and Economic Development*, London & New York,

1988, p. 13.
[15] Rigas DOGANIS, *Flying Off Course: The Economics of International Airlines*, 2nd ed. London, 1991, p. 174.
[16] See Alan SNUDDEN, "Success in a package" in *Journal of the Institute of Transport* January/February 1990.
[17] F.F.HIGGINS, *Tour Operating: Some Implications for Air Transport*, 15th Anglo-American Aeronautical Conference, London, 31 May - 2 June 1977, *Royal Aeronautical Society*.
[18] McDonnell Douglas Market Research Report, *The European Charter Airlines,* 2nd edition, Worldwide Horizons, Market Research Department, Douglas Aircraft Company, March 1977, MR-report, C1-800-4275, p. 1.
[19] Measured by passenger-kilometre, charter airlines were likely to be in front because the average charter flight is longer than the average scheduled flight; the latter usually being between north European capitals.
[20] See J.E.D.WILLIAMS, "Holiday Traffic by Air" in *Institute of Transport Journal*, May 1968, p. 372.
[21] Douglas PEARCE*, Tourism Today: A Geographical Analysis*, New York, 1987, pp. 86-93.
[22] Geoffrey CUTHBERT, *Flying to the Sun. Quarter century of Britannia Airways, Europe's leading leisure airline*, 1988, pp. 11-45.
[23] Civil Aviation Authority figures quoted in *ITQ*, No.3, 1985, Issues in the News; 18. The other major carriers were *Dan Air, Monarch* and *BA*'s charter company *British Air Tours.*
[24] Reported in *ITQ,* Issues in the News, 2, 1971, p. 5.
[25] Fares from London to Paris, Amsterdam, Brussels, Copenhagen, Frankfurt, Milan, Munich, Nice, Stockholm and Zurich were cut by half, while the peak-season fare to Rome was reduced from £92.30 to £41.15. *ITQ*, Issues in the News, 1, 1971, p. 4.
[26] This reassessment process also took place in government, see the musings of a senior British civil servant in R. BURNS, "What are Airlines for ?" in *Institute of Transport Journal,* May 1969, pp. 127-139.