Space tourism: Research recommendations for the future of the industry and perspectives of potential participants

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1. Introduction

Space tourism is no longer a myth but significant research questions remain unexplored. Several magazines have been publishing brief articles on such advancements (e.g.: Technology Review, The Engineer, The Guardian, and The Daily Telegraph). In relation to tourism, Crouch (2001) gave early indications of the space tourism industry and research notes have outlined the potential of space tourism market advances in a few countries. For example, motivational perceptions and early developments in the space tourism industry in Japan were addressed by Collins, Iwasaki, Kanayama, and Ohnuki (1994); in Canada and the United States by Collins, Stockmans, and Maita (1995); and in Australia by Laing and Chouch (2004). Though these studies have provided some useful early thoughts most of them are now outdated; for instance, the indications on the UK space tourism market by Barrett (1999). However, the space tourism industry, which is experiencing many technological and legal advances, is considered to have enormous potential in the UK (and elsewhere) and it has become imperative to better understand potential space tourists’ motivations, demand and price on a regional and country-specific basis. There are serious academic debates yet to come in this area as only a few full papers have been published, in research journals (e.g.: Cater, 2010; Collins et al., 1994; Crouch, Devinney, Louviere, & Islam, 2009; Olds, McCormick, Charania, & Marcus, 2005; Peeters, 2010), and in books (e.g.: Duval, 2005; Laing & Chouch, 2004; Lappas, 2006).

This paper has two objectives. Firstly, it proposes a set of research dimensions for the further investigation of the emerging space tourism industry and secondly, it examines the perceptions of potential space travel participants on key factors that influence their motivation, behaviour and decision-making. The research methodology adopted in this study involved collecting quantitative data from British residents in Southern England to explore and understand their perceptions of space tourism. In addition, qualitative data was gathered by interviewing key informants connected to the space tourism industry including Virgin Galactic, Airbus and EADS Astrium to understand their views on people’s motivations, perceptions and the future of the industry. Data analysis shows that intentional need for adventure and exploration is the motivational force in space tourism. Willingness to undertake space travel is also influenced by the perception to risk, which plays a central role in potential tourist behaviour. Furthermore, factors such as type of space travel (orbital/sub-orbital), type of launch and design of the spacecraft, location of spaceports, training required, duration, insurance, health and reputation of the operating company also seem to have some influence on tourist decision-making. The paper contends that while global research dimensions are necessary it is also important to understand perceptions on a country-specific and regional basis.

2. Current status of the space tourism industry

2.1. The business of space tourism industry

The commercial space market has existed since 1970. The world market for satellite-based services, which includes television,
telecommunications, global positioning systems, and earth observation missions (weather, environmental, and search and rescue) increases every year (Lappas, 2006; National Space Society-NSS, 2009). Over the last ten years, the gross domestic product (GDP) has increased 16% per year for the world’s commercial space related activities, with the market reaching more than $250 billion yearly (Shkolyar, 2009). The space tourism industry has enormous potential and seems to be a great economic driver with the potential to reduce the cost of space access and attract other players to the space market. According to the National Aerospace Laboratory (Japan), the demand for space tourism “apparently has the potential to grow to many times the most optimistic projections for existing commercial space activities” (Collins, 2003:5). Spacesport Scotland (2009) states that the space tourism industry is expected to grow by 18–26% per year during 2020–2030.

Russia first gave the opportunity for a space tourist on its Soyuz (Futron, 2002) and created the beginning of orbital space tourism. Today, only the Russian Soyuz and Chinese Shenzhou spacecrafts are regarded as suitable for human travel though several private companies are involved in the manufacture of commercial spacecrafts. The growth of the space tourism market is expected to follow a classic ‘S-curve’ similar to products that offer a new capability; for example, that avionics pioneers and $50,000.companie (Ashford, 2007). Spencer (2004) envisages four phases of space tourism development from 2001 to 2040 and beyond. A pioneering phase, which started with Dennis Tito’s first flight in 2001, is followed by an exclusive phase. In these two phases the market is limited to wealthy and adventurous people, willing to pay large amounts for this exclusive adventure. There follows a rapid growth phase (the mature phase) when the costs are reduced by the maturing technology, economy of scale, and competition. Finally, there is a saturation phase (mass market phase) when the growth is driven by economic expansion and new markets (young people) (Ashford, 2007; Spencer, 2004). At present, Virgin Galactic, Space Adventure, XCOR and Rocketplane-Kisler are some of the companies developing sub-orbital tourist vehicles (Excels, 2009; Globus, 2008). The first sub-orbital passenger flight is expected to travel in 2012. On the 4th May 2011, SpaceShipTwo developed by Virgin Galactic, demonstrated its unique re-entry ‘feather’ configuration for the first time. Though this was a test flight and the third in less than two weeks, it marks another major milestone on the path to powered test flights and commercial operations (Virgin Galactic, 2011). Virgin Galactic advertised a price of $200,000 per seat in its SpaceShipTwo for a two-hour space experience (Ker Than, 2009; Telegraph, 2009). Though there are differences between the costs of these trips advertised by companies and the space activities listed on the itinerary for that price, there is a widespread agreement that the costs need to be lowered. The NSS (2009) stated that this industry has the potential capability of sustaining thousands of flights per year, if the cost is maintained at the $100,000 level or less.

The early years of the aviation industry offers many lessons to the newly emerging and as yet expensive space tourism industry. The quest for lower costs and improved performance driven by competition led to today’s global aviation industry (Collins et al., 1994). Whilst providing parallelism with commercial flights, Peeters (2010:1625) discussed the potential ‘evolution of commercial personal spaceflights’ as well as indicating the assumptions that ‘point-to-point (P2P) commercial space transport will become the long term sustainable market’. Taking into account the current potential space tourism demand, International Space University (ISU) suggests that a ticket price of around $50,000 should be sufficient for a viable space tourism industry but this will depend heavily on technological developments in the propulsion system and vehicle design, low maintenance and operational costs (Swarbrooke, Beard, Leckie, & Pomfret, 2003). Though the need for private investment is now realised, authors such as Collins (2003) argue that governments have a duty to contribute to the funding of such technological developments.

The London Royal Aeronautical Society Conference (RAS, 2009) revealed that there is a more favourable situation in the United States as a result of the government’s green signal for the launch of tourism-related spacecraft from New Mexico. European perspectives are much influenced by the decision of the European Space Agency (ESA), which is not to allow the launch of tourism-related spacecraft given the sensitivities involved (ESA, 2008). However, a study conducted in all 27 EU Member States (Eurobarometer, 2009) revealed that 26% of respondents believe that the EU should do more regarding space exploration while 38% thought that it should perhaps put more emphasis on this sector; more than 60% believed that the EU should increase or maintain the level of budgetary resources allocated to space activities; with 43% supporting the budget remaining unchanged; and 20% wanting the budget to be increased. These findings indicate the need for more attention to space-related activities in Europe.

Such scepticism also prevailed in the USA. NASA initially treated the idea of space tourism with some disdain viewing, civilian space flights a waste of valuable time and research with obvious safety hazards (Collins, 2003; Swarbrooke et al., 2003). However, recently they reviewed their policy on space tourism and recognised the huge potential associated with the development of safe and relatively inexpensive space transportation. Griffin (2008), the Administrator of NASA states that ‘a successful space tourism industry would offer many synergistic opportunities for private-public partnerships’ and would generate new revenues for space agencies. Futron (2006) estimated that the sub-orbital space tourism business could generate 10,000 passengers by the year 2021 with revenues of more than $650 million. Swarbrooke et al. (2003:330) stated that ‘the potential for big business is there – the race is on to realise that potential’. Companies such as Virgin Galactic and XCOR Aerospace are already into this race. In future, minor differences in vehicle design, time duration in space might bring major competitive advantages for some of these companies. As Goehlich (2007) stated, space tourism flights have the potential to change the balance in human space flight from the traditional higher public funding to private expenditures in the long-term. However, the realities of the industry exhibit that current launch capabilities are inadequate for space settlement as anticipated by some authors (e.g.: Lappas, 2006).

Therefore, the main problem for the commercial space tourism industry is its limited ability to attract the private investment needed to lower the cost of access to space as well as to mobilise public and private sector support to increase the capacity to accommodate commercial passengers in the space. George Neild, the Associate Administrator of the Federal Aviation Administration (FAA), Department of the US Government commented that ‘the next 2-3 years will be a critical time period for the US space program. During this period, we are likely to see the retirement of the space shuttles, demonstration of commercial cargo deliveries to the International Space Station and the start of commercial human space flight operations’ (Neild, 2009). For instance, Atlantis carrying 3.5 tonnes of supplies to ISS made its final lift-off on 8 July 2011. Upon its return, the 30-year space shuttle programme will come to a close, with Atlantis and the other two shuttles retired to museums (BBC, 2011). The retirement of the Space Shuttle has considerably reduced the chances for a space tourist to obtain the third seat aboard Russian Soyuz spacecraft. Therefore, until the above goals are met by government departments supporting commercial flights, space travel will have to be short trips affordable only by the wealthy. Researchers at the US Space Systems Design Laboratory investigated the driving economic factors of space tourism markets.
and launch vehicle characteristics that affect businesses entering the industry (Olds et al., 2005).

While the demographic characteristics of potential customers such as nationality, education, gender, age and the level of risk-taking behaviour play a significant role in influencing their space travel choices, the past studies reveal some commonalities and differences (e.g.: Collins et al., 1994; Laing & Chouch, 2004). Futron (2002) reported that space travel was perceived to be less risky than activities such as mountain climbing and skydiving, and some of the adventure tourism activities are more expensive than space travel. For instance, expeditions to the Himalayas, especially to Mt Everest, cost a total of almost $1 million including guides and porters (Lappas, 2006:161) and trips to Antarctica and Amazon are also activities on which people are prepared to spend more. From past market research reports on the expensive adventure activities it is also interesting to note that people are willing to pay a significant amount of money to do something that no one (or) only a few have done before such as space travel.

The NSS (2009) argued that space tourism will attract potential customers from two already existing markets: extreme sports from which people seek the excitement of experiencing a new sensation of high acceleration and zero gravity, and wealthy leisure travellers. However, space tourism is not only about enjoyment for rich people; it is also seen as a major step towards a large space settlement, a way to promote human expansion into space (Hopkins, 2008). Whatever the future projections may be, early predictions indicate that space tourism would attract tourists who are interested in doing something new and unusual from the adventure tourism sphere as well as the established space-related interests such as viewing Earth from the space (rather than for scientific purposes).

2.2. Factors that influence space travel and directions for future research

There are ongoing debates on the motivation of space tourists, safety needs and preferences, technological issues and training needs. Many topics need attention from tourism researchers as well as air transport engineers. For instance, motivation theories have been successfully applied to explain tourist motivations in general and, to a lesser extent, adventure tourism. However, there is a considerable need to clearly identify tourists’ motivation for space travel. With the exception of seven people who have already travelled into space as tourists to date, there is no track record of commercial space tourism that might reveal potential consumer motivation, attitudes and behaviour (Crouch, 2001). Due to sociodemographic change, an active ageing population has emerged over the last few years. These so-called ‘new-tourists’ (Swarbrooke et al., 2003) are characterised by an increasing preference for escaping from everyday routine and a strong need for self-fulfilment and excitement.

As there is no specific typology of space tourists, a sensible correlation regarding motivation and tourist behaviour could be made with adventure tourists which seek to have self-directed, social, emotional, spiritual and intellectual needs that motivate them to engage in an adventure experience (Radder, 2005). Other assumptions that need some statistical backing are the actual affordability of the potential space tourists as most studies on space tourism do not consider the affordability of the samples selected for surveys whereas ‘per capita’ income is seen as the most important determinant of tourism demand (Martin and Witt, 1994 cited in Barrett, 1999). Based on a thorough analysis of reports and viewpoints of experts actively involved in space tourism, the authors of this paper propose ten research topics, which merit further investigation if we are to better understand the space tourism industry:

1. **Notion of ‘space tourist’**: needs more agreement as debated by FAA and ESA officials who would prefer using the term ‘space travel participant’ rather than ‘space tourist’ considering the human risk factors and insurance issues involved. However, there seems to be no discrepancies in defining what is space tourism and the ESA has defined space tourism as an activity that will ‘encompass the execution of sub-orbital flights by privately-funded and/or privately-operated vehicles and the associated technology development driven by the space tourism market’ (ESA, 2008:19; Farand, 2009; RAS, 2009);

2. **Actual demand**: the real future demand (Crouch et al., 2009; Olds et al., 2005) for space tourism needs to be determined. Some companies preparing for space travel have conducted market research but this is not available for public use. In addition to exploring the real demand and market share from developed countries, it would be interesting to investigate the potential market in the fast developing BRIC countries. For instance, the number of people who made more than a million dollars in India grew by 14% at a rate faster than in USA or UK (UNWTO, 2006). As a result of successful Indian and Chinese space explorations these potential millionaire tourists tend to be aware of space tourism opportunities. Areas to concentrate upon in terms of space tourism demand and market are the demand across geographic regions and in specific countries, price fluctuations, marketing strategies already in place and the actual growth of the industry;

3. **Space tourism awareness**: the common attitudes, interests and scientific knowledge level of the general public need to be investigated to analyse their opinions on the development of space tourism activities. The attitudes of the general public would be useful to influence the funding decisions of the public sector bodies and governments. For instance, the amount of queries received by the ESA from various groups starting from 2006 urge them to review their views on the legislations in place for commercial launches from Europe;

4. **Motivational inquiry**: motivational concepts and theories (Maslow’s hierarchy of needs, push—pull factors, etc.) have been applied to explain tourist motivation in the past (Cohen, 1974, 1979; Crompton, 1979; Dann, 1977, 1981; Uysal, 1998, pp. 79—94) but not as yet in relation to space tourism. To avoid unproven assumptions that space tourism may be linked to adventure tourism, in-depth research is needed to investigate and establish the motivational hypotheses;

5. **Risk factor**: risk is one of the significant variables in space trips and there is a need to explore the role of the risk factor (to identify resilient markets for space tourism) and its influence on tourists’ decision making process. Neilaid (2009) stated that ‘over the last 20 years, there have been 196 licensed launches, without any fatalities or property damage to the uninsured public’. Therefore it also becomes necessary to enhance people’s awareness on the types of spacecraft, safety measures and training provided to reduce the reluctances of the public about safety aspects;

6. ** Liability and insurance issues**: difficulties in getting travel insurance as a result of the assumption that greater risk is involved in space trips demands more information from the banking and insurance sector as well as assurances from the private companies. Debates from the Aeronautical Society Conference (RAS, 2009) confirm that the New Mexico authorities, the FAA and the US Government will not be responsible for insurance issues arising from technical failures or accidents. Experts stress the point that the liability aspect is not fully covered as well as there are uncertainties about the role of regulatory organisations, such as, the FAA. Wells (2009) raised serious questions as ‘there is no doubt that accidents will occur and there is uncertainty today as to which rules govern liability in Space Tourism activities’? Does (the) Air Law (Warsaw/Montreal

Conventions) or (the) Outer Space Law (OS treaties) apply?’ Wells also commented that ‘insurance markets are preparing to address the needs of space tourism operators — the earlier they are briefed the better’ (Wells, 2009).

7. Health and training aspects: the implications of health aspects, psychological issues, sufficient training and training time frame (the willingness of space tourists to spend longer time in training) need to be explored. In reality more information on these aspects can be collected only when the industry picks up in a year or two. At present, ‘the Civil Aerospace Medical Institute has issued Guidance for Medical Screening of Commercial Aerospace Passengers’ (Neild, 2009) to advise launch operators on this issue;

8. Impacts of the EU legislature restrictions: the wider implications of the ESA legislature restrictions, ongoing operation related regulations of the ESA, their impact on European public attitudes towards space industry and the future of possibilities of commercial launches from the EU need to be researched. Farand (2009) and ESA (2008:24) stated the intention to recognise this activity initially ‘by helping provide the necessary environment for this industry to flourish, for example by assisting in the setting up of legal frameworks for operation across Europe, involving civil aviation authorities and other relevant bodies in debate’. However, ESA permits to start commercial operations from European bases may take a while though several European companies are already actively involved in this industry;

9. Socio-economic benefits: Collins and Autino (2010) reviewed possible economic growth, employment, cultural influences and the possibilities of preserving peace in the world through the creation of the new space travel industry, some of which require detailed examination. There are wider benefits to Europe and particularly to the Swedish spaceport locations adjacent to Kiruna as the possibilities are bright for new hotel facilities, roads and travel centres (Abrahamsson, 2009). There seems to be multiple streams of revenue and first-mover advantage as commented by the President of the Virgin Galactic (Whitehorn, 2009). Spacesport Scotland (2009) stated the potential benefits that Lossiemouth and adjacent areas in Scotland might receive. The Telegraph (2009) reported that bringing Virgin Galactic from New Mexico to Britain ‘could create up to 2000 jobs’ and it would also ‘spur greater interest in the fast-growing space industry. Virgin wants the government to amend the 1986 Outer Space Act to allow it to launch space flights here. The legislation makes it difficult to run such a service in Britain’. ESA has slowly started considering the growing socio-economic importance of this industry in Europe;

10. Carbon footprint of space tourism: though several authors have sought to calculate the carbon footprint of air transport (e.g.: Peeters, Williams, & Gossling, 2007), some early indications are needed in relation to the possible carbon footprint of space tourism activity. Laporte-Weywada (2009) argued that there are plans to use Methane or Oxygen for commercial spacecraft and there will be less NOx and CO2 emissions. However, there are concerns that space tourism activity might increase tourism’s total share of emissions to global warming. Collaborative research between astronauts, aircraft engineers and climatologists may be necessary to investigate this. The Head of the Launchers and Exploration Legal Matters Office at the ESA stated that the studies funded by the ESA to evaluate the credibility of emerging private ventures as well as to evaluate the carbon footprint of the activity might shed some light on these aspects (Farand, 2009).

In an attempt to address some of these research gaps, this paper explores public opinion of residents of three cities in Southern England on their motivations to travel to space and the key factors influencing their decision-making process as well as the viewpoints of key informants actively connected to the global space tourism industry.

3. Research methods, data collection and analysis

This study used both qualitative interviews with key industry informants and a quantitative questionnaire for residents. Although semi-structured interviews offer more flexibility in obtaining unrestricted viewpoints, for this study the researchers considered that a more efficient way to gather data was necessary and selected structured interviews as the preferred research tool. Interviews with industry experts were undertaken to determine the supply side perspective of the potential space tourism market. It combines the flexibility of in-depth interviews with the comparability of key questions (Finn, Elliott-Whire, & Walton, 2000). The expert interview is a particular form of applying structured or semi-structured interviews (Meuser and Nagel, 2002 cited in Flick, 2009) with a focus on a person’s capacity as an expert in a certain area of activity and less interest in them as an individual. The question arises of who should be seen as an expert, especially in a new field like space tourism. Deeke (1985 cited in Flick, 2009) stated that deciding who the experts are depends on the issue of the research and the theoretical and analytical approaches applied. Consequently, experts are those persons ‘who are particularly competent as authorities on a certain matter of facts’ (Flick, 2009:165) and have ‘technical process oriented and interpretive knowledge referring to their specific professional sphere of activity’ (Bogner and Menz, 2002 cited in Flick, 2009, p.16). Moreover, the key informant interview suggested by Jankowicz (2005) refers to respondents who are chosen on the basis of their idiosyncratic, specialised knowledge and not randomly. Limited budget issues made it impossible to achieve face-to-face interaction between the interviewer and interviewees located in different parts of the UK, France and the USA; therefore, structured interviews through emails were carried out based on purposive selection with key informants. Though the advantage offered by email interview alleviated some time pressure of the interviewees, dealing with a new topic caused considerable difficulties in obtaining responses. Interviews by five key informants from different businesses linked to the space tourism industry were selected for interpretation: the Assistant Vice President of a leading bank in UK/Europe; a Manager and Aerospace Engineer from Airbus; Director of a leading Spaceport Consultancy; senior managers from the space flight companies Virgin Galactic and EADS Astrium.

The quantitative questionnaire survey was used to explore information on the attitudes and perceptions regarding space tourism among the British residents (n = 164) in Southampton, Bournemouth and Poole areas in South, and South West England. The survey instrument was designed to gather both open-ended qualitative and closed-ended quantitative data to better understand the motivation and potential behaviour of potential space tourists. Analysis of both methods offered the possibility of checking qualitative opinions (structured interviews) against quantitative results and to also establish if they correlate (Flick, 2009). The questionnaire design process also involved a thorough review of past studies (e.g.: Barrett, 1999; Crouch et al., 2009; Futron, 2002; Webber, 2009) as well as ongoing debates (e.g.: RAS, 2006) and appropriate variables were selected for the pilot survey. Non-probability convenience sampling strategy was chosen for gathering the final quantitative data due to the limited resources and time. One of the authors actively took part in the fieldwork and waited for its return but allowing the participant to
complete at their own pace. 164 fully-completed questionnaires were gathered during 10 February 2010 and 12 March 2010.

The qualitative interview quotes taken from the structured interviews were used thematically to strengthen the quantitative findings. In order to preserve their anonymity only the sectors represented by the key informants are mentioned. The key informant interview data was quantified using coding, which refers to the process of organising the data into “chunks” by taking text data, segmenting sentences or paragraphs into categories or themes and then labelling them with a term (Creswell, 2003). The codes were then categorised before patterns were identified. The data from quantitative questionnaires were analysed using SPSS and Excel. The outcomes of each analysis were then compared to determine similarities and differences. However, only findings related to tourist motivational factors and decision-making process are presented in this paper.

4. Key findings

The survey results reflect the attitudes and perceptions of a sample of respondents from Southern England towards space tourism. The results are outlined under headings, namely, space tourism awareness and interest, motivation, key factors influencing customer decision to travel into space, perceived risk in space travel, safety issues in space tourism, and demand in the UK. Of the 164 respondents, 53% were male and 47% female. However, according to the UK Census 2001 (ONS, 2010), the population is represented by 48.6% men and 51.4% women. Consequently, there is a variance of 4.4% compared to the overall gender ratio but it is unlikely to have a significant impact on the survey results. The sample had a moderate group age representation related to both male and female groups, with most respondents (30%) aged between 35 and 50, a further 26% were under 25 years, those between 25 and 34 were 23%, between 51 and 65 were 17%, and over 65’s were 4%.

4.1. Awareness, interest and reasons for not undertaking space travel

In terms of awareness, 51% of respondents mentioned that they are aware of the idea of space tourism but only 22% of respondents consider space tourism experience as important or very important. 39% of the respondents prefer to adopt a neutral position. The survey proposed a hypothetical situation in which the respondents were able to pay the cost of the trip and, thus, the affordability variable was excluded as carried out in past studies. Fig. 1 attempts to identify and present their willingness to travel into space. Combining the “likely” responses with the “very likely” responses resulted, a total of 54% of respondents were willing to participate in space travel, confirming an interest in space tourism among the British people and a willingness to undertake space travel if they could afford it, which is not surprising. On the other hand, more than a quarter (26%) of the respondents claimed that they are unlikely to participate in a space flight experience even though the cost would not be an issue.

Among those who claimed they are unlikely or not interested in undertaking space travel, three quarters (74%) were women (Fig. 1). Fig. 1 also gives the breakdown of different opinions of the respondents based on their age groups. It seems that women are less interested in space trips because they are more concerned about safety and consider space travel is “too risky”.

Table 1 shows that “risk” is their primary reason for not being willing to travel into space, and represents 34% of total responses. Perceived risk seems to act as a hurdle for some people in the decision-making process whilst for others it is something attractive, something that they are actively searching for (Dickson & Dolnicar, 2004). As a result, in space tourism, the concept of risk is central to tourism behaviour. Uncertain buying goals or purchase rewards; predictions of positive or negative consequences or financial considerations (Moutinho, 1980) are sources of perceived risk, which could also influence the potential space tourism demand. Around 33% of the respondents consider that there are “enough destinations to see on Earth” and they are not interested in space. This reflects the fact that there are considerable numbers of people for whom space holds no attraction at all. The third reason is related to “environmental concern” but it seems to be less important as only 9% of the respondents mentioned it.

Some of the respondent quotes (from the open-ended questions presented in the quantitative survey) show their unwillingness to undertake space travel: “I am concerned about the environmental impact” (female respondent, aged 25–34); “Apart from the view I don’t see what other value could be added to the experience” (male respondent, aged 35–50); “I have no interest in going to space.” (Male respondent, aged 35–50); “Plenty to see here on Earth.” (Female respondent, aged above 65); “Not keen on flying, too risky.” (Male respondent, aged 25–34); “I think it would be generally boring with occasional excitement” (Female respondent, aged 51–65); “It doesn’t appeal to me as a major step for human race.” (Male respondent, aged 35–50).

Given that it is also possible that lack of knowledge about space tourism makes some respondents declare that they are not interested in space tourism. Provision of information and a targeted market campaign might change their opinion in future.

4.2. Space tourism motivation

For a clear representation the 5-point Likert scale used in the survey was reduced to a scale of 1 to 3 (very important; important and less important) by combining the “most important” with “very important”, and “less important” with “the least important”. The results are illustrated in Fig. 2, which shows the overall respondent rating for the motivational variables. Over 66% of survey respondents...
rated ‘vision of Earth from space’ as the very important reason for undertaking space trip. This result is supported by previous studies that claimed that the most important motivation for people to go to space is the fascinating view of Earth from space. Futron (2002) revealed that 63% of the US respondents declared viewing Earth from space was the biggest attraction for sub-orbital space tourism. A decade before Barrett (1999) confirmed that viewing earth and looking deeper into space represent the key motivations for UK residents to take the trip.

Many astronauts have declared that viewing Earth from space as the most magnificent experience they ever had (Spencer, 2004). Personal communication of one the authors with Richard Garriott, the second-generation space traveller as well as the only person travelled to space on both the American Space Shuttle, and Russian Soyuz, also confirmed the value of the experience of viewing the earth from space. ‘People enjoy the emotional appeal of the limitless space frontier’ a key informant from the aerospace industry also pointed out. Thus, people’s need for exploration and the thought of imagery represent the most important motives for space tourism, which is the push factor, the so-called Ulysses factor (Anderson, 1970 cited in Mayo & Jarvis, 1981). The next very important reason for going to space is the weightlessness or experiencing zero gravity, which received 44% of the responses, followed by the unusual nature of the experience (43%). These two reasons seem to meet the need for a challenging and fun experience, which represents the attractiveness of any adventure travel that entices tourists (Hall, 1992 cited in Fluker, 2005). The high speed experience is preferred by only 26% of the respondents perhaps related to safety concerns. ‘Scientific contribution’ does not play an important role in respondent motivations to undertake space travel.

An investigation of what key informants in the space tourism industry consider to be the reasons for space travel revealed that the most important reasons for space tourism stated by quantitative survey respondents correlates with their answers. The key informant from EADS Astrium mentioned: ‘for some at the beginning: pride, demonstration of courage or of ability to perform leading edge activities. For most (others), it is (the) discovery of new areas (Going to Space, seeing earth from space), (and) of new sensations (weightlessness)’. Therefore, there are two aspects related to space tourism motivation were reflected. Firstly, there is the motivation to do something that only a few have done before and, thus, to be the first private astronauts (the pioneering aspect) and, secondly, the experience of space flight, which includes the view of Earth from space, weightlessness and the excitement of high speed sensations.

Table 2 shows the mean values for the motivational variables. It is evident that ‘vision of Earth from space’ is the most important reason with a mean of 2.08, followed by “unusual experience” (mean 2.72) and “weightlessness” (mean 2.74). “High speed experience” is rated as the fourth reason (mean 3.37) and the least important is “scientific contribution” (mean 3.92).

For the interviewees space travel represents an exceptional adventure, “a thrilling once in a lifetime experience”, according to the key informant from the banking sector (the Assistant Vice President of a leading bank in UK/Europe). It was also suggested that space tourism will improve environmental awareness and understanding of Earth and the Universe. This was mentioned by three key informants: “there is a potential for more awareness of the environment and humanity” (respondent from Airbus); “better perception of Earth’s fragility, better awareness of environmental problems” (respondent from EADS Astrium); or “enhancement in faith, compassion and environmental concern” (interviewee from the banking sector). This aspect is also pointed out by one of the previous seven space tourists’, who mentioned that: “You’re out there in space looking back at your life, yourself, your accomplishments. Thinking about everything you own, love or care for, and everything else that happens around the world. Thinking (the) bigger picture. Thinking in a more global fashion” (Ansari, 2009 cited in Fisher, 2009:69). However, all these viewpoints do not actually reflect the long-term goal of possible human settlement in space to which many astronauts and policy makers at space agencies aspire.

4.3. Key factors influencing space travel decision-making

Two factors influencing people’s motivation to undertake space travel are the socio-psychological motives to travel to space (push factors) and specific attributes or characteristics of the product (pull factors). Specific attributes of the space tourism product also seem to have considerable influence on a customer’s decision to undertake space travel. The factors that seem to affect people’s decision-making process, as stated by key informants include, a) type of experience (orbital vs. sub-orbital space travel); b) health and training requirements; c) safety issues; d) type of launch and design of the spacecraft (e.g. number of window seats); e) number of passengers onboard; f) reputation of the operating company; g) location of spaceports; f) reliability statistics; and h) environmental credentials.

Survey results demonstrate, the most important aspect in the decision-making process is related to risk as about 27% of respondents claimed that safety is the key factor that will mainly influence their decision to travel into space (Fig. 3). The training required is the next important aspect as around 20% of respondents refer to

Table 2
Descriptive statistics: Motivational factors for space tourism.

<table>
<thead>
<tr>
<th>Motivational variables</th>
<th>N</th>
<th>Mean</th>
<th>Std. deviation</th>
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<td>Vision of earth from space</td>
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<td>2.08</td>
<td>1.26</td>
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<tr>
<td>Weightlessness</td>
<td>156</td>
<td>2.74</td>
<td>1.17</td>
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<td>High speed experience</td>
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<td>3.37</td>
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<tr>
<td>Unusual experience</td>
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<td>2.72</td>
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<td>Scientific contribution</td>
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<td>Valid N (listwise)</td>
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</table>

Table 1
Unwillingness to undertake space travel vs. gender.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Too risky</th>
<th>Health problems</th>
<th>Enough destinations to see on earth</th>
<th>Environmental concern</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>30.00%</td>
<td>2.90%</td>
<td>17.10%</td>
<td>5.70%</td>
<td>10.00%</td>
<td>65.70%</td>
</tr>
<tr>
<td>Male</td>
<td>4.30%</td>
<td>4.30%</td>
<td>15.70%</td>
<td>2.90%</td>
<td>7.10%</td>
<td>34.30%</td>
</tr>
<tr>
<td>Total</td>
<td>34.30%</td>
<td>7.10%</td>
<td>32.90%</td>
<td>8.60%</td>
<td>17.10%</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

Fig. 2. Reasons for space travel.

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this. When asked about the maximum period of time they would be willing to take part in training, 47% of respondents mentioned as two weeks to one month (Fig. 4), which is similar to the training scheme planned by some operators. One of the Administrators of the FAA commented that “an operator must train each space flight participant before the flight on how to respond to emergency situations, including, smoke, fire, loss of cabin pressure, and emergency egress” (Neild, 2009). This also indicates that appropriate training lessons and rehearsals for a passenger who has never been to space would require two to four weeks. However, operators such as Virgin Galactic require only 3 days of pre-flight preparation for sub-orbital travel which raises questions about the viability of the training and the effectiveness in a likely event of an accident in space. The length of training may vary between operators and will depend on the specific needs of their vehicle, mission architecture and on legal regulations (Seedhouse, 2008).

Training programmes are an integral part of the space tourism experience aimed to prepare the tourist for the space regulations (Seedhouse, 2008). The speciﬁc length of training may vary between operators and will depend on the speciﬁc needs of their vehicle, mission architecture and on legal regulations (Seedhouse, 2008).

Training programmes are an integral part of the space tourism experience aimed to prepare the tourist for the space travel but also playing a signiﬁcant role in people’s decision to undertake space travel. The training programmes are already in place for orbital space travel, for instance, the Russian training programme (Fisher, 2009; Swarbrooke et al., 2003). For sub-orbital flights, training programmes are still in the developmental stage, as the interviewee from Airbus stated, “They will, however, evolve to include not just the minimum necessary training and fun, but other activities”. Other factors such as a company’s reputation and duration of space travel experience are also important for 12% and 11% of the British respondents respectively (Fig. 3). It is apparent that people are aware of the fact that companies like Virgin Galactic cannot afford to damage their name by having a signiﬁcant failure, which would affect not only their space business but the entire space tourism industry.

4.4. Perception of risk and participation in risky activities

A vast majority of the respondents (Fig. 5) claimed that they had participated in at least one extreme sport which shows similarity with research conducted by others (e.g.: Webber, 2009). The most popular activity among 27% of the respondents was skiing and snowboarding. In addition, skydiving, mountain climbing and bungee jumping were extreme sports considered to have a higher level of risk, and received 13%, 16% and 9% of responses respectively. These variables were selected to allow comparison with the results of similar studies conducted in other countries (e.g.: Fluker, 2005; Futron, 2002; Webber, 2009).

In addition to Fig. 5, a cross tabulation was carried out between their participation in risky activities and key factors influencing tourists’ decisions to undertake space travel, which revealed that people’s risk-taking behaviour has a direct impact on their appreciation of different factors related to space travel. For instance, many bungee jumping participants considered the training required as the key factor in their decision to travel to space while a company’s reputation seemed to influence many of the sailors and mountain climbing participants. Insurance costs and accommodation facilities in space are the least important factors, especially for sailing/boating participants. However, it is evident that for many extreme sports participants the safety aspect plays the most important role in their decision to undertake space travel.

Risk is considered to be a multidimensional phenomenon with influence on individual perception (Fluker, 2005; Webber, 2009). Factors such as the level of voluntary choice to accept or reject the risk or level of familiarity that people may have with the activity also impact upon their perception of risk. Futron (2002) asked respondents to rate five activities in the order of risk significance to explore US respondents’ perception of risk. In this study half of respondents rated space travel as the most risky activity (Fig. 6).

Although for some of the respondents the risk involved in space travel does not seem to be an impediment at all and they would like to travel as soon as space flights are available and thus, they might like the risks of flying on new spacecrafts that nobody has ever flown on before (9%). Risk-taking and danger are sought by many of the respondents who would prefer to wait until space travel becomes safer. Some 15% of respondents would travel in less than 5 years after the first commercial space flight, 18% between 5 and 10 years after, and 43% consider that this is something that they will do sometime during their lifetime (Fig. 7).

In responding to a question seeking to determine how enthusiastic the respondents were to become space tourists given that risk is inherent and that personal medical problems can be...
4.5. Safety issues in space tourism

With regard to the significance of safety measures, all the key industrial informants claimed that safety is extremely important for the long-term development of the industry. However, space travel is, by definition, a risky activity, as the key informant from Spaceport Associates mentioned: “Space is risky. There are no guarantees, and the US Government insists on space tourists signing an indemnification before they can fly. USG also insists that all tourists are fully informed of the risks”. Besides the regrettable disasters of the “Challenger” (1986) and “Columbia” (2003) space missions, they are a reminder that people can lose their life searching for the space experience. The industry has to consider high safety levels to make this activity safe enough to constantly attract people and prevent accidents which can bring the industry to a halt like the case of the Concorde crash in Paris, as mentioned by the key informant from the banking sector. Furthermore, another interviewee from Airbus noted: “The industry should be targeting safety levels similar to or better than parachuting (1 death per 60,000 jumps). Safety is dependent upon the vehicle and flight test program which will include hundreds of flights prior to commercial passenger service”. Nevertheless, risk plays a central role in space tourists’ behaviour as reinstated by the key informants. At the beginning, “for some […] risk adds to the excitement” (Virgin Galactic) whilst, for others, it represents more of an impediment because of “lack of insurance cover and/or dangerous experience” (Assistant Vice President of a leading UK/European bank). These reinstate that in the long-term the space tourism industry needs to provide an acceptable level of safety in order to be successful.

4.6. Space tourism demand in the UK

Space tourism seems to attract individuals with high adrenaline-driven appetites who accept taking risks to obtain their personal rewards. The interviewees indicated that “wealthy retired entrepreneurs who partake in high adrenaline sports experiences” (respondent from the banking sector) or the middle age “self-starters who have their own businesses and are very successful in their own areas” (respondent from Virgin Galactic) are the type of people with the financial affordability to become private space explorers. These appreciations are supported by the survey results since the majority of the British respondents considered that wealthy (54%) and/or adventurous people (12%) are the target market for space tourism in the UK.

It appears that certain personality traits like the genetic predisposition to “novelty seeking” (Hamer and Copeland, 1998 cited in Dickson & Dolnicar, 2004) or “sensation seeking” (Zuckerman, 1994 cited in Hansen & Breivik, 2001) make the first space tourists push the barrier and enjoy space adventure. These “super heroes” ready to travel in “prototype like vehicles”, as noted by the interviewee from EADS Astrium that will make the difference and will stimulate the interest in space travel for many people to follow. Though there are launch related ESA restrictions (ESA, 2008; Farand, 2009), given the considerable role of some of the British companies, such as, Virgin Galactic, ExcaliburAlmaz, Reaction Engines, and Bristol Spaceplanes, the potential UK market for space travel has to be considered in forecasting future demand. As stated by the interviewee from Virgin Galactic, globally there are currently 650,000 individuals’ willing to experience sub-orbital flight with the
financial capacity to afford and that a considerable number of them are from Britain.

On the other hand, as stipulated by the interviewees, there are also concerns in relation to the global space tourism industry, which refers to possible over-regulation by government authorities or, on the contrary, the development of unsafe vehicles that will slow down its growth. The concerns related to export controls due to sensitive technology or the development of a viable orbital spacecraft were also reflected. Overall, the interviewees’ optimism regarding the future of the space tourism industry is promising, showing that the industry is steadily progressing year after year. As Lappas (2006, p.164) stated, “space tourism is bound to expand in the near future. Although space hotels and mass media access are still a dream, the first steps towards making space tourism a reality have already been taken”. Such a viewpoint was confirmed by all the interviewees and Virgin Galactic has plans for operating hotels and handling cargos in space through its forthcoming projects, namely, Virgin Galactic Science Services, Virgin Galactic Cargo, and Virgin Galactic World Travel (Whitehorn, 2009).

5. Conclusion

In an attempt to investigate some the ten research dimensions proposed earlier, this paper has demonstrated the current understanding of space tourists’ motivations and risk perceptions in the UK. In summary, people’s need for unique, challenging and fun experiences drives the demand for space tourism. The reasons for travel, accessibility of the destination, and the level of information on them affect the relationship between motivations (push factors) and attributes of the destination (pull factors) (Uysal, 1998, pp. 79–94) as the interaction between supply and demand is essential for the travel experience to take place. The reputation of the operating company plays an important role in people’s decision to undertake space travel, as stated by 12% of survey participants. For instance, the use of the Virgin brand seems to act as a guarantee for a successful business. Space appears to be the next natural step in satisfying people’s need for exploration, adventure and new recreation activities. It can be said that the experience of viewing Earth and the blackness of space represents the most desirable element in people’s motivation to travel into space. This makes space travel a unique and breathtaking experience; as Shuttleworth, one of the seven space tourists to date mentioned: “It’s very stunning, very space, and very cool” (Fisher, 2009).

As discussed earlier, two aspects in particular have to be taken into consideration when explaining space tourism motivation. First, there is the pioneering aspect, which motivated the first private space explorers to push the barrier and experience something that only astronauts have done before and, secondly, it is the space flight experience which attracts many people with all the excitement and uniqueness. Now the industry is making an effort to develop an orbital spacecraft which will surpass the one-passenger-at-a-time offer of Soyuz spacecraft. Perhaps, the Space X Dragon has the best orbital spacecraft which will surpass the one-passenger-at-a-time uniqueness. Now the industry is making an effort to develop an experience which attracts many people with all the excitement and space explorers to push the barrier and experience something that generation-Y, which is reaching adulthood vs. Generation X or Baby Boomers (Benckendorff et al., 2010; Cooper, 2008).

The actual affordability is still considered the most important aspect of space tourism demand. Therefore, efforts should be made in future to survey wealthy British residents living in UK’s richest postcodes who could actually afford the price of a space trip to reveal their perceptions and their actual willingness to undertake space travel. Investigating specific aspects related to sub-orbital/orbital space travel is necessary to reveal to what extent specific product characteristics influence choice behaviour and implicit travel decisions. However, these will take few more years depending upon the knowledge level of the respondents.

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Appendix. Supplementary data

Supplementary data related to this article can be found online at doi:10.1016/j.tourman.2011.11.026.

References


space tourism: a new industry in the making