

Higher Education Aviation Programs in Greece: A Missed Opportunity or a Challenge to Meet?

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ABSTRACT: The air transport industry in Greece has been experiencing a significant growth. However, higher education has missed so far this export opportunity. Public universities and technological educational institutes have very limited undergraduate offerings in the fields of aeronautical engineering and aircraft maintenance technology, respectively. These programs are offered only in the local language, practically restricting them to the indigenous market. Postgraduate offerings are currently inexistent. This study proposes a generic model for undergraduate and postgraduate aviation programs. This model, aligning with the world's best practice in aviation education, would have to be adjusted to meet the Greek aviation industry. A preliminary investigation to identify the characteristics of the model was conducted in the Greek aviation industry, through a survey supported with in-depth interviews. The research findings suggest that it is necessary to invest in the strengths of the Greek aviation industry (aviation services and aircraft maintenance) and the strategic advantages of the country (climate favorable for flight training and touristic attractiveness). The need for a postgraduate aviation program is highlighted, in contrast to the introduction of an undergraduate program, which came up as less desirable. Moreover, the need for export-driven target-oriented synergies between industry and academia has been a key observation.

KEYWORDS: Aviation, Aviation education, Aviation training, Air transport, Higher education, Universities.

INTRODUCTION

AVIATION INDUSTRY: THE GENERAL CONTEXT

The aviation industry continues to grow, despite economic and other issues affecting economic development in many parts of the world. The global aviation workforce counts with approximately 10 million people acting directly in the industry and nearly 63 million people in support of the industry, including tourism services (ATAG 2016). Aviation is very important for the Greek economy, in terms of its influence on tourism and trade. Moreover, air transportation connects geographically remote areas, including the large number of islands around the country. The Greek air transport market comprised 48.81 million passengers in 2015, compared to 44.6 million in 2014, which corresponds to 9.5%. In the same year, the domestic traffic increased by 20% and the international one, by 5.5% (Hellenic Civil Aviation Authority 2016). The long-term passenger traffic trend (international and domestic; Fig. 1) is also indicative of the aviation sector growth in Greece.

Aegean Airlines, following the acquisition of Olympic Air, has a key role in the Greek air transport industry, having served, in 2015, 11.5 million passengers with a fleet of 58 aircraft (Aviator 2014). Moreover, new airlines, such as Ellinair and Astra Airlines, apart from serving the Greek market, expand their activities to foreign countries (e.g. Russian Federation). Until today, all Greek airports are owned and managed by the State, except for the Athens International Airport (AIA), which commenced its operation in 2001. A recent development is the approval of the agreement between the Greek Government and private investors for the privatization of 14 Greek airports. A private investment

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of approximately 330 million Euros, over the next 4 years, will fund airport infrastructure improvements, increasing the overall traffic capacity of the country and, consequently, the aircraft maintenance activity (Fraport 2015). In turn, the industry's needs for educated, well-trained and skilled professionals is anticipated to increase in the next years.

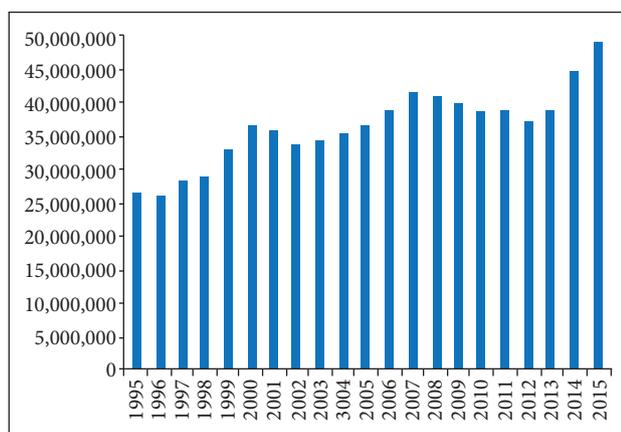


Figure 1. Total passenger traffic to/from Greece (1995 – 2015; Hellenic Civil Aviation Authority 2016).

HUMAN CAPITAL: EDUCATION AND TRAINING

Investment on human capital, in the form of education and training, has a key role in sustaining the industry's growth. One characteristic example of this close link is the introduction of the Boeing 747, which led to the establishment of a number of aviation programs in the US Universities (Prather 1998). Keeping up with a growing passenger traffic requires a growing number of knowledgeable employees graduating from high-quality academic programs (Lindseth 1998; Lappas and Kourousis 2016). Civil aviation training is provided by commercial flight and maintenance training organizations, with the International Civil Aviation Organization (ICAO), the European Aviation Safety Agency (EASA), the Federal Aviation Administration (FAA) and the national aviation authorities providing guidelines or dictating the rules for course offerings, organizational structure, teaching staff qualifications etc. Nevertheless, these organizations generally have weak links with higher education institutions, which, in effect, limits the interaction for the purposes of aviation education, training and research. There are, however, many paradigms of successful integration of aviation training and education. A number of public and private universities in Europe, USA, Asia and elsewhere offer a wide range of aviation programs at undergraduate and postgraduate levels, such as Cranfield University, Delft University, Embry-Riddle

Aeronautical University, Purdue University, Lewis University, Nanjing University of Aeronautics and Astronautics, RMIT University etc.

In the Greek higher education sector, there are currently very few institutions offering programs in transportation. Universities and Technological Educational Institutes (TEI) have several undergraduate offerings in the fields of aeronautical engineering (University of Patras, Hellenic Air Force Academy) and aircraft maintenance technology (TEI of Central Greece). In addition, there are some air transport courses that are part of Business Administration and Tourism programs (e.g. University of the Aegean). Besides, these undergraduate programs are offered only in the local (Greek) language, which practically restricts them to the indigenous market. Postgraduate offerings are currently inexistent. Higher education students can engage in aviation-related areas through final-year projects, Master's programs and PhD research. In the training domain, there are private training organizations that deliver aviation-related professional or vocational courses for pilots, aircraft maintenance mechanics/technicians, cabin crew, flight dispatchers and other support staff (e.g. ground handling, ticketing and reservation etc.). When applicable, training, certificates and licenses are validated and issued by the Hellenic Civil Aviation Authority (HCAA), EASA, ICAO or delegated bodies. Despite the change happening in the Greek aviation industry, the higher education and training sector has yet to respond adequately to the market needs, which includes the creation of cross synergies in offerings.

DESIGN AND ESTABLISHMENT OF AVIATION PROGRAMS

The provision of competent people is the base for the progress of a sustainable aviation system, and this should be achieved via education and training, developed further to face the lack of qualified and competent aviation personnel at a global level for all aviation positions (ICAO 2015). Universities have an important role in accommodating the increasing needs of the aviation industry. Those which offer aviation programs should establish clearly stated and specific learning objectives, essential for both instructors and students, as the former need to provide a precise roadmap for the facilitation of the instructional process and the latter, to create a clear picture of the instructor's expectations (Johnson and Ferguson 1998).

Factors Affecting the Quality of the Program – Perceived Quality

The establishment of a high-quality aviation bachelor's degree should consider many aspects, as suggested by Lindseth (1998):

- Curriculum: breadth and depth of course offerings, scholarship and high academic standards.
- Students: performance of graduates, number of students and student selectivity.
- Faculty: qualifications and technical expertise of the instructors, instruction quality, dedication of the instructors and research.
- Program activities: student internships, programs linked with potential employers for the graduates, alumni relations and their input on the program as well as services to the general public in aviation-related areas.
- Equipment: aircraft, simulators, computers etc.
- Facilities: buildings, classrooms, hangars etc. as well as geographic location.
- Leadership abilities: program administration and faculty leadership abilities; innovative administration, faculty and staff.
- Resources: efficient funding of the program.
- Reputation: respected within the aviation industry.
- Value: perception that the program is worth the cost of tuition fees.

Clark (2004), examining the factors that affect students for choosing a 4-year aviation program, suggests that the following are among the most important: program quality; university's reputation; equipment condition; institution's educational quality; location of the institution.

In a similar study, Steckel *et al.* (2010) identified the following factors as those influencing the students' decision: aviation reputation; academic reputation; obtaining job at graduation; quality of the curriculum; campus visit; graduation rate; quality of the faculty; employee value; classroom facilities; educational accreditation; university location; class size; information on the web; aircraft maintenance; scholarships availability; campus life.

Program Curriculum

Continuous research and dialogue between academics and the aviation industry is very important in the identification of the thematic areas included in a program, according to Quilty (2005), who suggests that an aviation management program should cover: basics of economics; applied statistics; airline

management courses; airport management courses; aviation services management or air cargo management courses.

An interesting insight on how an airport management curriculum should be is provided by Prather (1998), who examined the airport managers' points of view. Fields of study which were highly rated by the airport managers were (Prather 1998): general management; aviation transportation management; public administration, including focus on airport administration; general marketing, including focus on courses aviation marketing; general finance, including focus on airport finance; aviation policy and planning; aviation safety; aviation law and regulation; aviation communication; aviation insurance; aviation labor relations.

Industry Exposure

Schreckengast and Hiatt (2012) highlighted issues around exposure of the students to the industry. The authors identified, particularly, the need to connect the students to the industry early in the curriculum and to assist them in learning practical issues on how the job functions are performed. Besides, academic staff (faculty) should research, publish papers in international journals and present the outcomes in industry forums, as a way to promote active networking and foster contacts with the industry decision makers.

Academic Staff

Regarding the contribution of the academic staff, Pavel and Harrison (2013), examining the US system, found that the most essential factors for a successful program are: teaching; interaction with students; evidence of student's learning; interpersonal attributes/collegiality; aviation research grants; publications in peer-reviewed elite journals related to aviation and in book chapters.

Evaluation and Assessment

Evaluation and assessment are also critical in terms of sustaining a program with highly-perceived quality. The continuous evaluation, review, map and assessment with the broad faculty participation is necessary to develop and sustain an effective professional program, ensuring a continuous improvement process (Steckel *et al.* 2010). This assessment should contain the necessary levels of students' knowledge, skills and attitudes related with the programs outputs (Letassy *et al.* 2015). Paredes (2012) pointed out the need to establish quality systems ensuring that the offered education is of the highest level.

RESEARCH METHODOLOGY

RESEARCH STRATEGY

This pilot research intended to identify the main features of aviation programs in Greece. Qualitative research methods and more specific in-depth interviews were employed in the current study to elicit the required information. Qualitative research steps suggested by Robinson (2014) were followed in an explicit and systematic manner to improve the validity of the study and the quality of the final outcome. In particular:

- **Sample Quality:** selection of the appropriate sample universe (sample population) following a trade-off between homogeneity and heterogeneity of the respondents. This ensures that the sample universe is coherent with the research aims and questions. Therefore, potential interviewees were selected according to their relationship and experience in aviation.
- **Sample Size:** this can affect the generated generalizations. In the present study, 9 in-depth interviews were held and, in 3 cases, information was obtained via telephone discussions after sending the questionnaire.
- **Sample Strategy:** convenient sampling is a common method, where the participants are convenient in their proximity and willingness to participate and meet the required criteria. The participants ($n = 12$) were airline staff, airport staff, civil aviation administration staff as well as educators and academics with strong interest and experience in aviation. The participants had more than 26 years of experience in the aviation industry (in average, 26.3 years). Figure 2 presents the number of participants and their average experience per professional category.

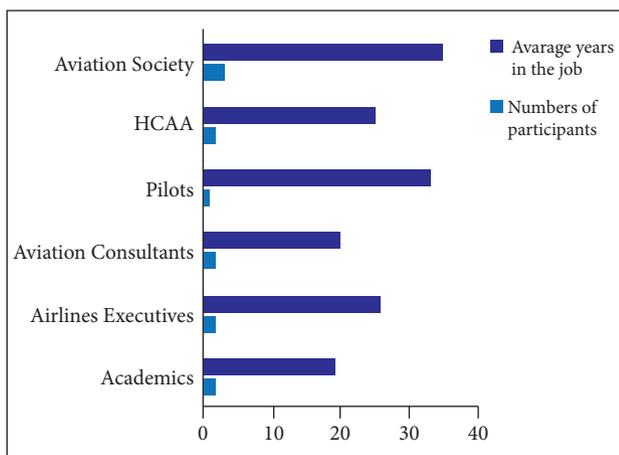


Figure 2. Occupational characteristics of the participants.

- **Source Sample:** at this stage, the researcher contacts the participants. Ethical skills and sensitivity are required, and all interviewees must be informed for the study purpose, of what participation entails, that the participation is voluntary and how anonymity will be protected as well as any other necessary information that will help them to reach an informed, consensual decision to participate. It maximizes the validity, credibility of information and the optimal flow of interviews, having been adopted in the present study. Furthermore, the researcher must be aware of the possibility of bias and consider its possible impact on findings and generalizability. The participation of the respondents in this study was an important incentive for them, as they found the interview and the study interesting (Berg 2001).

QUESTIONNAIRE DESIGN

Due to the lack of data and past research conducted in, the authors used a number of questions to capture as many factors as possible. The questionnaire was constructed based on the findings of literature review (analyzed in the previous section of this paper), but also having in mind the specifics of the Greek aviation industry. At the end of the questionnaire, 2 open-ended questions were added to collect any information that the researchers may have overlooked.

Prior to the finalization of the questionnaire, a focus group discussion was held with members of the Hellenic Aviation Society, the largest known forum of aviation professionals in Greece. The focus group consisted of airline and aviation authority professionals, as well as academics, all with high knowledge of the subject and rich experience. The questions were checked by the focus group for relevance and understanding, practice also suggested in the literature (*e.g.* Yin 1994).

RESEARCH QUESTIONNAIRE

The questionnaire contained 13 questions, most of which were derived from the literature review and the issues put forward by the focus group is shown in Table 1. Questions were added on the occupational characteristics of the respondents and 2 open ones were introduced to capture any additional issues and recommendations. The duration of the interview was about 30 – 45 min.

Table 1. Survey Questionnaire.

1	What is your current professional position?
2	How many years in total have you worked in aviation related positions?
3	Do you know of any educational/training program offered by public and/or private institutions operating in Greece that prepare students for employment in the aviation sector? For example: universities; Technological Educational Institutes (TEI); private professional training institutes for pilots, aircraft engineers, etc.; or other organizations and authorities (e.g. Civil Aviation Authority).
4	Further to the engineer- and pilot-training programs that are currently available in Greece, do you believe that additional aviation-related education/training programs could be offered, which would prove useful for current and future needs of the Greek aviation sector?
5	Do you believe that it would be useful to establish a four-year degree program in aviation at a Greek university?
6	Which areas of the Greek aviation sector do you believe would benefit from the establishment of such a program?
7	What is your opinion regarding the establishment of a postgraduate aviation program in Greece?
8	What do you think are the most important advantages that Greece brings to the provision of aviation education that would make it attractive to international students?
9	Which of the following subjects do you believe are most important and should be included in the curriculum of a postgraduate degree program in aviation offered by a Greek university? Please select six from the following subjects: <ul style="list-style-type: none"> - Project Management - Human Resources Management - Aviation Policy and Planning - Aviation Law and Regulation - Technical and Engineering Support - Aviation Management - Finance - Accounting - Airline Management - Air Transportation - Aviation Safety Management - Aviation Insurance - Contract Management - Marketing - Aircraft Leasing and Finance - Airport Administration - Other (please specify):
10	What kind of partnerships or collaborations with relevant institutions and organizations (e.g. airlines, airports) can such a degree program establish in order to enhance its quality and content?
11	Do you think that current aviation professionals could benefit from e-learning programs if these were to become available?
12	Is there anything else that you believe would contribute to successfully establishing a four-year degree program in aviation at a Greek university?
13	Finally, is there anything else that you believe is crucial to successfully establishing a postgraduate degree program in aviation at a Greek university?

RESEARCH VALIDITY SAFEGUARDS

The present researchers have a deep knowledge and experience in the subject, know the professionals who formed the study's sample and did not influence the interviewees to answer a question in a certain way, so this contributed to avoid any respondents' bias.

Validity and reliability are factors that may interest any qualitative researcher and be achieved while designing a study, analysing its results and judging its quality (Patton 2002). Triangulation is an important qualitative research strategy to test validity through the convergence of information from different sources, "data source triangulation", such as individuals, groups

and communities to gain multiple perspectives and achieve data validation (Carter *et al.* 2014). In this study, extensive researches into public universities, private institutions and academies' programs in Greece were conducted to achieve data triangulation. Also, feedback discussions with 6 aviation-related individuals were held to evaluate findings.

RESEARCH RESULTS

AWARENESS OF AVIATION PROGRAMS IN GREECE

The respondents knew some universities that offer undergraduate and postgraduate studies or at least a number of some aviation courses, including the Hellenic Air Force Academy. One respondent mentioned that HCAA offers some aviation-related courses/short programs for their employees and external students (mainly security staff), while it is a body generally validating/certifying a number of courses/staff. Other respondents were aware that 1 TEI department offers a program in aircraft maintenance technology; some private vocational institutions (institutes for professional training) offer training for the basic airline operations (such as ticketing, reservation, ground handling etc.) and some private schools offer training for pilots, flight and ground engineers.

AN AVIATION UNIVERSITY PROGRAM FOR GREECE

All the respondents agreed that the establishment of a university program, offering education in the wide spectrum of aviation, would be very useful for the industry and contribute to its further development. In addition, the program may offer significant benefits to all participants in the aviation industry and other relevant fields. Airlines and airport organizations are in a growth stage, and the HCAA, government services, tourism organizations and agencies would be benefited from the establishment of such a school. Also, the respondents suggested that the introduction of a competitive curriculum could enhance the benefits that such a program would provide.

ESTABLISHMENT OF AN UNDERGRADUATE AVIATION PROGRAM

The answers are varied for this issue and very interesting for the purposes of this research:

- Most respondents agreed with the establishment of such a program.

- One respondent pointed out that the duration (4 years) is too long for such a program and shorter initiatives would fit better the industry needs.
- One respondent pointed out that “such a school may follow the example of Embry Riddle Aviation University in USA”, offering more general studies at the beginning and specialized aviation subjects on the 3rd and 4th years of study.
- Another respondent suggested the establishment of an aviation academy, focusing on basic subjects and, in the future, this would be extended to a 4-year program with the involvement of more participants (relevant organizations).
- Another respondent was negative for the establishment of such a school and mentioned that, for non-operational subjects, such as airport management, ground handling, marketing, accounting etc., the private institutes for professional training may consist on a cheaper solution.
- One of the respondents stressed out that the aviation is a huge area of study and students should focus on specific subjects that have more demand in the market, as this ensures more probabilities for the employment in the industry. In addition, 2 respondents suggested that academics, aviation professionals and governmental officials may co-operate to develop the curriculum. According to these respondents, the teaching staff should have deep knowledge and experience in aviation, as the holding of a PhD is not enough. Nevertheless, some professors with broader business and management specializations, for example, would be necessary to cover basic courses in these fields.
- Two respondents highlighted that the contribution of HCAA is important for the establishment of such a program, due to the high knowledge of the subject and the necessary accreditation of the provision of studies in operational issues, while another respondent said that the HCAA co-operation might be difficult for the establishment of such a program. The university that offers education for operational issues should follow the international aviation standards, although this is not easy for the Greek public universities within the framework in which they currently operate.

ESTABLISHMENT OF A POSTGRADUATE AVIATION PROGRAM

All respondents were very much favourable about the introduction of a postgraduate level program, unlike the diverse responses received for the undergraduate program. One respondent put forward that this program may offer at least 2 specializations and focus on attracting students with a background in Economics, Engineering, Physics, Mathematics or Statistics since aviation requires a wide range of various skills and roles.

It was also highlighted that a well-organized program which contain a curriculum aligned to the market's needs would widen students' job prospects and develop the human resources factor in Greek aviation. Also, this program should focus on employers in aviation and relevant industries, as they may contribute by funding their employees' participation to this program.

One respondent stated that the public and private sectors should co-operate to provide the necessary resources for the establishment of such a program. Another one mentioned that the partnership with a well-established foreign aviation university program would provide added value.

The respondents agreed that a postgraduate program may contain 2 broad categories of subjects:

- Business: aviation management, marketing, finance, airport administration, aviation policy and planning, aircraft leasing and planning, aviation insurance, human resources management and strategy.
- Operations: flight planning, fleet planning, aircraft performance, aviation safety and infrastructure, air navigation and flight operations/air traffic control optimization.

Quality audit as well as management and environmental issues, such as the use of biofuel, came up as a recommendation for the curriculum. In addition, logistics and freight could be an option for the cargo operation sector. Figure 3 presents in summary the frequencies of the top 10 subjects that a postgraduate aviation program may contain according to the respondents.

GREECE'S STRENGTHS AND WEAKNESSES

The respondents agreed that Greece offers significant advantages that may contribute to the operation of such a program. In particular: the weather conditions especially for piloting; the strategic location of the country; the reasonable



Figure 3. Frequency of subjects that an aviation postgraduate program may contain.

living cost and good living standards; the high technical know-how and highly-qualified operational personnel; large number of airports (39 in total) of various sizes and operational characteristics.

On the other hand, the following conditions were stressed out as non-contributing factors for aviation programs in Greece: very diverse market conditions (there are thin routes like the Public Services Obligations, commercial routes, long and short haul routes, different kinds of demand like business, tourist, religious, charter and VFR), besides various, frequent and significant changes in the ownership status of airports and airlines. Finally, the operating framework, limitations and the unstable environment of the legislation governing the Greek higher education sector would be a negative influence in attracting international students.

AVIATION PROGRAM CONNECTIVITY WITH THE INDUSTRY

There was a general agreement among respondents that the program should include: welcome seminars and presentations by professionals; discussions of real-case studies; workplace visits; career days; cooperation with industry stakeholders in support of research projects and joint presentations in conferences (both in Greece and internationally); students participation in international organizations' research and rule-making-related projects; student placements/internships — e.g. airlines and airports may employ students as seasonal staff in areas of their interest (mutual benefit for the students and employers).

DISTANCE LEARNING FOR AVIATION PROFESSIONALS

All respondents agreed that e-learning programs would be of high benefit to aviation professionals. These professionals and today's students have a high level of Information Technology (IT) literacy and are technology-oriented, so they could embrace such an opportunity, which, at the same time, would support their personal development and career prospects.

DISCUSSION AND CONCLUSIONS

These findings are very interesting and answer the question that the study initially set, concerning the establishment of a 4-year university undergraduate program and a postgraduate program in aviation. All the respondents agreed that the establishment of an aviation program would contribute further to the development of the Greek aviation industry, offering benefits to all participants in the industry and other relevant sectors. Respondents also highlighted that Greece has a number of strong positive features for the establishment of such programs. However, there are negative influences owe to the high level of state regulation existing in the higher education sector. In particular, according to Mattheou (2003), higher education institutions in Greece are often characterized by centralization, as every educational decision, activity and policies, even that which are less important, should have the approval of state authorities; receive inadequate funding; are seen as a public service and are against every effort of privatization; the knowledge, which is too theoretical, encyclopaedic and old-fashioned and is not actually related to the labour market needs; present resistance to external evolutions.

The establishment of a 4-year undergraduate program is not supported by all respondents. Most of them stated that 4 years is a long period for such studies. The establishment of an undergraduate program could be pushed back, as soon as the Greek aviation industry indicates signs of further expansion and development. For example, if the Greek airlines (mainly Aegean Airlines and smaller ones) and Ryanair expand further their services, the privatization of the Greek airports will prove successful and tourism traffic, keep growing. Thus, an aviation program could be an option to meet the demand. Instead, the establishment

of a shorter-duration aviation academic program was proposed as a way to bridge the knowledge gap that exists today (too many generalist graduates and very few specialists in aviation).

On the other hand, all respondents agreed that a postgraduate program would be very useful, providing mutual benefits to the students and the industry. The co-operation between public and private sectors for the establishment of a postgraduate aviation program addressing market needs was considered very important. The curriculum of such a program should be broken into 2 broad categories of subjects, namely business and operations. The participation of aviation professionals and relevant organizations in the courses, presenting case studies, undertaking research projects and organizing speeches and seminars, would be useful. In addition, the co-operation with established overseas (EU- or non-EU-based) aviation/aeronautical universities should also be considered, as the academic and aviation reputation are important factors for the attractiveness of such aviation program (Lindseth 1998; Clark 2004; Steckel *et al.* 2010). Another point strongly supported by all respondents is the provision of e-learning aviation courses for aviation professionals.

Conclusively, the establishment of a postgraduate aviation school — offering 2 basic specializations on business and operations and containing a high-quality curriculum as well as a faculty with high knowledge of the industry and close co-operation with organizations from the industry and other professionals — seems to be useful at the present time. Moreover, the operation of a postgraduate school may offer valuable lessons and pave the way for an undergraduate program. It remains a question to answer whether this school/department/program would be able to overcome some of the barriers of the Greek educational system and exploit the advantages that the country offers to attract foreign students.

STUDY LIMITATIONS AND FURTHER RESEARCH

The collected data and their analysis show areas that require further examination; as in any qualitative study, the data collection is a continuing process. The first data analyzed

may show that additional information and clarifications are necessary to shed light into the examined subject (Burnard *et al.* 2008). A follow-up and more extensive survey (that would include a quantitative analysis) is suggested for this reason. The main factors affecting the establishment and sustainment of an aviation program, as suggested by the literature and by the findings of this pilot study, require further exploration.

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AUTHOR'S CONTRIBUTION

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