



Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David

MODULE CODE: LCMB7020

MBA DISSERTATION

**Strategic Analysis for the Development of a Waterplane
Network in Greece**

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MBA IN GENERAL MANAGEMENT

LONDON, OCTOBER 2021



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ABSTRACT

In Greece, one opportunity for a new market with zero competition for the time being is that of waterplanes. Waterplanes may function as a useful tool that will fill the market gap for the connection of remote areas, mainly islands. It can also provide a quick and economical solution for transportation from mainland Greece to other areas where transportation is long and expensive. It is an original medium that can enhance this in turn one of the two most '*heavy industries*' in Greece, namely tourism. However, for the above to be achieved, there must be a clear legal framework so that the respective companies can operate, as well as the corresponding territory so that the interested investors can understand. It is one of the financial sectors, yet unsaturated with multiple opportunities for new investments as well as in 'blue ocean' strategies, such in the case of waterplanes.

This work raises the issue of the use of waterplanes to improve national transport planning. The waterplane is a rather unusual and unknown means of transportation for most people, but it has advantages that makes it useful and easy to use in several countries around the world. In addition, this work analyses whether, and in what way, the waterplane can be part of the solution to the complex and multidimensional transport problem in this area (or other similar).

To date there have been multiple efforts to raise and investigate the waterplane implementation both in Greece and the rest of Europe. However, their focus was segmental in many topics that surrounds this field, from analysis on the regulatory background to site specific case studies. Yet, there are still knowledge gaps in the synthesis and interconnections of the variables that surround the waterplane business venture. Therefore, through this thesis we aim to provide a comprehensive analysis for the operation, feasibility, and sustainability of waterplane in the area. This has been done through an extensive empirical investigation of the strategic management methods and the financial assessments. In addition, qualitative and quantitative data have been collected and examined to provide a holistic overview of the market potential. Raw data has been collected from questionnaires designed and responded by potential waterplane users. Also, interviews have been organised with specialised people in aviation and tourism, to gain even more awareness in our research.

This thesis may function as the basis and reference for future entrepreneurs and the immediate appreciation of the tangible and intangible benefits that the waterplanes can offer to the Hellenic region.

Acknowledgements

First and foremost, I would like to thank my supervisor Dr Anastasis Petrou for giving me the opportunity to carry out this project as my MBA thesis together with his support throughout the whole period. In addition, I would like to thank Dr Gladius Kulothungan, our programme director, for his invaluable guidance and great experience that inspired me to progress in my research and further explore my capabilities.

Special thanks to Dr Nandish V. Patel for all the confidence, advice and inspiration I was provided, which ensured the smooth completion of my studies. I am also thankful to Dr Jiao Miao who kindly opened my horizon to the finance world.

Last but not least, I would like to thank my family for all the assistance and more than anyone my partner Chrysoula Sfynia for all the unconditional and endless motivation and support.

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Chapter 1. Introduction

The need of people to transport either themselves or goods has been known since the prehistoric times. Back then, the prehistoric man was moving in search of food, or out of curiosity to get to know their environment, or even to protect themselves from various natural dangers. Over the years they created means of transport for both themselves and their goods, starting with the use of animals on land and from the primitive raft to lakes and rivers which led to the sea. Thus, from the wheel, the oar, the sail, and the steam they invented modern turbines of advanced means of transport (Herbst, 2005). The sector of transportation is a key sector both in Greece and in the rest of the world. It is not an end in itself, but is used as a 'tool' to promote other industries such as tourism, trade, logistics, etc. Therefore, transportation is directly affected by the decline or growth of some of these sections of the economy. It is worth noting that it represents 5% of the total GDP in Greece (SETE, 2020).

Greece as a predominantly island country, but also due to its strategic location favors the development of this sector, either for trade or tourism. It is known that the merchant naval fleet of Greece is one of the largest in the world including more than 2,000 ships. According to the CIA World Factbook of 2005, Greece is in 9th place in the world based on its coastline which is 15,147 kilometers (CIA, 2005) and consists of over 2,500 islands of which 165 are inhabited (Danforth *et al.*, 2021). Therefore, the development of a comprehensive transport network in Greece based on the sea is rather advantageous both for the country and for the companies that intend to invest in it.

In order to evaluate the transportation market and invest in, the strategic analysis is a necessary step. It all starts with the definition of 'strategy' (Johnson *et al.*, 2017). Conceptually, it is a joint word that stems from the ancient Greek words 'stratos' (= army) and 'ago' which means 'I lead'. Based on literature, the dominant people in ancient times were those with the strongest army. But times are changing and even though initially the army played a leading role, in the Middle Ages the church became powerful. Today this role is shaped by the companies. Strategy is therefore directly linked to survival and dominance (Barney and Hesterly, 2019).

In the present work, which will function as a strategic management plan and will implement quantitative and qualitative methods, we will investigate how feasible and interesting it is to develop a grid of waterplanes in Greece. This work raises the issue of the use of waterplanes to improve national transport planning. The waterplane is a rather unusual and unknown means of transportation for most people, but it has

advantages that makes it definitely useful and easy to use in several countries around the world. In addition, this work will analyse whether, and in what way, the waterplane can be part of the solution to the complex and multidimensional transport problem in this area (or other similar).

As it is known, the European subsidies to the shipping companies, which cover the ferry connections between the islands and the mainland, are decreasing more and more every year. As a result, most of the border islands, as well as many other areas, have a serious problem of transport connectivity with the rest of the country, as shipowners are forced to reduce the number of connections of their ships every year (Newmoney, 2012). Thus, the government and the European Union must either subsidize the itineraries of these ships, so that they are not unprofitable as businesses, or look for alternatives, which will provide a solution to the problem of interconnection of the islands. This problem can be solved with the use of waterplanes. Already in Europe, due to the economic crisis, several countries, such as France, England, Poland, Norway, Croatia, Malta, etc., have begun to realize the possibilities of the waterplane and started to use them to a greater extent (EU, 2019).

The waterplane can replace other commercial flights at short distances, if there are water surfaces, so that it is possible to land and dock. As discussed below, the waterplane already operates as the main means of transportation in Canada, which boasts of many lakes, and in the Maldives, which boasts of many islands (Alaskan Seaplane, 2021; Trans Maldivian Airways, 2021). The most important advantage of the waterplane is that it does not require expensive facilities such as airports with special runways. Instead, small water surfaces are required which are ready in nature at zero cost. Finally, we can add to the disadvantages of waterplanes that they are smaller than corresponding planes, due to the floats, and that they are more affected by the weather conditions (Leyva et al., 2012).

The investigation of the use of waterplanes can be divided into two sub-issues. The first concerns the use of the waterplane as a means of transport for the country's tourists, i.e., when it operates in the touristic areas, and primarily transports visitors to various nearby destinations to and from their place of residence. The second issue concerns the possible lack of existing transport structures, mainly in the islandic part of a country, where the waterplane can be used as a means of transport for permanent residents to nearby larger areas (healthcare, public services etc.) (Ballis et al., 2018).

Waterplanes may function as a useful tool that will fill the market gap for the connection of remote areas, mainly islands. It can also provide a quick and economical solution

for transportation from mainland Greece to other areas where transportation is long and expensive. It is an original medium that can enhance this in turn one of the two most '*heavy industries*' in Greece, namely tourism. However, for the above to be achieved, there must be a clear legal framework so that the respective companies can operate, as well as the corresponding territory so that the interested investors can understand.

1.1 Aim & Objectives

The **aim** of this dissertation project is to design a comprehensive business analysis for the development of a waterplane network in the Hellenic area. This will be done through the outline of the steps and decisions that will allow such a business to achieve its goals and gain its position in the tourism market.

The **specific objectives** of the dissertation are:

- To contextualise waterplane analysis in Greece within the bigger market as a means to extract practical lessons for future (*Blue Ocean Strategy* at the local level).
- To investigate the financial feasibility and evaluate the sustainability (both qualitative and quantitative) of the waterplane business in Greece.
- To collect valuable information through individual interviews and questionnaires, that gave a further insight in the waterplane subject.

1.2 Thesis Outline

The MBA thesis consists of seven main chapters for introduction, literature review, methodology followed by the business plan and financial analysis, both including a discussion on the main findings. The penultimate chapter is the results and discussion from the questionnaire that provides a holistic approach of this thesis, concluding with the closing chapter of Conclusions which Summarizes the contributions to knowledge and recommendations for waterplanes operations. After the final chapter, the literature references as well the appendices can be found, that include the survey questions, interviews and statistical analysis.

Chapter 2. Literature Review & Background

The waterplane is an original and rather strange means of transport, despite its history. It has been designed to function as a solution to the complex transport issue of archipelagos, including the Hellenic region (Ballis *et al.*, 2018). Its special features and the need of non-expensive and sophisticated landing and take-off infrastructure, since the seas and lakes are already ready by nature, makes it a rather advantageous transportation solution.

2.1 Waterplane – Definition & types

The waterplane is a special category of aircraft that can land, float and take off from water surfaces such as the sea, rivers and lakes (Merriam-Webster, 2021). The buoyancy of the waterplane is done either through the lateral floats, or by a special adaptation of the fuselage on a vessel. In the past, waterplanes that combined fuselages and floats were called air shuttles, but today, in addition to the term waterplane, we also find the term ‘amphibious aircraft’ (Gunston, 2005). The two main types of waterplanes currently operating are the floatplane and the flying boat.

2.2 History of waterplanes

The idea of the waterplane creation was born, primarily due to the lack of proper ground infrastructure and the availability of huge motorboats. The first waterplane flight was executed in 1910 by the French engineer Henry Fabre naming this instrument ‘Le canard’ (The Duck) (Nikolaou, 1998). Since then, waterplane research has focused in the technical upgrades and designs for this instrument’s wide implementation. Aircraft designers Gabriel and Charles Voisin experimented quite a bit by adapting the floats from Fabre’s design to an improved design, the Canard Voisin. The Canard Voisin plane (Figure 2-1) became the first waterplane used in military exercises by the aircraft carrier La Foudre in March 1912. In the USA, the first prototype was designed by Glenn Curtis who worked with Alexander Graham Bell at the Air Transport Association (AEA). The first British waterplane flight from Sydney Sippe also took place in 1912 (Gunston, 2005). In the late 1930s, forty-two Short S-23 Empire waterplanes (Figure 2-2) were built in Rochester, England, to operate during the last days of the British ‘empire’ (Leyva *et al.*, 2012).

During the I and II World Wars the lack of abundance of ground airports, and the potential to monitor key military points made waterplanes an indispensable tool. After the Great Wars, the prospects of the waterplane as a means of commercial transport began to fade, as this dream was wiped out by the army for its own use (Nikolaou,

1998). Nevertheless, some airlines continued to promise long-haul waterplanes and the aerospace industry was always heavily involved in water aircrafts R&D (Gunston, 2005).

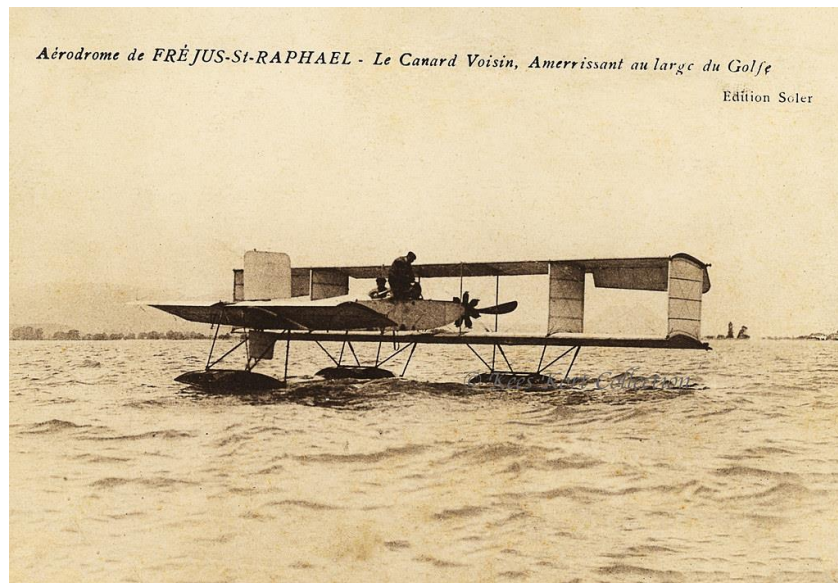


Figure 2-1: The Canard Voisin waterplane in Fréjus Saint-Raphaël, France (1911-1912) (Kort, 2016).



Figure 2-2: The Short S-23 Empire waterplane Bristol, UK (1935) (V&A, 1996).

2.3 Historical data for Greece

As far as the Hellenic region is concerned, the waterplane as a means of transport made its first appearance in the 1930s and was a very important means of transportation within the country (Figure 2-3Figure 2-4). A few years later, however, World War II not only halted their development, but also contributed to the disappearance of the transport service provided by waterplanes until then. Despite several occasional efforts by various operators for their return, waterplanes have

stopped flying for over 70 years and there hasn't been any significant step until the beginning of this century (Interview 1 - Appendix B, Pagonakis, 2016).



Figure 2-3: Children watching a waterplane in the port of Symi, Greece (1930) (Kyrannis, 2020).



Figure 2-4: People gathering to see a waterplane in the port of Kalymnos, Greece (1930) (Kyrannis, 2020).

In 2004, AirSea Lines airlines, based in Corfu, resumed waterplane flights, having secured operating permits and building ten waterports in the Ionian islands (Capital, 2008). In April 2013, arrangements for the establishment, operation and exploitation of airports on water surfaces were included in the updated Investment Law (4146/2013 Articles 32-57) (Greek Parliament, 2013). The path towards private investment in Greek waterports opens shortly afterwards, in April 2014, after the completion of the public bid for the construction of a waterport within the port of Skyros (island in the North Aegean). Eight months later, in December 2014, the first waterport in Greece was completed in the port area of Corfu, the birthplace of the Greek waterports. Since then, many maritime areas of islands have been under consideration for licensing, marking a new era for the waterplanes of Greece (Pagonakis, 2016). It has to be noted

that one of the main problems towards such an investment is the bureaucracy and obstructions on behalf of the government services. In any case, in 2020 the waterports bill has been passed with the aim of creating a dense waterplane transport network in Greece, for recreational and commercial purposes (Tsoni, 2021).

2.4 Greek legislative framework

As mentioned before, the regulations around the licensing of waterports and the operation of waterplanes in Greece has been rather cloudy until 2018. According to the law 4568/2018, the purpose of which is to define the licensing framework for the establishment, operation and exploitation of watercourses, the landscape of the market began to unravel. In more detail, this law describes (Greek Parliament, 2018):

- the procedural steps for the approval of the licensing application.
- The technical & environmental report to be submitted.
- The obligations of the waterport operator.
- The prohibitions and restrictions in force with regards to the other means of transport.
- The inspections provision and procedures for the control of waterports.
- The specific rules applicable for take-off and landing in water fields.

In order for the successful implementation and design of waterports and waterplane journeys, supplementary joint agreements should have been issued by the ministries involved, to shorten the procedures. Unfortunately, this was not adopted until 2020, when a new supplementary regulation was introduced (Greek Parliament, 2020). According to the Ministry of Infrastructure and Transport, the promotion of this legislation on watercourses regulates the procedures relating to their establishment and operation by simplifying the individual procedures.

2.5 Blue ocean Strategy Concept

Part of the creation of new markets is the concept of 'blue ocean strategy'. According to a book by Chan and Mauborgne (2015) the Blue Ocean Strategy aims to create new opportunities where competition is virtually non-existent. They refer to the existing market, or part of it, as an ocean full of sharks who fight to win a competitive advantage and have turned the ocean bloody red. Therefore, the one who will stand out is anyone who can spot a 'blue' piece of ocean, where there are no competitors yet. In financial terms, an entrepreneur should focus in investing in a market sector or even create a new one, which is not yet saturated. In Greece, one opportunity for a new market with zero competition for the time being is that of waterplanes.

2.6 The contribution of waterplane in the Greek tourist industry and the local community

Tourism is an important socio-economic phenomenon especially nowadays where its development is directly linked to the development of transport, resulting in the ongoing increased and improved investment strategies in transport infrastructure (Jovanovic et al., 2016). The element of a safe, fast and affordable travel to a destination are important parameters for attracting tourists. In particular air transport plays an important role in holiday planning due its speed and comfort that offers.

Greece is heavily dependent in tourism; both domestic and international (SETE, 2020). However, for islandic population and tourists, living or visiting isolated destinations, it may take two or even three routes until they reach their final destination. Access to these destinations is usually via regional airports with limited possibilities and flight frequency, or by a waterport, where weather conditions can be difficult and the boat trips can be long and time-consuming (Sotiriadis et al., 2015). In fact, the majority of Greek islands are not equipped with a terrestrial airport. Therefore, the waterplane would function as a great alternative to the existing means which especially in regions where either connection by boat is long or rare, and where airports are non-existent.

Waterplanes are considered a relatively safe means of transport, as it covers short distances at low altitudes, and are preferred by people with high living standards for its convenience, privacy and continued availability (Ballis *et al.*, 2018). In addition, several social groups such as the elderly and people with chronic health problems usually opt for a destination based on their accessibility and proximity to medical care units. The waterplanes can eliminate these concerns, since they can deviate from the specific routes and cutoff travel time, which is not possible by the conventional means of especially in remote destinations. Waterplanes will also play a key role in the health sector with patient airlifts and the growing health tourism (Rodríguez et al., 2016).

Thus, the disadvantage of limited accessibility of several Greek island/ coastal destinations can be transformed into an advantage with the implementation of waterplanes. More age groups of tourists and others will have access to these islands, and this will work for the benefit of local communities. In addition to their positive contribution towards touristic development, the possibility of having an alternative means of transport has a positive impact on the daily lives of the islandic population as well. Waterplane passenger transportation meets the needs of such areas by connecting the entire coastline and islands throughout the year and thus improving their quality of life.

Moreover, waterplanes are also considered more environmentally friendly than ships or airplanes (Briguglio et al., 2002; Ballis *et al.*, 2018). The only requirements, apart from the natural water 'runway', are the construction of a floating bridge or pier, which provides passenger access. The choice of a site for the construction of a waterport depends on the ecological surrounding system. So, it is necessary to identify the positive and / or negative effects that may occur temporarily or permanently and affect the environment. The impact of waterports on the air quality of nearby residential areas depends on the number of waterplanes arriving at the port. In detail, the main sources of emissions in the waterplane port area are:

- The gases produced by the combustion of fuel in waterplane engines.
- The gases released into the atmosphere during refueling.
- Emissions from motor vehicles used to transport passengers, workers and visitors to the port.

The urgent need to introduce the waterplanes in Greece also stems from the fact that the introduction of waterplanes indirectly encourages the revitalization of local areas, especially the islands. A supportive policy planning framework from national to local level can help unleash the potential contribution and value of waterports to the economic, social and environmental well-being of regions, communities and individuals, together with the protection of these valuable assets. It is vital, therefore, to support a policy that recognizes the multifunctional nature of waterports and their contribution to the broader financial, environmental and social objectives, such as public health, sustainable development and enhancing resilience.

2.7 Existing Greek market

There is an significant level of interest in the waterplane market for the entrance of investors, as it was expected that by the summer of 2021 the first 30 waterports in various parts of the country will be ready for delivery and operation (Tsoni, 2021). Unfortunately, this prediction was not confirmed, due to the CoViD-19 pandemic and the anticipation has been carried over for the summer of 2022. The Canadian 'HarbourAir', the TransMalvidian of Blackrock and 2 Greek businessmen (Airwaves, Hellenic Waterplanes), are the first to be prepared, to make the waterplane trips in Greece a reality (Protonotariou, 2019). The waterplanes will start flying from Corfu, an ideal starting point due to the great tourist mobility to and from the island. Currently, 8 waterports are being prepared in the Ionian Sea to accommodate these trips. In the summer of 2022, the following waterports are expected to operate (Zoi, 2019):

- Aegean Sea: 8 waterports in Kalymnos, Leros, Lipsi, Syros, Paros, Naxos, Milos and Amorgos.
- Ionian Sea: 5 + 3 in Kefalonia, Ithaca, Lefkada, Zakynthos and Meganisi and Corfu, Paxos and Patras.
- Evia region: Kymi, Karystos, Edipsos, Chalkida.
- Sporades: Skopelos, Alonissos, Skyros, Skiathos, Volos.
- Future waterports to operate: Loutraki, Patmos, Tinos, Elefsina, Amfilochia, Sitia, Kalamata, Kamena Vourla.



Figure 2-5: The waterport grid licenced or under consideration in the Hellenic region (Hellenic Seaplanes, 2016).

2.8 The drawbacks of waterplanes

Despite the many advantages that the use of waterplanes present, there are several disadvantages that could not be ignored, especially when a business plan is to be designed. First of all, the waterplane operation is expensive (Gobbi *et al.*, 2011). The increased maintenance and operation costs may limit the attractiveness of the

investment. Indeed, small aircrafts are already expensive per passenger compared to cars or large aircrafts. On the other hand, waterplanes have additional operating costs: the floats themselves cost about 40% of the aircraft price and metal sheet damage is common. The latter is caused by things like sunken rocks, docks and waves from passing boats and accidents are mostly unavoidable due to the fact that waterplanes are meant to land in environments not easily controlled (Rodríguez et al., 2016).

Moreover, waterplanes suffer from severe saltwater erosion and fuel costs, due to greater traction. Also, waterplanes lack large passenger capacity. A waterplane has a few hundred pounds less payload than the aircraft version of the same type, due to the weight of the floats that have to be removed from the maximum total weight. It has to be noted that since any airplane trip involves time to travel to and from the airport, any waterplane less than 100-200 miles (160-320 km) takes more than a car ride (Pagonakis, 2016). In addition, a major problem is the highly corrosive marine environment, affecting metal surfaces and requiring extensive maintenance processes on both the boat structure and the engine. For this reason, despite the special anti-corrosion protection that is applied at a regular basis, corrosion problems reduce the time limit of life and operation of the various individual systems. Another important disadvantage of waterplanes is the inability of landing on a water surface after sunset (under the current regulations) (Leyva and Leonel, 2012).

2.9 The use (statistics) of questionnaires (capacity, type, time, cost)

Waterplanes have been operating for 100 years outside Greece. This indicates that in some countries there is not only the knowledge of the management and operation of waterplanes, but also a high level of technical expertise.

The literature review found a list of more than 350 operators and companies that focus in the field of waterplane trips. As seen in *Figure 2-6*, the largest number of waterplane operators globally is located in the USA, with 80% located in North America overall. This highlights that Europe hasn't exploited its full potential in this field, regardless of its extensive coastline and islandic regions.

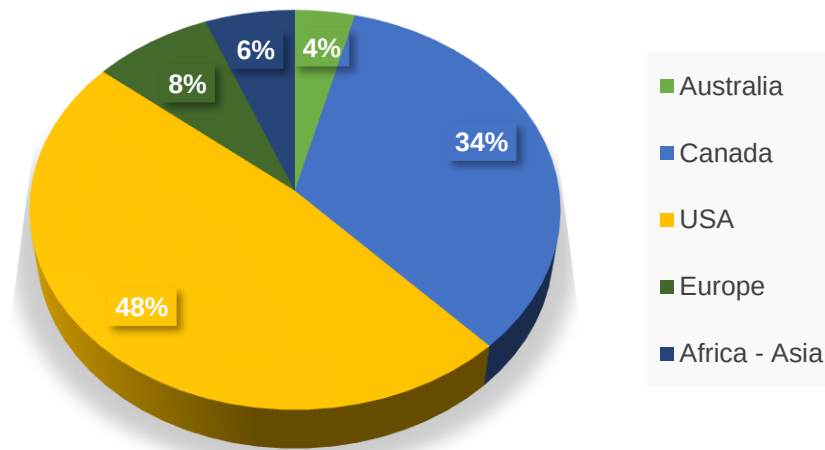


Figure 2-6: Waterplane operators' global distribution (adapted from Mohr et al., 2010).

Another informative survey in the field was conducted by Denz et al. (2007) and involved 1,200 waterplane pilots (professional and non-professional) from countries where this industry operates. Participants were primarily asked about the service background they usually offer (Figure 2-7). It was evident that the majority of waterplane flights were commercial and charter flights.

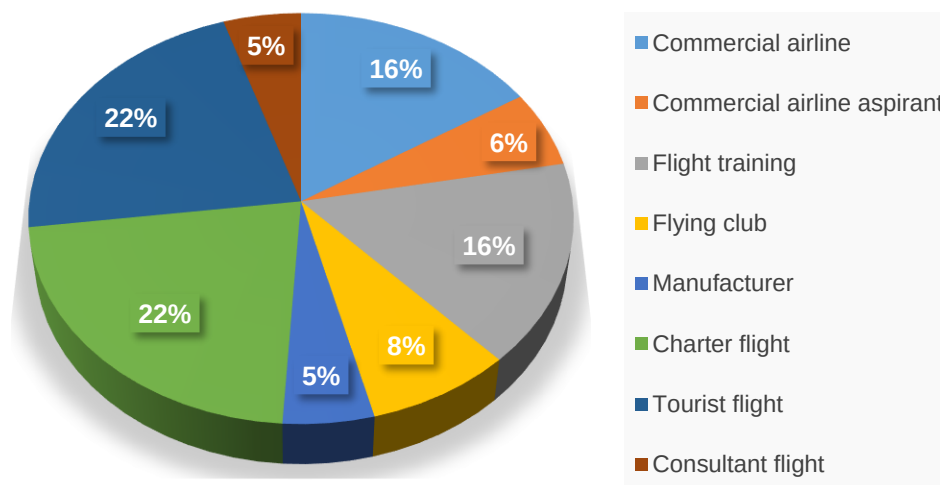


Figure 2-7: Type of waterplane services offered by the pilots (adapted from Mohr et al., 2010).

The survey participants were also asked about the occupancy rate of the participating flights (Figure 2-8), as well as the number of flights they operated per year (Figure 2-9). The average flight occupancy with any aircraft is 75%, while on the waterplane based on the below data seems to be 79%. However, conclusions from the number of flights cannot be withdrawn, as some non-professional pilots make 40 flights a year, while some professionals make 1200 flights a year.

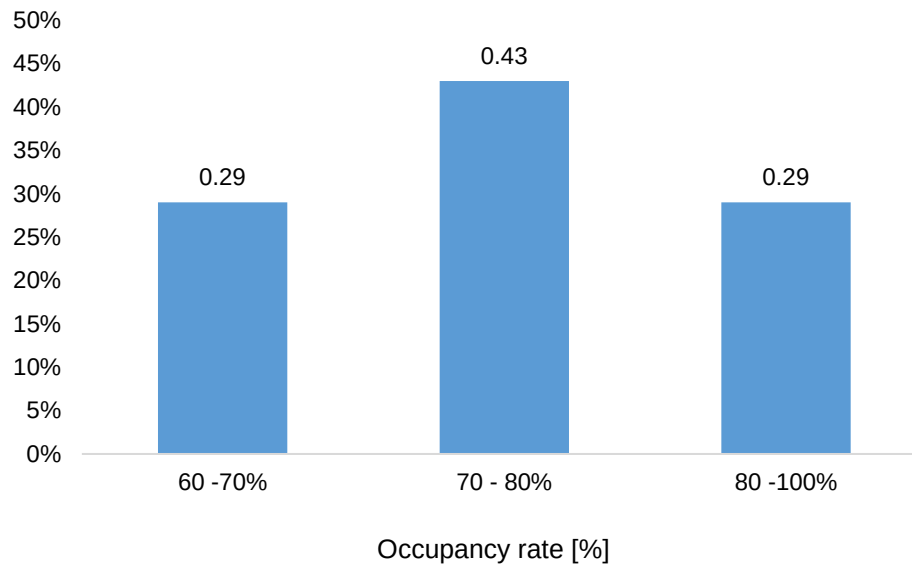


Figure 2-8: Occupancy rate of waterplanes (adapted from Mohr et al., 2010).

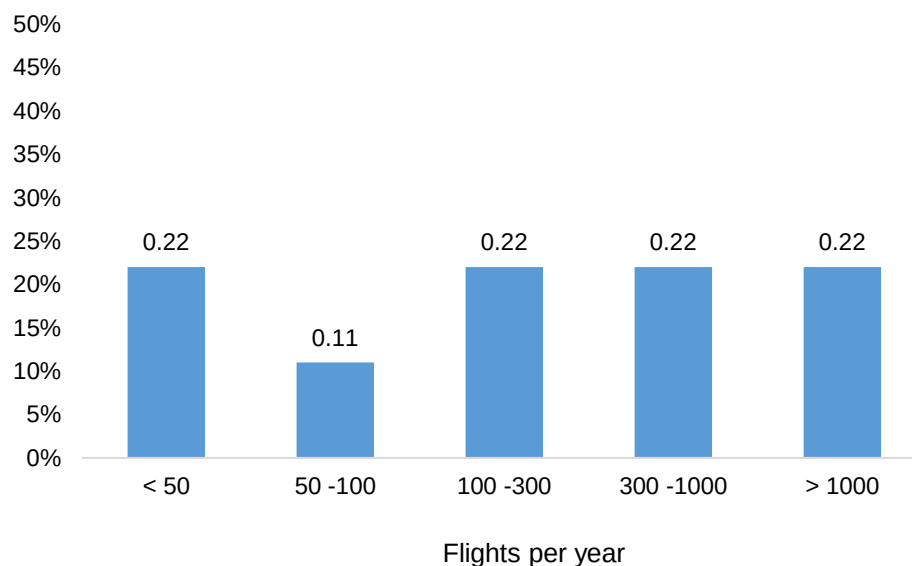


Figure 2-9: Average number of waterplane flights per year (adapted from Mohr et al., 2010).

In addition, the average flight time and distance were also included in the survey. The longest flight distances are performed by clubs and training flights, while the average distance for commercial flights is between 30 and 70 nautical miles (Figure 2-10). Similar observations apply to flight times, i.e., short times are performed by commercial flights, while long times, over 1 hour, are performed by aeroclubs (Figure 2-11).

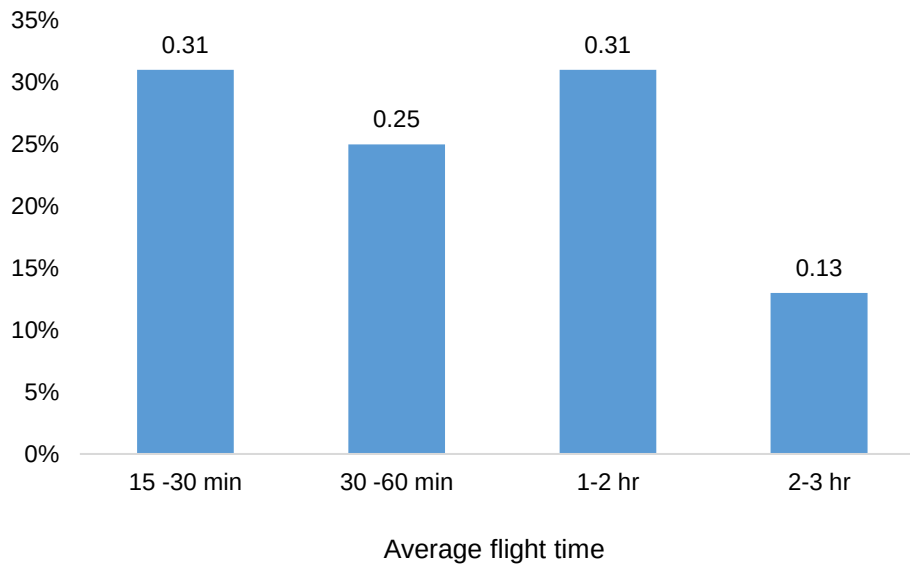


Figure 2-10: Average waterplane flight time (adapted from Mohr et al., 2010).

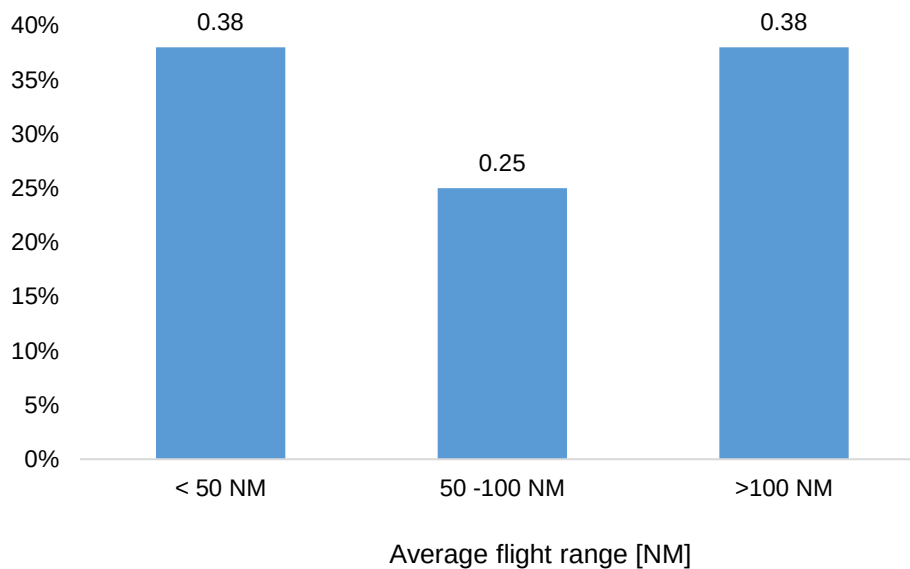


Figure 2-11: Average waterplane flight range (adapted from Mohr et al., 2010).

Finally, the respondents were asked about the type of connection between the three types of waterplane flights, ie from water to water, from land to water, and from land to land. In this case, 81% of the flights are performed from water to water.

Chapter 3. Methodology

Since this thesis aims to be a comprehensive plan of the waterplane business in the Hellenic region, both qualitative and quantitative methods were implemented (Saunders et al., 2006). For the writing of the literature review, business plan, and financial assessment research papers, case studies, scientific articles, books from the international/national literature, and results of previous questionnaires were used. Furthermore, for the research gaps that arose it was decided to collect raw data from a variety of people through a designed questionnaire and specialized individual interviews. The data obtained from the questionnaires and interviews, assisted in simplifying the assumptions and the unknown but necessary parameters of the waterplane topic.

Therefore, the methodology implemented is triangulation or mixed methods. By 'triangulation' we mean the 'mixing' of multiple methods in the study of the same phenomenon (Denzin, 1978). In other words, it is the use of more than one research technique in the study of the same research field where each is used to verify the results of the other. When a technique is used later, it verifies and develops the results of the previous one (Olsen, 2001). Triangulation is based on the principle that a single method cannot reflect the multidimensional social reality. To do this, you need to combine more than one method. In our case those methods are the literature review, the interviews, and the survey (Figure 3-1). Via mixed methods a semi-structured interview does not exclude the collection of statistics, and vice versa. These two can work in supplement. Silverman (1997) argues that 'looking at the same object of research from different perspectives we have a more complete picture of what we are examining'.

To the authors knowledge the findings of this research are unknown and the feasibility of such a project is yet to be found.

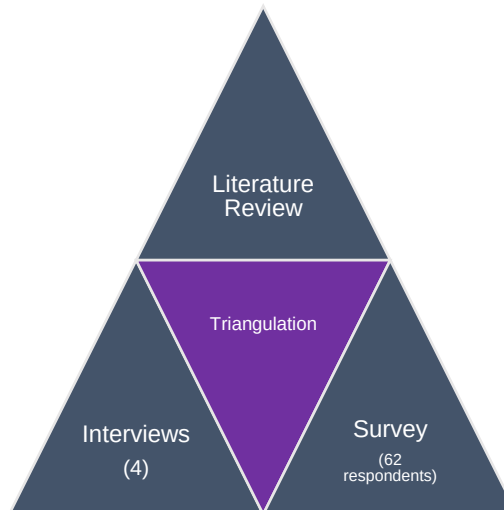


Figure 3-1: Triangulation and the methods used in this study.

3.1 Survey method

The questionnaire, the results/graphs of which are presented in chapter 6, aims to capture as much as possible the trend and highlight the choices from a total of 62 people who were asked about waterplane issues. The aim was to obtain information on whether the respondents would choose the waterplane as a means of transport, what are their preferences for the destinations, the flight reasons, the money they would spend for such a transport, etc.

As part of our plan to distribute the questionnaire we used Google forms and send it to a statistically homogenous sample of 100 male and female adults, between 18 to 108 years old people from a variety of cultural backgrounds, to have the best possible sample and more representative conclusions. The type of questions posed were primarily demographic, list and category questions (Davies and Hughes, 2007). The data collections resulted in an informative database that was analysed with the statistical software package of SPSS (Field, 2013). The data analysis gave us important insight on the target groups that may be interested and will support such a business. It also provided valuable information on the business aspects that may deter customers, and therefore to design the business investment in a proactive way. The actual questionnaire can be found in Appendix A and filled online in the following link: https://docs.google.com/forms/d/e/1FAIpQLSe4qiaEQWXqiKdDNCvU4ZLubVAUjTB_LWigmvklQRGIDgOZfUw/viewform?usp=sf_link

3.2 Individual interviews

The data collection went even further with the organising of individual interviews sessions with people that have experience in the aviation and tourism sector, which

functioned as catalysts for the holistic approach of analysis and recommendations. The interviews conducted provided information that could not be found in literature, since the respondents answered based on their personal experience and depending on their specialty.

The first interview was conducted with Ms. Pappas, former director of EOT, who explained the visitor statistics, but also the need of a multiple analysis in the selection of the best waterport location per zone of influence.

The second interview was with Mr. Giannis Bouras, CEO of Airwaves Consulting, who discusses the restrictions that have prevented the operation of waterports to date and the changes that need to be made in the legal framework.

The third interview was with Mr Theodorakopoulos, a travel agent in Heraklion, Crete, who highlighted the industry's and visitor interest towards waterplanes.

Finally, the fourth interview was given by Mr. Fortounas, director of the company 'Hellenic Waterports', who gave all the business, financial, technical information about the waterports and analysed the strategy of his company.

3.3 Ethical Approach

The answers that were given, through the questionnaire and interviews, for the analysis of the data will be used only for the needs of the elaboration of this specific work. The data will remain strictly confidential and private. There will be absolute confidentiality regarding any sensitive information or data that has come to my knowledge in the context of people participation in the above process. Participants will have the opportunity to withdraw their questionnaire/ sessions at any time. I will finally make sure not to disclose the gathered information to third parties without the subject's prior written permission. For ethical purposes, minors were excluded from this procedure.

Chapter 4. Business Plan

4.1 Introduction

This chapter contains an analysis on a comprehensive and holistic business design on how to organize a waterplanes network in the Hellenic region. Initially, there will be a market evaluation, the accompanied costs, and the benefits of such a venture, at both at individual and social level. The growth rate of the waterplane market in the European Union is 5% in the last decade, according to an EU study (EU, 2020). This rate is projected to increase in the coming years, which is why many countries are shifting their interest towards this sector.

Amongst them are Turkey, which operates flights from Moonlight Park, Kemer, to Antalya; Malta, which operates tourist flights for daily tour of the capital Valletta to the island of Glauco (Briguglio et al., 2002); the Maldives, where waterplanes travel to over 40 tourist destinations with about 150 flights per day.

By combining the advantages of the waterplanes and the EU subsidies to the declining shipping companies, such a business seems as a rather advantageous solution for both Greece and other countries characterised by coastal areas. Nowadays, shipping companies are forced to reduce their ferry trips to remote islands due high costs resulting in significant disruptions in the transportation and servicing of their habitants and their goods (cargo) (Newmoney, 2012).

4.2 Market Evaluation

Prior to any further analysis for the waterplane sector it is crucial to assess the market in which they will be operating (Blackwell, 2011). Since the waterplane market is still in its infancy we cannot have a crystal-clear image.

4.2.1 Tourism in Greece

Tourism is one of the primary pillars of the Greek economy; It constitutes about 21% of GDP, with an ever-increasing growth rate. In monetary terms, the tourism sector brought to the economy revenues of 51 billion euros or £44 billion in 2019 (INSETE, 2020). According to the database from the WTTC survey, the tourism sector employed 950,000 employees during that year (WTTC, 2020). Even during the years of the Greek financial crisis, the contribution of tourism to employment in 2008 was 14.7% and followed an upward trend in 2015 to reach 18.9%. It has to be noted that regardless of the country's severe economic recession, tourism has been and continues to prove that is the heaviest industry in the country.

The following *Table 4-1* shows both the direct and indirect contribution of tourism to the GDP until 2019, according to data collated from SETE reports (Association of Greek Tourism Enterprises), where the last column shows the forecasts for the year 2021.

Table 4-1: Direct and indirect contribution of tourism in GDP (INSETTE, 2020).

Category of Expenditures	2016	2017	2018	2019	2021
	€ million	€ million	€ million	€ million	€ million
Incoming tourist expenditures	12,749	14,202	15,653	17,784	18,500
Cruise tourist expenditures	457	171	433	457	650
Cruise companies' expenditures	169	1,432	120	127	350
Aviation transportation	1,326	90	1,715	1,914	2,100
Ferry transportation	133	90	98	96	350
Inbound tourism	1,287	1,323	1,715	1,886	2,500
Investments	615	615	1,411	1,178	1,000
Direct tourism impact	16,736	18,295	21,143	23,442	25,450
as % GDP	9.60%	10.30%	11.40%	12.50%	12.30%
Indirect & direct tourism impact	36,818	40,249	46,525	51,573	n/a
as % GDP	21.10%	22.60%	25.20%	27.50%	n/a
GDP	174,199	177,735	184,714	187,456	207,490

The number of tourists who spent at least one night in Greece in 2017 increased by 9.8% compared to 2016, reaching almost 23 million, according to a study compiled with the aim to monitor the tourist's profile who spent their holidays in Greece (SETE, 2020). The lion's share was occupied by European tourists last year with 20.5 million arrivals, compared to non-Europeans who reached 2.6 million arrivals. All markets recorded an increase in tourist flow in 2017, with the exception of the Russian market which showed a marginal decrease (-0.5%). The highest percentage increases were reported in the market of the Netherlands (+24.1%), Germany (+17.8%) and the USA (+12%) (INSETTE, 2020).

4.2.1.1 Trip purposes & types of vacation

The main reason for choosing Greece as a destination, by the majority of tourists (ELSTAT, 2021), was for holidays (88.8% for both years) for visiting friends and relatives (3.8% in 2016 and 4.4% in 2017), for conferences (3.1% in 2016 and 3% in 2017) and conventional business travel (2.4% in 2016 and 2.5% in 2017). The tourists who visited Greece for holidays, primarily did so due to the sun and sea (70.4% in 2016 and 68.4% in 2017) and then for historical tourism (11.3 % in 2016 and 12.8% in

2017), city break (7.2% in 2016 and 8% in 2017) and cruises (4.2% in 2016 and 4% in 2017).

4.2.1.2 Gender and age

Based on gender, in 2016 women were 51.6% of tourists, while in 2017 men were marginally more with a percentage of 50.5%. The majority of tourists come mainly from the age ranges of 25 to 54 years (64.8%). All age groups saw an increase in the number of visitors between 2016 and 2017 (WTTC, 2020).

4.2.1.3 Income and level of education

Most tourists who chose Greece for their holidays, came from the upper income class (57.8% in 2016 and 58.9% in 2017) and then from the middle - upper (24.7% in 2016 and 23.7% in 2017). Tourists with a median income of lower-middle and lower family income, represented 13.2% and 4.2% in 2016 and 13.9% and 3.5% in 2017 respectively (SKAI, 2018).

4.2.1.4 Advertising media & bookings

Regarding the media from which the majority of incoming tourists who visited Greece were informed through Internet sources (85.3% in 2017), followed by travel agency (44%), friends and relatives (19.6%) and tour operator lists (9.3%) (ELSTAT, 2021). As far as the Internet is concerned, the majority of tourists were informed by accommodation websites (49.7%), tour operator websites (38.7%), means of transport (31.5%).

Therefore, it is the sector in which more emphasis and attention should be given to attract new investments and services in the future. It is one of the economy sectors not yet saturated with multiple opportunities for new investments in accommodation, hospitality, etc. as well as in "blue ocean" strategies, such as waterplanes.

4.2.2 The waterplane market

Based on information found in countries in which the waterplane sector is currently operating and flourishing, an initial assessment can be prepared. According to other countries' data, the market is mainly divided into the following categories (Pagonakis, 2016; Ballis et al., 2018):

- Tourist flights.
- Leisure and entertainment flights.
- Local transportation flights

- Cargo flights.
- Firefighting flights

4.2.2.1 Leisure and entertainment flights

This category refers to consumers who are looking for fun and challenges during their leisure time. These flights are being performed by small aircrafts, which can be easily transported and have a low flight range, about 300 miles. This area will not be of interest in the present work, as the focus is on a more integrated network of waterplanes in the country.

4.2.2.2 Tourist flights

Several companies in Canada, the USA, Australia and the United Kingdom offer waterplane tour flights. These waterplanes usually are of 4-5 seats and fly to attractions, resorts, excursions, etc., in places that are inaccessible but in high demand, which are not or under-served by other means of transport (Alaskan Seaplane, 2021).

In Greece, such a flight could be, for example, over the shipwreck in Zakynthos, over the volcano in Santorini or over the lake of Ioannina.

These flights are usually operated by small businesses that own 1 or 2 waterplanes. Many of them even use these aircrafts for educational purposes, ie for the training of other waterplane pilots (Trans Maldivian Airways, 2021). They are also offer their services upon the request of the government for research purposes or for the transport of goods and passengers in emergencies. Another service they offer is romantic sunset flights or day trips with a stop at a historical monument for photos, food and rest. It should be noted at this point that most of these companies offer other things besides flights in order to have an extra source of revenue. A typical example of such a company is 'Loch Lomond Waterplanes Ltd' in Scotland (Airliner World, 2007). The company started its business in 2003 and employs 10 employees where it is allowed to carry up to 20 passengers, cargo and mail that does not exceed 10 tons. It chose Scotland as its headquarters because it consists of 790 islands, so it is an ideal location in the United Kingdom. The services it offers are cruise and charter flights to the west coast of Scotland in various places.

Although waterplanes have been active in the UK since 2003, there is no question of competition with conventional aircrafts, as their market share is quite small between

0.08 - 0.14% (1985-2011) (Gobbi *et al.*, 2011). However, this issue depends on the following areas (Briguglio *et al.*, 2002; Pagonakis, 2016):

1. From the tourist quality and the dynamics of the country, ie the number of visitors per year per region, as well as the amount of money spent per visitor. At the same time, it depends on the quality of the country's hotels and accommodation, the competitiveness of hotels and packages nationally/ internationally and especially the neighbouring countries that provide similar services, e.g. Italy, Turkey and Spain.
2. Another important factor is the strategy of the companies that will be active in the country for the operation of waterplanes and waterports, ie waterport location and flight schedules. In order to select the right locations, it would be useful to carry out feasibility studies on the minimum number of operations per region and per level of flight dynamics. Local stakeholders, such as the council, port organizations should contribute to this, and excellent cooperation with travel agencies is certainly required.

4.2.2.3 Local transportation flights

Although waterplane companies do not wish to focus on commercial flights for local citizen transportation, one of their goals is to enter into this activity as well. With the use of amphibious aircrafts, they will be able to perform flights from a small airport to a waterport from a waterport to another waterport or even flights from a large airport to a waterport at a long distance (FAA, 2018).

Some countries have already invested in similar routes, such as Canada, the USA, the Maldives and Malta. In Vancouver, Canada, Harbor Air Vancouver operates scheduled flights from April to October to a total of 8 destinations. One of the scheduled flights is from the city of Victoria to the surrounding islands. It operates almost all day flights of up to 20 minutes and is used for both business and commute. In the Maldives, Maldivian Air Taxi and Trans Maldivian operate flights from the country's Central National Airport to 40 different destinations (Trans Maldivian Airways, 2021). These destinations are mainly small islands, which do not have an airport. However, apart from scheduled flights, both companies operate charter flights and excursion flights. The Malta-based company, Harbor Air Malta operates scheduled flights from Valletta, the capital of Malta, to the island of Gozo (or Glauco). The flights last from 15 to 45 minutes and cover a distance of 30 to 220 kilometres (AirMalta, 2021).

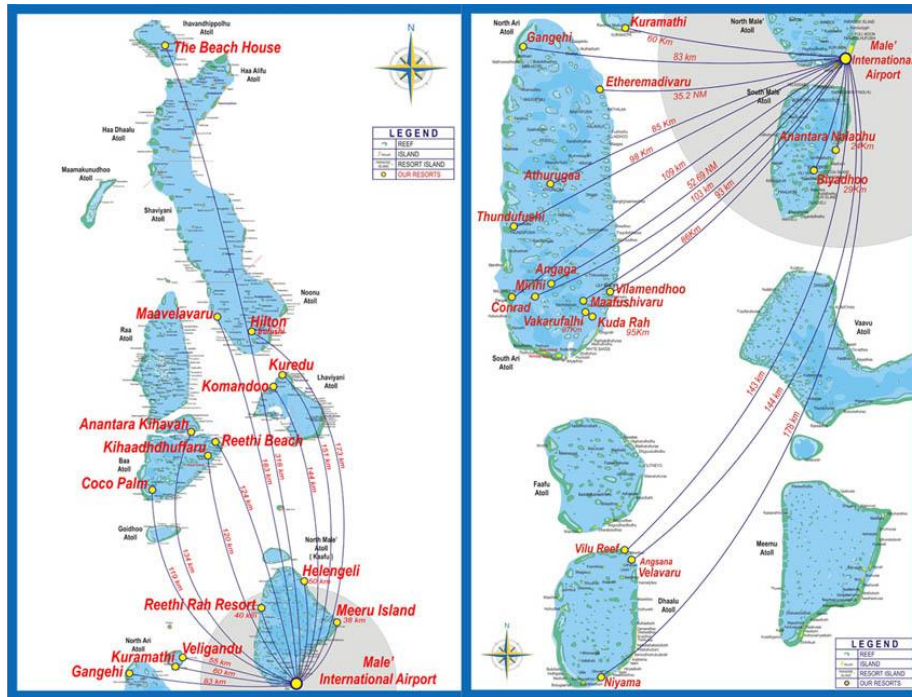


Figure 4-1: Map of waterplane routes in the Maldives (Airline Route Maps, 2021).

These types of flights have an important social aspect, because they can facilitate the transportation of the local community of the islands, especially the small and remote ones, so that they can commute quickly, economically, frequently to the central cities, as well as to central islands of the region in which they belong. This issue is multidimensional, and depends on the following parameters (Gobbi *et al.*, 2011; Ballis *et al.*, 2018):

1. An important parameter is the economic prosperity of the country and its citizens and in particular the financial freedom of entrepreneurs to make investments in the construction of waterports. In addition, the financial situation of the citizens is important so that they are able to pay for the waterplane tickets, which will be more expensive than the ticket of the ferry (the current conventional transportation media).
2. Another parameter is the stable course of Greece in the European Union, so that the country's remote travel connections continue to be subsidized by European funds. This will reduce the cost of tickets for these flights and make ticket fares affordable for islanders.
3. Another factor is the evolution of technology to find new, environmental-friendly and cost-effective methods of transportation for the island inhabitants.
4. It is important for the government to realise and apply the optimal transport study for the quantitative use of each means in each region. Also, the willingness of the state to

proceed vigorously to change the time-consuming bureaucratic procedures regarding the new means of transportation.

5. Another parameter is the marketing of water companies towards the citizen transportation. For instance, they should initially provide their services to the islanders at the lowest possible prices, so that they switch users interest towards the new means of transportation. Also, highlight waterplane safety and opt for low fuel consumption aircrafts, with the aim of keeping the cost of tickets as low as possible.

4.2.2.4 Cargo flights

This category mainly concerns the transportation of foods, goods, mail and freight. Due to the high cost of transportation and the heavy weight of cargo, this waterplane's type in most countries belongs to the army or the government. Russia and Japan, for example, have state-of-the-art waterplanes with a wide range of take-off and landing systems that can weigh up to 50 tonnes (FAA, 2018).

4.2.2.5 Firefighting or Rescue flights

As mentioned above, this market is mainly for military and government purposes. Indeed, Greece has experienced several devastating consequences from wildfires, and it is considered necessary to use aerial means of firefighting. Most countries with coastlines use such means, as the Canadair CL 415m, which is also widely in the Hellenic region. However, the cost of acquiring it is quite high, about \$25 million, and for this reason more cost-effective solutions are being examined (Rand, 2012).

4.3 Porter's Five Forces

One of the most useful tools for analysing a particular sector is the Porter's 5-Force Model, that focuses on the 5 competing forces of an industry. It allows the analysis of the businesses' competitive position in the sector in which they operate and enhances decision making (Johnson *et al.*, 2017; Armstrong and Taylor, 2020). These five forces are:

1. Threat of new entries.
2. Customer bargaining power.
3. Threat of substitutes.
4. Supplier bargaining power.
5. Rivalry among existing competitors.

4.3.1 Threat of new entries

Every new company entry into an industry causes reconstructions; as the new company tries to gain market share and is a threat to the existing ones, in our case in the waterplane industry. At first glance one would say that since the waterplane industry does not yet exist, there is no threat of new companies since all companies will be new entrants. But if we look at the bigger picture, waterplanes are the combination of sea and air transport. Therefore, the sector in which waterplanes operate is this of transport, which has as much history as humanity. For this reason, existing transportation companies may create barriers to candidate start-ups, such as (Sotiriadis et al., 2015) :

- Economies of scale, i.e., when potential competitors should enter the market with similar dynamics to those present.
- Consumer preferences for a specific brand, such as wanting to travel only with Aegean.
- Capital requirements for the introduction of a new 'player' in the market, such as the high cost of acquiring and maintaining an aircraft.
- Diversity in the service provided, such as lunch, facilities, service, use of technology for ticket issuance and check-in, etc.
- Legislative restrictions and trade policies.
- Barriers to accessing specialized technology.

Therefore, potential companies that want to engage in this industry should have already structured a strategy to overcome the obstacles that will be faced due to existing companies. One way to prevent this, is to go hand by hand with potential 'competitors', such as Aegean Airlines, and create strategic alliances.

4.3.2 Customer bargaining power

The bargaining power of buyers - customers depends on several factors; the customer size, needs and demand. Buyers wish to lower the market price of a service while simultaneously enjoying the highest amount of benefit. For this reason, they function as pressure points for companies in each sector to reduce prices and increase the quality of their services (Carter and Jones-Evans, 2012).

Waterplanes are a fledgling industry in Greece, which results to customers having limited or no bargaining power. However, there are several alternatives for the transportation of passengers such as the various ferry companies, airlines, coaches and private cars. Therefore, if a company wishes to invest in waterplanes they should

emphasize the convenience and frequency it offers to travel to islands and resorts, where alternative transportation is difficult and requires more than one means.

4.3.3 Threat of substitutes

The substitute product is the one the customer is willing to consume in lieu of another product or service that will fulfil its needs completely. Of course, it is very difficult to do, since no substitute can completely replace a main product or service. In the case of waterplanes, as we have already mentioned, substitute products are other forms of transport to a destination, such as airplane, ship, train, bus or other means.

4.3.4 Supplier bargaining power

Suppliers can influence an industry through their ability to fluctuate the prices or quantities. It can be said that a supplier has a bargaining power in an industry only if one of the following areas is valid (Armstrong and Taylor, 2020).

- The industry has a small number of companies.
- The product is unique.
- The substitution by the customer is costly.
- There are no substitutes.

In the waterplane market there are few companies involved in the construction of such aircrafts, whereas the aircraft types are specific depending on the passenger number. Also, the piers that waterplanes will be docked, primarily belong to regional port organisations, which determine the rents. Therefore, in such a new industry the bargaining power of suppliers is rather strong.

4.3.5 Competition between existing companies

The companies of an industry are completely interdependent. Even a minimal competitive move by a company will cause a visible impact on its competitors, who in return will do similar moves, such as a price alteration or sale. This competition is directly related to the following factors (Pagonakis, 2016):

- The number of competitors.

In the field of waterplanes there are yet no direct competitors in Greece, so this factor does not affect competition at least for the time being.

- The growth rate of the industry.

The wider sector in which waterplanes will be active is that of tourism. As we have already mentioned above, tourism is vital for our country.

- The characteristics of the product or service.

The main service that waterplanes will offer is the quick and easy movement to areas with high demand, which are not served, under-served or access is quite expensive and complicated.

- Need for capital.

Anyone wishing to enter the waterplane industry will have to spend resources for licensing, purchasing or leasing aircrafts, hiring qualified personnel such as pilots and waterport personnel. Obtaining these resources is quite expensive and so entering the industry is difficult.

- Diversity among competitors.

As mentioned before there are no direct competitors yet, so the diversity comparison should be done on the basis of indirect competitors, i.e. in the other types of air, land and sea transport. A distinctive feature of waterplanes is the ease of access to several areas, which just have sufficient water surfaces for landing and take-off and their lower costs in comparison with conventional airline companies.

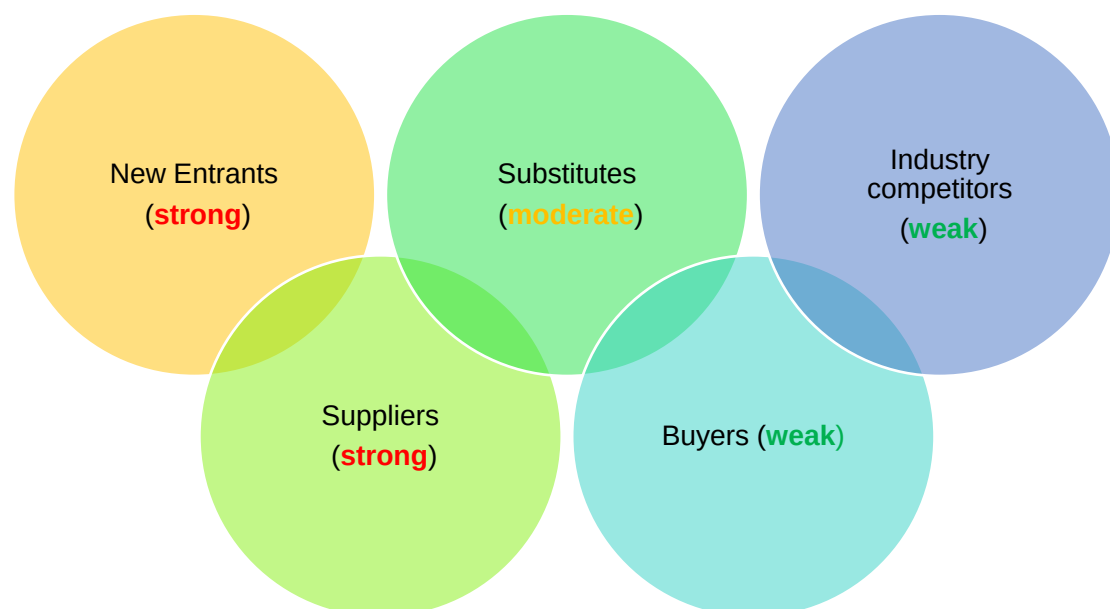


Figure 4-2: Porter 5-Forces Model illustration for the waterplanes.

4.4 SWOT Analysis

SWOT analysis is one of the most important tools for rational business management. This analysis gives an overview of the business or market sector of interest, to understand its current position what it needs to achieve its goals. These acronyms correspond to the words Strengths, Weaknesses, Opportunities and Threats. The first two refer to the internal environment of the company or the market sector while the last two refer to the external (McLaney, 2006; Blackwell, 2011; Armstrong and Taylor, 2020). Based on the market evaluation, the SWOT analysis for the waterplane sector is structured below.

Strengths

One of the strengths of waterplanes is the low level of air and sea pollution. A study by the US Army Corps of Engineers showed that the operation of waterplanes and amphibious aircrafts has no effect on air, water, soil and fauna quality (USACE, 2020). Waterplanes do not discharge sewage or oil from their tanks and are not treated with toxic anti-pollution paints, as ferries. The exhaust of the waterplane is emitted into the air, well above the water, providing a low environmental impact. The only discharge of water from the waterplane is a small amount pumped from the floats each day. Finally, there are no toilets on any waterplane intended for commercial operation with less than 20 seats. As a result, there is no sewage discharged into the environment by the aircraft. Also, the waterplane does not cause noise pollution. The decibels (dba) it causes during take-off and landing are 75 dba. Namely, a normal conversation corresponds to 65 dba, and a tractor to 95 dba (Gobbi *et al.*, 2011).

Another strong element of waterplanes is their infrastructure. As already mentioned, waterplanes do not need complex and expensive constructions to dock and land such as an aircraft. Therefore, it has a minimal overall footprint since it doesn't reserve large areas (Jovanovic *et al.*, 2016). In addition, since the distance needed for take-off and landing is much smaller than that of a conventional airplane, waterports can share the sea, lake, or river with other users such as ships, yachts, jet skis, etc. There is no need for large runway, since waterplane runways are already in place by nature. For this reason, waterplanes have from 40% to 70% more access to parts of the world, than the conventional planes (Denz *et al.*, 2007). The platform used by Harbor Air Malta is only 15x10m and the extra space needed for manoeuvres is estimated 1.5 times the wingspan or 1.5 times the length of the waterplane, depending on which of the two is larger.

Moreover, the waterplane has not recorded any adverse effects in wildlife. The animals that could be affected are fish and birds. However, waterplane floats are close enough to the water surface and do not reach such a depth that they affect the ecosystem's flora and fauna. The only animals that could be affected are birds. In any case, the endangered bird species are out of waterplane activity regions (USACE, 2020). It has to be noted, that when waterplanes are in the air they have exactly the same effect and risks as conventional airplanes. In other words, the effect of waterplanes on fauna and flora could be compared to that of a small sailboat.

Finally, in terms of societal needs and passenger convenience the advantages of waterplanes are obvious. Waterplanes are a safe, convenient and quick means of transportation. It connects directly areas that are difficult to access either for tourism or to provide assistance in emergencies, such as transporting a patient (Pagonakis, 2016). It offers effective aerial monitoring of inaccessible destinations, making it easier to manage wildlife and national parks. Just like airplanes, waterplanes share good travel safety statistics. Apart from the actual trips, however, waterplanes can offer sightseeing tours, which can attract many tourists who are willing to pay something extra to have a unique travel experience.

Weaknesses

Despite their dynamic, waterplanes are threatened with extinction. The termination of their activity from the Second World War onwards led to a lack of innovation in their construction resulting in them being more vulnerable to extreme weather conditions and large waves (FAA, 2018). There is a limited number of servicing bases for the maintenance and refuelling of waterplanes, therefore this risk and maintenance costs should be investigated more detail.

Due to the fact that waterplane activity in Greece and Europe is still in its infancy, there are no experienced pilots for these types. The most experienced pilots are located in North America, which makes it quite expensive to train domestic pilots from scratch.

Another weakness is the delay and complexity of bureaucratic procedures for licensing waterports and regulate the commercial activity of waterplanes. I wasn't until 2020 that the legal framework for waterports was completed in Greece (Ballis *et al.*, 2018), which started in 2004, i.e. 16 years later. There is also difficulty in deciding upon the right location of the waterports. For a waterplane to dock, the company should hold the relevant permission from the local and national authorities, even though it has the ability to land in any type of water body. This can result in significant delays in the launch of waterplane networks, but also in the addition of new travel destinations.

Opportunities

The waterplane market is a relatively new and unknown market, which has not started its widespread activity. Therefore, it is difficult to make a reliable forecast for future demand. In any case, by targeting a new market and following the blue ocean strategy, several opportunities can be created (Chan and Mauborgne, 2015).

Firstly, it creates frequent and quick transportation between areas, mainly islands, with enough water surfaces. It can serve passengers faster compared to ships, trains and buses, especially in a country like Greece, which consists of many remote islands.

Due to the 'green economy' that should dominate future entrepreneurial ventures, the waterplane is a fairly ecological means of transport (Sotiriadis et al., 2015). This creates the opportunity to attract more tourists, more aware of their overall footprint, and in combination with the unique flight experience make the waterplanes a strong competitor.

One of the disadvantages of waterplanes is that they can fly until sunset at the latest. This creates an opportunity for the installation of new technologies in these aircrafts such as GPS, radar, laser altitudes, IoT, headlights, etc. In this way the above disadvantage may not exist in the future. Another opportunity, which presupposes the success of waterplanes in the market, is the design and construction of larger ones to make longer trips and carry more passengers. In addition, some existing aircrafts could be modified by adding floats and other required components to convert them to waterplanes, thus reducing the cost of building new ones (FAA, 2018).

Finally, research and development in the field of aeronautics and shipping is strengthened. New needs and new opportunities are created for the design of waterplanes that can fly at night or electric ones. In other words, new jobs could potentially be created for engineers, designers and scientists who will work in this field. In addition, with the creation of this new market, the passenger will have more transportation options and thus avoid congestion at airports and ports.

Threats

There are also some serious threats that a potential waterplane investor should take into consideration in order to structure future operating strategies.

One of the most important threats is the passenger's perception about the flight safety of small aircrafts (Mohr et al., 2010). Although airplanes are statistically the safest means of transportation, many still fear an accident. One way to deal with this threat

is to inform the public about studies that show flight safety, but also provide clear safety instructions, so that it is understood that even in the event of an accident there is an escape plan. The lack of experienced pilots and their training duration is an additional threat to the activity of waterplanes. This can cause significant delays in the start-up time of the business, but also in the passenger confidence building period.

Another threat is once more the time required for the licensing and operation of new waterports and waterplanes (Ballis et al., 2018). Combined with the high initial cost of the investment it is a threat that can hardly be overcome.

Furthermore, the metallic corrosion due to the seawater contact increases maintenance/ replacement costs of waterplanes. New materials should be applied in the future to control or eliminate this problem (FAA, 2018).

Finally, the more expensive waterplane fares than the ship, train or bus combined with the habit of passengers in other modes of transport is an additional threat, which may be addressed with a targeted marketing plan. Table 4-2 is a summary of the Strengths, Weaknesses, Opportunities and Threats analysed above.

Table 4-2: Summary of SWOT analysis environment.

STRENGTHS	WEAKNESSES
• Eco friendly (fauna, flora). • Easy access to the islands. • Lower ticket fee than airplanes. • No need for sophisticated construction for landing. • Faster than bus and ferry. • Original passenger experience. • Connection with all islands.	• Lack of construction innovations. • Small number of landing bases. • High cost for operation and maintenance. • Lack of experienced pilots. • Small passenger occupancy potential. • Slower than airplanes. • No flights after sunset. • Susceptible to weather conditions. • Long procedures/ delays in licensing.
OPPORTUNITIES	THREATS
• R & D. • Alternative tourism. • Connections with multiple regions. • Construction of bigger waterplanes.	• Security concerns of the public. • Time and cost consuming for new pilot training. • Bureaucracy for the issuance of new licenses.

• Conversion of airplanes to waterplanes. • Strategic partnerships with tourist operators and transport companies. • Flight expansion in nearby out-of-the country destinations. • Growth of tourism.	• High initial capital investment and maintenance. • Difficulties of altering passenger habits. • High competition from other means of transport. • Economic recession. • Lack of supportive business environment
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4.5 Human resources

In order for a company to operate, the most important factor is its employees, ie its human resources. Both the operation of waterports and the launching of waterplanes will lead to the creation of new jobs, both direct and indirect. The human resources that such a company will need are (Hellenic Seaplanes, 2016):



Figure 4-3: Staff needed for the waterplane operation.

For the efficient operation of a waterports the following positions will be needed:



Figure 4-4: Staff of waterports

A result of all the activity will be the creation of other jobs due to satellite initiatives that will be created. These positions can be available in various commercial and tourist shops, in bars - cafes and other businesses in the restaurant area, in tourist resorts, which will have increased attendance, etc.

Chapter 5. Financial Analysis

The main income of any commercial airline and subsequently for one that operates in the field of waterplanes, is the ticket fare. Therefore, a financial assessment needs to be conducted in order to investigate the potential profitability and viability of the venture (Arnold and Lewis, 2019). The initial step towards this assessment is to define the variables (Weetman, 2013); the factors by which ticket fares will be determined. These are:

- i. the cost of fuel,
- ii. the fuel consumption of the aircraft,
- iii. the cost of salaries,
- iv. the cost of the waterport fees,
- v. the cost of maintenance,
- vi. the cost of tax,
- vii. the aircraft seat capacity,
- viii. the cost of repaying the loan for the acquisition of the waterplane or the cost of leasing,
- ix. season of activity,

Based on the above variables, the equation of the flight cost is as follows (Pagonakis, 2016):

$$\text{Cost} = \text{Fare Tax} \times \left[\frac{t}{60} \times (\text{Fuel} + \text{Payroll} + \text{Leasing}) + \text{Waterport Cost} \right] \quad (\text{Eq. 5.1})$$

The cost of the fare tax is the tax imposed by the government on the fares of each flight. It is equal to the tax fare of the waterport per flight and will be symbolized with "T", where:

$$T = (100 + \text{VAT}) \% \quad (\text{Eq. 5.2})$$

The **cost of fuel** is considered the cost of fuel consumption per hour of the selected waterplane, which depends on the type and weight. This will be symbolized with **P**.

The **cost of payroll** is essentially the cost of the wages offered to the two pilots of the waterplane symbolized with **S**.

The **cost of leasing** is the overall cost per flight hour and is divided into *cost per flight hour* and *mechanical maintenance costs per flight hour*. A company could opt to repay a mortgage by buying a waterplane, but it seems more advantageous to start by renting

it from first. This overall cost will be denoted by R , whereas R_1 and R_2 will be the flight and maintenance costs, respectively. So, in more detail: $R = R_1 + R_2$ (Eq. 5.3)

Leasing companies choose to provide mechanical maintenance services themselves for two reasons; Primarily to increase their income and secondly to supervise the proper maintenance of the aircraft.

The **cost of the waterport** is the amount paid by airlines for landing, mooring, and using the waterport's facilities. This cost will be denoted by K_w . The cost of landing depends on the MTOW, i.e. the maximum offshore weight of the waterplane. This is defined by each waterplane manufacturer based on the following (Pagonakis, 2016):

- MTOW $\leq$ 5.7 tons € 5.00 to € 10.00 per landing.
- MTOW > 5.7 tons € 10.00 to € 15.00 per landing.

The cost of mooring is calculated in a similar way:

- MTOW $\leq$ 5.7 tons € 0.20 to € 0.40 per mooring.
- MTOW > 5.7 tons € 0.40 to € 0.60 per mooring.

The cost for using the rest of the waterport facilities depends on the provision of basic flight services, i.e. waterplane guidance, anchoring, means of boarding and disembarkation, luggage loading/ unloading, ticket control, etc.

However, the cost of the flight, as mentioned before, also depends on the **fullness or not of the seats**. By sufficient occupancy we mean the number of positions where we achieve:

$$\text{Revenue} - \text{Expenses} = 0 \text{ (Eq. 5.4)}$$

Namely, the number of positions by which an equilibrium point (0) will be reached. If m is the maximum waterplane passenger capacity and B_0 the number required to reach the equilibrium point, then the required occupancy will be:

$$B = \frac{B_0}{m} \rightarrow B_0 = B \times m \text{ (Eq. 5.5)}$$

Time is defined as the flight distance in relation with its speed:

$$t = \frac{s}{u} \text{ (Eq. 5.6), where } s \text{ (km) is the distance and } u \text{ (km / h) is the velocity.}$$

So, by referring to the overall cost as K , equation 5.1 becomes:

$$5.1 \rightarrow K = T \cdot \left[\frac{t}{60} \cdot (P + S + R_1 + R_2) + K_w \right] \text{ (Eq. 5.7) or}$$

$$K = (100 + \text{VAT}) \% \cdot \left[\frac{t}{60} \cdot (P + S + R_1 + R_2) + K_w \right] \text{ (Eq. 5.8)}$$

When dividing equation 5.8 by B_0 , which is the critical point occupancy, then we will come up with the minimum ticket cost. The cost of the ticket will be denoted with K_F . Therefore, we will have:

$$K_F = K / B_0 \text{ (Eq. 5.9)}$$

Once we have defined our equations and before proceeding into the actual calculation of the flight cost and fare, several assumptions need to be considered.

Some other parameters that may affect the actual cost such as seasonality, unforeseen costs (breakdown, company operating costs, etc) and other types of funding were not taken into account. Therefore, the results are indicative of how much is the minimum of the fare cost so that this venture is viable. But in addition to the cost of the flight and the ticket, the company has to think about other costs and challenges that will have to face like weather conditions, delays, cancelling of the flights, etc. It should be considered how these conditions can affect its activity both in time and cost.

To date, there are multiple types of waterplanes that present different characteristics. For the purposes of this thesis, Dornier Seastar CD2 was selected, due to its variable technological superiority and matching with the needs of Hellenic geography (Wings, 2010; GTP, 2014). It is characterised as the most advanced amphibious aircraft and its maximum velocity of Dornier Seastar CD2 is $u = 333 \text{ km/h}$ (Dornier Seawings, 2019).

The financing method that was selected was through leasing instead of a mortgage or private capital. Therefore, the overall cost includes the leasing expenses. For a waterplane of this type the operating costs are approximately \$300 and the maintenance costs are \$90 per flight/hour (Wings, 2010; Vikings Air Ltd, 2021). The sum is \$390 = £282 per flight hour. For comparison, a conventional aircraft of the same type and occupancy, Cessna 208 Caravan, presents a cost of £422.40 per hour.



					
Max Cruise Speed	Max Range	Max Passengers	Max Take-off Weight	T&L distance	Wave Height
333 km/ h	900 NM	12 PAX	5100 kg	684 m	0.6 m

Figure 5-1: Dornier Seastar CD2 features.

From the company's specification of the waterplane, the Seastar fuel consumption is 380 litre per hour (Avron, 2010). The fuel used in this type of aircraft is kerosene, which as of July 2021 costs \$0.80 per litre (£0.58 /L). Therefore, the total fuel cost per flight hour $380 \cdot 0.58 = £220.4$.

Every aviation trip is equipped with two trained pilots (captain and first officer) of this specific type of waterplane. It is assumed that the average pilot's salary will be £2.100 per month. If they work a shift of 8 hours per day, their flight hours are approximately 5. If we add to the assumption that they work 20 days a month, then

$$S = \left(\frac{2100}{20 \times 5} \right) \times 2 \rightarrow S = £42 \text{ per flight hour for both pilots.}$$

According to article 18 of Greek law (4663/2020), the waterport operator shall determine the tariffs for the services provided for aircraft and passenger services. In addition, article 19 of the above states that 'For each passenger departing from the waterport, the aircraft company operating the flights shall pay a fee in favour of the Greek State equal to five percent (5%) of the net fare corresponding to a specific itinerary (Greek Parliament, 2020).

If we assume that the average price of the waterport fees is €100 then we will have that $K_w = £80.00$.

After the VAT is applied (5%) we will have $T = 105 \%$. Now if we substitute all the above calculated numbers equation 5.7 becomes:

Fee VAT	T	105%
Fuel consumption	P	£220.4
Pilot salary	S	£42
Operation cost	R ₁	£217
Maintenance cost	R ₂	£65
Waterport expenses	K _w	£80

Therefore

$$K = T \cdot \left[\frac{t}{60} \cdot (P + S + R_1 + R_2) + K_w \right] \rightarrow$$

$$K = 105\% \cdot \left[\frac{t}{60} \cdot (220.4 + 42 + 217 + 65) + 80 \right] \rightarrow$$

$$\rightarrow K = 1.05 \cdot \left[\frac{t}{60} \cdot (544.4) + 80 \right] \rightarrow$$

$$\rightarrow K = 1.05 \cdot (9.07 \cdot t + 80) \rightarrow K = 9.53 t + 84 \quad (\text{Eq. 5.10})$$

The above equation represents the cost equation of the flight of a waterplane as a function of time. Dividing the above equation by the perspective passengers of a flight we have:

$$K_F = \frac{K}{B_0} \rightarrow K_F = \frac{9.53 t + 84}{B_0} \quad (\text{Eq. 5.11})$$

Scenario No. 1

In the ideal scenario, the waterplane flies in full capacity, meaning that all 12 seats are occupied. So, with the following calculations from equations 4.5, 4.6, 4.11 we will determine the breakeven point for the ticket fare. In this point the expenses are equal with the revenue. From that point onwards the company will start to record gains according to the final ticket fare. The aircraft flies at a cruise speed of 333km/h and a stall speed of 120km/h, therefore we calculated and use the average of the two as a reference (226 km/h). The range of the aircraft is 150 NM (277.8 km) thus the flight distance ranges from 20–260 km.

Table 5-1: Calculations of the ticket costs (100% occupancy).

S	u	t	B ₀	K _F
[km]	[km/h]	[min]	[seats]	[£]
20	226	5.3	12	11.2
40	226	10.6	12	15.4
60	226	15.9	12	19.7
80	226	21.2	12	23.9
100	226	26.5	12	28.1
120	226	31.9	12	32.3
140	226	37.2	12	36.5

160	226	42.5	12	40.7
180	226	47.8	12	45.0
200	226	53.1	12	49.2
220	226	58.4	12	53.4
240	226	63.7	12	57.6
260	226	69.0	12	61.8

From the table it can be observed that the selected waterplane has a variety of travel times from 5 to 70 minutes according to the distance. Whereas the ticket fare has a minimum of £11 to £62. From Figure 2-10: Average waterplane flight time the majority waterplane flights are between 15-30 minutes. In the specific waterplane such a trip will cost £20-30.

Scenario No. 2

However, the reality is far away from the ideal scenario, so that leads to another case. As mentioned in the literature review (Figure 2-8) the majority of the waterplane flights (43%) run with an occupancy of 75–80%. For this reason, the initial assessment will be done according to this hypothesis, to investigate the cost of ticket to breakeven (eq. 5.4).

Table 5-2: Calculations of the ticket costs (75-80% occupancy).

S	u	t	B₀	K_F
[km]	[km/h]	[min]	[seats]	[£]
20	226	5.3	9	15.0
40	226	10.6	9	20.6
60	226	15.9	9	26.2
80	226	21.2	9	31.8
100	226	26.5	9	37.4
120	226	31.9	9	43.1
140	226	37.2	9	48.7
160	226	42.5	9	54.3
180	226	47.8	9	59.9
200	226	53.1	9	65.6
220	226	58.4	9	71.2
240	226	63.7	9	76.8
260	226	69.0	9	82.4

From the table it can be mentioned that with the occupancy of 9 seats the minimum cost of the ticket is increased significantly. Namely, for the same distances the ticket fare has a minimum of £15 to a maximum of £83. From 100% occupancy to 75% in a flight, the ticket fare increases by 25%. A trip between 15-30 minutes will now cost £26-37.

Taking as an example companies already operating in other countries Harbor Air in Canada for a 120 km flight charges £90 (\$125.00), Air Malta in Malta for half day excursions charges approximately £100, while in Alaska 'Alaskan waterplanes' for a route of 35 km, they charge approximately £40. All these business are running successfully for a long time and report profits (AirMalta, 2021; Alaskan Waterplane, 2021; Harbour Air Waterplanes, 2021).

5.1 Waterplane versus airplane/ ferry/ bus/ car

To examine whether the waterplane will be a potentially sustainable investment both financially and as an alternative to the existing transportation means, an example will be utilised of a passenger travelling to Skiathos. Skiathos is an island of the Sporades archipelago, which in a straight line is located 135 km from Athens (VA, 2021). If we suppose that a resident of Athens wants to go to the island of Skiathos can do so by several options.

Option 1 (with own car)

If we assume that they have a car, the first option is to drive from Athens to Agios Konstantinos, Fthiotida, with a distance of 190 kilometres and a duration of 2 hours and ten minutes (VA, 2021). From there they will take the ferry to the port of Skiathos with a cruising duration of about 4 hours. The cost for this option is:

- Fuel cost = £19.3 (with an average price of petrol of £1.36 per litre and fuel consumption of about 14.2 liters).
- Toll cost = £12.
- Cost of ferry ticket (Agios Konstantinos to Skiathos) = £26.

The total cost of the trip is £57.3, and the total travel time is 6h and 10min.

Option 2 (by bus)

If the passenger does not have their own car. Then the second option is to get the coach from Athens to Agios Konstantinos, Fthiotida, a distance of 190 km and duration 3 hours and then embark on the ferry to Skiathos with duration 4 hours (Direct Ferries, 2021; KTEL, 2021). The cost in this case will be:

- KTEL ticket cost = £12.
- Ship ticket cost = £26.
- Other transportation costs to the coach station = £2-10.

The total cost will be £ 40-48 and last almost 7 hours. Much cheaper than the first option, but more time consuming.

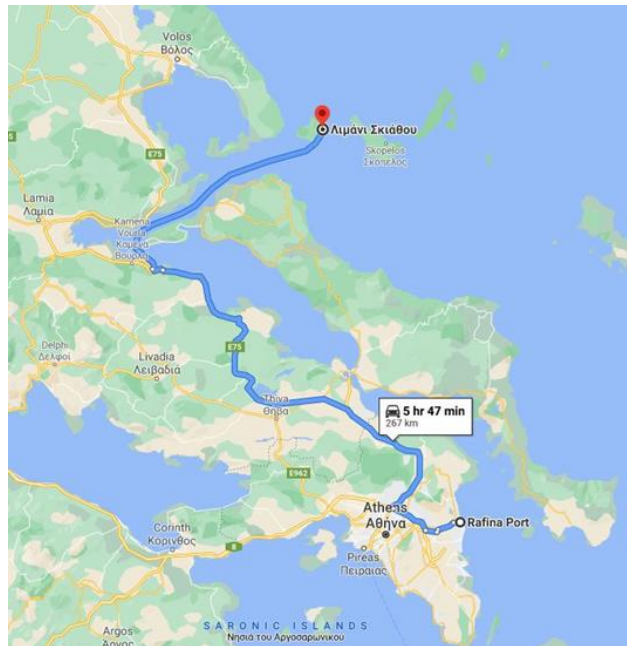


Figure 5-2: Route by land & sea Athens-Skiathos

Option 3 (by airplane)

The third option is to fly to Skiathos Airport from Athens International Airport with Aegean Airlines with an average ticket fare of around £70 and a flight duration of 40 minutes (Aegean Airlines, 2021). We should also include the cost of transportation to Athens airport, which is £10 by tube and £30 by taxi, and take 40 minutes from the city center (Booking, 2021). The total cost of the trip is a minimum of £90 and does not exceed two hours.

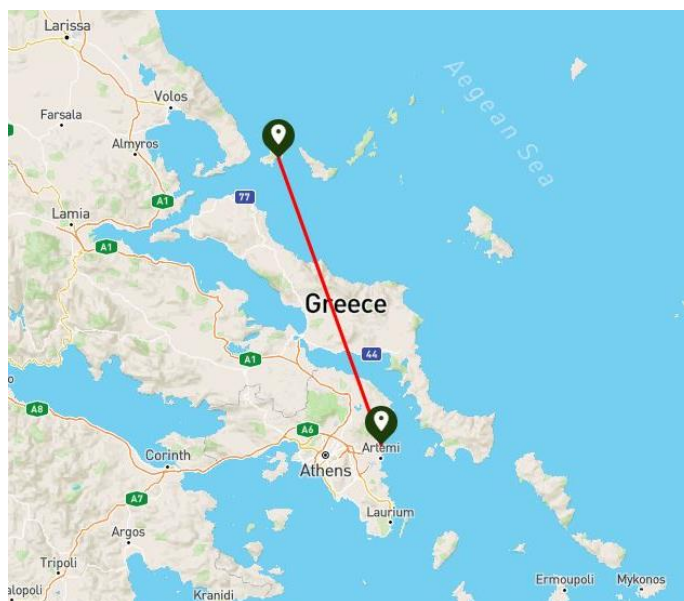


Figure 5-3: Route by air Athens-Skiathos

Option 4 (by waterplane)

The fourth option could potentially be the transportation to Skiathos via the waterplane. As a starting point the projected waterport has been selected in the port of Piraeus, which will be formed as an extension of the Athenian Riviera. The trip from the centre of Athens to the port of Piraeus will be done either by public transport (local bus, subway) or by taxi. The cost will be between £2-10 with an average trip time of 30 minutes.

Below we will evaluate the ticket prices for this option and the duration of the trip based on the two scenarios analyzed above in relation to occupancy, scenario No1 and No2. In both scenarios the waterplane trip duration will be 40 minutes and another 30 minutes to reach the waterport, in total 70 minutes.

Occupancy 100%: The ticket price for a 135 km route corresponds to a base rate of £36.5 (Table 5-1). Meaning that this should be the minimum ticket price for the company to break even.

Occupancy 75%: The ticket price for a 135 km route corresponds to a base price of £ 48.7 (Table 5-2). If the company wishes to have some profit, then the ticket fare should be higher than the above price.

By the evaluation of all the options, the summarized costs and trip duration of each trip can be found below:

Table 5-3: Cost and duration of all means of transportation from Athens to Skiathos.

135 km	Duration [min]	Means of Transportation [£]						Total Cost [£]
		Car	Bus	Airplane	Ferry	Other	Waterplane	
Option 1	370	31.3	-	-	26	-	-	57.3
Option 2	420	-	12	-	26	2-10	-	40-48
Option 3	80	-	-	70	-	10-30	-	80-100
Option 4	70	-	-	-	-	2-10	36.5 (100%)	> 38.5-46.5 (100%)
							48.7 (75%)	> 50.7-58.7 (75%)

From our example of a passenger travelling from Athens to Skiathos, it is observed that the most economical option is the coach (2), with a total cost of £40-48 and the most time-consuming trip with a total travel time of 7 hours. The shortest trip is by waterplane and plane, where the whole trip will take 1 hour and 20 minutes. The net flight time of both the airplane and the waterplane is 40 minutes. Of these two, the plane is the most expensive, about twice as expensive as the bus/ car and ship. The

price of the waterplane is not far from the price of the car and takes five times less time.

In other words, it is proved that the waterplane is a potentially beneficial solution for consumers and a significant competitor for existing means of transport.

Chapter 6. Questionnaire Discussion

The thesis questionnaire (Appendix A) was sent to 100 people from which 62 replied with their answers. From this amount of people 45% were male and the other 55% were female respondents. The age range was from 18 to 65 plus, with the largest part of respondents representing the ages of 36-50 years old (60%) followed by 26-35 years old (24%). It has to be noted that only two respondents belonged in the age group 18-25, hence this sample cannot be regarded as representative. 77.4% of the respondents have completed university degrees, 14.5% have graduated from high school, and there is also a small percentage that have obtained a doctorate (8.1%). The most common type of traveler from an array of 5 options was the family one 27.4%, followed by couples (22.6%), solo travelers and group of friends (21%). In this case, the answers given cover all the traveler type options; thus, the picture is complete.

Gender
62 responses

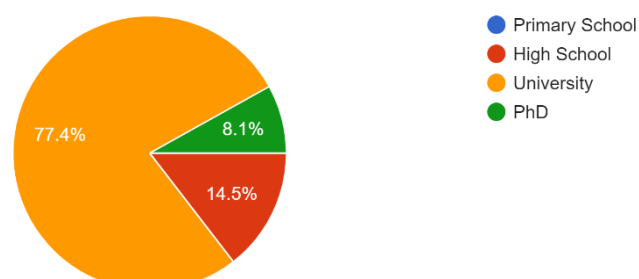
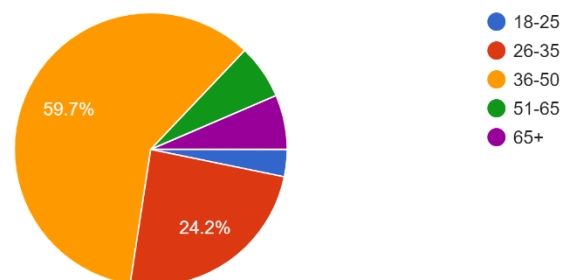
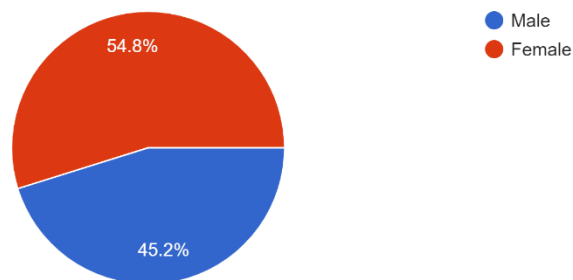
a)

Age
62 responses

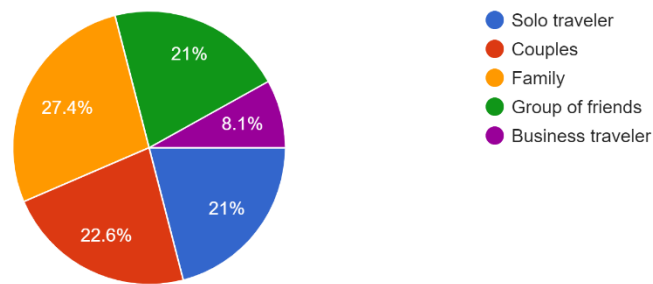
b)

Education level
62 responses

c)



Type of traveler (most common)
62 responses



d)

Figure 6-1: Demographic pie charts for (a) Gender, (b) Age, (c) Education level and (d) Type of traveler (62 participants).

From the questionnaire analysis it was observed that the majority of participants are usually travelling during the summer (38.7%), and to a lesser extent in autumn (16.1%), spring (12.9%) and winter (6.5%). There is also a large percentage of those that said that they are travelling all year around (Figure 6-2: Travel season of preference.

What time of the year are you usually travelling?
62 responses

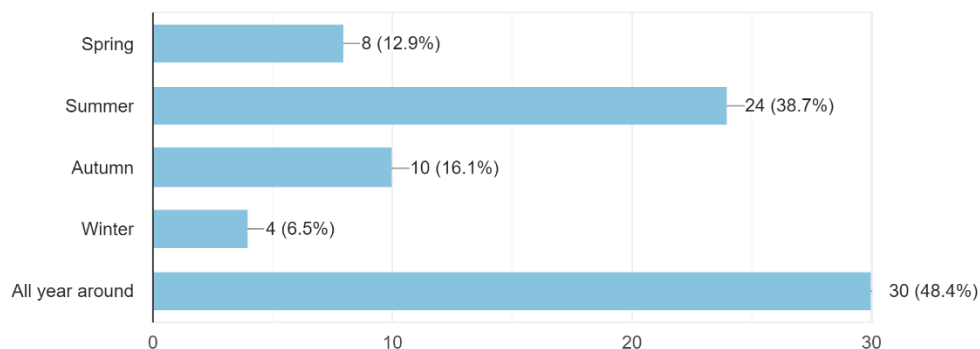


Figure 6-2: Travel season of preference.

The waterplane is not a widespread means of transport neither in Europe nor in Greece, and therefore this is noticed with the fact that only 3 participants have actually travelled with the waterplane. From them one has responded that they want to do it again and the other two answered maybe. On the other hand, there is great enthusiasm from those that they had never tried a waterplane: 77.4% are looking forward to travel by a waterplane, whereas 19.4% are skeptical. Only one was negative and explained that the main reason behind this is that he feels that waterplanes will increase noise pollution and destroy remote areas. The idea of travelling with waterplanes seems exciting for more than half of the responded and a minor percentage (14.5%) would only use it if it was necessary.

If the response is No, would you like to travel in the future?
62 responses

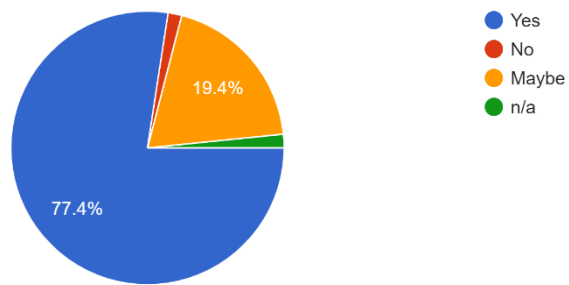


Figure 6-3: Would you like to travel with a waterplane in the future.

Do you like the idea of travelling with a seaplane?
62 responses

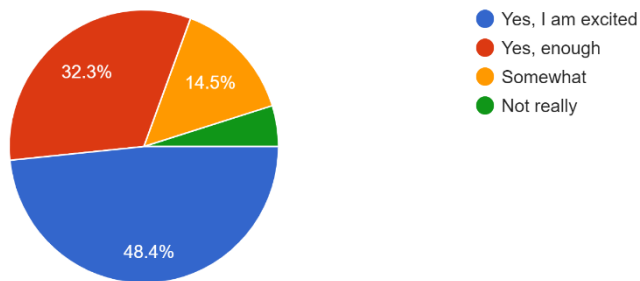


Figure 6-4: The idea of travelling with a waterplane.

There are no significant variations between the numbers that preferred waterplane trips with duration of 15-30 minutes, 30-60 min, and >60 min. In fact, it was surprising that almost 1/3 of the people feel comfortable with the trips over an hour in so small aircrafts. In any case a very small percentage (<2%) would not want to travel than more to 15 min. The above is also confirmed in a similar survey performed by Mohr et al. (2010) in Malta on the preference of flying times.

How long would you spend in a seaplane trip?
62 responses

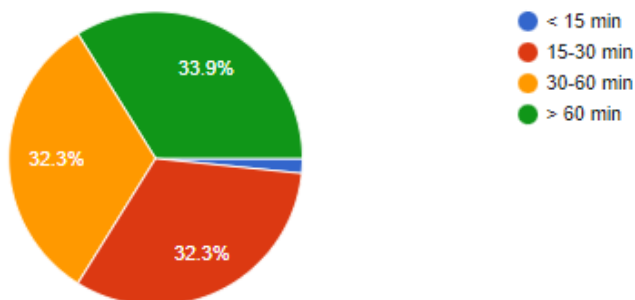


Figure 6-5: The preference of flight duration by travelers.

From *Figure 6-6* it can be seen that overall, the participants do not wish to spend more than €100 for a waterplane trip of 40 min with the majority willing to pay something between €50-100 (61.3%). In more detail there is another percentage that will not pay more than €50 (35.5%). From the statistical analysis ($p=0.024$), the older the respondent the more money are willing to spend in a waterplane fare. This is probably associated with the fact that people from older generations travel on a higher budget.

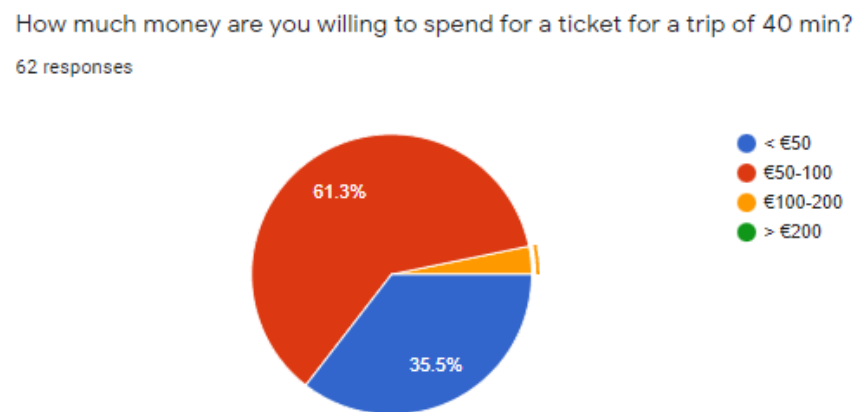


Figure 6-6: The preference on ticket fare by travelers.

It was expected that the primary reason that the participant would take a waterplane is for vacation or other transfer by 59.7%. Another interesting percentage is that of people using the waterplane for tours at 27.4%. To a lesser extent people will use it for emergencies (8.1%), cargo- goods transfer (1.6%) or any other (1.6%).

For what reason would you take a seaplane?

62 responses

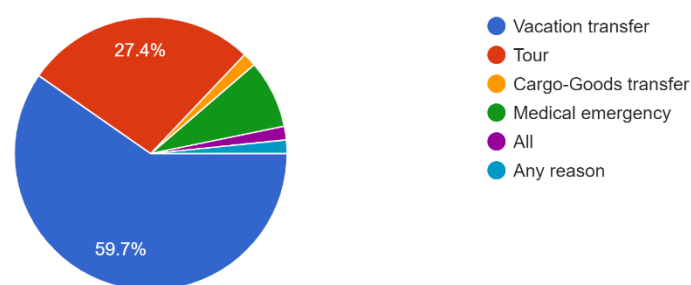


Figure 6-7: The reason of travelling with waterplane.

In the question of preference between waterplane and ship given that the waterplane is 2 times more expensive but faster 4 times than the ship less than half of respondents would clearly prefer the waterplane (48.4%). The alternative of the ship is a strong competitor against the waterplane since 30.6% prefers or 21% is likely to prefer this option. Another interesting statistical finding is from the comparison between the answers given and gender, where from those that would not exchange the ship with the waterplane 80% are women.

Would you prefer the seaplane as a means of transport, instead of the ship given that the seaplane is a little more expensive than the ship (around 2 times) but much faster (around 4 times)?

62 responses

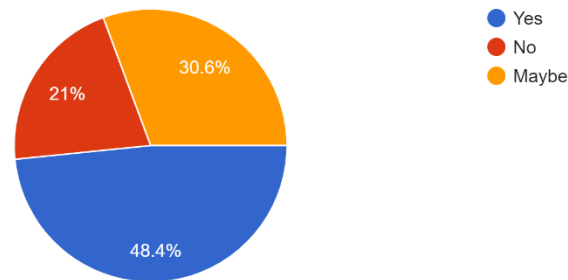


Figure 6-8: The preference of travelling between waterplane and ship.

On the other hand, when the bus become the alternative, the trend is much more conclusive. Only 8.1% would clearly prefer the bus instead of the waterplane given that the last is 3 times more expensive and 5 times faster. The percentage is significantly high with those that they would opt for waterplane (69.4%). This is a clear tendency that the travel duration is an important factor when choosing a means of transportation.

Would you prefer the seaplane as a means of transportation, instead of a bus as the seaplane is more expensive than bus (around 3 times) but much faster (around 5 times)?

62 responses

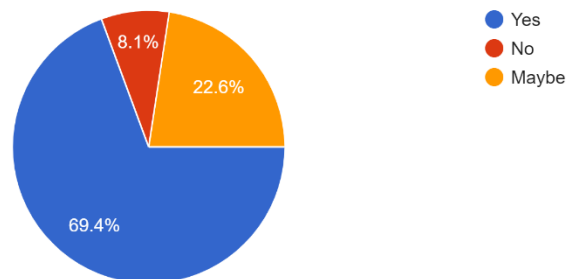


Figure 6-9: The preference of travelling between waterplane and bus.

It is not worthy that the majority of the responded combine feel either safe (53.2%) or extremely safe (11.3%). However, it has to be noted that 30.6% feel somewhat safe or not safe at all (4.8%). This indicates that the element of safety of waterplanes should not be disregarded, and it should be further supported with campaigns that waterplane is a safe means of transfer.

How secure do you feel with a seaplane?
62 responses

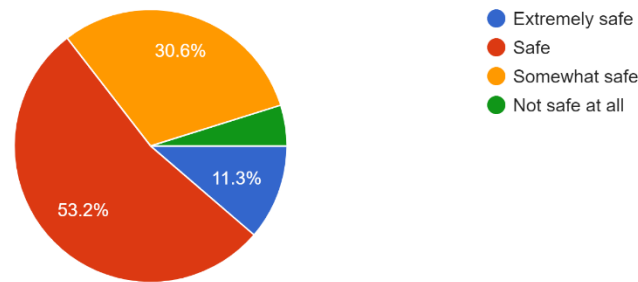


Figure 6-10: The feeling of security travelling with waterplane

In the last question of the survey there are a variety of possibly answers with regards to the deterring factors for not using a waterplane. The majority of respondents are worried about the cost of the ticket (50.3%) followed by those that equally (17.7%) share the same concerns over safety and convenience. Other main reasons include luck of availability (5%), concerns over weather (3%) and time (6%).

Which is the main reason not to travel by seaplane?
62 responses

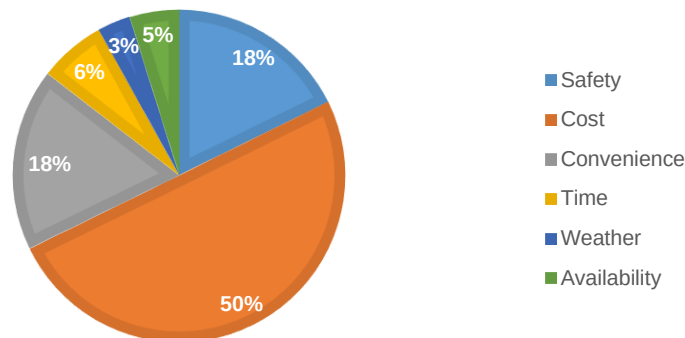


Figure 6-11: The reason of travelling with waterplane

From the statistical analysis it seems that the elements of safety and the cost of tickets are the main factors to deter waterplane users of the age groups 26-35 and 35-50. Since these groups are the dominant age base of consumers then it is highlighted that the company policies should focus on these two variables.

All the questions posed compared against the demographics to extract even more information and tendencies. However, in the majority of the comparisons the Pearson factor (p) was greater than 0.05, and therefore the statistical hypothesis was not valid (Appendix C). Namely, the gender, age education, and type of traveler were in very few cases the determining factors.

Table 6-1: Statistical Analysis

Questions	Pearson Correlation - ρ			
	Gender	Age	Education	Type of traveler
Q ₁	0.552	0.507	0.640	0.300
Q ₂	0.629	0.734	0.300	0.021
Q ₃	0.357	0.115	0.200	0.234
Q ₄	0.861	0.193	0.145	0.787
Q ₅	0.383	0.337	0.350	0.221
Q ₆	0.469	0.024	0.209	0.559
Q ₇	0.466	0.622	0.133	0.327
Q ₈	0.037	0.267	0.519	0.247
Q ₉	0.768	0.561	0.706	0.521
Q ₁₀	0.887	0.812	0.247	0.375
Q ₁₁	0.190	0.018	0.093	0.591

Chapter 7. Conclusion

As of 2019, the area of tourism in Greece constitutes of 20.6% of the GDP, while globally it is 10.4%. In 2018 the growth rate of the industry was around 7%, i.e., about 3.5 times higher than the growth rate of the whole national economy, which was 2%. One opportunity for a new market in tourism with zero competition for the time being is that of waterplanes. Waterplanes are a unique medium that can enhance one of the most 'heavy industries' in Greece and be part of the solution to the complex and multidimensional transport problem in the area. This study offers a comprehensive and holistic business design on how to organize a waterplanes network in the Hellenic region.

The need to introduce waterplanes in Greece also stems from the fact that they indirectly encourage the revitalization of local areas, especially the islands. A supportive policy planning framework from national to local level can help unleash the potential contribution and value of waterports to the economic, social, and environmental well-being of regions, communities, and individuals, together with the protection of these valuable assets. It is vital, therefore, to support a policy that recognizes the multifunctional nature of waterports and their contribution to the broader financial, environmental, and social objectives, such as public health, sustainable development and enhancing resilience. However, for the above to be achieved, also discussed from the individual interviews, there must be a clear legal framework and less bureaucracy so that the respective companies can operate and interested investors can understand. For the waterplane business to be viable, an organized waterport network should be designed, so that customers have a range of options in locations, activities etc.

It is one of the financial sectors, yet unsaturated with multiple opportunities for new investments as well as in 'blue ocean' strategies. Based on the business analysis there is strong threat of new entrants, moderate threat of substitutes and weak competition between existing companies since it is in its infancy. In addition, the bargaining power of suppliers and buyers is strong and weak, respectively.

One of the major strengths of waterplane is the convenience they offer in transportation in remote areas and faster than alternative means. Moreover, they have low environmental impact and are cost effective for both companies and users. However, they are susceptible to weather conditions and to date there is lack of infrastructure, innovation, and extensive operation and maintenance grids.

According to the financial analysis the minimum cost for a flight of 40 minutes in a small waterplane of 12 seats fully occupied (Dornier Seastar CD2) will be £37. In the most usual case that the waterplane has an occupancy of 75%, the same ticket fare will be minimum £49. When a waterplane trip was compared with all other alternative means for the same trip it was found that it was twice as expensive as the bus, car or ship but five time less in duration.

The questionnaire provided interesting findings with concern to potential waterplane users. From the results there was lot of enthusiasm to travel with this unique means (78%). Most of the respondents are willing to pay somewhere between €50-100 for a 40-minute trip (61%), whereas none would pay over €200. Indeed, the potential high cost has been the main deterring reason for someone not to travel by a waterplane (50%). To a lesser extent, safety is also a deterring factor (18%), since 35.5% expressed they feel somewhat or not at all safe.

Finally, this study may function as the basis and reference for future entrepreneurs and assist in the immediate appreciation of the tangible and intangible benefits that waterplanes can offer to the Hellenic region.



References

- Aegean Airlines (2021) *Tickets fees, Aegean*. Available at: <https://el.aegeanair.com/> (Accessed: 27 July 2021).
- Airline Route Maps (2021) *Trans Maldivian Airways*. Available at: www.airlineroutemaps.com/maps/Trans_Maldivian_Airways (Accessed: 3 October 2021).
- Airliner World (2007) 'Loch Lomond Seaplanes venture', *Key Publishing*. Available at: www.airlinerworld.com.
- AirMalta (2021) *AirMalta fare checker*. Available at: <https://airmalta.com/> (Accessed: 27 July 2021).
- Alaskan Seaplane (2021) *Alaskan Seaplanes fare checker*. Available at: <https://www.flyalaskaseaplanes.com/> (Accessed: 27 July 2021).
- Armstrong, M. and Taylor, S. (2020) *Armstrong's Handbook of Human Resource Management Practice*. 15th edn. London, UK: Kogan Page.
- Arnold, G. and Lewis, D. (2019) *Corporate Financial Management*. 6th edn. London, UK: Pearson Education.
- Avron (2010) *Dornier CD-2 Seastar booklet*. Moscow, Russia.
- Ballis, A. et al. (2018) 'Perspectives for the development of the Greek water airports and seaplane services', *7th International Symposium & 29th National Conference on Operational Research*, p. 5.
- Ballis, A., Petroulakis, Z. and Stathopoulos, S. (2018) 'The contribution of air and maritime transport in the development of tourism in the islands of South Aegean', *7th International Symposium & 29th National Conference on Operational Research*, p. 4.
- Barney, J. B. and Hesterly, W. S. (2019) *Strategic management and competitive advantage: concepts and cases*. 6th Global. Harlow, England: Pearson.
- Blackwell, E. (2011) *How to Prepare a Business Plan: Planning for Successful Start-up and Expansion*. 5th edn. Edited by Sunday Times Business Enterprise Series. London, UK: Kogan Page.
- Booking (2021) *Airport taxi quotes*. Available at: <https://www.booking.com/> (Accessed: 27 July 2021).
- Briguglio, L. and Briguglio, M. (2002) 'Sustainable tourism in small islands : the case of Malta', *Sustainable tourism in islands and small states: Case studies*, 226(317), p. 5.
- Capital (2008) 'The take-off of the waterplanes of AirSea Lines Rab Capital and Fidelity', *Fotis Fotinos*. Available at: www.capital.gr/epixeiriseis/488233.
- Carter, S. and Jones-Evans, D. (2012) *Entreprise and small business: principles, practice and policy*. 3rd edn. Edited by Harlow: Financial Times Prentice Hall. New York, USA.
- Chan, K. W. and Mauborgne, R. A. (2015) *Blue Ocean Strategy: How to Create Uncontested Market Space and Make the Competition Irrelevant*. Expanded. Boston, USA: Harvard Business Review Press.
- CIA (2005) *The World Factbook: 2005: CIA's*. 2nd edn. The Central Intelligence Agency.
- Danforth, L. et al. (2021) *Greece, Britannica*. Available at: <https://www.britannica.com/place/Greece> (Accessed: 6 July 2021).
- Davies, M. B. and Hughes, N. (2007) *Doing a Successful Research Project: Using Qualitative Or Quantitative Methods*. 1st edn. London, UK: Palgrave MacMillan.
- Denz, T., Smith, S. and Shrestha, R. (2007) *Seaplane Economics: A Quantitative Cost*

Comparison of Seaplanes and Land Planes for Sea Base Operations. West Bethesda, USA: Naval Surface Warfare Center.

Denzin, N. K. (1978) *Sociological methods: A Sourcebook*. 2nd edn. New York, USA: McGraw-Hill.

Direct Ferries (2021) *Ferry Schedule and cost*, Direct Ferries. Available at: <https://www.directferries.gr> (Accessed: 27 July 2021).

Dornier Seawings (2019) *Seastar world's most advanced amphibious aircraft brochure*. Oberpfaffenhofen, Germany.

ELSTAT (2021) *Statics in tourism in Greece*. Athens.

EU (2019) *Transport in the European Union Current Trends and Issues*. Brussels, Belgium. Available at: <https://ec.europa.eu/transport/sites/default/files/2019-transport-in-the-eu-current-trends-and-issues.pdf>.

EU (2020) *Regional Policy contributing to smart growth in Europe 2020*. Brussels, Belgium.

FAA (2018) *Seaplane Bases*. Washington DC, USA. Available at: https://www.faa.gov/documentlibrary/media/advisory_circular/150-5395-1b-seaplane-bases.pdf.

Field, A. (2013) *Discovering Statistics Using IBM SPSS Statistics*. 4th edn. CA, USA: SAGE Publications Ltd.

Gobbi, G. et al. (2011) *Report on current strength and weaknesses of existing seaplane/amphibian transport system as well as future opportunities including workshop Analysis*. Glasgow.

Greek Parliament (2013) *Formulation of a Friendly Development Environment for Strategic and Private Investments and other provisions*. Legislation 4146/2013. Athens, Greece.

Greek Parliament (2018) *Waterport issues, urban road transport and other provisions*. Legislation 4568/2018. Athens, Greece.

Greek Parliament (2020) *Legislation 4663/2020-Establishment, and operation of airports on water surfaces, transport regulations and other provisions*. Athens, Greece.

GTP (2014) *Hellenic Seaplanes In Talks To Acquire Seastar CD2 Amphibious Aircraft*, Greek Travel Pages. Available at: <https://news.gtp.gr/2014/03/20/hellenic-seaplanes-talks-acquire-seastar-cd2-amphibious-aircraft/> (Accessed: 26 July 2021).

Gunston, B. (2005) *World Encyclopedia of Aircraft Manufacturers: From the Pioneers to the Present Day*. 2nd edn. London, UK: The History Press Ltd.

Harbour Air Seaplanes (2021) *Harbour Air Seaplane fare checker*. Available at: <https://www.harbourair.com/> (Accessed: 27 July 2021).

Hellenic Seaplanes (2016) 'Hellenic Seaplanes planned waterway network'. Greek Travel Pages.

Herbst, J. (2005) *History of Transportation*. 1st edn. Minneapolis, MN: Lerner Publishing Group.

INSETE (2020) *the contribution of tourism in the Greek economy (2019)*. Athens.

Johnson, G. et al. (2017) *Exploring Strategy: Text and Cases*. 11th edn. Harlow, England: Pearson.

Jovanovic, S. and Ilic, I. (2016) *Infrastructure as important determinant of tourism development in the countries of Southeast Europe*. 5. Nis, Serbia.

Kort, K. (2016) *The Voisin Canard hydro with three floats seen at Fréjus-St Raphael*, Kees Kort Collection. Available at: <https://www.flickr.com/photos/varese2002/36578016650> (Accessed: 1 September 2021).

KTEL (2021) *Coach schedule and cost, Ktel Evoias*. Available at: <https://www.ktelevias.gr/gr/> (Accessed: 27 July 2021).

Kyrannis, M. (2020) *Kyrannis Photography Archive: Greece 1930, Rodiaki*.

Leyva, C. and Leonel, A. (2012) *Seaplane conceptual design and sizing*. University of Glasgow, UK.

McLaney, E. I. (2006) *Business Finance: Theory and Practice*. 7th edn. New Jersey, USA: FT Prentice Hall.

Merriam-Webster (2021) 'Definition of Seaplane', in *Merriam-Webster Dictionary*. Springfield, MA.

Mohr, B. and Schoman, J. (2010) *Today's Seaplane Operations: Results from the 2010 survey*. Directorate-General for Energy and Transport.

Newmoney (2012) 'Cuts on barren lines', *Politis*. Available at: <https://www.newmoney.gr/roh/palmos-oikonomias/oikonomia/>.

Nikolaou, S. (1998) *Flying boats and seaplanes: A history from 1905*. 1st edn. London, UK: MBI Publishing Company.

Olsen, E. (2001) *Qualitative and Quantitative Research Methods*. United Kingdom.

Pagonakis, M. (2016) *Seaplane Business Plan in Greece: Implementation in Crete Island*. National Technical University of Athens.

Protonotariou, M. (2019) *The five major names for waterplanes in Greek region*, *Mononews*. Available at: <https://www.mononews.gr/business/afes-i-5-eteries-tha-petaxoun-ta-idroplana-stin-ellada-ola-ta-onomata> (Accessed: 18 August 2021).

Rand (2012) *Amphibious Aircraft in Aerial Firefighting*. London, UK: An Illustrated Comparative Study.

Rodríguez, M. D. and Rodríguez, T. E. (2016) *Determining the Sustainability Factors and Performance of a Tourism Destination from the Stakeholders' Perspective*. Las Palmas, Spain. Available at: <https://www.mdpi.com/2071-1050/8/9/951>.

Saunders, M., Lewis, P. and Thornhill, A. (2006) *Research Methods for Business Students*. 4th edn. New Jersey, USA: Prentice Hall.

SETE (2020) *Tourism and Greek economy, 2018-2019*. Athens.

Silverman, D. (1997) *Qualitative research: Theory, method and practice*. 4th edn. New York, USA: SAGE Publications Ltd.

SKAI (2018) *The profile of tourists who choose Greece for their holidays*, *Skai news*. Available at: <https://www.skai.gr/news/greece/ayto-einai-to-profil-touriston-pou-epilegoun-ellada-gia-tis-diakopes> (Accessed: 21 July 2021).

Sotiriadis, M. D. and Varvaressos, S. (2015) 'A Strategic Analysis of the Greek Leisure Tourism: Competitive Position, Issues and Challenges', *Mediterranean Journal of Social Science*, 6(1), pp. 319–332.

Trans Maldivian Airways (2021) *Trans Maldivian Airways*. Available at: <https://www.transmaldivian.com/> (Accessed: 3 September 2021).

Tsoni, P. (2021) *Seaplane Service Set To Make Greece "The Maldives of Europe"*, *Greek Reporter*. Available at: <https://greekreporter.com/2021/04/21/seaplane-service-set-to-make-greece-the-maldives-of-europe/> (Accessed: 7 July 2021).

USACE (2020) *Environmental Operating Principles, US Army Corps of Engineers*. Available at: www.usace.army.mil/Missions/Environmental.aspx (Accessed: 1 September 2021).

V&A (1996) 'Photo archive from UK aircraft design of the 19-20th century'. London, UK: Victoria & Albert Museum Archives.

VA (2021) *Distance and cost calculator*, VriskoApostasi. Available at: <https://vriskoapostasi.gr/el/> (Accessed: 27 July 2021).

Vikings Air Ltd (2021) *Finance Leases*. Available at: <https://www.vikingair.com/longview-finance/finance-leases> (Accessed: 26 July 2021).

Weetman, P. (2013) *Financial and management accounting*. 6th edn. Harlow, England: Pearson.

Wings (2010) *The Dornier Seastar*. Available at: <https://www.wingsmagazine.com/the-dornier-seastar-4039/> (Accessed: 26 July 2021).

WTTC (2020) *Economic Impact Reports*. London, UK. Available at: <https://wttc.org/Research/Economic-Impact>.

Zoi, F. (2019) *'Gear' for the licence of seaports*, Naftemporiki. Available at: <https://www.naftemporiki.gr/story/1525633/gkazi-gia-tis-adeies-ton-udatodromion> (Accessed: 2 September 2021).

Appendix A: Questionnaire



A Questionnaire to collect data for the dissertation research project entitled 'Strategic analysis for the development of a waterplane network in Greece'

Dear Respondent,

The main objective of this questionnaire is to collect primary data to undertake an assessment on the socioeconomic impacts of waterplanes in select representative communities. Your responses to the questions are valuable and will be held in utmost confidentiality to be used only for the analysis of this research. You will not be identified by name in any case. If you accept to participate in this research, you will be doing so voluntarily and there will not be any monetary returns. You are also free to refuse to respond to any questions you do not feel comfortable answering or to withdraw from the research all together. This questionnaire will take about five minutes of your time to respond to the questions. Thank you in advance for your cooperation.

Part I: Demographics

Gender

1. Male 2. Female 3. Other

Age

1. 18 - 25 2. 26 - 35 3. 36 - 50 4. 51 - 65 5. 66 +

Type of traveller

1. Solo traveller 2. Couples 3. Family 4. Group of friends 5. Business traveller

Education level

1. Primary school 2. High school 3. University 4. PhD

PART II: Main part of questionnaire

1) What time of the year are you usually travelling?

1. Spring 2. Summer 3. Autumn 4. Winter 5. All year round

- 2) Have you ever travelled with waterplane?
 1. Yes 2. No
- 3) If the response is Yes, would you travel again?
 1. Yes 2. No 3. Maybe
- 4) If the response is No, would you like to travel in the future?
 1. Yes 2. No 3. Maybe
- 5) Do you like the idea by travelling with waterplane?
 1. I am excited 2. Enough 3. Some what 4. Not really
- 6) How long would you spend in a waterplane trip?
 1. < 15 mins 2. 15-30 mins 3. 30 – 60 mins 4. > 1 hr
- 7) How much money are you willing to spend for a ticket?
 1. < € 50 2. € 50-100 3. € 100-200 4. > € 200
- 8) For what reason would you take a waterplane?
 1. Vacation transfer 2. Tour 3. Cargo 4. Medical emergency 5. Other
- 9) Would you prefer the waterplane as a means of transportation, instead of a bus as the waterplane is more expensive than bus (around 3 times) but much faster (around 5 times)?
 1. Yes 2. No 3. Maybe
- 10) Would you prefer the waterplane as a means of transport, instead of the ship given that the waterplane is a little more expensive than the ship (around 2 times) but much faster (around 4 times)?
 1. Yes 2. No 3. Maybe
- 11) How secure do you feel with a waterplane?
 1. Extremely safe 2. Safe 3. Somewhat safe 4. Not safe
- 12) Which is the main reason not to travel by waterplane?
 1. Safety 2. Cost 3. Convenience 4. Other

Thank you in advance for your collaboration. Any comments are welcomed.

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Appendix B: Interviews

This appendix lists the four most important of the interviews conducted. From the interviews that follow, the first is of Mr. Fortounas, director and shareholder of the company 'Hellenic Seawaves'. The second is of Mr Theodorakopoulos, tourist operator from the city of Heraklion, Crete. The third is of Mr. Bouras, CEO of the travel company Airwaves Consulting. The fourth interview is of Ms. Pappa, former director of Greek National Tourism Organisation (EOT).

The four interviews aimed to understand the operational and business situation of waterplanes and waterports in Greece. Mr. Fortounas is the most appropriate to describe the past and present state of the waterways. Mr Theodorakopoulos present as the pulse of the local society. Mr. Bouras talks to us about the existing constraints, the legal framework, and the investment interest. Finally, Ms. Pappas provided many useful statistics in the field of tourism market. The above-mentioned interviews are not presented in detail, as their data have been used directly in the previous chapters.

Interview 1

Mr. Fortounas: Director of Hellenic Seawaves

Mr. Fortounas is an expert in the field of waterports management, as a general manager, with many years of experience in the first company that restored the waterports in our country. With 25 years of experience in the field of aviation, Anastasios Fortounas has been the co-owner & CEO of two Greek Airlines while he worked for several years as CAO and Director of Quality Control in private Airlines. Since 2003, he has specialized in the licencing and operation of waterports.

Questions

- What is the historical course of waterplanes in our country?

Before the Venizelos era, there were flights almost all over the country, such as to Leros, Corfu and Athens. Now, almost 100 years later, we are trying to bring waterplanes back to the country. The truth is that we should have had waterplanes much earlier. In our time, the history of waterplanes begins in 2004, when an effort was made by a Greek Canadian company and the waterplanes operated for 5 years, from 2004 to 2008. The main area where flights took place was the Ionian Sea and we had licensed waterports in all the Ionian islands, in the lake of Ioannina, in the port of Patras, and performed regular and special flights, even to Brindisi, Italy from the waterport of Corfu. Then, due to a series of reasons, primarily the incomplete legal framework, the waterplanes stopped operating. Another reason was the financial crisis, as the company was set up to expand to other larger regions, such as the Cyclades, the Dodecanese, Crete, and Athens with the islands of the Saronic Gulf.

- What is the bureaucratic process in a nutshell?

The process involves the submission of the environmental assessment (EIA) and the technical specification report. Those two are performed almost simultaneously. The technical file is submitted to the Ministry of Transport, Infrastructure and Networks and distributed to the relevant ministries. The EIA goes separately and is submitted either to the Ministry of Environment, if it is a large port, or to the council for smaller ports. In the end, both assessments should be approved for the waterport to be licensed.

- What is the minimum number of waterports in a region to start waterplane flights?

You have to think that in each region we consider that 4 to 5 waterports is the critical number to achieve operation viability. But the number of water fields is also important. I mean, the areas where waterplanes can be docked, apart from ports, namely, to act as a destination for flights.

- What is your vision for waterplanes in Greece?

My vision is to expand a complete network of waterports in islandic areas, but also in coastal and lakeside areas. We should remember that there are several lakes in our country that are located at strategic points, especially in the mainland.

The waterplane will enable the completion of the transport network of the country, for all the populations of the country (permanent and visiting population). In fact, none of the people involved in tourism say that the waterplane will replace another existing means, but it will work in addition. Planes and ships mainly refer to completely different markets than the waterplane. The waterplane due to its small size, ease of use and functionality, can help in tourism or to meet the needs of the small islands of the inhabitants during the difficult winter months, which we all know the problem of connectivity is maximized. I believe that Greece is an ideal country for waterplanes, which if implemented well, will be beneficial for the whole country, both tourism and the inhabitants of our country. I think that this project has only positives, so it will be good to do it.

- Why do you think waterplane will help the transport network in Greece, and in which areas?

The waterplane will operate in addition to the ships, because ships have different functionality, since they are addressed to 500 or more people per trip (and in large loads, such as cars, food, building materials, as well as at different service times and periodicity of connections) from the waterplane. The waterplane is aimed at a much smaller number of passengers, up to 19 people per flight. By this logic, I think that all the above-mentioned means of transport "fit" in our country.

- What is the business plan of your company during the first (5) years of operation of waterplanes in the country?

Our company has the objective to design, construct, licence and operate waterports and their infrastructure. In the first 5 years our goal is to open waterports in the main regions of the country and specifically the Ionian, the wider region of Crete, the Cyclades, the Dodecanese, the region of the north-eastern Aegean, and certainly Attica, having a metropolitan waterport nearby in the centre of Athens.

- How many companies can be active in the field of waterports?

In the field of waterports, it would be more functional for one company to manage the waterports in each region, but not necessarily. If there is more than one company in the same region, there will definitely be competition. If the competition is healthy, it will work for the benefit of all, and the end users, who is the

customer, and for the benefit of the companies themselves, although it sounds a bit pretend, but it is not, because if you have a good competitor, you work to become better.

- What investment capital is needed to license and operate a sustainable waterport network?

A regional waterport has a construction and licensing cost of up to 60,000 euros. This is the case if a floating platform and a prefabricated settlement needs to be constructed, since several ports already have similar infrastructure and do not require this extra money. For a central waterport, which corresponds to each region, you need at least one shelter for waterplane maintenance or fuel storage areas, as well as larger customer service areas and docks for waterplanes, but again the cost is up to 200,000 to 300,000 euros for the largest metropolitan waterport. So, the total investment of a network for example 60 waterports will amount to 4,800,000 euros, if we consider 5 to be the main waterports and the remaining 55 regional. But if we consider that the cost of construction of an airport amounts to at least 10,000,000 euros, then we can understand the large difference in cost between the two constructions.

- How much is the desirable occupancy of waterplane to be viable, and what Break Even would be?

A desired fullness of 70-75% would be acceptable, ie in the twin Otter which has 19 seats, it would be 12 to 13 seats. For the business to be viable, Break Even will be if 11 seats are covered, meaning an occupancy of 55-60%. However, all of these have many variations, so it would be reasonable to be careful when using numbers, so as not to lead to wrong decisions. It is crucial for the waterplane company to design the flight schedules, i.e. the flight hours that each waterplane will perform annually. The more the waterplane flies, the lowest the ticket price will be, driving the viability of the venture into high levels. This is due to the fact that the waterplane has multiple and specific fix costs, either for leasing if it is rented, payroll etc. So, the more the waterplane flies, the better for everyone. A good number of flight hours is 1000 hours per year. Because the division of the fixed cost of a waterplane, over 1000 hours, brings the amount per flight hour very low and so the ticket becomes attractive.

- What is the ideal flight time of a waterplane?

The ideal flight time from statistics that exist in these decades of flying, is between 20 and 35 minutes. This flight duration makes a route as commercial as possible. In more detail, in a range of 30 min it can cover all the destinations in the same region. But even if more time is need it is obviously possible.

- How many flights must be operated per year at each waterport to be viable and profitable as a business?

With the business plan we have submitted, and it is approved, 1500 flights per year should be performed from a regional waterport, whereas 3200 flights per year from a central waterport.

- Is there a national strategic planning for waterplanes in Greece?

Doesn't exist at such a level. The planning for the time is done by our company which is also interested directly. For the time being we have contacted some councils, such as in the South Aegean region, where we have conducted a study to calculate the optimal number of waterports in the Cyclades region.

- How much do you think will be on average the cost of the flight?

The prediction of cost of the flight, obviously depends on the duration of the flight, how many flights the waterplane makes per year. With our calculations the average flight fee per hour and per passenger is 130 to 150 euros, which means that the ticket price for a half hour flight will be around 60 to 70 euros. For example, the ticket price from Corfu to Paxoi was 40 euros, while the flight from Corfu to Patras was around 110 euros. This does not mean that these numbers are absolutely accurate and depend on targets. For example, if the waterplanes fly more and have a fullness of seats from high (90%) to optimal (100%), the ticket fee for the flight time can go down to 100 euros. If the waterplanes become eligible for EU substitutions for remote areas connection, obviously the cost will be even cheaper. The state will support the permanent residents of the remote islands by subsidizing waterplanes and due to this, the cost of the ticket for these residents will be reduced by 50 to 70% or maybe more. That is, if a flight normally costs 40 euros, after the subsidy it will cost maybe 10 to 20 euros. In addition, they will help the waterports since they will receive the payment in advance as revenue from the flights 12 months a year. Finally, the citizens will be transferred with very low prices. In other words, this will be great for everyone; waterplane companies, waterports, tourists and permanent residents.

- On days with dangerous weather, will waterplanes be able to land and take-off? If possible, will there be a safe area for mooring?

On days with dangerous weather phenomena, which will make the dock unsafe for passengers, the professional pilots, will not dock at the specific waterport, or will not start the flight from the beginning. However, if the weather is considered safe for flights, then in every watershed with port infrastructure there will be at least one offshore runway within the maritime port area, which within this area (inside the pier) is almost not affected by strong blasts and sea currents.

Interview 2

Mr. Theodorakopoulos is a tourist operator in the city of Heraklion, Crete.

Questions:

- What is your opinion about waterplanes?

We are very interested as tourist operators in the idea of the waterplanes. Also, I think that there is interest from the behalf of tourists.

- Is there any interest in the development of this means in the tourist population in Crete?

Yes of course.

- What percentage of visitors, do you think may be afraid to travel with waterplanes?

Around 40%, but for a more accurate number it would be good to ask this question in your questionnaire.

- What percentage of visitors are not afraid but do not want to travel with waterplane, for other reasons, and what are these reasons?

Around 20 to 30%, and logically it will be for financial reasons, or they just do not prefer the waterplane as a means of transport, in the place of ferries or cars.

- What percentage of visitors are willing to travel by waterplane?

I think around 25% will try it as a means of transport and if they like it they will definitely try it again.

- How much money do you think the visitor will spend on a day trip by waterplane?

Depending on the area and the hotel where the guest is staying, this amount will change. A different ticket fee could be given by a visitor who lives in Elounda and another by the visitor who lives in Matala. On average I estimate that the amount will be around 80 to 90 euros per visitor.

- Would the visitor choose an alternative means of transport, such as the waterplane, instead of the existing means, such as bus, taxi, ship, for daily transportation to a destination?

It is certain that he would choose it as a means of transportation, instead of the existing means.

- What capacity of waterplane seats do you believe Crete can sustain?

The bigger the better.

Interview 3

Ms. Pappa: Former director of EOT (Greek National Tourism Organisation)

- Do you think there will be interest in day trips with waterplane? If so, at what rate?

Yes, there would be a special interest in waterplane day trips of approximately 50% - 70% of our visitors.

- How many kilometres do you think the tourist will travel to reach a waterport in to travel by waterplane?

The nearest waterports are more convenient. Up to 30 km distance to the waterport is fine.

- Would the visitor prefer to travel with waterplane instead of bus if the distance is long and the road network is bad?

Yes, they would obviously prefer the waterplane for long distances.

- How many times will the tourist get on the waterplane?

For an excursion, not more than once.

- Would the tourist use the waterplane instead of the taxi or the bus?

Yes, they would use it depending on the financial level of the tourist.

- Would the tourist travel individually by waterplane without arrangements by their travel agent? If so, at what rate?

No, only through tourist offices. The percentage of individual tourists would be almost non-existent.

Interview 4

Mr.Bouras: CEO of Airwaves Consulting

- Why haven't seen waterplanes flying so far?

The development of waterports in Greece is an issue that should have been resolved many years ago. Unfortunately, the effort that had started with great success several years ago with flights to the Ionian, did not continue mainly due to the lack of legal framework and various other bureaucratic problems.

- Do you think the problem is political?

To clarify that, the whole process has 3 stages; First the establishment license, second the operating license and last the flight part. The problem so far, in my view, has been political. There were no intentions to run the proceedings, as no waterport has been licensed since today.

- Is there any investment interest?

The information I have is that there is an active interest of companies both for the operation of waterports and, mainly, for the waterplane flights. The main issue is the increase of tourism and the easier interconnection of destinations with each other, working in addition to the other means of coastal transport and aviation. It is also very important that several regional authorities, such as that of the South Aegean, which has pioneered the effort, but also those of the Ionian Islands, Central Greece and the North Aegean have already supported or are supporting the effort by financing the establishment license, through contracts with the local port funds of each region. I think that the other regions should follow their example.

Appendix C: Data Analysis

How much money are you willing to spend for a ticket for a trip of 40 min?	Age					Total
	18-25	26-35	36-50	51-65	65+	
<50 E	1 5.56 100.00	6 33.33 50.00	9 50.00 30.00	0 0.00 0.00	2 11.11 50.00	18 100.00 36.00
50-100 E	0 0.00 0.00	6 19.35 50.00	21 67.74 70.00	3 9.68 100.00	1 3.23 25.00	31 100.00 62.00
100-200 E	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 100.00 25.00	1 100.00 2.00
Total	1 2.00 100.00	12 24.00 100.00	30 60.00 100.00	3 6.00 100.00	4 8.00 100.00	50 100.00 100.00

Pearson chi2(8) = 17.6792 Pr = 0.024
 likelihood-ratio chi2(8) = 12.6366 Pr = 0.125
 Fisher's exact = 0.064

Which is the main reason not to travel by seaplane?	Age					Total
	18-25	26-35	36-50	51-65	65+	
Safety	0 0.00 0.00	3 37.50 25.00	5 62.50 16.67	0 0.00 0.00	0 0.00 0.00	8 100.00 16.00
Cost	1 3.85 100.00	8 30.77 66.67	16 61.54 53.33	0 0.00 0.00	1 3.85 25.00	26 100.00 52.00
Convenience	0 0.00 0.00	0 0.00 0.00	2 28.57 6.67	3 42.86 100.00	2 28.57 50.00	7 100.00 14.00
Time	0 0.00 0.00	1 25.00 8.33	3 75.00 10.00	0 0.00 0.00	0 0.00 0.00	4 100.00 8.00
Weather	0 0.00 0.00	0 0.00 0.00	1 50.00 3.33	0 0.00 0.00	1 50.00 25.00	2 100.00 4.00
Availability	0 0.00 0.00	0 0.00 0.00	3 100.00 10.00	0 0.00 0.00	0 0.00 0.00	3 100.00 6.00
Total	1 2.00 100.00	12 24.00 100.00	30 60.00 100.00	3 6.00 100.00	4 8.00 100.00	50 100.00 100.00

Pearson chi2(20) = 35.3652 Pr = 0.018
 likelihood-ratio chi2(20) = 29.4214 Pr = 0.080
 Fisher's exact = 0.044