

A Mobile Application As a Tool for Sustainable
Development in Protected Areas
(a proposal for the case of Arrabida Natural Park)

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Glossary of acronyms

DMOs - Destination Management Organizations

DMS - Destination Management Systems

EMIS - Environmental Management Information Systems

EP - The educational potential

GIS - Geographical Information Systems

GPS - Global Positioning System

ICNF – Institute for Nature Conservation and Forests

ICT - Information and Communication Technology

ITS - Intelligent Transport Systems

IUCN - International Union for Conservation of Nature

LBS - Location Based Services

PNAr - Arrabida Natural Park

TEC - Tourist Entertainment Companiesca ^[1]_[SEP]

TIS - Tourism Information System

UNWTO - World Tourism Organization

UNEP - The United Nations Environment Programme

WTO - World Tourism Organization

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Abstract

Protected natural areas are designed to preserve biological and landscape diversity and ensure sustainable environmental development. Huge territories face great challenges in the management of sustainable tourism, which are very difficult to control due to uncontrolled traffic capacity and the lack of awareness of visitors about the uniqueness of the park. The best way to convey information to the masses is information technology, which almost every modern person has. The goal of this project is to develop and promote a mobile application to help developing sustainable tourism in protected areas using the case of Arrabida Natural Park.

Chapter 1. Introduction

In the modern world, sustainable tourism is an integral part of sustainable nature management. The development of sustainable tourism is inextricably linked with specially protected natural areas and is an important component of integrating protected areas into the sphere of socio-economic development of regions.

The purpose of the development of cognitive tourism in protected areas is to form an understanding of the modern role of protected areas in the conservation of biological and landscape diversity as the basis of the biosphere, natural and nature-related cultural heritage, as well as their place in the socio-economic development of regions, among the general public. To achieve this goal, a modern way of delivering information to a sick number of visitors should be developed.

1.1 Problem Setting

The large-scale application of modern information technologies in recent years raises the question of new ways of presenting information. This is especially true for those cases when you need to present a large object or space - a museum, a new tourist route. At the moment, the user can get various kinds of knowledge of entertaining or professional nature, even without leaving home. This is largely due to the creation of mobile applications as one of the web-systems that contribute to information globalization.

In the modern world, any institution needs its own Internet resource. The necessity lies in the fact that a mobile application is one of the most optimal methods of advertising, as well as

delivering certain information to a large number of audiences. The mobile applications of nature reserves and national parks contain the information related to this institution - it can be various videos, event pictures, photographs of local flora and fauna, as well as the information about sustainable behavior in the territory. All of this is an effective way to grab the attention of visitors and create a more sustainable society, which means a responsible trip to the territory in order to explore and enjoy nature and cultural attractions and does not violate the integrity of ecosystems, ensures the active socio-economic participation of local residents and their benefits from this activity.

The relevance of this project lies in the fact that with the increase in the availability of mobile Internet, mobile applications have become increasingly popular. They allow you to solve a huge range of user tasks. Currently, information and communication technologies are winning a decisive victory in the field of education around the world, they can significantly influence public awareness, as well as take an active role in environmental education.

1.2. Aim of the Project

The aim of this project is to develop and promote a mobile application to help developing sustainable tourism in protected areas using the case of Arrabida Natural Park.

This project is based on the assumption that a modern mobile application providing relevant information about the natural park, as well as recommendations for sustainable tourism on and off the site, is a suitable way to reach a wider audience before, during and after visiting the PNAr.

The scientific novelty of the declared project is due to the fact that previously there were no special applications for the development of sustainable tourism in the territory of Arrabida Natural Park.

The information obtained during the writing of this project will allow you to review the theoretical base for developing similar mobile applications for other protected areas, as well as develop a unique project to create a mobile application for Arrabida Natural Park.

1.3. Structure of the Project

This project is structured in 5 chapters, starting with the Chapter I of the introduction which includes the relevance of the project to create a mobile application for the development of sustainable attitudes and behavior of visitors in Arrabida Natural Park, reveals the goals, objectives and progress of work.

The second chapter examines the theoretical main provisions of sustainable tourism in protected areas, defines the essence and principles of ecotourism, as well as the importance and tasks of natural areas in the development and promotion of these principles. The prospects for the development of applications for tourists are also analyzed.

The third chapter provides information on the Arrabida Natural Park for which this application is to be developed. Clarified physical and geographical data, as well as recreational activities, tourism infrastructure and attractions. At the end of the chapter, the potential for sustainable tourism development in this area is analyzed.

The fourth chapter includes the description and development of the main stages of the project to create a mobile application for PNAr visitors.

The fifth chapter consists of two important promotion strategies, with the help of which the main purpose of this mobile application will be conveyed to a larger number of potential tourists.

In the conclusion, the results of the implementation of the tasks of this project and the achievement of the stated goal are summarized.

Chapter 2. Main provisions of Sustainable Tourism in Protected Areas

After defining the problem, goals and structure of the project, it is worth analyzing the information already available in order to emphasize the value of the idea of creating a mobile application for protected areas, as a project that helps visitors get the necessary and useful information and helps maintain sustainable behavior. To do this, it is necessary to derive the definition, meaning and tasks of the sustainable tourism in protected areas, emphasize the ecological and educational potential of Natural Park, and also analyze the importance of using modern technologies.

2.1. Definition, Meaning and Provisions of the Sustainable Tourism

The global tourism industry has faced a constantly increasing level of tourism in recent years. In 2019, the World Tourism Organization (UNWTO) registered 1.5 billion international tourist trips worldwide, it is 4% higher than in the previous year (UNWTO, 2020).

Tourism as the largest industry is in a complex interaction with the natural and socio-cultural environment. There is no other sector of the world economy, which, to the same extent, depends on the purity of water, air, landscapes and, in general, on the ideal state of nature, as the leisure industry (Böhler, Grischkat, Haustein, Hunecke, 2006). Today, the success of most popular tourist destinations is based on the cleanliness of the environment, effective measures to protect it and the uniqueness of the local culture. In an attempt to harmonize their own life and their relations with nature, especially in the context of compliance with the sustainable and environmental regime of specially protected and adjacent natural areas, modern sustainable tourism has replaced the passive consumer "3 S": Sea - Sun - Sand, for active and "inexhaustible" "3 L": Lore — Landscape - Leisure (Kolodiy, 2019). This perfectly meets the new values that are affirmed in human psychology and expressed in the behavior of a modern tourist. Wishing to break away from everyday reality, a visitor shows an increased interest in the local charm, the peculiarities of life, customs, culture of a foreign people (Kolodiy, 2019).

And yet, environmental problems often occupy one of the last places in the minds of an adult, and the main life priorities are health, family, material well-being of the family, caring for children and their future. Long-term studies of the Public Opinion Foundation show that if adult respondents are asked to choose the most significant social problems for them from a general

list of problems, the environmental problems are noted by only 13% of respondents (Anand SV, 2013).

Specially protected natural areas are the areas of land, water surface and air space above them, where natural complexes are located, some objects of special natural, scientific, cultural, aesthetic, recreational, health-improving significance, which are removed in whole or in part from the economic activities by the decision of state authorities and a special protection mode is established for them (Savenkova, 2001).

Specially protected natural areas, primarily natural reserves and national parks, have always been especially attractive objects for tourists interested in nature: for the public consciousness, the fact of establishing a protection regime for a natural object (territory, complex, monument) signals its significance, interest, therefore, the existing system of specially protected areas plays a key role in the reservation of the country's biological diversity and the sustainable tourism development. Sustainability has been discussed as a key topic in tourism, however, its conceptual ambiguity prevents it from having a precise definition (Hardy, Beeton, Pearson, 2002).

The United Nations Environment Programme (UNEP) defines sustainability as follows, but this definition is subject to multiple interpretations: "Tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment, and host communities". (UNEP, 2013, p.2). Multiple Interpretation depends on which side of the stakeholder group is considering the definition of full consideration of interests, be it a tourist, industry or host communities.

Only by giving a person the opportunity to come into contact with the unique, untouched corners of nature, it is possible to educate him as a person who will appreciate and protect the wealth of nature always and everywhere. (Wight, P. A., 1996). The concept of sustainable tourism development makes it possible to resolve the growing contradiction between the need to meet the growing needs of tourists, stimulating the rapid growth of the tourism industry, and the limited amount of natural, social, economic resources of host destinations in the face of environmental degradation (WTO, 1993).

In general, the importance of sustainable tourism can be defined as (Amarova, 2015):

1. Preservation of natural beauty, unique territories
2. Reducing the impact on the natural environment
3. Raising the awareness of the population and other users of natural resources regarding the exploitation of the natural environment, as well as increasing the knowledge of schoolchildren through the nature contact experience.
4. Improving the efficiency of government agencies in the field of control and prevention of environmental offenses
5. Creation and regular seeding of a database on environment status, typical environmental offenses by nature users

Sustainable tourism (especially in the form of biosphere tourism) is the most environmentally friendly type of environmental management. Within its framework, knowledge can go in line with either the educational process, or simple awareness. The difference between the first type of cognition and the second one is that the educational process is associated with purposeful and thematic acquisition of information about the elements of the ecosystem, and the informational one - with non-professional observation of nature (Archipenko, Dudko, 2000).

At the same time, sustainable tourism in the protected area should not contradict or harm the implementation of its other functions - environmental protection and research. The main goals of the environmental and educational activities on the basis of the protected area: expansion of knowledge and ideas about the nature of the native land, about the unique value of natural areas, the development of a careful and responsible attitude to wildlife, involvement in practical research and environmental activities. Each reserve and national park develops its own strategy for environmental education, relying both on its own environmental and educational potential and on real opportunities, taking into account the peculiarities of the protected area and the region in which it is located.

The educational potential (EP) of a natural reserve or national park is understood as a set of natural, cultural, historical and socio-economic prerequisites for environmental education and public awareness (Shpilenok, 2007).

2.2 The Environmental and Educational Potential of the Specially Protected Areas.

If we consider the educational potential of PAs from the point of view of pedagogy, then we can state that they have a sufficiently high teaching, educational and developmental potential:

- preserving the most valuable natural territories, natural reserves and national parks competently demonstrating to people the beauty and richness of nature, as well as attract the surrounding population, primarily schoolchildren, to direct nature conservation activities.
- the staff of natural reserves and national parks employs qualified specialists in the field of biology, ecology, forestry.
- in nature reserves and national parks there is or is being created a material base for environmental education: nature museums, visit centers, ecological paths, open-air expositions, etc.
- Protected areas help to form the attitude of the local population to a specific natural reserve and the existing environmental restrictions on economic activities on its territory (Rudenko, 2012).

In the environmental education practice of the protected areas, a wide range of techniques and methods of work with different age and social groups of the population are used. At the same time, a great importance is attached to the socio-ecological aspect of human interaction with the natural environment. This is due to the need to refocus the pragmatic attitude of society towards natural resources from the position of “inexhaustibility” to the position of “rationality” (Postnikova, 2015). In general, the system of environmental education work on the basis of the protected areas is aimed at developing spiritual, aesthetic and environmental perception of the surrounding world by a person, stimulating positive changes in the development of environmental awareness of children and adults, and shaping the environmental culture of the population (Postnikova, 2015). This is where the humanitarian component of the educational potential of protected areas lies.

The ecological culture of a society is the recognition of the observance of environmental laws and the rational use of natural resources as the norm of social behavior, both directly in interaction with the environment and indirectly in other activities (social, labor, creative, etc.). not related to the study, use and protection of nature.

Reimers (1990) gives the following definitions of the concepts environmental culture and environmental consciousness. The environmental culture is a stage and an integral part of the development of global culture, characterized by an acute, deep and universal awareness of the vital importance of environmental problems in the life and future development of mankind. Environmental consciousness is an individual and collective (public) ability to understand the inextricable connection between man and humanity with nature, the dependence of human well-being on the integrity and comparative immutability of the natural environment of a person and the use of this understanding in practical activities. Thus, environmental culture is the ability of people to use their environmental knowledge and skills in their daily household and professional activities. Without the appropriate level of culture, people can have knowledge, but not possess it. This means that the environmental culture of a person, in addition to environmental consciousness, should also include environmental behavior. Yasvin (2004) defines environmental behavior as a set of specific actions and deeds of people, directly or indirectly associated with the impact on the natural environment, the use of natural resources. The environmental behavior of a person is determined by the level of his/her environmental consciousness and mastered practical skills in the field of environmental management.

Tourism in the protected natural areas has many interested people. Each of them has its own values and objectives. Such a complex mosaic of interests of different groups has a permanent impact on the management of the protected area. Staff of a protected area should develop a policy to inform and increase awareness. The objectives of such policy should be in the interest of both visitors and managers (Ilina & Pylenkova, 2013). Here information technologies are widely used in its various areas: hotel and restaurant business, complex automation of the activities of travel organizations, booking tours, tickets and hotels, the formation and promotion of tourism products to the market. Researchers note the primary role of information technology in the successful functioning of tourism organizations (Gamble, 1992). The choice of forms and methods of work with the population is also of great importance for the effectiveness of the environmental awareness.

2.3. Use of a Mobile Application to Develop Sustainable Behaviour of Visitors

The use of a mobile application is one of the most effective types of educational and research activities, during which not only the deepening of environmental knowledge takes place, but also the improvement of research, environmental protection and communication skills, the

implementation of which is possible both on the territory and beyond.

This circumstance is explained by the fact that, unlike many other spheres of activity, a tourist product is chosen and purchased, as a rule, far from the place of its direct use. In these conditions, a potential tourist pays great attention to the study of information, first of all, presented in the Internet and in mobile applications (Buhalis & Law, 2008).

At the present stage of development, information technologies and software in the field of travel and tourism. Information and Communication Technology (ICT) and its components penetrate in tourism and its management. ICT's profound implications for tourism have created a new industry, called e-Tourism, which reflects the digitalization of all processes and value chains in the travel, hospitality and catering industries (Buhalis & O'Connor, 2005). One of the fast developing ICT component is mobile applications which is believed to have a significant influence on decision-making process (Wang, Park, & Fesenmaier, 2013).

Mobile services have a huge potential in tourism and may have a high societal impact, as can be used for improve the "choice architecture" by providing necessary information and guidelines (Seager, Selinger & Wiek, 2012). No matter how old the traveller is and which continent he lives on, digital tools and content are no longer auxiliary, but the main means of interacting with him/her from the moment he/she started searching until the moment he/she returns from the trip. (Travelport, 2017).

With a growing number of users, apps are increasingly influential in tourism travel decisions and behaviour (Wang, Park, & Fesenmaier, 2011) at all stages of tourism consumption (Höpken, Fuchs, Zanker, & Beer, 2010). This is especially so given the increasing number of independent tourists who are no longer reliant on packaged options (Buhalis & Law, 2008) and the marked shift from a "place-based connectivity to individual, person-to-person connectivity" (Schwanen & Kwan, 2008).

Travellers nowadays are dependent on help and advice from others. They are social media and review websites, download different apps to research holiday ideas and say that they are influenced by them. 45% of travellers say they can't live without a map app when travelling (Travelport, 2017).

The 21st century has become the century of information technologies, and today such technologies have penetrated almost all spheres of human life. Modern people cannot live their day without their smartphones or tablets, and such an attachment to mobile devices gives the developers ample space for work. In 2019, more than 100 billion applications were downloaded in the world, 20% of them are tourism applications (Kovalyov, 2003). Nowadays, with the increase of disposable income, leisure time, and information, as well as the development of transportation networks, tourism is facilitated and many individuals are motivated to travel without agencies and a help of their parties (Echtner & Ritchie, 2003).

Mobile internet and supporting applications have changed travel forever. Keeping the travellers in touch and in comfort, they influence travel-planning and decision making process (Wang, Park, & Fesenmaier, 2013). and as a result reengineer the whole process of developing, managing and marketing tourism products and destinations (Buhalis, & O'Connor, 2005). Mobile applications are usually aimed at managing specific task and provide its user with context specific data just when the user needs it and limits choices to the tactical needs of the moment. Due to the ability to provide direct and immediate access to information and offer solutions based on user preferences and experiences, mobile apps are predicted to make a revolution in decision-making processes. (Thain, 2012).

Unfortunately, tourism always has an impact on the environment, even at low intensity, despite the efforts of the protected area staff. Such impacts have both a local level and spread over large areas. Since tourism develops in areas that are inherently particularly sensitive, it is important to actively inform tourists and local residents about environmental friendliness and sustainable behavior. Nowadays mobile applications have a great potential in supporting sustainable travel development as they provide informational benefits both for Destination Management Organizations (DMOs) and travellers. The days of paper maps, guidebooks are gone and replaced by interactive mobile applications for travel and tourism industry that come with many functionalities. Modern mobile applications can combine interactivity, affordability, information and professional content (Shmatchenko, 1995).

The strategy for the sustainable tourism development in protected areas is to manage the visiting process in such a way as to maximize the benefits and minimize negative environmental impacts before they occur. This is the most easily achieved through well-designed strategic development plans. Key elements in this are: an emphasis on cumulative impacts; applying adaptive

management; reaching a consensus between all stakeholders on the acceptable level and location of impact in protected areas, as well as raising the awareness of tourists and the public about the value of nature, sustainable behavior and soft tourism that does not harm it. (Manitskaya, 2014)

Travel and tourism have become an integral part of life of a huge number of the population, because if you want and have a certain amount of money, you can get to almost anywhere in the world. Many people travel in search of new emotions, sensations, to see new beautiful places, to communicate with people. The number of tourists is huge, and this very large number of people attracts mobile application developers.

It is also important that visitors have correct expectations even before arriving to the place, so that on the spot they will better understand what activities are allowed and what not. Formulating the right expectations before visiting the site also matters a lot (Cohen et al., 2014; Gretzel & Fesenmaier, 2010). The sphere of environmental tourism has its own distinctive features, since the objects of tourist activity in this case are intact natural-territorial complexes characterized by a certain spatial distribution over the territory. This, in turn, determines the feasibility of using geoinformation technologies, remote sensing systems and global positioning in order to organize tourism facilities (optimizing the location of tourist facilities, developing tourist routes, maintaining databases of tourist facilities, etc.), analyzing tourist flows, using mobile navigation aids, creation of tourist planning and cartographic materials and multimedia cartographic Internet services.

When visitors come to a specially protected area, their requests change, become more specific and complex (Gusanov, 2009). They want to know more about the resources and infrastructure available, what activities are allowed and what are prohibited, they are interested in security issues. As their understanding of the area grows, they show an increasing curiosity about the natural and historical environment, the culture of the people living in and around the area and the responsibilities of visitors. These are exactly the questions that the environmental education program should answer. A well-organized educational program should result in a consciousness of thousands of visitors, a more meaningful, interesting and harmless stay.

Environmental education plays a critical role in managing visits, especially in terms of awareness and influencing the behavior and further habits of visitors (Cohen et al., 2014;

Gretzel & Fesenmaier, 2009). The increased availability of information through modern technology means that visitors are more informed about all aspects of life and the rules of the park. Today, potential tourists have access to massive online databases of topographic maps, quick access to photo and video banks, which ultimately encourage them to visit a particular national park, and behave according to sustainable tourism requirements. Significant changes in tourism in national parks are taking place due to the general availability of high-performance handheld computers and smartphones with geolocation function. New technologies remove some restrictions for tourists in movement, however, national parks must keep pace with the times and use new opportunities to attract tourists and, most importantly, help them to be more aware of the correct behavior in nature. A tourist, thanks to the application, can have photographic information about attractions, video and text information about the most important conditions for sustainable tourism.

Moreover, achievements in hardware and software (automated accounting systems, geographic information systems) make it possible to effectively manage and plan the development of the park, reserve as a regional protected area does not allow establishing access control on its territory with the issuance of permits for visits from a departmental institution, which in turn does not make it possible to collect reliable data on the number of visitors and calculate the recreational load that the territory actually bears. The Internet takes an increasingly confident position in the development of tourism and mobile applications that perform a range of functions: from advertising to attracting tourists to the park, their behaviour inside it and even their subsequent sustainable solutions- (Katsoni & Dologlou, 2017).

It is clear that the available information base stimulates greater use of protected areas by people and determines the nature of this use. Wherever possible, infrastructure should help visitors understand the values of the protected area. A good mobile application will allow tourists to feel more comfortable and responsible in the unique places they visit. Visitors who feel comfortable will value the area higher and are more likely to be willing to help preserve it.

The next chapter will analyze in more details the territory of the Arrabida Natural Park, on which this proposal case is built. The territory itself, its value, biodiversity and different attractions, tourism infrastructure and communication will be described. And also using the SWOT table, the potential development of sustainable tourism and its opportunity on this protected area is to be determined.

Chapter 3: Arrábida Natural Park as Advantageous Touristic Destination for Sustainable Tourism Development

Protected areas were created with the aim of preserving habitats, species, landscapes, and places of ecological, scientific, recreational, tourist and cultural interest (Reimers & Shtilmark, 2011). They play a huge role in the development and implementation of the original concept and establishment of sustainable tourism. Together, the protected areas represent a fairly serious basis not only for the preservation of natural heritage, for conducting research in the natural laboratory, but also for the environmental education of the general population. The latter circumstance gives a right to call them *open classrooms*, and the entire system of protected areas - the school of nature.

Environmental education in PAs has a number of features in comparison with traditional ones, that is, the usual study of new information.

- The first feature is that a synthesis of two principles is manifested here: intellectual and spiritual - teaching and upbringing, which in fact constitute education as such.
- The second feature of environmental education: no matter how serious are the problems raised in the educational programs of reserves and national parks, no matter how global their scale is, first of all, they are solved taking into account local conditions. It refers to the characteristics and state of the natural environment not only of this protected area, but of the entire region for which this reserve or national park is a representative institution. And the solution of such problems must necessarily contribute to the improvement of the local environmental situation.
- As a third feature, there are ample opportunities for any protected area to carry out practical work on the protection of nature by the forces of volunteer visitors. Such work, carried out regularly and entirely voluntarily, is an obligatory component of the environmental education process.
- The fourth feature is related to the need to reorient people's perceptions of the goals and objectives of PAs as a whole. It is no secret that the majority of the world's population considers PAs to be mostly free territories with great potential for the

exploitation of natural resources. To change this point of view to the opposite, to show the true, lasting value of untouched nature is possible only through environmental educational activities carried out primarily within the protected areas itself. Environmental education in national parks and reserves is carried out mainly through the development of sustainable tourism.

Portugal's nature is unique. This is confirmed by the numerous national parks and reserves of the country, which can be visited in any region of the country. Portugal ranks the 62nd in the world in terms of the number of specially protected natural areas. At the moment, there are about 50 nature reserves, parks, protected landscapes, monuments and territories that protect the main ecosystems of the peninsula and islands. Protected areas cover 22% of the country's territory (AEP, 2008).

3.1. Physicogeographical Features of the Territory

Nature tourism is one of the most important and fastest growing segments of the tourism industry (Priskin, 2001). In the case of Portugal, it is possible that nature tourism will grow by 11% annually over the current decade, higher than the European average of 7% (AEP, 2008). Arrabida Natural Park (PNar) is one of the most interesting natural parks in Portugal. The classification that Natural Park has envisioned the protection of the geological, forest, wildlife and landscapes, but also cultural and historical material located within the area. The park is located between the town of Sesimbra and the city of Setúbal, the hill of Palmela and the sea, including areas in the municipalities of Setúbal, Palmela, and Sesimbra in the Portuguese Península de Setúbal region, district of Setúbal (AMRS, 2013).



Picture 1 – Map of Arrabida Natural Park

Icnf.pt

Arrabida Natural Park was established in 1976. It was founded after the law Decreto-Lei nº 622/76, dated July 28 was established, *recognizing the insufficient protection provided by the preventive measures adopted for this territory* (ICNF, 2015). After that, once the amendments were made and the territory was expanded on October 14, 1998, its borders were increased by creating a sea zone.

The territory of the park covers the area of 108 square kilometers (ICNF, 2015), PNar has beautiful beaches and is located among untouched nature and unlike one another, protected by mountains from wind and cold.

The name Arrábida comes from the Arabic word for a place to pray, as the wooded hillsides really contribute to a peaceful retreat. These slopes, facing south, are covered with evergreen shrubs and trees, pines and cypresses, more typical of the Mediterranean. Grapes also grow on the hillsides, and the city of Vila Nogueira de Azeitão is famous for its wine, especially Moscatel de Serubal.

Biodiversity

Vegetation in PNAr is closely related to the specific climate of the region, soil condition and characteristics, and anthropogenic impact (ICNF, 2015). The vegetation of Arrábida has a high natural value, in this territory three floristic elements are combined: Euro-Atlantic, cooler, wetter and darker on the northern slopes; The Mediterranean Sea, warmer, drier and lighter on the southern slopes; and pasta in seaside rocks. Its scientific value is invaluable, leading to the inclusion of PNAr in the European Network of Biogenetic Reserves (Pedro, 1998).

Despite the growing interest in visiting PNAr, there are still areas of relatively little human impact that are unique examples of ancient Mediterranean vegetation (Pedro, 1998). Areas with unique plants are closed to the public and can only be seen when accompanied by park staff.

Pedro (1998) grouped the vegetation of the region in 8 types of formations:

- rocky formations;
- herbs;
- thyme;
- bushes;
- thicket;
- brenkhi;
- Machial;
- forests.



Picture 2 – The top view on Portihna da Arrabida beach

Photographer V. Khodzhaeva

His classification depends on such factors as topography, geology, climate, soil and human activities. Also in the limestone soils of the PNAr, such species as rosemary (*Rosmarinus Officinalis*), aroeira (*Pistacia Lentiscus*), aderno (*Philyrea Latifolia*), stone rose (*Cistus Ladanifer*), mint (*Philyrea Angustifolia*), black hawthorn (*Rhamnus Lycioides*) (*Viburnum Tinus*), honeysuckle (*Lonicera sp.*), Strawberry tree (*Arbutus Unedo*), myrtle (*Myrtus Common*), rosemary (*Lavandula Luisieri*), beach sabine (*Juniperus phoenicea*), sargasso (*Cistus Monspeliensis*) and trovisnium Gulf (D) Almeida, 1998; ICNF, 2015). You can also observe rare species within the PNAr, namely: *Convolvulus Fernandesii*, *Euphorbia Obtusifolia*; *Withania Frutescens*, *Ulex Densus*, and *Iberis Procumbens* (Cunha, 2013).

The fauna of Arrábida is also quite diverse: 213 species of vertebrates have been recorded here, including mammals, birds and reptiles: these are 8 species of amphibians, 16 reptiles, 154 birds and 35 species of mammals (ICNF, 2015). Until the beginning of the 20th century, wolves and deer could be observed in PNAr. However, the high level of hunting led to its extinction. Foxes, wild boars and wild dogs are still abundant in the region (ICNF, 2015). Although the fauna of Arrábida is not as rich as it was a few years ago, it is still very diverse, with wild cat, birthing,

tail bugger, badger, tendril, weasel, hare and rabbit. (ICNF, 2015). Bird species such as Bonelli's eagle, eagle owl and peregrine falcon, king swift, tortoiseshell owl, kestrel and partridge nest in cracks and crevices in the rocks along the coast (ICN, 2003). The cliffs contain caves that are home to endangered species of bats, namely the greater mouse-eared bat, the greater horseshoe bat, the common bent-wing bat (AMRS, 2013).

Marine ecosystems also form a large system: 1,320 species were recorded in 2011, including those listed as Vulnerable or Threatened by the IUCN Red List (AMRS, 2013). Also in the marine environment there is a convergence of various elements of the fauna, namely: the cold-temperate climate of Northern Europe, the warm-temperate climate of the Mediterranean and North Africa and tropical. This mixed ichthyological composition, combined with a hinge character from a biogeographic point of view, gives the Arrabida Sea a predominant role in understanding the phenomenon of the evolution of marine communities.

Most of the PNAr area is composed of limestone and dolomite rocks (ICNF, 2015). It follows from this that there are two types of soil in the Natural Park, limestone, originating from the rocks that make up the core of the mountain range; and silicoargilosos, from the periphery of this nucleus (Ribeiro, 1986). Most of these soils are of sedimentary origin, such as detritus (ICNF, 2015; Ribeiro, 1986). The region is also characterized by areas with high relief (Cunha, 2013) with thin soils, which makes them less useful (Guerreiro, 2008). The rocky coastline is cut by small bays that hide white sand beaches, being the main attraction of the PNAr, especially in summer (ICNF, 2015). However, Arrábida is also highly regarded for its strong landscape characteristics, as the rocky boundary between land and sea is a favorable environment for contemplation (AMRS, 2013). The transition between marine and terrestrial environments, interspersed with lush Mediterranean vegetation, gives Arrabida a landscape of rare beauty loved by local and foreign tourists (ICNF, 2015).

3.2. Recreational Activities and Tourism Infrastructure

As for the tourist entertainment agents working in the territory of Arrábida, according to the data, there are 47 registered agents, of which 30 are TEC and 17 are sea tour operators (Turismo de Portugal, 2015). A wide range of recreational activities are provided by agents working in PNAr.

These activities are divided into 3 groups:

- 1) outdoor activities / adventures;
- 2) cultural events / landscape and cultural tour;
- 3) marine tourism activities.

“outdoor activities / adventures” are those with the highest number of registrations by travel entertainment agents (154 registrations). For this activity, there are more records of “walking and other walking tours” (27 types) they are followed by “nature observation tours” (26 types) and “group tours”, construction” (18 types). The “cultural events / landscape and cultural tour” group has a total of 78 tours, while “visits to museums, monuments and other sites of interest” (25 tours) are the activities with animal watching tours. Tourism training, followed by “Ethnographic Heritage Discovery Activities and Experiences” (20 species), and thematic routes and other heritage discovery routes (19 species).

As for land sports, it is worth noting the presence of a long walking trail and 14 short hiking trails, bicycle and 13 cycling links, eight horse trails, 12 climbing sites, 8 training caves. speleology and 494 caches.

Sea tourism is the type with the least number of tour options. In this case, the activity with the highest rate is “rent of vessels with a crew” (15 types), followed by “tourist fishing activities” (13 types) and “rental of unmanned vessels” (12 types), 40 types in total. With regard to water sports, it is worth mentioning six routes for the practice of coteering, 37 diving and snorkeling points, and a beach conducive to the practice of surfing and body boarding. Still in relation to the aquatic space, it is possible to practice canoeing, boat trips and cetacean observation, and open water swimming along the entire PNAr coast.



Picture 3 – Arrabida Natural Park Waterfront

Photographer V. Khodzhaeva

There are several dozen restaurants and cafes in Setúbal. Visitors especially note the Rockalot Acqua Bay restaurant, whose signature dish is squid pizza. In addition, there are many restaurants, mostly fish, located right next to the beaches, so grabbing a bite in Natural Park is not a problem. There is also a place specially equipped for picnics; it is located at the foot of the mountain.

3.2.1. Natural Attractions

The Arrábida Coast offers some of the best beaches in Portugal (Turismo de Portugal, 2015). The most famous and popular is Portinho da Arrábida. From there, many fans of surface and scuba diving often go to a small island located about a hundred meters from the coast.

There are also some popular Arrábida beaches, such as :



Picture 4 - Praia de Galapinhos

Shutterstock.com



Picture 5 - Praia da Figueira

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Picture 6 - Praia dos Coelhos

Shutterstock.com



Picture 7 - Praia do Creiro

Shutterstock.com

3.2.2. Historic Attractions

Signs of human presence in Arrábida date back to the Lower Paleolithic. Due to its geographic location, PNar has played an important role in military strategy many times to capture and defend territory. Even the Romans began the production of salt in this place, which at that time

was the currency and for centuries Setíbal was a supplier of it to all European (and not only) countries. A salt factory has survived since that time. The Romans, however, built factories for salting and preserving fish and kilns for firing clay and clay products. Sesimbra and Palmela Castles and Fort San Filipe in Setúbal (AMRS, 2013) are examples of this military architecture. The site contains buildings of historical and ancestral value, once used by the Portuguese nobility as a holiday home, these are the Bacalhoa Palace, the Aveiro Palace and the Palace do Calhariz, as well as buildings associated with religious activities such as churches, chapels and monasteries, and namely: Arrábida Monastery (Novo e Velho), Sanctuary de Nossa Senhora do Cabo Espichel and the churches of San Lourenço and São Simão de Azeitão (ICNF, 2015). In a large building half-hidden by trees of the 16th century on the southern slopes of the Serra there was once a Franciscan monastery. Five round towers on the slopes were probably used for solitary prayer.



Picture 8 – Santuario de Nossa Senhora do Cabo Espichel

Photographer V. Khodzhaeva

A small fort just above Portinho da Arrábida was built in 1676 by the Prince Regent of Pedro to protect the locals from Arab pirates. Today, it houses the Maritime Museum and the Center for Marine Biology, where visitors can see an aquarium with a variety of local marine animals, including sea urchins, octopuses and starfish.

An interesting fact is that during the Jurassic period, tropical forests grew on the site of what is now Portugal, in which different types of dinosaurs lived. The dinosaurs left many footprints on the wet soil, which were soon covered with a layer of sediment. And millions of years later, they appeared in the form of fossils.

Among the exposed and weathered cliffs and cliffs of Cape Cabo Espichel, two dinosaur footprints have survived. Some of them are located on the almost sheer Donkey Rock just below the place where the Memory Chapel is located. These footprints were left by a herd of giant four-legged sauropod dinosaurs. One footprint belongs to a young dinosaur, and the second, an uneven footprint was left by a wounded animal. These footprints are perfectly preserved only due to the fact that they are located on an almost vertical rock and it is almost impossible to get closer to them.

Another dinosaur footprint that can be seen up close is on Lagosteirus beach. These footprints date back to the Cretaceous and belong to theropods and ornithopods. The most interesting are the footprints left by the running animal. The striking fact is that these two footprints are only 500 meters apart and more than 50 million years old.



Picture 9 – The dinosaur footprint *Shutterstock.com*

3.2.3. Transport and Communication

The PNAr is located about 50 km from Lisbon Airport and is served by a good road network connecting it to the north and south and a neighboring country — Spain. There are several ways to access the PNAr by motorway (A2, A6 and A12) or by road (EN 10 A2-IP1 or EN5). In the PNAr, the most frequently used roads are EN-379, which connects Palmela, Azeitão and Sesimbra, and EN-379-1, which passes through the summit of Cabo Espichel, the monastery of Santuario de Nossa Senhora do Cabo Espichel, and connects to Setubal. Arrábida can be reached by boat, across the ocean or the garden estuary, using the port of Setúbal and the port of Sesimbra.

In terms of public transport, there is a regular train connection, with the nearest stations Palmela-Aires and Setúbal, as well as ferries that connect Península de Troia with Setubal. There are also trucking companies such as Rede Expressos Lisboa-Setúbal.

While there are several options for accessing the PNAr, there are some difficulties during the summer season, namely access to the beaches, mainly due to the increased demand in these locations and the types of roads and parking available in the PNAr.

The large number of tourism and entertainment companies operating in PNAr, which has steadily increased in recent years (ICNF, 2015), reflect the territory's ability to attract investment in this area.

Housing supply has also increased (INE, 2015; Rito, 2015). Local housing has achieved tremendous success in recent years, mainly due to the proximity to the numerous beaches located in the PNAr, thanks to the fact that the local population takes advantage of this business opportunity, mainly during the summer season. The local people also make calls and distribute the local products of this region, presenting a rich assortment and making the best of it.

3.3. Potential Development of the Sustainable Tourism in Arrabida Natural Park

Analysis of these data allows us to assert that PNAr represents great potential for the development of outdoor sports, since it covers the large number and variety of natural sports grounds that allow doing these activities throughout a year, it has a variety of typical cuisine

and dishes rich in fish, shellfish and varieties of wines and liqueurs grown in this particular region, and can also contribute to the establishment and sustainable tourism education for both tourists and local residents, as the Arrabida Natural Park *exudes history* by observing the geological values and human remains that were left there throughout the history and that can be observed today: dinosaur footprints or old salt factories, fish and garum production during the Roman period, as well as one can admire the many species of flora and fauna, being careful not to harm them with your stay.

To analyze the existing problems and opportunities, a SWOT analysis was carried out (table), which can be effectively used to understand the intricacies of sustainable tourism in PNAr and introduce new ideas and opportunities for its development.

Strengths	Weak
<ul style="list-style-type: none"> - the presence of a developed system, including unique monuments of nature, history and culture; - high tourist and recreational potential for the development of various types of tourism; - the presence of a rich historical and cultural heritage; - a special legal regime of territories, favorable to the preservation of natural and cultural heritage; - favorable ecological situation in most of the territory; - the interest of authorities at all levels in the development of sustainable tourism 	<ul style="list-style-type: none"> • lack of elements of the tourist infrastructure (accommodation facilities, museums, visit centers, trails, etc.); • lack of specialists with the necessary experience of knowledge necessary for the successful organization of tourism, especially in the field of marketing; • insufficient information support of specialized information on sustainable tourism; • high-quality advertising and information materials and opportunities to enter the international sustainable tourism market; • lack of a mechanism for regulating recreational loads due to the large territorial space; • lack of developed and equipped routes and programs for different categories of tourists; • Inaccurate methods for determining recreational loads and monitoring;

Opportunities	Threads
<ul style="list-style-type: none"> - the growing popularity of sustainable tourism; - all-season, allowing to provide various tourist services in the territory, regardless of the seasons and climatic conditions; - the ability to simultaneously develop several types of tourism and recreation; • obtaining additional income through the development of sustainable tourism 	<ul style="list-style-type: none"> - deterioration of the environmental state due to uncontrolled recreational impact; - low demand for domestic tourism; - lack of awareness of tourists and local residents about the rules of tourism in the PNAr - high competition with outbound tourism; - lack of bandwidth calculations; - focus on a narrow circle of consumers of tourist services; - general decline in living standards and purchasing power of the population

Table 1 SWOT- analysis of the potential of the sustainable tourism development in Arrabida Natural Park

Unfortunately, tourism always has an impact on the environment, even at low intensity, despite the efforts of the protected area staff. Such impacts have both a local level and spread over large areas. Since tourism develops in areas that are inherently particularly sensitive, it is important to actively inform tourists and local residents about environmental friendliness and sustainable behavior. One of the solutions to the above problems can be the creation of a mobile application. Nowadays mobile applications have a great potential in supporting sustainable travel development as they provide informational benefits both for Destination Management Organizations (DMOs) and travelers. The days of paper maps, guidebooks are gone and replaced by interactive mobile applications for travel and tourism industry that come with many functionalities. Modern mobile applications can combine interactivity, accessibility, information content and professional content (Shmatchenko, 1995).

Thus, the study carried out in this chapter allows us to talk about the possibility of using the landscape and recreational resources of the Arrabida Natural Park for the prospective development of sustainable tourism in the park. And to define it as a type of recreational activity aimed at acquaintance with natural landscapes, natural-cultural and cultural attractions for the purpose of environmental education and behavior of recreationalists. A mobile application is an effective method to achieve this goal. Next, attention will be paid to the goals and reasons

for mobile application development, its negative and positive sides in the educational process and also the very idea of the structure of this mobile application, which will consist of 4 blocks.

Chapter 4: Description of Mobile Application Project

A person is always characterized by the desire to achieve the most comfortable receipt of information of interest to him, and in modern society, his attribute is the use of a mobile phone, and as a consequence, mobile applications. The demand for applications for mobile devices has been steadily growing lately. Accordingly, today the relevance of developing an application for protected areas is quite appropriate and will definitely receive appropriate recognition from users. Today, the development and creation of a mobile application is an important tool that helps to build trusting and reliable relationships with visitors.

4.1. Goals, Tasks and Reasons for Mobile Application Development

The goal of the project is to create a mobile application for a wide range of consumers with a possibility of a deeper study of the Arrabida Natural Park and a more accurate understanding of sustainable tourism in the territory. Currently, in order to form a special image and increase the tourist attractiveness of the region, information and communication technologies are actively used. In addition to the generally accepted presentation and advertising tasks, modern information technologies are effective in the form of mobile applications to increase the level of ecological and geographical literacy of recreants, awareness of unique natural and cultural-historical sites.

The development of ecotourism and sustainable tourism in protected areas is about managing the visitation process in a way that maximizes the benefits and minimizes negative environmental impacts before they occur. Key elements of this principle are: a focus on cumulative impacts; applying adaptive management; reaching a consensus among all stakeholders on the acceptable level and location of impact in protected areas, as well as raising awareness of tourists and the population about the value of nature, sustainable behavior on it and gentle tourism that does not harm it. A mobile application can greatly facilitate these control and management tasks of protected areas.

XXI century has become the century of information technologies, and today such technologies have penetrated almost all spheres of human life. Modern people cannot live their day without their smartphones or tablets, and such an attachment to mobile devices gives developers ample space for development. In 2019, more than 100 billion applications were downloaded in the

world, 20% of them are tourism applications (Kovalyov Yu., 2003). Travel and tourism have become an integral part of the life of a huge number of the population, because if you want and have a certain amount of money, you can get to almost anywhere in the world. The number of tourists is huge, and this very large number of people is attracted by mobile applications developers. Nowadays, with the increase of disposable income, leisure time, and information, as well as the development of transportation networks, tourism is facilitated and many individuals are motivated to travel without agencies and a help of their parties (Echtner & Ritchie, 2003).

Mobile internet and supporting applications have changed travel forever. Keeping the travellers in touch and in comfort, they influence travel-planning and decision making process (Wang & Fesenmaier 2013) and as a result reengineer the whole process of developing, managing and marketing tourism products and destinations (Buhalis & O'Connor 2005).

Mobile applications are usually aimed at managing specific task and provide its user with context specific data just when the user needs it and limits choices to the tactical needs of the moment. Due to the ability to provide direct and immediate access to information and offer solutions based on user preferences and experiences, mobile apps are predicted to make a revolution in decision-making processes. (Thain 2012).

4.2. Pros and Cons of the Idea for Creation of an Application for Sustainable Tourism Development and Education Purposes

A mobile application in protected areas has a number of advantages in sustainable tourism and education, such as:

- provides the information about the sustainable destination information about the destination accommodation, transportation, natural-based attractions, local food, the cost of the trip, eco-trip routes and itineraries

- provides of an interactive guide map which shows the location of attractions and activity routes to help users to plan their visit. Interactive guides have the ability to geolocate and find eco-routes that help minimize the impact of a visitor's presence on the territory - Unlike paper guides, you can even listen to the mobile application and quickly find the necessary information and emerging questions on sustainable behavior. Such an application gives complete freedom

of movement

- to provide assistance in environmental education of tourists and local residents. The application can replace the missing number of protected area workers and provide visitors with a fascinating author's story in several languages.

- provide up-to-date information for the management, some reviews and monitoring on the number of visitors and their movement in protected areas. Special counters allow detailed analysis of user interaction with content. DMOs need to constantly monitor and analyse tourists' activities and environmental conditions and ICT-based applications appear to be good tools for that. Destination Management Systems (DMS), Environmental Management Information Systems (EMIS), Geographical Information Systems (GIS), Global Positioning System (GPS) and finally Tourism Information System (TIS) and already developed and ready to use. (Ali & Frew 2010, 2.)

Among the most effective DMOs tools for managing sustainable tools are Location Based Services (LBS), Destination management Systems (DMS) and Intelligent Transport Systems (ITS) and Visitor Management applications – technique to control visitor numbers, manage tourist flows, protect sensitive areas and manage visitor time in queues (Page & Connell 2009). This can play an important role in confirming confidence that decisions regarding visits control (and other aspects of protected area management) are based on the information provided.

- mobile phone use and proper advertising and application policies can help popularize ecotourism and connect people with common views and interests, as well as create hobby clubs and even volunteer organizations. Being connected and having access to the needed information play very important part in tourists satisfaction (Buhalis & O'Connor 2005; Wang & Fesenmaier 2013), which was identified as a baseline for sustainable travel development by UNEP and UNWTO (2005, 12).

- gives up-to-date information about events, ceremonies and festivals relating to ecotourism with information about their timing

- the use of mobile application at different stages of traveling can be also considered sustainable, as it saves both efforts and resources: there is no need to distribute printed materials, like

brushers, guides, maps, etc. Considering the sizes of travel and tourism industry, these changes can already bring significant improvements.

- also the gamification can be used to increase a level of motivation of sustainable tourism habits, especially for younger people. Gamification is a participation-and-reward. Gamifying of processes is projected to rise both as a tool of managing innovations and changes inside the companies and in engaging and retaining the customers (Swan 2012). The benefits of using gamification is improving engagement before, during and after the experience. This results in a greater number of inbound and outbound tourists at the destination, greater visibility, greater interaction in social networks, faster feedback and increased loyalty.

- help to establish effective partnerships and connect with local community. As mentioned by Buhalis and O'Connor (2005), ICT gives an opportunity for small businesses to manage global distribution of their services at affordable costs.

The disadvantages of a mobile application as a communication channel with the audience include the following factors:

- minor technical limitations;
- possible inadequate control and security system;
- the complexity of the implementation of innovations.

Mobile applications make it possible to establish a long-term communication with a user: after installation, it will always be present on the user's mobile phone, which will allow him /her to interact with the application more often, access information and content and follow updates. It can become a tool for collecting information about visitors, with its help you can not only monitor the activity of tourists, but also enter into an interactive dialogue with it.

Today, almost every user has a map service installed, which, in fact, can also be a travel application (Buhalis D., 2005). But in addition to simple maps with the function of determining the location using GPS sensors, there are also more advanced solutions that offer the user not only a route to a monument, but also a short description, photographs, information on the object, ratings from other users and much more (Wang D., 2011).

When considering the importance of tourism, understanding tourists' behavior is a vital element in order to attract them. According to Pearce (2005), tourist behavior is formed on five levels:

- 1) an anticipation or pre-purchase
- 2) a travel to the site segment
- 3) an on-site experience
- 4) a return travel component
- 5) an extended recall and recollection stage.

A mobile application can participate and contribute to education at each of these levels.

An anticipation or pre-purchase that leads to the selection of a destination is very important. Choosing a destination is a main issue in tourism. The success of tourist destinations depends very much on the factors that can influence the decision-making behavior of tourists. One of the powerful factors influencing tourists' decision-making behavior and the choice of destination is destination image (Assaker, Esposito Vinzi, & O'Connor, 2011; Bigné, Sánchez, & Sánchez, 2001; Chen & Tsai, 2007; Chen et al., 2013; Chi & Qu, 2008; Kozak & Decrop, 2009; Nicoletta & Servidio, 2012; Phillips, Wolfe, Hodur, & Leistriz, 2013; Sonmez & Sirakaya, 2002; Tavitiyaman & Qu, 2013) that can also be given by mobile application. Destinations which have a positive and strong image are more likely to be chosen by tourists (Echtner & Ritchie, 2003; Tavitiyaman & Qu, 2013; Zahra, 2012) than those without.

A travel to the site segment and an on-site experience depend on accurate, accessible information, as well as a clear interface that a mobile application can provide.

In addition to the pre-travel phase, destination image affects both on-travel and post-travel behaviors of tourists (Chen et al., 2013; Tavitiyaman & Qu, 2013). A mobile application can help fulfilling its educational function not only at the very stage of the trip and being in the protected areas, but also in the continuation of the study of the topic of sustainable tourism and sustainable behavior of people.

This application will be for informational purposes, that is, the application will carry the function of attracting a wide audience to learning sustainable behavior on the PNAr through the publication of various maps, important information, photos and articles. Although the

application will have a range of functions, its main purpose will be to provide a channel for the dissemination of information about sustainable tourism in Arrabida Natural Park and environmental behavior outside the territory.

The main target audience of this project will be tourists of all ages. Those who want new experiences. That is, the majority of the population will be taken into account as the target audience: teenagers, young people, adults - all active participants in social networks. The main task of the application is to stimulate visitors to use a new high-quality product that contributes to the promotion and sustainable tourism development of PNAR.

4.3. Expert interviews with specialists whose activities are related to tourism in the Arrabida Natural Park

The method of the expert interview was chosen to evaluate this project effectiveness. A typical evaluation method presents the information horizontally, gathering together the opinions of many people. Expert interview - a vertical assessment which is penetrating the essence of the topic with the help of deep analysis by a specialist. This is an in-depth interview with a competent industry specialist who is well aware of the specifics of the subject being studied. The persons involved for the interviews include scientists, company leaders, narrow specialists, employees of research organisations and other people who are more familiar with the project topic than others. This research method involves exclusively experts specialising in the required field.

While talking with an expert, it becomes possible to obtain data of a narrow profile concerning those issues that are unknown to others, less knowledgeable people in the topic (Butenko, 2007). This approach allows you to solve the problems of market research, as well as questions of potential demand and product positioning. In addition, an interview with an industry expert can be a critical step in developing a strategy for further promoting a product or service, and will also significantly reduce costs by eliminating unnecessary actions and creating a reliable plan for promoting products on the market (Butenko, 2007).

Expert interviews have significant advantages over other methods of data collection. For example, due to the fact that respondents are highly qualified in the question under analysis, it eliminates the need to use additional screening and clarifying questions aimed at revealing true, but hidden from the interviewer respondent views. This type of survey is uniquely aimed at

obtaining reliable data because respondents' competence is very high (Dorussen, Lenz, Blavoukos, 2005).

As noted by a leading European specialist in qualitative research S. Kvale: the form of conversation today is a necessary condition to obtain knowledge about the inner world and social life. According to him, the research interview is the best way of finding the quality and content of information required to solve research problems.

As part of this study, 3 expert interviews were conducted on the importance of creating a sustainable tourism mobile app at Arrabida Natural Park. These are the former graduate in nature tourism and now working for the Setúbal City Hall in the walking trails and other tourism activities in the Natural Park, the manager of one of the nature tourism enterprises and the teacher in the Hotel and Tourism School of Setubal, and the member of tourism department of Palmela city Hall.

The main criterion for the selection of experts for the interview was the competence and active participation in the field of travel services of Arrabida Natural Park. The expert interview was aimed at identifying the main problems associated with tourism activities, establishing the behavioural habits of visitors, identifying the attitude of local residents and the tourism industry in the park, as well as identifying decisions made in Natural Park in this regard, which the administration and the authorities are doing to change the prevailing situation and how a mobile app can help improve sustainability in the park.

In accordance with these objectives, the following expert interview plan was presented. All respondents were asked the following questions:

How are you connected with Arrabida Natural Park?

Why do you think visitors of Arrabida Natural Park do not always behave sustainably

Do you think there is enough information about sustainable tourism in arrabida np through the web?

What age groups do you think the app will be most effective for?

What, in your opinion, the creation of a dedicated mobile application for sustainable tourism in Arrábida Natural Park can positively influence?

Each of expert's answer was unique and contributed to the formation of new, clarifying questions. All the experts agreed with the proposed project and recognised its benefits for establishing sustainable tourism in the Arrabida Natural Park. In their opinion, there are a lot of advantages in creating an application, one of them is that it is a unique idea as there are no mobile applications for this Natural Park at all. Also, the application will promote interest in tourism in the territory, and help the establishment of the correct sustainable behaviour. It will also make it easier to find information of interest about the territory. Experts also agree that the popularity of mobile phones can help to spread the right information about Arrabida Natural Park. However, their opinion was divided about what age group the application will be most effective for. One of the experts thought that the mobile application would be more interesting for young people under the age of 30. Another suggested that, on the contrary, the application would be more interesting to people who think about environment in a more conscious age after 30 years. The third specialist is sure that age groups do not play any role in the interests of sustainable tourism, since almost every person has a mobile phone and the choice of behavioural roles consists of views and interests, it can be assumed that this mobile application is suitable for people of all age groups.

All experts agree that at this moment there is very little information about the hiking trails in the Natural Park and other important information for tourists on the Internet and on the territory of the Park itself. At the moment, according to experts, the process of marking hiking trails in the park itself is just in the beginning.

Experts find many reasons why tourists and the locals often do not behave sustainably, for instance, they leave a lot of trash, enter private territories, trample new trails, act too freely in the Natural Park. The experts agreed that the main reasons for this behaviour in Arrabida Natural Park is lack of knowledge, information and guidelines about sustainable behaviour and indicators of sustainability. Also the other reasons are a lack of motivation and understanding of how to make behaviour more sustainable. One of the experts thinks that quite important factor is a personality like lifestyle or decision-making style.

As a result of an expert interview with specialists whose activities are related to Arrabida Natural Park, it was agreed that the project of the mobile application will be very convenient source of information which is easy to use. This application is predicted to make a revolution in tourism decision-making process as it can save time, resources and efforts while planning a

trip to Arrabida and also receiving information about travel options while traveling in the Park. It will also give the a sustainable advice which may influence travel behaviour of visitors of Arrabida Natural Park.

4.4 Analisis of similar applications

Currently, there is a large number of applications on various topics of sustainable development, due to the high popularity of this topic in recent years. Currently, there is a number of mobile applications that address sustainable tourism and behavior problems. Each of them has its own features, advantages and disadvantages.

For Portugal, this is the NaturalPTrail mobile app. It is a national government strategy implemented by the Institute for the Conservation of Nature and Forests (ICNF), which aims to identify and promote what distinguishes Portugal from products and services produced in protected areas of the Portuguese mainland that are compatible with the principles of sustainability and conservation. Therefore, this application is an integrated bet on endogenous resources, biodiversity and Portuguese culture associated with Portuguese culture associated with an exceptional national natural heritage, with an appreciation of the quality products of the identity and traditional and authentic activities and knowledge of Portugal.

In this application, you can find a large number of routes for walking, horse riding, bicycle or car. All routes can be found on the map and selected by category region, protected areas, municipality and nearby. The list of routes can be arranged in alphabetic order, by rating, popularity, distance of the route, proximity. The app also allows you to evaluate each route you have traveled and offers some travel tips related to safety rather than sustainable tourism. The application advises not to go on the routes alone, or at least inform friends and family about it, as well as wear the correct equipment and check the weather conditions in advance.

For completing each route, you can get a certain number of points, depending on its complexity. You can compare your total achievements with other users of the application.

It is not easy to find photographs of routes in the application and their rating is given only by name, which later you have to look for in another tab in order to check more details about it. In the description of trails there is a lot of information that is not explained in any way, so it

becomes difficult to plan time that will be spent on the route. Most importantly, there is little relevant information in the app. For example, for Arrabida Natural Park only 1 short walking route is indicated in the application, while the number of official routes in Arrabida Natural Park is five. The application is free.

Other application that contains a lot of information on sustainable tourism is called TripSketch Green Book. With ideas for eco-friendly travel in more than 80 cities across the world, the Green Book can be used as a city guide to find nearby attractions and get directions. The categories that can be found in the app are attractions, hotels, dining, tours, transportation. Because all of the info is saved on the phone, you don't need data or Wi-Fi to use the iPhone app. The application is paid.

Since the application tries to cover the whole world, and accordingly contains a huge number of destinations such as Canada, Europe and the United States, it is limited in information. And also, despite the fact that the application positions itself as a mobile application for sustainable tourism, nothing was noticed in it that could help a traveler to make any right sustainable decisions.

The search engine also found a number of sustainable tourism applications, containing information not only about routes, but also photos, videos, and a little information about the nature surrounding visitors. But, unfortunately, they are all made not in international languages, but in the languages of the countries for which the applications were created - India, Thailand, Latvia and others, which makes it impossible to use them without knowing the language.

The rest of the applications are divided into narrower specializations related to sustainable tourism. For example, the largest number are applications for choosing a place to sleep and eat. The most popular apps are Wayaj and Green Globe.

This is a typical green travel app. They help you find green hotels, resorts, cruise ships, tours and convention centers, and provide property photos, videos and links to help you book your trip directly. These apps detail the travel sustainability certification and the rigorous process involved in meeting the green criteria of the Travel and Tourism Standard, so visitors can be sure they are realizing the ideas of green travel. Carbon Footprint calculator in Wayaj app was added. It offers to offset the carbon footprint by choosing from a variety of UNFCCC certified

projects. Hotels and restaurants can be sorted by price, accommodation type and Eco Score given by the travelers. Such categories as materials and resources, management, community, water, waste, energy, indoors are evaluated. All these categories do not have a description, so it is not known whether such estimates can be trusted, since, most likely, the respondent himself was not exactly sure what each of the categories was about. The Green Globe app also does not explain green leaflet icons labeled Eco-friendly next to some hotels and restaurants.

UNEP Carbon Calculator и Green Travel Choice - the platforms which are designed to calculate emissions based on car, plane, motor bike or train travel on a per trip basis. It keeps a log of your trips, travel distance and your emissions over time, helping you to choose your future “modes of transport” more wisely. The travellers can also learn about the habitat of an area and what you can do to help. The app Green Travel Choice is paid.

Nosh Planet - helps to find ethical and sustainably sourced food at local eateries across the globe. The travellers can check in at places currently listed within the app to earn points and ultimately, deals for dining and can also redeem your points to donate to a community food project! The developers also created Local Food Loop, which connects people with local growers, makers, and markers. Unfortunately, these apps are best used in Australia and Canada.

Thus, it can be concluded that the mobile applications for sustainable tourism available on the software market have their drawbacks. And since there is not a single example of a sustainable tourism application for Arrabida Natural Park, the development of a new application to solve this problem becomes very important.

4.5 The Structure of the Mobile Application Consists of 4 Blocks:

Application development will proceed primarily from the tasks initially assigned to the application. This determines the basic strategy for choosing the building blocks. In the future, its structure can be changed.

The structure of the mobile application consists of 10 blocks. The main menu will contain all the most relevant things that a PNAR visitor may need. This is done to ease the use so that a tourist does not have to search for the information he needs in the application for a long time. Thus, it can help a visitor to make a decision on the trip. The first 2 blocks will relate to the description of historical and natural attractions, as well as transport and travel to Natural Park.

Destinations block will not be divided into categories such as beach, point view, it will be compiled according to the rating of visitors. A tourist can give a rating from 1 to 5 in the description under each attraction, as well as add it to Favorites.

The heading of this block will display a Google Map of Arrabida Natural Park with labels denoting PNAr Cultural Interests in the database, panoramic sites, beaches, picnic spots and eco trails.

In the next block there will be pictures and video of everything related to PNAr and may be of interest to visitors. Then there will be 4 blocks dedicated to local business. These blocks will be named Activities, Restaurants, Accommodation, Local Shops. The application will support the local production like wines, azeitão cheese, oysters from the sado river estuary, different restaurants with fish from Setúbal and Sesimbra, handicrafts, like glazed tiles and tourism accommodation. In the block Activities people will have a change to choose without searching through web different group and individual offers. Arrabida Natural Park is very rich on different activities, such as dolphin watching, seaview board and boat tours, snorkering, mountain adventure, wine tours and art craft tours.

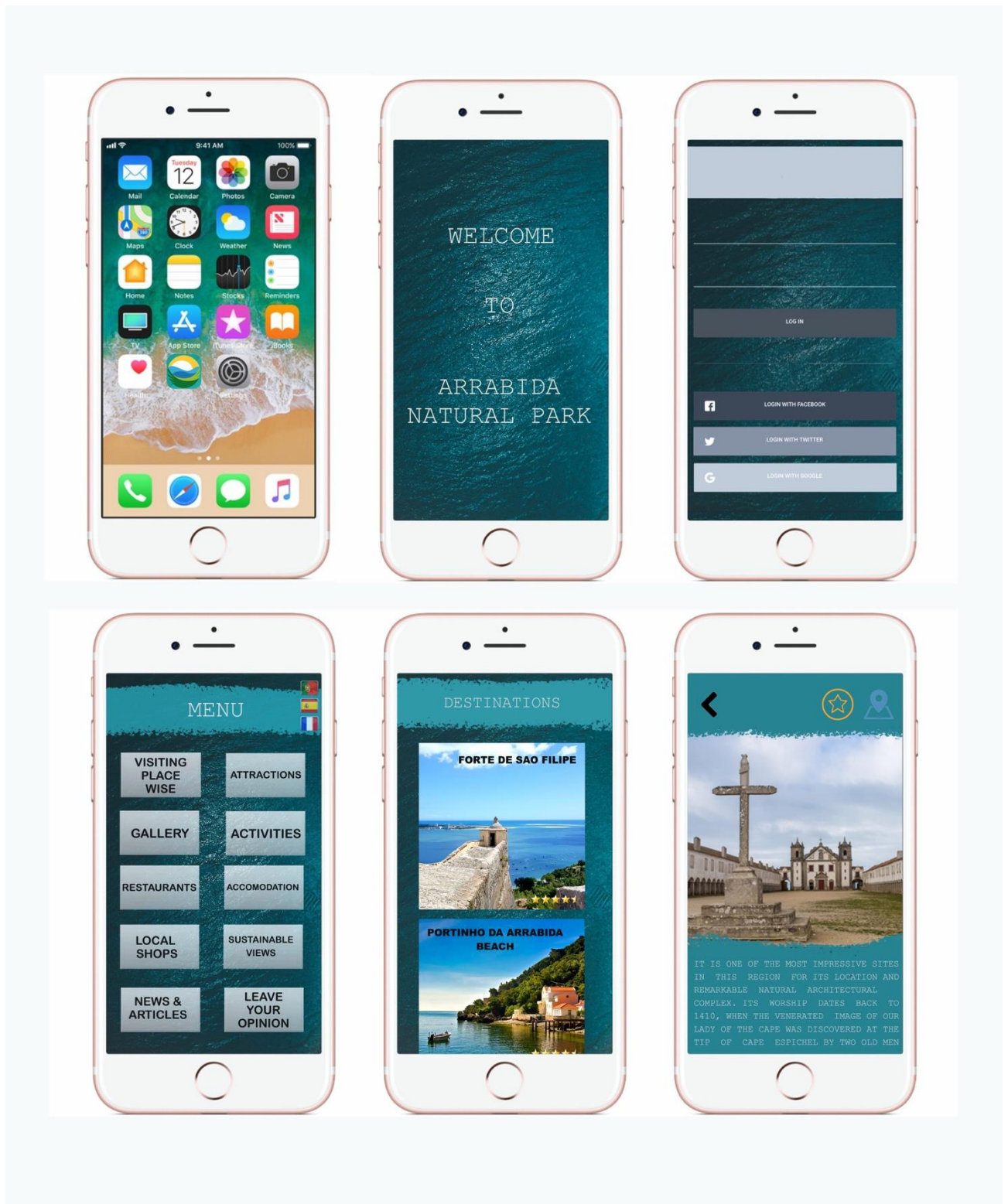
The next block will contain the rules of sustainable behavior in the territory, the uniqueness and reasons for the protection of the nature of Arrabida, as well as articles on related issues of ecotourism (they will also be created in two versions - text and audio). The application will contain articles and / or videos for a deeper understanding of sustainable development as voluntary carbon off-setting schemes (VCOs), the amount of CO2 emissions produced by various modes of transport, principles of sustainable accommodation, principles of sustainable behavior in destination, the importance of supporting local economies and others.

The last 2 blocks will be aimed at more active visitors, as well as at dawn that tourists will want to take part in the life of Arrabida Natural Park. The New and Articles block will help tourists stay up to date with the latest developments related to the PNAr, know the latest achievements, problems of the park, its value, and so on. The last block in the appendix will be devoted to a marketing tool that will help PNAr in the future development, like short surveys.

At the bottom of the application, active links will always be available - menu, favorite, contacts.

4.5.1. Description of the Functionality

An important detail of the program is the logo and the user interface, which should be friendly and intuitive for a wide range of users. Since the interface is the tool with which a dialogue between the user and the program is made, and it creates the first impression of the software production in general.



There should be a lot of visual content in the application to draw attention and interest to the PNAr and the topic of sustainability. Most readers perceive a page with several materials per page in this order:

- 1) examine an image;
- 2) check headings, captions under pictures;
- 3) stop at highlighted fragments, frames, subheadings;
- 4) read text material.

If the first two elements listed above do not attract attention, the text will remain unread. Therefore, visual forms should offer a reader something interesting or unusual, that is, perform one of the tasks (Shevchenko, 2004): to attract the reader's attention, to name the main idea of the material, to highlight those whom the material is intended to, allowing others to skip unnecessary content if they wish. spark interest with the content of the headline or image, create a positive impression.

The application must have social media integration. Social networks are becoming an active platform for communication with consumers. Their main feature is the desire of visitors to share information and discuss it. For these purposes, the visual content is the most convenient type of content. Undoubtedly, data visualization is a prerequisite for a promotion of tourist destinations. However, a serious study of the principles and laws of the implementation of visual communication, its effects and methods of management is necessary.

Access to the application database should be carried out offline, because there is not always a stable access to the Internet.

Special counters will allow for a detailed analysis of user interaction with content.

4.5.2. Interface Language

The application interface must be in English in order to reach the largest audience, due to the prevalence of the language. It can also include several of the most common languages: German, French, Portuguese.

The mechanism of operation in the absence of an Internet connection, while the user must have

access to all the functionality. Changes are saved locally on the mobile device.

4.5.3. Data Mining

One of the most exciting possibilities is the capability of mobile applications to mine user data to both better understand existing travel patterns and to identify novel travel opportunities. Projects are emerging to consider the best use of these data on the trajectories of people, objects in transit their field of interest.

Data of this sort can be compiled anonymously but could equally, subject to user agreement, be shared among a social network of users willing to provide social assistance. This raises various privacy, security and ethical issues that are currently subject to scrutiny by both governments and developer communities. There are also other challenges. Several authors point out that new technology can have unintended consequences (Shove, 2010; Wajcman, 2008) as novel practices materialize and people use the emerging opportunities in “creative and often unexpected ways” (Couclelis, 2009, p. 1559).

One project exploring these opportunities is Sixth Sense Transport. This provides a “glimpse of future mobility patterns” making collaborative travel and transport opportunities in the immediate future visible to users in order to reduce CO2 emissions and improve quality of life measures (Davies et al, 2012). Tourism is one of its experimental domains. From a theoretical perspective, the project poses a number of computing and social scientific challenges. Drawing on a variety of data sources, such as public transport travel feeds and data mining of individuals’ travel ‘traces’ from smartphones, predictions can be made relative to the immediate future travel plans of users.

Creation of a mobile app is only half the battle. An even more difficult and responsible task is its promotion. For people to know and hear about the application, it needs to be done with competent and effective marketing.

Thus, the mobile application attracts customers with its ease of use and functionality. Applications provide capabilities that other channels do not. For example - PUSH notifications, geolocation tools, many times greater interactivity, delivering important information to a large coverage of users.

But the development of the application is only the first stage, marketing and advertising are becoming important, which allow you to build a market model and a psychological portrait of the client in advance, as well as to interest new potential visitors. Through these strategies, the market and its prospects are visualized, awareness of the area and a deep understanding of the importance of sustainable tourism both within and outside the park are raised.

Chapter 5: Mobile Application Promotion Strategy

Having a competent and effective strategy is one of the factors that determine the strategic success of a mobile application. The relevance of this conclusion is based on the fact that the mobile applications market is growing exponentially. When promoting mobile applications, various strategies are used, which are determined based on the target audience, resources and goals.

5.1 Marketing Strategy

Having a competent and effective marketing strategy is one of the factors that determine the success of a mobile application. The relevance of this statement is based on the fact that the market for mobile applications is growing exponentially, but only a few achieve the result that millions of users download them. So the rapid pace of market development is confirmed by the statistics of the largest mobile application stores - according to data for 2018, such market giants as App Store and Google Play had more than 5 million applications (Anischenko, 2018). At the same time, the average content growth rate is over a thousand new applications from publishers per month.

When analyzing the role of a marketing strategy, it is also worth considering general market statistics. So at the end of 2019, there are more than 4 billion devices connected to the App Store and Google Play, and user spendings for mobile applications exceeds 81 billion USD (Williams, 2019).

In this (highly competitive) environment, publishers use maximum efforts to secure the best position in app stores. Thus, maximizing the effectiveness of promotion channels, it is necessary to clearly define the base of promotion, expressed in the presence of the following elements (Dine, 2018).

- Strategic positioning;
- The target audience;
- Competitive analysis;
- Performance indicators.

A well-formed positioning strategy is the basis for competent application promotion. Positioning is based on the definition of the main value (a unique mobile application offer), the wording of which defines the competitors of the application.

In the industrial era it was believed that the more people visit the national parks, the more benefit society would have. Thus, the growth in the number of visitors was a measure of management success. Today this statement has been challenged. The success of modern PNAr management must be measured in benefits received by a visitor - new knowledge, sensations, experiences. In other words, management today should be focused on the quality and variety of services provided, and information support and environmental education are also actively used and are extremely important methods of work in national parks. Since Arrabida Natural Park does not have any mobile applications that would relate only to this park, and where all the information about its uniqueness and what kind of tourism is welcomed in this area would be collected, strategic positioning here plays an extremely important role. First of all, it is necessary to decide what task the application is designed to solve for a user: it can be information about the PNAr itself, the rules of behavior in the protected area, historical and cultural attractions, or even, all these items together. Today's user is very spoiled with a high number of applications, so this application should really solve an important problem of a consumer and attract his/her attention when choosing a place to spend time, as well as describe the advantages of a given territory.

In terms of target audience, tourism in Arrabida Natural Park has many interested parties. Each has its own values and objectives. Such a complex mosaic of interests of different groups has a constant impact on the management of protected areas. Here are the groups that have direct interests in tourism management in a protected natural area:

Founders and directors of PNAr

Volunteers

Group visitors

PNAr employees

Land owners on the territory of the PNAr and in the neighbourhood)

Residents (living on the territory of the PNAr and in the neighbourhood)

State ministries, departments

Commercial sector

Environmental institutions

Licensing services, concessionaires, tenants

Hotel business

Tour operators, travel agents

Four groups from this list are the most important in organizing sustainable tourism management in Protected area:

- (1) society as a whole, including local communities,
- (2) employees of a specially protected tourist area,
- (3) company tour
- (4) visitors and users of resources.

Unfortunately, it is clear that PNAr employees cannot independently meet the interests of visitors and local residents, since the territory of the protected area is very large, the throughput is not controlled. Therefore, the mobile application will be very relevant in the field of providing information and education to a tourist who wants to get acquainted with it, I do not resort to anything except my mobile phone.

Visitors need some basic information before arriving in Arrábida, such as how to get there and how much it will cost, which natural and cultural sites, programs and infrastructure are available. It is important that visitors have the correct expectations even before arriving at the site, then on the spot they will better understand what activities are allowed and what is not. It is important that visitors have right expectations before visiting the site.

When visitors arrive at a specially protected area, their requests change, become more specific and complex. They want to know more about the resources and infrastructure available, what activities are allowed and what are prohibited, they are interested in security issues. As their understanding of the territory grows, they show an increasing curiosity about the natural and historical environment, the culture of the people living in and around the territory, and the responsibilities of visitors. A well-designed mobile application should result in a more meaningful, interesting, non-detrimental stay for thousands of visitors.

As noted, education is also important in the management of visitors and their impacts on

protected areas. This process can be used to change visitor behavior to align with the principles of the site; as a result, natural and cultural heritage will be better preserved.

Protected areas achieve prominence and success when many people visit, like them and take action to support them. The strategy of attracting visitors through communication through a mobile application can also have very positive consequences.

Such strategy shall include:

- a) information to announce the problems the park faces, as well as to inform about penalties where necessary;
- b) providing a visitor with all the information he/she needs, which has already been written above;
- c). developing an understanding of the issues, ensuring that interested institutions do not feel any pressure and they understand what they are allowed or prohibited to do in PNAr, developing visitor codes of conduct;
- d) a system of reviews and proposals from the visitors themselves, people who come to the territory and use the application should feel interested in their opinion. The system should provide consulting, information services, as well as various training materials. When developing an application, it is very important to understand that for constant contact with the consumer, it will constantly require updates - adding new functions and news feed, improving depending on requests of visitors.
- e) creating constituencies, uploading photographs, all these can create an active life in and around the PNAr, which will help in the development and dissemination of sustainable tourism both within the protected area itself and beyond. For most people, the most effective way to get the message across is to have fun with the environment, which will lead to interest, then conscious awareness, and finally, care for the environment.

This strategy was to create a friendly atmosphere through a mobile application that would make visitors want to come back here again. A range of interpretive techniques can be enjoyable, comfortable, and interesting: application design, photographs and structured information, graphic panels, audio and video, maps and reviews.

The competitiveness of the reserve as a tourist destination can be defined as its comparative advantage in relation to other tourist destinations in the country and abroad.

Several dozen of protected areas, natural parks and reserves have been organized in Portugal. The most successful example of promoting a nature reserve as a tourist destination that stands out for its positioning is the Penede-Gerês National Park, which is famous for oak forests and a large population of eagles, as well as wolves, brown bears, wild goats and other animals.

However, when analyzing mobile applications of protected areas, it was found that not a single park has an independent application. Penede-Gerês is the only park that has been found to have an independent attachment. It largely helps tourists to determine the territory and pre-book apartments, but it does not help in any way to position Penede-Gerês as a protected area. After analyzing the competitive environment of protected areas, we can come to the conclusion that creating a convenient mobile application can reveal the competitive advantage of Arrabida Natural Park in comparison with other destinations.

When analyzing the effectiveness of the application, it is necessary to monitor the number and level of satisfaction of visitors. The most informative app performance metrics will include:

- application traffic (number of unique views, number of returning visitors)
- time spent by the consumer in the application
- the number of viewed pages, thanks to which you can understand the preferences of visitors and how they interact with the application
- the dynamics of visiting new and old visitors to the mobile application

By analyzing the above indicators, you can determine the most productive pages of the application that establish the most effective communication contact with a potential visitor. Also, the analysis of these indicators determines the effectiveness of the application promotion:

- the popularity of certain pages and articles - the ratio of the number of unique visitors in the previous period and in the current one;
- session time - the time (one visit) spent by a potential visitor in the mobile application;
- failure statistics - analysis of the efficiency of the application sections, for example, if a user opened one page and left it without activating other requests, then the information in the application did not attract a potential consumer

5.1.1. Key Elements of the Marketing of the Application

In modern conditions, the mastery of marketing technologies is of particular importance. The main ways to promote a mobile application are as follows:

- the application should be aimed at the entire audience to which the park would like to appeal to, and these are mostly advanced Internet and mobile phone users; The attractiveness of the Internet resource can be increased by the fact that visitors themselves can create new points and fill the site with their informational description. After verification by specialists, the collected materials are placed in a common database, i.e. everyone can contribute to the development of local history and tourism in the region. This approach is effective in stimulating interest in geography and increasing the tourist attraction of the PNAr. As a result, the application is of a navigational or illustrative plot nature.

- there must be a clear and consistent idea of the topics that the park would like to highlight;

First of all, this is a description of the PNAr itself, its value and uniqueness, as well as maps, routes and programs developed for different categories of tourists and the principle of rational use of natural resources.

The mobile application will also help to conduct systematic case studies to assess the attitude of the local population and visitors to Arrabida Natural Park and the protection system in general, which will help to adjust the application itself, thereby attracting more supporters.

- continuous research should be an integral part of the strategy; of course, visit management is not the main target. Its task is to contribute to solving the problems of nature protection in the territory in the long term. Since the territory of the Natural Park is very large, it is extremely difficult to control the flow of tourists as well as to make any calculations. In terms of water tourism, detailed calculations are carried out, boats are licensed, but no counting is done on the territory of Arrábida itself.

- simple language;

Simple writing improves communication, saves time and creates a positive and light atmosphere. Thanks to plain language texts, a barrier between a visitor and the protected areas

will not be put.

- compliance with the ecological, social and physical characteristics of the park, rules of conduct on the territory;

The rules of conduct are special on a specially protected area. Here a person is a guest, so he/she must behave respectfully towards the owner - nature. But it is important that a tourist does not feel pressure from the PNAr, so that the rules and restrictions do not affect the tourist's choice of whether to visit the territory or not. A causal system works well here, telling people and sharing with them what can result from their misbehavior will help them feel more responsible for their actions. Also, the introduction of gamification can help revise visitors to their actions towards nature.

- good management and maintenance of information support; use of information guidelines;

In order for a tourist to choose the Arrabida Natural Park application, in addition to the simplicity of the language, he/she should be attracted by the informativeness and completeness of relevant information about what he/she may need before, during and after a trip. And this is the current address, PNAr operating hours, directions on the map, ecotrails of different levels for independent walks, picnic areas, observation points.

- good understanding of visitors, for this, the application should have questionnaires and a room for proposals;

This is an effective way to help establish a strong connection with the audience and get their opinion on the activities of PNAr, which in the future will help to get the opinion of visitors, call to identify their expectations and needs. Also, polls will increase tourist engagement and stimulate discussion. Thus, the group of people using the application will turn into a living community, whose members interact with each other. And also, using polls, you can create three content: tell about the prerequisites for voting, share the results with users, create user-generated content through the fact that tourists will participate in discussions.

- key and disputable issues regarding the park should also be highlighted, but it is important that they are raised in the right way, in the right tone, in order to reduce the pressure on visitors;

- flexibility: willingness to adapt the strategy to changing circumstances and to improved knowledge.

- the interests of local residents should also be taken into account. The lifespan of the natural park also depends on whether the local population supports it. However, this need for support does not mean that protection tasks can be sacrificed for it. It means respect for people whose customs and habits existed long before the formation of the protected area. The meaning of the term *visitors* distinguishes people coming from outside the protected area and those who live in the area. This distinction is of little use and the distinction itself is somewhat blurred; local residents are also visitors to the parks. Likewise, it is not only local residents who damage the resources of the park: they can disrupt the integrity of the forest, and tourists can disrupt the integrity of the culture.

The mobile application is also convenient for this category of people. They, too, can leave their comments and opinions, thus quickly ensuring that their wishes are taken into account by the PNAr management.

The mobile application can also help develop cooperation between the park and the community based on mutual understanding. If it will, for example, mark lists of local producers, restaurants and accommodations. It is very important to work with local people as well, explaining and educating them about sustainable views of tourism.

The main contribution that the creation of a mobile application can make lies in the opportunities that can provide support - the protected area, the management of the protected area, and environmental principles in general - through training, communication and information dissemination through the mobile application.

Of course, visitor behavior can be influenced by factors that the park has no control over: social and economic factors that can affect how some people spend their free time or how others are forced to earn their living. Policies, plans and technologies must adapt to new requirements and changed circumstances. However, the mobile application provides the opportunity to use its certain influence on how a potential visitor relates to the protected area and how he behaves in the park.

Conservation of landscapes, ecosystems or habitats is called *change management*; it is necessary to act on changes in favor of some of the special characteristics on which the original system was based. The creation and use of the latest technology such as a mobile application has the same relevance to changes: in the number of visitors, recreational requirements, expectations, interest, social and economic factors.

PNAr mobile app and visitor communication strategy is to understand people; how people behave; how to ensure that people perceive sustainable tourism and correct behavior in the territory as something natural, and not as a restriction of their freedom, and so that this does not cause discomfort.

This mobile application will open up a completely new channel through which you can communicate with visitors. It is a haven where the audience always has access to the PNAr with one simple pick-up. In other words, an application is a space that does double work, on the one hand, it is something that can be adjusted to the needs of visitors, on the other hand, it carries exactly the load that the application manufacturers want to convey to tourists, in this case it is an improvement in the understanding of Arrábida Natural Park, its values and learning in sustainable tourism that does not harm nature, but rather contributes to a positive impact.

There are many forums on the Internet where developers and ordinary users communicate. It is worth taking the project to such communities, presenting the concept, or even getting people to beta test. This approach will help to gain additional visibility, analyze the audience, and effectively identify errors in the technical part and design. Mobile app analytics is an important part of its promotion.

However, there is no doubt in the fact that mobile applications today cannot break through and gain the greatest popularity among consumers on just one idea. A competent implementation is required, and more importantly, a well-thought-out promotion strategy.

The application will be free, monetization will take place through advertisements for restaurants, cafes, accommodations, places to visit and various different commercial tours. To perform technical maintenance one person specialized in IT will be required, also a second person will be needed to update the park information and article section.

5.2. Advertising Strategy

Recently, tourism has been developing progressively and is becoming a massive socio-economic phenomenon on a global scale (Blackman et al, 2014). The expansion of political, scientific, economic and cultural ties between states contributes to the rapid development. Along with tourism, technologies are also rapidly evolving that help to simplify many tourism tasks, as well as disseminate information and conduct distance education.

The high degree of technology development has reoriented all modern associations to brand concepts, the strengthening of which gives various companies significant advantages in the market. Brands are not created in production, they arise and are in the minds of consumers, delivering an emotional relationship between their perception and the functionality of the product (Makasheva, Makashev., 2011) In the minds of many, this means that they are characterized by various properties and advantages that make them known and distinguish from other brands.

The study of many variants of the term brand allowed us to formulate the distinctive properties of the concept of "natural brand" for Arrabida Natural Park, which should be used when promoting an application. Natural brand is:

- competitive identity of a natural object;
- the impression created by nature or a natural object is unique in its kind;
- not just a manifestation of the uniqueness of a natural object based on positive associations, but the formation of the associations;
- it is a constructor, which consists of functional and emotional elements that together create a set of associations with a given natural area.

A natural brand can be considered the highest manifestation of emotional consumer preferences; it can also be presented as a meaningful system concept.

The physical and geographical environment of Arrabida Natural Park makes it possible to create on the territory of the region a whole frame of natural branded objects and routes and the protected area itself as a brand concept.

Accordingly, a mobile application built on the association of the Arrabida Natural Park brand is a much more meaningful system concept. It is:

- a unique emotionally positive image, which is due to the natural, historical, industrial, socio-cultural and other features of a given territory, which has become well known to the public;
- ensuring high-quality satisfaction of the needs of the consumer of the natural territory, obtaining certain benefits on a two-sided basis;
- an increased subjective level of value of a natural territory for the consumer and for satisfaction, formed through positive associations that encourage the consumption of the territory and remind of it.

Arrabida Natural Park has a unique blend of the tallest hills clad in lush vegetation and mountain-like, breathtaking panoramic views, unique vegetation, proximity to the ocean, and old architecture.

It is also necessary to note the importance of a natural brand for sustainable tourism development, one of the tasks of which is to guarantee the long-term competitiveness, vitality and prosperity of tourism. The presence of an attractive natural brand will be the best way to contribute to this. The development of a natural brand should be based on an integrated approach that will allow using a natural brand as a strategic tool for the formation of territories. A strong natural brand of the area will help the area to enter new markets, increase previously existing markets, establish relationships at a higher level, since now the natural brand is becoming a powerful tool for the development of territories and an important part of the regional strategy.

A positive image of the territory, the so-called image, is created due to the influence of a variety of factors. The image of a territory in the modern world is becoming an important economic resource and one of the main factors of the region's competitiveness (Kuznecov and Bolshuhina, 2017). Natural brands can largely determine their attractiveness, arouse desire and unwillingness to visit them, and ultimately influence the geography of human flows.

To form a natural brand, a territory must have a recreational potential, have a unified system of natural and socio-cultural subsystems, which are characterized by functional interconnectedness and territorial integrity.

PNAr can be attributed to the most promising recreational area, as it is facilitated by a rich and varied natural heritage, transport accessibility, and a favorable geographical position. The

natural curiosity of a tourist in relation to different parts of the world and the peoples inhabiting them form one of the most powerful incentives for tourist motivations (McCabe S.t and Diekmannb, 2015).

At the moment, local tourism prevails in Arrabida Natural Park.

The reasons for the situation are:

- low development of natural and cultural potential;
- low equipment and low level of material base for recreation facilities;
- insufficient development of the recreational infrastructure;
- competition from surrounding recreational regions, namely the northern direction from Lisbon
- Sintra and Cascais
- little awareness of tourists about the recreational potential of the PNAr

The newest direction in increasing the tourist flow and correcting the situation with underdeveloped tourism in PNAr can be work on creating a natural brand through a mobile application. The park as a natural brand can shape many tourism destinations in the region. Excursions, hikes, and wellness resources are immense. One of the main reasons for the low level of use of natural brands in the region is the lack of insufficient information on the Internet and from tour operators about the advantages and possibilities of the region.

And even for branded applications, even if it is simple to attract buyers through the recognition of their brand, they can keep their interest only by applying a competent advertising strategy. Mobile app promotion is a step-by-step process that involves a huge number of channels and tools. A program to promote sustainable tourism in Arrabida Natural Park should build on the resources already available - natural, historical, cultural.

The basis for promoting sustainable tourism in PNAr is the picturesque nature, many clean beaches, a variety of historical and cultural monuments, the small population of the region, and a favorable ecological situation.

Environmental information should be a critical component of a PNAR advertising product. Particular attention should be paid to the cleanliness of air and water, the ecological purity of local food. Along with direct environmental information, indirect methods of presenting environmental information are used throughout the world.

Along with direct environmental information, indirect ways of presenting environmental information should be used to attract and educate customers. An effective tool of this kind can be environmental brands and signs, as well as certificates awarded to hotels, firms, goods. These marks have no government status and are not legally normative. They build credibility based on public recognition and the reputation of the organizations awarding them.

There are popular and authoritative international and national signs: *green suitcase*, *green tree*, *green stars* for hotels, etc. These signs do not have state status and legal regulatory nature; their authority and prevalence are based on public recognition, on the reputation of those organizations that award these marks.

The main goal of environmentally oriented advertising of national parks is to directly and indirectly inform park visitors and consumers of its products about the general environmental situation in the park, the environmental friendliness of the services offered and the feasibility of using them. Eco-friendly park advertisements must be credible and not contain unsubstantiated claims that cannot be verified. This is the main principle of conscientious environmental advertising, observing which the park can secure itself the reputation of a serious, responsible partner.

The key themes and style of advertising for the PNAr mobile app should be clearly targeted at different target groups.

For visitors looking for non-typical vacations, closer to nature with few people, it will be important for the application to include a large selection of information about classic and unusual eco-trails;

- information about specially dedicated to ecology and sustainable tourism;
- to indicate that the destination is not overcrowded with tourists and at the same time is very close to Lisbon;
- photographs of local crafts, other items representing the most interesting, unique and valuable natural and cultural resources of the park and the region

For clients who are sensitive to the language of advertising it should explore:

- exoticism, cognition, enchanting impressions in places of classic adventures;

- ecological susceptibility;
- intercultural interactions;
- environmentally friendly tours;
- susceptibility to the natural and cultural environment;
- spiritual adventures for responsible travelers;
- tours for people who are conscious of nature;
- nature-oriented travel.

For clients interested in science and nature conservation:

- information about work for volunteers;
- visiting the most pristine natural sites and assistance in their protection;
- involvement of participants in an environmental project;
- For customers who value knowledge and quality:
- use of your own transport, travel, availability;
- offer of hotels owned by local owners;
- information materials to prepare for a visit to the park, as well as a large amount of information (also in audio format) during the trip on the PNAr itself;

For all target groups, advertising campaigns should be composed in all possible emotional components, which will not only have a positive impact on a potential visitor, but will also remain in his memory for a long time. First of all, this will increase the awareness and recognition of Arrabida Natural Park, which is one of the main goals of the advertising campaign for this mobile application. This recommendation is due to the fact that the mobile application, as well as the PNAr, remain in the person's memory. In the modern era of information technology, the amount of information that a person processes increases significantly, and, accordingly, most of the information is not remembered. Therefore, so that the advertising campaign of the mobile application and Arrabida Natural Park as a brand does not go unnoticed against the general background of the advertising sphere, it must use the emotional strings of a person. Advertising can evoke such positive emotions as laughter, joy, the desire to use the application in order to have an unforgettable vacation in the right vision for sustainable tourism.

The next important step in a competently correct advertising campaign for this mobile application is the obligatory conduct of marketing research through the application itself for

their evaluation by potential customers, identifying the level of emotional impact and memorability. First of all, this will reduce the risk of a negative effect of an advertising campaign for PNAr, as well as increase the effectiveness of its use and correct possible negative results.

An important part of an advertising strategy is to establish feedback from visitors. This can be partnerships with trending companies that promote ecotourism, such as prizes for active participation in the life of the application and PNAr, such as coupons and certificates for discounts at places that are run by local residents of the park. This will motivate people to return to the park, as well as help local residents stay active in their businesses. It is also mandatory to receive feedback on the impressions received after visiting the Arrabida Natural Park. At the same time, the condition for the productive and effective use of feedback is the elimination of all identified comments and negative reviews to prevent them in the future. Getting feedback is important not only to attract new customers, but also to improve the activities of the tourism company itself, as well as its strategic development.

The interaction of Arrabida Natural Park with representatives of mass media - journalists, photographers, operators, offering them to try a mobile application is an effective means of promoting it. Collaborating with local resources is important when working for the future. A few news, interviews or reviews on local sites will positively influence the loyalty of more serious media representatives and bloggers.

A press kit is also an effective resource - this is an analogue of a classic presentation. With the help of the team, you can create such a document, be sure to talk about the benefits that the project brings.

By implementing an advertising strategy on a mobile app, awareness of sustainable tourism opportunities in Arrabida Natural Park will be raised and will be a step towards universal environmental education and training. The attention of specialists and visitors to the PNAr will undoubtedly lead to a deeper understanding of PAs and correct behavior on the territory and beyond. But in order to achieve maximum efficiency, that is, the integration of this application into the daily life of people and the formation of a culture of a responsible attitude to tourism and the environment, one's own behavior and social control over the behavior of others, large-scale advertising projects of this application are needed, which will focus on convenience and benefits. the use of this application for the general population.

Chapter 6: Sustainability Planning

It is better to light a small candle than curse the darkness all your life! Confucius said. This aphorism can be considered the main motto of project environmental activities. Each environmental education or nature conservation project is the very candle that needs to be lit.

6.1. Sustainable Tourism Problems in PNAr

During the research, the following problems of sustainable tourism on the PNAr were found:

- Increased pressure on the natural systems of the park. Direct contact with settlements located near the borders of the PNAr, and Lisbon, places great stress on the natural systems of the park. Tourist activities in the park are more widespread.
- the growing general pollution of the territory, the air basin and the degradation of ecosystems due to an increase in anthropogenic load, insufficient attention to the problem of garbage collection and general pollution of the territory;
- since the territory of Arrabida Natural Park has a long border, accessible from almost many sides, especially for pedestrians, registration of visitors, as well as the load on the territory is almost impossible
- there is insufficient attention to marketing research and market segmentation of potential consumers of tourism services;
- lack of conditions and incentives for the introduction of innovation, "green" technologies and attracting environmental investments in order to reduce pollution, save natural resources;
- Lack of effective monitoring of recreational and tourist activities, which does not allow regulating the recreational load and redistributing tourist flows in order to preserve ecosystems;
- Lack of regulation of relations with owners, tenants and settlements located in the protected zone within the territory complicates the effective management of PNAr;
- Lack of information materials about the tourist opportunities of Arrabida Natural Park, about the types of tourist services and prices for them.

The use of services designed for smartphones currently seems relevant in the context of the development of a culture of care for the environment and correct views on tourism, especially in protected areas. The sustainable tourism application offers great opportunities to address the identified problems related to tourist behavior in the PNAr area.

The developed mobile application can help to change the opinion and behavior of visitors in the form of the following understanding of sustainable tourism:

- minimization of negative impact, respect for nature, compliance with environmental rules and regulations in relation to PNAr.
- raising environmental, ecological and cultural awareness, including environmental education, respect for customs and traditional way of life of local communities.
- enrichment of tourists with vital general cultural and natural scientific environmental knowledge, including in the field of personal and public ecological safety;
- socialization of the worldview of tourists through the formation of their environmental culture, which includes new value orientations and behavior that are important for the sustainable development of society and are adequate to the ecological imperative;
- the formation of a tolerant attitude towards previously unknown cultures and ethnic groups, towards their way of life and traditions, adapted to the natural environment;
- development of the activities of the local population; popularization of sustainable and ecological local products, places to stay, can stimulate local people to actively follow and develop views in this direction
- stimulation of traditional forms of nature management, production of ecologically clean food products;
- an increase in investments both in infrastructure and services and in nature protection;
- an increase in the welfare of the local population and the development of special education aimed at acquiring tourism and nature conservation professions;
- moreover, the use of mobile application at different stages of traveling can be also considered sustainable, as it saves both efforts and resources: there is no need to travel to tourist agency to book a tour, no need to distribute printed materials, like brochures, guides, maps, etc. Considering the sizes of travel and tourism industry in PNAr, these changes can already bring significant improvements.

6.2. Comparison of Mass and Sustainable Tourism in the Territory

Comparative characteristics of sustainable tourism, which can be established using a mobile application and mass (traditional) tourism in the PNAr

Comparison factors	Sustainable tourism	Mass (traditional tourism)
Attraction of tourists	With the help of the application, tourists already go to the territory with the correct ideas about the PNAr, know the rules of conduct, routes and the value of this natural park. They can ask the questions they have and get full and detailed answers to them even before the trip.	Most of the visitors do not know anything about the territory and its uniqueness, they leave trash, make fires, and do not take into account the way of life of local residents.
Tourists behaviour	Tourists follow a specific behavior pattern in accordance with the PNAr culture during their stay. Their behavior does not harm the natural resources and customs of the local population.	Tourists bring their lifestyle and behavior to the Natural Park grounds.
Attitude to nature	For tourists, the very value of the existence of natural objects on the territory of Arrábida is important, and not their consumer value. Tourists do not try to destroy nature, do not leave trash after themselves, do not light fires,	Tourists' consumerism dominate towards natural objects, which are evaluated based on their usefulness to humans

	do not take nature (stones, flowers) home as a souvenir.	
Relations between tourists and local people	A friendly, respectful relationship aimed at learning a new culture and supporting local businesses.	Formal relationship. Tourists expect that they will be provided with all necessary resources and services that they have paid for.

Mass tourism can be a powerful destructive force if it develops spontaneously, without competent planning and arrangement of the natural territory, without the necessary infrastructure, without strict control from the guardians of nature. At the same time, tourism in PNAr has a huge educational potential, and its development with the help of modern technologies, such as the development of a mobile application, can give a serious impetus to the economic development of the region and the country as a whole. An interested tourist will find in the application a lot of useful experience, answers to exciting questions related to the difficult relationship between tourism and protected natural areas.

Sustainable tourism development on the territory of PNAr is such a long-term tourism development, in which a balance is achieved in the implementation of economic, environmental, social and cultural development goals, the interests of all stakeholders (tourists, receiving and sending destinations, the local population) are taken into account, based on the rational use of tourism resources and comprehensive partnership.

6.3. Ways of Sustainable Behaviour Management by Means of a Mobile Application

Let's take a look at each of clause and how the creation of a mobile application can affect each of these areas:

- economic development

The mobile application will help manage tourist flows in order to reduce the pronounced seasonality offering different activities, extend the tourist season, more effectively distribute tourist flows, both in time and space, is undoubtedly beneficial not only from an environmental,

but also from an economic point of view. It will also help develop the regional economy, through advertisements and articles with reviews of the best places to visit for tourists.

- welfare of local residents and preservation of the foundations of the local population

Sustainable tourism development through the app will help take care of the local population and maintain a stable social and cultural environment in the PNAr. With the help of a special column of advertisements for services and goods of local residents, as well as articles describing their lives, habits and roots, it will raise the attractiveness of their employment in tourism, improving working conditions, expanding opportunities and ways of earning money, and, as a result, creating new jobs

- thriving culture

The mobile app will help to better communicate to more people the PNAr's values, sports and cultural events taking place on the territory, as well as allow visitors to experience it all first hand. Accordingly, the application promotes interpersonal and international communication, familiarization with culture, as well as the physical and intellectual development of the individual.

- environmental sustainability

The developed mobile application will help visitors reduce the negative consequences of their presence in the protected area, since now, in essence, most types of tourism do not meet the criteria for sustainable development, simply due to the fact that people have nowhere to get information about it.

- meeting the needs of tourists

Of course, the application can take part in the process of meeting the needs of visitors, the main idea is based on the emotional and sensory feelings of tourists, which leave their mark on the level of their satisfaction from visiting Arrabida Natural Park. Therefore, with its design, interface and component part, the mobile application focuses on creating positive emotional

and sensory feelings, and most importantly, creating a sense of awareness, interest and safety in the tourist and thereby draw his attention to PNAr and subsequent stable views.

Chapter 7. Conclusion

Protected areas achieve prominence and success when many people visit, sympathize with them and take action to support them. Tourism in protected areas is an essential component of protected area management. It is important that the application not only helps tourists on their travels, but also fosters a culture of sustainable tourism. The previous chapter identified the challenges and comparative characteristics of sustainable and mass tourism at Arrabida Natural Park, and examined the options and privileges that a developed application focused on sustainable tourism in the area could provide.

A mobile device for the Arrabida Natural Park can provide a conceptual framework for understanding the specifics of tourism on the PNAr. It will help you not only to travel around the territory, but also to navigate it correctly, to know the features of this particular park, to appreciate nature, to lead a sustainable way of tourism not only in the territory, but also outside it. Thus, involvement in environmental education and environmental protection activities in the project contributes to the formation of a responsible attitude towards nature among visitors, the development of skills in analyzing environmental problems and predicting the consequences of human activity in nature, the development of an active citizenship based on a sense of involvement in solving social and environmental problems and responsibility for the environment. This approach is consistent with the idea that environmental education should not provide knowledge as such, but form a worldview and contribute to the formation of an “environmentally friendly” and socially active person who has an active civic position and is able to influence his social environment in the interests of nature protection and rational nature management. This practice has a long-term basis. It is important to develop the right motivation for visitors, which will influence the decision-making processes within the community and will be able to preserve the biological diversity and cultural values of the PNAr.

This study analyzed the literature on the topic and developed a system so that users can make their journeys more sustainable, as well as receive information about the conservation of the environment and culture of Arrabida Natural Park, and the application also includes detailed information that members of the local community provide to visitors. Thus, this mobile

application covers all areas for further development and prosperity of sustainable development in the protected areas.

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