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Innovative Airport Designs' Infrastructures to support an Integrated Sustainable Tourism Policy for Sustainable Development and Public Health Protection

Summary. In this paper are investigated actions for public health protection in airports' tourism facilities and actions that promote innovation at Airports' sustainable construction infrastructures to minimize associated pollution threats. An integrated framework is presented based on a comprehensive and analysis of the community airport tourism centers and sustainable design facilities in sustainable construction infrastructures in transportation related to waste management facilities and energy recovery from landfill emissions that are produced at nearby places at airports. Research in Sustainable Airport Designs and Infrastructures is necessary to solve common operating problems, to adapt appropriate useful information technologies, and to introduce innovations into the airport tourism industry. The study reveals sustainability dimensions that are lagging or require much greater attention, such as sustainable designs, environmental management, monitoring, safety and public health protection of tourists at airport facilities. In this study are presented useful solutions for sustainable airport designs that promote sustainability supporting an Integrated Sustainable Tourism Policy for Public Health Protection and Sustainable Development within associated infrastructures and airport facilities. Useful conclusions are made for the airport tourism industry, sustainable infrastructures, environmental technologies, renewable resources, sanitary facilities and associative infrastructures developing innovative near-term solutions to meet demands placed on it.

Key words: Sustainable tourism, ICTs – Technological innovation in airports, public health protection, sustainable designs in tourism, tourism marketing management, renewable resources

Introduction

Tourism is generating revenue and creating employment opportunities and jobs on a large scalebasis in related sectors such as hotels, guest houses, restaurants, catering services, transport, guides and mule porters, shops, retailers, handicrafts etc**.** As web information pages in tourism industry become more common, there is an increasing interest in the factors underlying the development of online assistance services for tourists

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and stakeholders for sustainable airport infrastructures and associated tourism facilities. The tourism industry is now an important socio-economic factor for the district.

According to some sources, today tourism is a major contributor to the local economy in Greece. This statistic presents the total contribution of travel and tourism to GDP in Greece from 2012 to 2018. Over this period, the contribution of the travel and tourism industry to GDP in Greece has increased, reaching approximately EUR 35 billion in 2017[1]. But the benefits of the tourism industry are still concentrated mostly in and around Leh town. However, all infrastructural systems (sustainable designs in waste management at airport infrastructures, solid waste disposal, exploitation of landfill emissions, water supply distribution networks, sewage networks, sanitation, clean energy use in airports infrastructures, power from renewable resources, sustainable construction designs etc.) are under parallel increasing pressures.

Tourism generates over a quarter of Greece's gross domestic product, according to data presented on Wednesday by the Institute of the Greek Tourism Confederation (INSETE). The data highlight the industry's importance to the national economy and employment, as well as tourism's quasi-monopolistic status in the country's growth. In Greece, according to the latest figures available, at least 1 p.p. out of the 1.9 points of economic expansion last year came from tourism. The INSETE report showed that tourism is amounting to EUR 21.6 billion or 11.7% of GDP, it had a direct impact on the economy in 2018. This was up by 13.3% or EUR 2.5 billion from 2017. Directly and indirectly, tourism accounted for between EUR 47.4 billion and 57.1 billion, or 25.7 to 30.9% of GDP. These figures amount to about half of the economy's total expansion. Given that travel receipts rose by 10.1% last year from 2017, per the Bank of Greece, to reach EUR 16.113 billion, tourism has added EUR 1.483 billion to Greece's GDP just through its direct impact, and much more indirectly[2].

Moreover, that also illustrates the country's great dependence on tourism, as Greece has not developed any other important sector, with the possible exception of shipping, which accounts for about 7% of GDP. At peak season last year, tourism employed 411,000 people in accommodation and food service companies alone, contributing 16.7% of the country's employment. When the indirect impact of tourism is factored in, including professions such as transport etc, its share in national employment ranged between 36.7 and 44.2%, making it the main factor in the reduction of unemployment, particularly for young people, according to INSETE.

The tourism sector also made a sizable contribution in terms of investment activity, amounting to EUR 5 billion in 2018, and 90% of the sector's revenues originated from abroad[3].

However, airports are vital global resources. They serve a key role in transportation of people and goods and in regional, national, and international commerce. They are

[1] I. Bellos: Greece is over-reliant on tourism, ekathimerini, http://www.ekathimerini.com/241056/article/ekathimerini/business/greece-is-over-reliant-on-tourism (access: 30.06.2019).
[2] Ibidem.
[3] Ibidem.

where the nation's aviation system connects with other modes of transportation and shipment of goods for tourism's stakeholders where responsibility for sustainable infrastructures and managing transportation operations intersects with the role of local governments and stakeholders own and operate most airport facilities.

Regional Airport infrastructures in Greece and the necessity of ICT's to promote tourism infrastructures

The efficient distribution of air services became necessary immediately after air transport deregulation in American airline industry in the mid '70s when the fare structure changed and price war between the airlines increased the need for computing and communication. By then, Central Reservation Systems (CRSs) contributed to the airlines with internal organization improvement and inventory management. A decade later, travel agencies, as stakeholders of travel industry demanded access in an integrated terminal of fares and information. As a result, CRSs were soon been transformed into the so-called Global Distribution Systems (GDSs) that penetrated tourism industry to become important leaders of travel market purchase and powerful intermediaries up to date[4].

Air travel became more accessible to the individuals at more affordable prices, while airlines enjoyed the fact that by 2003, 6% of tickets were booking directly via their own websites to become gradually the major distribution mechanism worldwide. In fact, as the mobile devices are both integral and essential parts of everyday life, cross-device travel purchase has been increased by 10% in 2017 leading to a significant trend change when it comes to distribution channels booking shares[5]. Admittedly, the commission per booking in GDSs has always been an issue to impede cost reduction for travel service suppliers, especially for network airlines that have to deal with competition from Low Cost Carriers that, empowered by the emergence of Internet in the mid '90s and other Information and Communication Technologies (ICTs) tools, avoided such costs being able to offer lower fares.

Consequently, online direct sales were inevitable from all market players with network carriers to adopt new methods of air services distribution. Internet and mobile technologies enabled consumers to acquire travel-related information and purchase core and ancillary tourism products from tourism suppliers directly[6] and there were a number of ICT-enabled innovations introduced in air transport industry including electronic tickets, proactive and reactive yield management, commission capping and publication of net fares, financial benefits from self-online booking, powerful Customer

[4] D. Buhalis: eAirlines: strategic and tactical use of ICTs in the airline industry, Journal of Information and Management 2004, vol. 41(7), pp. 805–825.

[5] A. Dichter: How to serve today's digital traveler, McKinsey & Company Report, New York 2018, https://www.mckinsey.com/industries/travel-transport-and-logistics/our-insights/how-to-serve-todays-digital-traveler (access: 10.07.2019).

[6] D. Buhalis: eAirlines: strategic and tactical…, op. cit.; C. Morosan: Toward an integrated model of adoption of mobile phones for purchasing ancillary services in air travel, International Journal of Contemporary Hospitality Management 2014, vol. 27, no 2, pp. 246–271.

Relationship Management Systems (CRM), online promotions and advertising; an evolution which clearly worked for the mutual benefit for both passengers and airlines.

ICT trends in the hotel industry are increasing on a daily basis. The development of ICT has dramatically changed the way customers interact and seek information, as well as the way they purchase services[7]. Hotel managers are now fully aware of the benefits that ICT in the hospitality industry, and accordingly, are motivated to create greater awareness of the hotel with the goal of establishing mutually beneficial interactive relationships with guests. Having no geographical or physical barriers, the Internet is considered a competitive marketing channel in the hospitality and tourism industry[8]. Rather than actually going to a travel agent, travelers increasingly prefer interacting with the tourism business online to conveniently obtain information on destinations, prices or schedules[9]. Hotels understand the Internet to be a tool that allows potential guests to find information about them and that motivates guests to make a reservation at the hotel[10].

It is clear that ICT's in Tourism industry for stakeholders are necessary meeting future challenges[11]. ICT's are coming to promote places as semantic destinations for several groups in tourism industry especially for tourists that would like to combine tourism with eco-tourism and associated healthcare tourism facilities either natural or artificial. Proper sustainable construction designs and associated qualitative facilities should exist in healthcare tourism facilities and associated types of tourism[12].

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[7] R. Leung, R. Law: Evaluation of Hotel Information Technologies and EDI Adoption: The Perspective of Hotel IT Managers in Hong Kong Cornell Hospitality Quarterly 2013, vol. 54, issue 1.

[8] B. Doolin, S. Dillon, F, Thompson, J. Corner: Perceived Risk and the Internet Shopping Experience in Online Purchasing Behaviour in New Zealand, 7th annual CollECTer conference on electronic commerce, Melbourne, 1–2 December, 2002.

[9] A. Greenspan: Risk and Uncertainty in Monetary Policy, American Economic Reviews 2004, no. 94, pp. 33–40.

[10] B. Milović: Social Media and eCRM as a Prerequisite for Hotel Success, Management Information Systems 2012, vol. 7, no 3, pp. 26–31.

[11] V. Katsoni: The Strategic Role of Virtual Communities and Social Network Sites on Tourism Destination Marketing, e-Journal of Science & Technology 2014, vol. 9(5), pp. 107–117; V. Katsoni: ICT applications in the hotel industry through an e-CRM systems theory approach, Academica turistica (Spletna izd.) 2015, vol. 8, no 1, pp. 15–23 https://www.dlib.si/details/URN:NBN:SI:doc-VES5GDHR (access: 10.07.2019); V. Katsoni: The effects of ICTs on tourism distribution channels and DMOs marketing strategies, [in:] New media, entrepreneurship and sustainable tourism development, Z. Andreopoulou, N. Leandros, G. Quaranta& R. Salvia (Eds), Francoangeli, Mediolan, 2017, pp. 58–66; T. Koliopoulos, V. Katsoni: The Innovative Health Tourism's Environmental Management Sustainable Design Facilities Assessment Capability, [in:] Smart Tourism as a Driver for Culture and Sustainability. Fifth International Conference IACuDiT, V. Katsoni, M. Segarra-Oña (Eds), Springer, Athens 2018, pp. 79–87, Doi: 10.1007/978-3-030-03910-3_6.; T. Koliopoulos, V. Katsoni, C. Radu: Information Tools for Health Tourism's Sustainability and Safe Mobility, Journal of Emerging Environmental Technologies and Health Protection 2018, vol. 1, pp. 138–146.

[12] T. Koliopoulos, V. Katsoni: The Innovative Health…, op. cit.; T. Koliopoulos, V. Katsoni, C. Radu: Information Tools for Health…, op. cit.

In this paper are investigated the new 14 airport regional infrastructures that have been developed the last 5 years in Greece by Fraport[13]. The identification is focused not only on airports that need more expansion of their sustainable development in their infrastructures but also in airports that need more support to be developed properly and to be competitive so as to meet the challenges of tourism growth in Greece supporting sustainability and public health protection.

On 14 December 2015 Fraport Greece signed contracts with the Hellenic Republic Asset Development Fund (HRADF) and the Greek State for the 40-year concessions to operate, manage, develop and maintain 14 regional airports in Greece. At the time of the project closing full payment of the EUR 1.234 billion upfront concession fee will be made by Fraport Greece in tandem with the transfer of operations at the 14 airports. Along with the upfront concession payment, an annual fixed concession fee of initially EUR 22.9 million and a variable annual concession fee of on average 28.5% of the operational profit will be paid. In addition, Fraport Greece will invest a total of EUR 330 million in airport infrastructure until 2020, followed by maintenance and traffic-driven capacity investments during subsequent years of the project[14].

The 14 Greek regional airports project is one of the largest and most beneficial investments and is a basis for boosting the Greek economy, especially during this challenging time for the country. The benefits at the national and regional level are multiple and the cooperation of the two sponsors Fraport and Copelouzos is a guarantee for successfully supporting tourism as one of the most important industries of Greece, reinforcing competitiveness of the economy and creating new jobs[15].

The important characteristic of mobile technology is that it has been developed for individual use and does not require any organizational support for stakeholders in tourism; health tourism; eco-tourism; other types of tourism. Moreover, there are a number of infrastructure challenges that health tourism organizations will have to address if they adopt web / mobile ICT's technologies informing interesting tourists about interactive activities that could take place in their air flight destinations including packets of sports like rowing, jogging, trekking and activities in planting within agrotourism[16].

The development and use of web / mobile technology in the health tourism industry combining other types of tourism can be realized by the use of proper web ICT's / mobile technologies that have a large range of application environments. Fruitful areas of further research include studying the challenges in implementing mobile applications in the health tourism sector with other types of tourism. Identifying the key role players in implementing mobile computing applications and reflecting on the diffusion process at a later stage to determine whether the dissemination of web ICT's / mobile technology

[13] Fraport 2019, 14 Greek Regional Airports – A major investment that boosts the Greek economy and acts as a catalyst for the growth of Greek tourism, Fraport publication, Greece.
[14] Ibidem.
[15] Ibidem.
[16] Flisi M.: Smart handheld devices: The emergence of convergence, Mobile Trends, April 2, 2001.

follow the traditional theory of diffusion in terms of marketing and proper use of social media to promote ideal sustainable tourism's packets.

Tourism traffic volume analysis – a policy for integrated sustainable tourism

An important topic is the integrated SWM that should be introduced at municipalities next to airports, LCA, monitoring, exploitation of energy from renewable resources. Monitoring tools are necessary for decision making; the mitigation of pollution and protection of public health[17].

The main renewable resources from landfill management are landfill gas for electricity; treated leachates for cleaning, irrigation and planting for landscape upgrade[18]. Bioclimatic designs are necessary the sustainability of construction designs as well as their location is preferred to be close to sea so as to be linked airports with other means of transport like ships for the convenient and economic traveling of tourists especially on Greek islands. However, in the table 1 is presented the implementation of Greek legislation that follows the relative EU directives for sustainability and public health protection in Fraport's airports.

In Fraport Group (FG) has a contract in concession project for the operation of fourteen regional airports with the Greek Republic for forty years. In Figure 1 are presented the FG's regional airport locations. In Fraport's Group (FG) strategic management module A includes the next Fraport's airports: International Airport of Thessaloniki (SKG); International airport of Corfu (CFU); International airport of Kefalonia (EFL); International airport of Zakinthos (ZTH); International airport of Aktion (PVK); International airport of Kavala (KVA); and International airport of Chania (CHQ). Also In Fraport's Group strategic management module B includes the next Fraport's airports: International airport of Santorini (JTR); International airport of Samos (SMI); International airport of Skiathos (JSI); International airport of Mykonos (JMK); International airport of Mytilini (MJT); International airport of Rhodes (RHO); and International airport of Kos (KGS).

[17] T. Koliopoulos, V. Katsoni, C. Radu: Information Tools for Health…, op. cit.; T. Koliopoulos: Sulphate concentrations at mid auchencarroch experimental site – Image processing and environmental quality assurance of leachate pond treatment units on displaced geological surfaces, International Journal of ChemTech Research 2009, vol. 1, no. 2, pp. 126–134; T. Koliopoulos, M. Kouoroulout: Biodegradation of iso-valeric acid in relation to other chemical indexes and spatial liner risk assessment at landfill topographies – mid auchencarroch experimental site, Asian Journal of Chemistry 2009, vol. 21, no. 4, pp. 2989–3000; T. Koliopoulos, G. Koliopoulou: Efficient numerical solution schemes combined with spatial analysis simulation models – Diffusion and heat transfer problem, AIP Conference Proceedings of 33rd International Conference on Applications of Mathematics in Engineering and Economics. American Institute of Physics, Maryland 2007; T. Koliopoulos et al.: Evaluation of geotechnical parameters for effective landfill design and risk assessment Geotechnical and Environmental Aspects of Waste Disposal Sites, Proceedings of Green4 International Symposium on Geotechnics Related to the Environment, conference-paper. Taylor & Francis, Abingdon 2007, pp. 49–57.

[18] T. Koliopoulos, V. Katsoni, C. Radu: Information Tools for Health…, op. cit.; T. Koliopoulos: Sulphate concentrations…, op. cit.; T. Koliopoulos, M. Kouoroulout: Biodegradation of iso-valeric…, op. cit.; T. Koliopoulos et al.: Evaluation of geotechnical parameters…, op. cit.

Table 1. List of Implemented Regulations, Articles of Greek legislation for sustainability and public health protection in 14 regional FG's airports in Greece

N. 1650/1986 A 160 For the Environmental Protection (in Greece)
N. 4014/2011 A 209 New framework of licenses for environmental projects
ΚΥΑ 5825/2010 Β 407 Regulation for energy efficiency in buildings – EU Directive 91/2002/ΕΚ & 31/2010/ΕΚ Waste management
N. 4042/2012 A 24 Legislative criminal protection for Waste Management – EU Directive (WFD) 2008/99/ΕΚ & 2008/98/ΕΚ
ΠΔ 82/2004 A 64 Management of used mineral oils
ΠΔ 109/2004 A 75 Management of used vehicles' tires
ΚΥΑ 41624/2057/Ε103/2 010 Β 1625 Management of batteries
ΚΥΑ 23615/651/Δ103/2014 Β 1184 Management of electronic & electrical equipment's wastes (ΑΗΗΕ)
ΚΥΑ 36259/1757/Ε103/2010 Β 1312 Management of wastes from excavations, constructions and demolitions (ΑΕΚΚ)
ΚΥΑ 13588/725/1985 Β 383 Measures, terms and constraints about the management of hazardous wastes – EU Directive 91/156/ΕΚ
ΚΥΑ 211773/2012 Β 1367 Environmental noise & aircrafts' noise – EU Directive (END) 2002/49/ΕΚ
ΚΥΑ 13586/724/2006 Β 384 Environmental noise – EU Directive (END) 2002/59/ΕΚ
ΠΔ 80/2004 A 63 Management of noise in airports – EU Directive 2002/30/ΕΚ
ΠΔ 1178/81 A 291 Measurements and aircrafts' noise control
ΠΔ 148/2009 A 190 Environmental responsibility for the prevention and restoration of environmental damages – EU Directive (ELD) 2004/35/ΕΚ Air pollutants
ΚΥΑ 14122/549/Ε.103/2011 Β 488 Quality of atmospheric air – EU Directive 2008/50/ΕΚ ΚΥΑ 22306/1075/Δ103/2007 Β 920 Values-targets and evaluation limitis of concentrations in arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in atmospheric air – EU Directive 2004/107/ΕΚ
ΠΔ 67/81 A 23 Keep protection of flora and fauna
N. 3937/2011 Keep the biodiversity
N. 3028/2002 A 153 Protection of cultural heritage
ΚΥΑ 145116/2001 Β 354 Determine measures, terms and procedures for the reuse of treated wastewater plumes and other provisions
ΚΥΑ 191002/2013 Β 428 Amendment of the ΚΥΑ 145116/2011 for the abolishment of the relative license
ΥΠ Ε1β/221/65 Β 138 Standards in emissions and limits of wastewater which are disposed in waters for swimming and any other of water except of drinking water, as it amendmented by ΥΑ Γ4/1305/1974, Γ1/17831/1971, ΓΥΓ2/133551/2008
Legislative Decision 661/2012 Β 2529 Electromagnetic fields – Procedures for the provision of ground antennas' licenses

Source: Fraport 2017. First Annual Report of Environmental Strategy for Creta Island, Mainland and Ionian Islands, Fraport's airports module A; Fraport 2017. First Annual Report of Environmental Strategy for Aegean Islands, Fraport's airports module B; Fraport 2018. Second Annual Report of Environmental Strategy for Creta Island, Mainland and Ionian Islands, Fraport's airports module A; Fraport 2018. Second Annual Report of Environmental Strategy for Aegean Islands, Fraport's airports module B; Fraport 2019. Third Annual Report of Environmental Strategy for Creta Island, Mainland and Ionian Islands, Fraport's airports module A; Fraport 2019. Third Annual Report of Environmental Strategy for Aegean Islands, Fraport's airports module B.

Figure 1. Map of fourteen regional airports operated by FG
Source: Fraport 2019. 14 Greek Regional Airports…, op. cit.

Below in Figures 2, 3 is presented the traffic volume for the fourteen regional airports operated by FG in terms of number of flights and number of passengers. The main of strategic environmental plan of FG in fourteen Greek regional airports is the improvement of their ecological footprint.

Based on the Figure 3 traffic volume for the fourteen regional airports operated by FG, we can see as a result that Kavala is the airport that presents lower traffic volume for the years 2017 and 2018 from cluster A. Also, we can see as a result that Mytilini is the airport that presents lower traffic volume for the years 2017 and 2018 from cluster B. Both the later airports should be promoted properly so as to be competitive travel destinations in relation to the rest Greek regional airport destinations following the right marketing promotion advertisement tools in web, social media and others for web advertisement web pages so as to promote their surrounded hotel facilities for stakeholders. Based in FG's traffic data management for 2018 the total passengers were 29,877,203 while in 2017 one were 27,433,908 yielding an 8.7% increase. Also the flights in 2018 were 244,250 while in 2017 one were 225,871 yielding an increase 8.1%. Sustainable tourism infrastructures should be promoted not only for local hotels but also for the expansion of airport regional infrastructures.

However, The Routes Marketing Awards were created in 1997 to recognise excellence in airport marketing as voted by airlines. They provide the airline community with the chance to have their say as to which airport they think provides the best overall marketing services to them. In 2019 Thessaloniki Airport "Makedonia" has the honor that it was nominated by leading airlines and shortlisted for the "World Routes Airport Marketing Awards", Fraport Greece, the airport's operator, said in an announcement in 2019[19].

[19] GTP: Thessaloniki Airport Shortlisted for World Routes Marketing Award, GTP electronic web news, 2019, https://news.gtp.gr/2019/08/13/thessaloniki-airport-shortlisted-world-routes-marketing-award/ (access: 13.08.2019).

FRAPORT GREECE - FULL YEAR 2018

	Flights	Domestic			International			Total		
	Airport	2018	2017	%Δ	2018	2017	%Δ	2018	2017	%Δ
Cluster A	AKTION	1,037	1,215	-14.7%	4,357	4,080	6.8%	5,394	5,295	1.9%
	CHANIA	4,823	5,827	-17.2%	14,781	13,685	8.0%	19,604	19,512	0.5%
	KERKIRA	4,974	3,857	29.0%	21,329	18,624	14.5%	26,303	22,481	17.0%
	KAVALA	1,346	1,612	-16.5%	2,805	2,221	26.3%	4,151	3,833	8.3%
	KEFALLINIA	2,183	1,749	24.8%	4,984	4,148	20.2%	7,167	5,897	21.5%
	THESSALONIKI	21,764	22,861	-4.8%	33,543	30,809	8.9%	55,307	53,670	3.1%
	ZAKINTHOS	2,290	2,242	2.1%	10,880	10,133	7.4%	13,170	12,375	6.4%
	TOTAL Cluster A	38,417	39,363	-2.4%	92,679	83,700	10.7%	131,096	123,063	6.5%
Cluster B	KOS	4,655	4,071	14.3%	15,672	13,263	18.2%	20,327	17,334	17.3%
	MITILINI	5,163	4,873	6.0%	994	743	33.8%	6,157	5,616	9.6%
	MIKONOS	7,292	7,830	-6.9%	9,975	7,992	24.8%	17,267	15,822	9.1%
	RODOS	8,290	8,891	-6.8%	30,379	28,175	7.8%	38,669	37,066	4.3%
	SAMOS	3,940	3,787	4.0%	2,263	1,883	20.2%	6,203	5,670	9.4%
	SANTORINI	12,201	10,100	20.8%	8,159	6,934	17.7%	20,360	17,034	19.5%
	SKIATHOS	1,215	1,373	-11.5%	2,956	2,893	2.2%	4,171	4,266	-2.2%
	TOTAL Cluster B	42,756	40,925	4.5%	70,398	61,883	13.8%	113,154	102,808	10.1%
	TOTAL Clusters A+B	81,173	80,288	1.1%	163,077	145,583	12.0%	244,250	225,871	8.1%

FRAPORT GREECE - FULL YEAR 2018

	Passengers	Domestic			International			Total		
	Airport	2018	2017	%Δ	2018	2017	%Δ	2018	2017	%Δ
Cluster A	AKTION	16,232	19,704	-17.6%	567,434	549,378	3.3%	583,666	569,082	2.6%
	CHANIA	646,723	831,324	-22.2%	2,361,964	2,211,085	6.8%	3,008,687	3,042,409	-1.1%
	KERKIRA	340,318	295,745	15.1%	3,023,797	2,622,205	15.3%	3,364,115	2,917,950	15.3%
	KAVALA	75,026	75,284	-0.3%	331,923	262,679	26.4%	406,949	337,963	20.4%
	KEFALLINIA	97,622	82,058	19.0%	664,025	547,613	21.3%	761,647	629,671	21.0%
	THESSALONIKI	2,333,505	2,352,838	-0.8%	4,355,688	3,894,676	11.8%	6,689,193	6,247,514	7.1%
	ZAKINTHOS	90,938	83,334	9.1%	1,709,519	1,576,307	8.5%	1,800,457	1,659,641	8.5%
	TOTAL Cluster A	3,600,364	3,740,287	-3.7%	13,014,350	11,663,943	11.6%	16,614,714	15,404,230	7.9%
Cluster B	KOS	271,725	233,783	16.2%	2,394,582	2,086,248	14.8%	2,666,307	2,320,031	14.9%
	MITILINI	344,257	332,370	3.6%	132,799	103,626	28.2%	477,056	435,996	9.4%
	MIKONOS	508,676	475,578	7.0%	887,111	731,448	21.3%	1,395,787	1,207,026	15.6%
	RODOS	829,475	868,459	-4.5%	4,738,273	4,432,764	6.9%	5,567,748	5,301,223	5.0%
	SAMOS	172,622	161,313	7.0%	290,127	248,972	16.5%	462,749	410,285	12.8%
	SANTORINI	1,186,904	1,022,117	16.1%	1,068,022	908,894	17.5%	2,254,926	1,931,011	16.8%
	SKIATHOS	48,228	43,740	10.3%	389,688	380,366	2.5%	437,916	424,106	3.3%
	TOTAL Cluster B	3,361,887	3,137,360	7.2%	9,900,602	8,892,318	11.3%	13,262,489	12,029,678	10.2%
	TOTAL Clusters A+B	6,962,251	6,877,647	1.2%	22,914,952	20,556,261	11.5%	29,877,203	27,433,908	8.9%

Figure 2. Traffic Data Management in regional airports for 2018 in Greece
Source: V. Katsoni: ICT applications in the hotel industry through..., op. cit.

This is the first time that a Greek regional airport secures a top 5 nomination in the 4 to 20 million passengers category. Thessaloniki's airport will be up against the airports of Budapest, Malta, Oakland and Stuttgart. "Our participation in the final stage of the awards, is a great honor for the Thessaloniki Airport Makedonia and Fraport Greece," Giorgos Vilos, Executive Director of Commercial & Business Development at Fraport Greece, said. "First and foremost because this the first time that a Greek regional airport is being shortlisted in a category with other top airports, but also because the shortlisted airports are being nominated by the airlines, a fact that proves that the industry acknowledges the quality of our work across all levels," he added[20]. Based on Fraport's statistics, higher traffic volume 1.6% present the 14 regional Fraport's airports the first seven months in 2019 in Greece. Proper marketing tools should be followed to promote the productivity in shipment of goods, services, quality and sustainability in 14 regional Greek airports.

[20] Ibidem.

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	KEFALLINIA	2,183	1,749	24.8%	4,984	4,148	20.2%	7,167	5,897	21.5%
	THESSALONIKI	21,764	22,861	-4.8%	33,543	30,809	8.9%	55,307	53,670	3.1%
	ZAKINTHOS	2,290	2,242	2.1%	10,880	10,133	7.4%	13,170	12,375	6.4%
	TOTAL Cluster A	38,417	39,363	-2.4%	92,679	83,700	10.7%	131,096	123,063	6.5%
Cluster B	KOS	4,655	4,071	14.3%	15,672	13,263	18.2%	20,327	17,334	17.3%
	MITILINI	5,163	4,873	6.0%	994	743	33.8%	6,157	5,616	9.6%
	MIKONOS	7,292	7,830	-6.9%	9,975	7,992	24.8%	17,267	15,822	9.1%
	RODOS	8,290	8,891	-6.8%	30,379	28,175	7.8%	38,669	37,066	4.3%
	SAMOS	3,940	3,787	4.0%	2,263	1,883	20.2%	6,203	5,670	9.4%
	SANTORINI	12,201	10,100	20.8%	8,159	6,934	17.7%	20,360	17,034	19.5%
	SKIATHOS	1,215	1,373	-11.5%	2,956	2,893	2.2%	4,171	4,266	-2.2%
	TOTAL Cluster B	42,756	40,925	4.5%	70,398	61,883	13.8%	113,154	102,808	10.1%
	TOTAL Clusters A+B	81,173	80,288	1.1%	163,077	145,583	12.0%	244,250	225,871	8.1%

FRAPORT GREECE - FULL YEAR 2017

	Passengers	Domestic			International			Total		
	Airport	2017	2016	%Δ	2017	2016	%Δ	2017	2016	%Δ
Cluster A	AKTION	19,704	21,958	-10.3%	549,545	460,716	19.3%	569,249	482,674	17.9%
	CHANIA	833,877	881,031	-5.4%	2,209,026	2,085,666	5.9%	3,042,903	2,966,697	2.6%
	KERKIRA	295,767	299,483	-1.2%	2,622,667	2,476,030	5.9%	2,918,434	2,775,513	5.1%
	KAVALA	75,290	82,859	-9.1%	262,673	192,449	36.5%	337,963	275,308	22.8%
	KEFALLINIA	82,058	72,197	13.7%	547,613	474,718	15.4%	629,671	546,915	15.1%
	THESSALONIKI	2,442,350	2,423,095	0.8%	3,953,173	3,312,486	19.3%	6,395,523	5,735,581	11.5%
	ZAKINTHOS	83,339	68,570	21.5%	1,576,307	1,351,226	16.7%	1,659,646	1,419,796	16.9%
	TOTAL Cluster A	3,832,385	3,849,193	-0.4%	11,721,004	10,353,291	13.2%	15,553,389	14,202,484	9.5%
Cluster B	KOS	234,023	207,008	13.1%	2,086,567	1,715,214	21.7%	2,320,590	1,922,222	20.7%
	MITILINI	332,429	349,347	-4.8%	103,676	70,623	46.8%	436,105	419,970	3.8%
	MIKONOS	475,605	392,931	21.0%	731,456	624,608	17.1%	1,207,061	1,017,539	18.6%
	RODOS	868,421	849,543	2.2%	4,433,096	4,122,686	7.5%	5,301,517	4,972,229	6.6%
	SAMOS	161,357	155,983	3.4%	248,974	207,330	20.1%	410,331	363,313	12.9%
	SANTORINI	1,019,399	897,770	13.5%	908,896	809,211	12.3%	1,928,295	1,706,981	13.0%
	SKIATHOS	44,918	44,209	1.6%	380,369	360,018	5.7%	425,287	404,227	5.2%
	TOTAL Cluster B	3,136,152	2,896,791	8.3%	8,893,034	7,909,690	12.4%	12,029,186	10,806,481	11.3%
	TOTAL Clusters A+B	6,968,537	6,745,984	3.3%	20,614,038	18,262,981	12.9%	27,582,575	25,008,965	10.3%

Figure 3. Traffic Data Management in regional airports for 2017 in Greece
Source: V. Katsoni: The Strategic Role of Virtual Communities…, op. cit.

Moreover, the main fields focused on targets for sustainability in FG airports are: Sustainable Development; Surface and underground waters; Soil management; Biodiversity; Heritage culture; Quality of atmospheric air; Noise and Waste Management[21].

[21] Fraport 2017, First Annual Report of Environmental Strategy for Creta Island…, op. cit.; Fraport 2017, First Annual Report of Environmental Strategy for Aegean Islands…, op. cit.; Fraport 2018, Second Annual Report of Environmental Strategy for Creta Island…, op. cit.; Fraport 2018, Second Annual Report of Environmental Strategy for Aegean Islands…, op. cit.; Fraport 2019, Third Annual Report of Environmental Strategy for Creta Island…, op. cit.; Fraport 2019, Third Annual Report of Environmental Strategy for Aegean Islands…, op. cit.

Greening technologies and sustainable designs are needed for the sustainability of the fourteen Greek regional airports. One of the most important topic in airport infrastructures for sustainable tourism facilities is the waste management that should follow the right engineering designs to promote the sustainability in the associated types of tourism linked with airport transportation infrastructures protecting public health. The quality of a complicate environmental system within airport and associated tourism facilities begins to be problem when is demanded the simultaneously cover of its needs and the environmental effects of such system arise and become an environmental public health risk. Proper geoinformation utilities in engineering simulation tools for public health protection could be used in decision making for monitoring and sustainable designs[22]. Then the improvement of the monitoring and proper quality management of environmental systems is necessary. In an effort to meet growing environmental awareness, most industrial tourism companies include in their plan investments that are related to the protection of the environment. Environmental technologies for renewable resources from landfill leachate treatment; wastewater units; biogas; for electricity and cleaning water should be preferred more as an investment option as they are economic installations with minimal construction and associated costs considering to other ones i.e. photovoltaics.

Environmental waste management is the discipline that is concerned with resources once society requires them. Sustainable efficient designs are necessary so to recover renewable resources from landfilled solid wastes like biogas for energy exploitation in electricity and heating as well as treated leachates quantities for water resources in irrigation plants or cleaning airport services. In this way is upgraded the environmental quality at open spaces nearby to airport facilities as well as protecting public health at indoors and outdoors spaces minimizing associated hazards for public health[23]. Monitoring schemes should be taken into account for the right exploitation of renewable resources minimizing associated risks to public health and tourism infrastructures next to airport facilities[24]. It is necessary to manage the environmental resources in an sustainable way by minimizing the environmental impacts related to the operation of an environmental system in sustainable tourism facilities[25]. Moreover, except the energy efficiency from renewable resources also innovation in airports design is demanded following the market trends in the proper application of new efficient construction materials[26].

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[22] T. Koliopoulos: Sulphate concentrations…, op. cit.; T. Koliopoulos, M. Kouoroulout: Biodegradation…, op. cit.; T. Koliopoulos, G. Koliopoulou: Efficient numerical…, op. cit.; T. Koliopoulos et al.: Evaluation…, op. cit.; R. Leung, R. Law: Evaluation…, op. cit.

[23] T. Koliopoulos, M. Kouoroulout: Biodegradation…, op. cit.; T. Koliopoulos, G. Koliopoulou: Efficient numerical…, op. cit.

[24] T. Koliopoulos, V. Katsoni, C. Radu: Information Tools T. Koliopoulos: Sulphate concentrations…, op. cit.; T. Koliopoulos, M. Kouoroulout: Biodegradation…, op. cit.; T. Koliopoulos, G. Koliopoulou: Efficient numerical…, op. cit.; T. Koliopoulos et al.: Evaluation…, op. cit.; R. Leung, R. Law: Evaluation…, op. cit.

[25] M. Janić: Greening Airports: Advanced Technology and Operations, Springer-Verlag, London 2011; T. Koliopoulos, V. Katsoni: The Innovative Health…, op. cit.; T. Koliopoulos, V. Katsoni, C. Radu: Information Tools…, op. cit.

[26] M. Janić: Greening Airports…, op. cit.

In Figure 4 is presented an integrated sustainable tourism policy for airport facility infrastructures and asscociated linked types of tourism. The supply chain in renewable resources not only can provide energy efficiency in building infrastructures of airports but also can sell renewable energy resources to stakeholders in other types of tourism (Fig. 4).

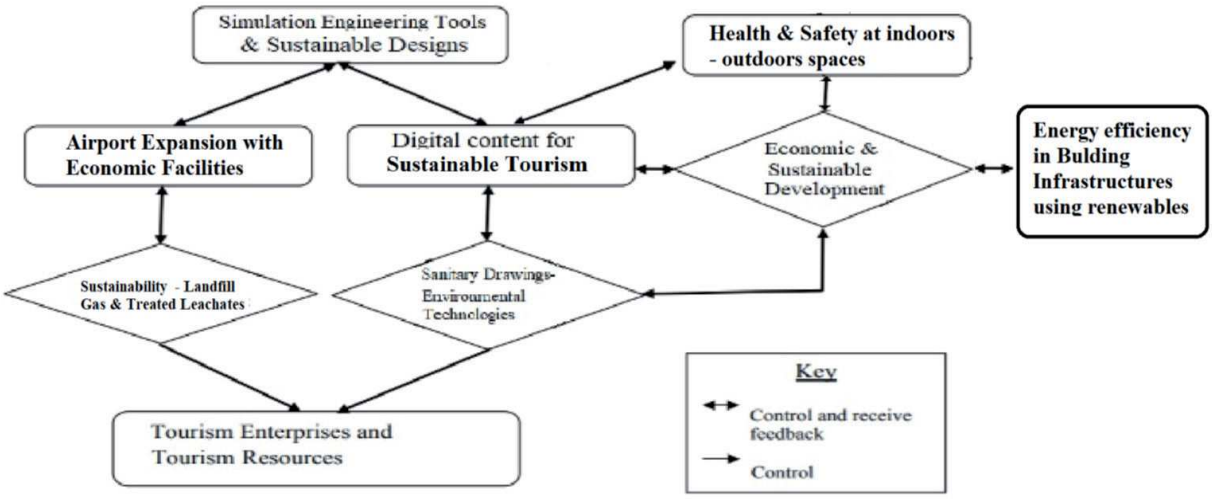

Figure 4. Integrated policy for implementation on sustainable tourism within airport infrastructures

Source: own elaboration.

Following the above presented airport management principles will be achieved:

- airport industry revenues and minimization of operational costs;
- airport operational management profit using renewable resources from landfill waste emissions in collaboration with local authorities and municipalities
- public-private partnerships between stakeholders in sustainable airport designs, services and products (PPPs).

Electricity from biomass assisted by biogas in landfills as well as in wastewater treatment units can be exploited for power for office air conditioning, IT systems, and lighting at airport facilities.

Furthermore, the high level of staff training in associated airport tourism's facilities is expected to increase satisfaction to tourists in terms of sustainable designs; energy efficiency of building infrastructures; satisfactory in health and safety at indoors, outdoors spaces; recovery of energy by the proper use of renewable resources from landfill gas and treated leachates, wastewater emissions; their public health protection and improve the quality of the associated types of tourism services provided in their travel destination. Operations and maintenance activities at airport facilities should include:

- administrative procedures,
- sustainable site management,
- water efficiency,
- energy and atmosphere,
- materials and resources,

- indoor environmental quality,
- innovation for operations and maintenance,
- education and training at airport facilities.

In this way can be achieved greening regional airports infrastructures in Greece.

Moreover, training of the presented framework in interesting parties is a key factor in increasing the share of sustainable tourism in the company's turnover and boosting staff skills. High class hotels located at nearby airport infrastructures have the ability and the relevant infrastructure to develop similar sustainable infrastructures, supporting sustainability and promoting their services to stakeholders providing the whole through ICT web information for qualitative clean environments for tourists. In this way sustainable designed infrastructures integrate successfully the operational management of sustainable tourism businesses minimizing associated costs and environmental impacts to public health. Cooperation and network creation among all relevant sustainable tourism's stakeholders within airport infrastructures, public and private, is necessary, in order to coordinate efforts for the successful development of the presented framework in an integrated sustainable tourism.

Conclusions

The above analysis reveals that professionals in sustainable tourism and public health ones should be able to use proper web ICT's technology; mobile technology to innovate and utilize applications for efficient services in airport facilities for monitoring associated airport infrastructures that promote associated sustainable tourism's facilities. These applications could be diffused through their profession to other stakeholders, individuals. The trend of information diffusion in new sustainable tourism's facilities for minimizing waste emissions and the recovery of renewable resources for airports will indicate that professionalization and open communication channels will speed up the adoption of particular innovations for airports sustainability. Web technologies are useful not only for stakeholders but also for tourists to select the right qualitative facilities for their tourism vacations combined with associative health tourism facilities and other types of tourism.

Further studies are necessary to determine the effect the adoption of web ICT's; mobile technology by individual professionals in tourism industry that will have on adoption of these web technologies for monitoring waste emissions at nearby airport facilities; energy efficiency of building infrastructures at airports and public health protection. The role the innovators will play in this adoption process also warrants some further investigation. If the trend is followed properly in a right sustainable development way then these innovators will play a major role in identifying the technology and the need for the technology in the airport facilities and associative tourism organizations. Marketing tools are important to promote new travel destinations and airports that are close to sea side Greek natural beauties with modern hotels facilities for all ages and different types of tourism. In that way not only will be secured an integrated sustainable development in airport facilities and links in associated tourism types but also will be protected public health.

References

Bellos I.: Greece is over-reliant on tourism, ekathimerini, http://www.ekathimerini.com/241056/article/ekathimerini/business/greece-is-over-reliant-on-tourism (access: 30.06.2019).

Buhalis D.: eAirlines: strategic and tactical use of ICTs in the airline industry, Journal of Information and Management 2004, vol. 41(7), pp. 805–825. Doi: 10.1016/j.im.2003.08.015.

Dichter A.: How to serve today's digital traveler, McKinsey & Company Report, New York 2018, https://www.mckinsey.com/industries/travel-transport-and-logistics/our-insights/how-to-serve-todays-digital-traveler (access: 10.07.2019).

Doolin B., Dillon S., Thompson F., Corner J.: Perceived Risk and the Internet Shopping Experience in Online Purchasing Behaviour in New Zealand, 7th annual CollECTer conference on electronic commerce, Melbourne, 1–2 December, 2002.

Fraport 2019, 14 Greek Regional Airports – A major investment that boosts the Greek economy and acts as a catalyst for the growth of Greek tourism, Fraport publication, Greece.

Fraport 2017, First Annual Report of Environmental Strategy for Creta Island, Mainland and Ionian Islands, Fraport's airports module A.

Fraport 2017, First Annual Report of Environmental Strategy for Aegean Islands, Fraport's airports module B.

Fraport 2018, Second Annual Report of Environmental Strategy for Creta Island, Mainland and Ionian Islands, Fraport's airports module A.

Fraport 2018, Second Annual Report of Environmental Strategy for Aegean Islands, Fraport's airports module B.

Fraport 2019, Third Annual Report of Environmental Strategy for Creta Island, Mainland and Ionian Islands, Fraport's airports module A.

Fraport 2019,Third Annual Report of Environmental Strategy for Aegean Islands, Fraport's airports module B.

FG Traffic Data Management in Greece, Traffic statistics, 2018.

FG Traffic Data Management in Greece, Traffic statistics, 2017.

Flisi M.: Smart handheld devices: The emergence of convergence, Mobile Trends, April 2, 2001.

Greenspan Risk and Uncertainty in Monetary Policy, American Economic Reviews 2004, no 94, pp. 33–40.

GTP: Thessaloniki Airport Shortlisted for World Routes Marketing Award, GTP electronic web news, 2019, https://news.gtp.gr/2019/08/13/thessaloniki-airport-shortlisted-world-routes-marketing-award/ (access: 13.08.2019).

Janić M.: Greening Airports: Advanced Technology and Operations, Springer-Verlag, London 2011.

Katsoni V.: The Strategic Role of Virtual Communities and Social Network Sites on Tourism Destination Marketing, e-Journal of Science & Technology 2014, vol. 9(5), pp. 107–117.

Katsoni V.: ICT applications in the hotel industry through an e-CRM systems theory approach, Academica turistica (Spletna izd.) 2015, vol. 8, no 1, pp. 15–23 https://www.dlib.si/details/URN:NBN:SI:doc-VES5GDHR (access: 10.07.2019).

Katsoni V.: The effects of ICTs on tourism distribution channels and DMOs marketing strategies, [in:] New media, entrepreneurship and sustainable tourism development, Z. Andreopoulou, N. Leandros, G. Quaranta& R. Salvia (Eds), Francoangeli, Mediolan, 2017, pp. 58–66

Koliopoulos T., Katsoni V.: The Innovative Health Tourism's Environmental Management Sustainable Design Facilities Assessment Capability, [in:] Smart Tourism as a Driver for Culture and Sustainability. Fifth International Conference IACuDiT, V. Katsoni, M. Segarra-Oña (Eds), Springer, Athens 2018, pp. 79–87, Doi: 10.1007/978-3-030-03910-3_6.

Koliopoulos T., Katsoni V., Radu C.: Information Tools for Health Tourism's Sustainability and Safe Mobility, Journal of Emerging Environmental Technologies and Health Protection 2018, vol. 1, pp. 138–146.

Koliopoulos T., Sulphate concentrations at mid auchencarroch experimental site – Image processing and environmental quality assurance of leachate pond treatment units on displaced geological surfaces, International Journal of ChemTech Research 2009, vol. 1, no. 2, pp. 126–134.

Koliopoulos T., Kouoroulout M.: Biodegradation of iso-valeric acid in relation to other chemical indexes and spatial liner risk assessment at landfill topographies – mid auchencarroch experimental site, Asian Journal of Chemistry 2009, vol. 21, no. 4, pp. 2989–3000.

Koliopoulos T., Koliopoulou G.: Efficient numerical solution schemes combined with spatial analysis simulation models – Diffusion and heat transfer problem, AIP Conference Proceedings of 33rd International Conference on Applications of Mathematics in Engineering and Economics. American Institute of Physics, Maryland 2007. Doi: 10.1063/1.2806052EID: 2-s2.0-36849042987

Koliopoulos T., Kollias V., Kollias P., Koliopoulou G., Kollias S.: Evaluation of geotechnical parameters for effective landfill design and risk assessment Geotechnical and Environmental Aspects of Waste Disposal Sites, Proceedings of Green4 International Symposium on Geotechnics Related to the Environment, conference-paper. Taylor & Francis, Abingdon 2007, pp. 49–57.

Leung R., Law R.: Evaluation of Hotel Information Technologies and EDI Adoption: The Perspective of Hotel IT Managers in Hong Kong Cornell Hospitality Quarterly 2013, vol. 54, issue 1. Doi:10.1177/1938965512454594

Milović B.: Social Media and eCRM as a Prerequisite for Hotel Success, Management Information Systems 2012, vol. 7, no 3, pp. 26–31.

Morosan C.: Toward an integrated model of adoption of mobile phones for purchasing ancillary services in air travel, International Journal of Contemporary Hospitality Management 2014, vol. 27, no 2, pp. 246–271.