

Regional development in the islands of Kos and Rhodes: a study of sustainable financial opportunities

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Abstract

It is generally accepted that during the last few decades an important change in the direction of economic development in the Greek islands has taken place. In the early 1970s a wide ranging change occurred in the nature of production in some of the largest Aegean islands, which encompassed the transition of the rural economies from primary and secondary to tertiary production, and in particular tourism.

In particular, Kos and Rhodes experienced a transition from agricultural and industrial economies to highly developed tourist economies providing top market services. This paper describes this transition in terms of basic economic indicators and discusses the options of future investments in the area of sustainable renewable energy and other production.

1 Basic population characteristics, employment and economy of Kos and Rhodes islands

Kos and Rhodes are the largest islands of Dodecanese. Tourist economies of scale take place in these two islands. They both belong to the island complex of Dodecanese.

Table 1: Population characteristics.

	1971	1981	1991	2001
Kos	16653	20370	26379	30947
Rhodes	66609	86037	96073	117007



Kos, with area of 285 sq. km, is considered as one of the largest Greek islands and tourist sites in Greece. Kos is situated in the centre of the island complex of Dodecanese. The gross per capita income has risen to \$12962 per citizen in the Dodecanese islands, corresponding to an increase of over 60% compared to the average gross per capita income for European island areas [1].

Rhodes, with area of 1400 sq. km is even larger than Kos and it is noteworthy that the island was the first tourist site of Greece. Tourism in Rhodes started before the second civil war when the Dodecanese islands were still under Italian occupation.

Data presented in Table 1 indicate that the population of Kos and Rhodes has increased considerably during the period of 1950-1990 representing a rise of 67% and 62% respectively. This increase in population is more pronounced for the town of Kos and the northern part of Rhodes were the major urban centers are situated [2]. This increase is considerably higher than the Greek national average and has been associated to the increase in the tourist trade, especially after the 1970's.

Table 2: Employment in Greece, Rhodes and Kos.

	Kos		Rhodes		Greece (national)	
	1981	1991	1981	1991	1981	1991
1 ST	4.1%	7.8%	10.2%	6.0%	29.2%	19.6%
2 ND	22.45%	23.8%	25.6%	22.7%	30.5%	25.4%
3 RD	73.5%	68.25%	64.3%	71.3%	40.4%	55.0%

It is clear from the data presented in Table 2, that employment in the primary and secondary production level has dropped whereas there is an increase in the tertiary level, confirming both the national trend as well as the increase in the tourist trade for the area, during the 1980s [3].

2 Production factors

The production factors in Kos and Rhodes are limited due to the island character of the areas studied. More specifically:

- **Land:** Coastal land areas are the primarily the site for tourist development whereas inland areas are still important to primary production. Both islands have an industrial zone close to the sea, which plays an important role in secondary production.
- **Water resources:** In both islands water resources are restricted. In the summer, there is practically no rainfall and thus local demand is often higher than locally maintained resources [4].
- **Minerals:** Although Kos and Rhodes have reasonable quantities of mineral deposits, only few quarries for construction materials are operating. Although have reasonable quantities of minerals only few quarries for construction materials are operable, 4 in Rhodes and 1 in Kos.
- **Labor:** As Kos and Rhodes have island economies the workforce is limited, although, recently, a number of immigrants from neighboring countries have joined the local work force.

- Capital: Development laws, low taxes and other business support programs of national and European origin are operative in the Dodecanese islands.

3 Primary, secondary and tertiary production

3.1 Primary production

Agricultural production in Kos and Rhodes has been constant for the last twenty years, not being able to sustain the increasingly demanding tourist trade and thus relying on imported goods [5]. A detailed description is presented in Table 3.

Table 3: Primary production in Kos and Rhodes in 2001.

	Kos	Rhodes	Kind of measurement
Cultivated trees	20955	128480	Units
Wine yards	208200	759300	Units
Seeds and cereals	45140	103146	acres
Irrigated land	6591	7861	acres
Vegetables		6739	acres
Pigsties:	2	(2000 pigs)	units
Chickens farms:	2	4	units
Fish farms:	0	3	units
Shell cultures:	1	0	units

3.2 Secondary production

Until the end of 80s there was a substantial manufacturing activity in Kos and Rhodes. However during the nineties a serious decline in manufactured products occurred, having as a result an increase of industrial product imports in both islands. Nowadays small manufacturing units are mainly oriented towards agricultural products, juices, soft drinks, distilleries, olive oil presses, ceramics, pottery, clothing, furniture and goldsmiths. A detailed description of basic secondary production units is presented in Table 4.

3.3 Tertiary production

3.3.1 Tourism

Tourist development in Kos started in the early '70s mainly in the eastern part of the island. In 1977, hotels in Kos were a total of 17, whereas by 1986 this number had risen to 182. Table 5 describes the increase in tourist infrastructure.

Tourist development in Rhodes started in the early '60s in the northern part of the island, known as the "The Northern Triangle". Further details are presented in Table 6.

Associated to this intense tourist trade a wide range of entertainment activities and other services operate, as described in Table 7 below [5].

3.3.2 Other economic activities

Tables 8 and 9 present data on basic businesses and professions in the islands



Table 4: Small manufacturing units in Kos and Rhodes in 2004.

	Kos	Rhodes
Iron and aluminum processing	17	140
Jewellery		8
Building materials	36	131
Leather products	2	
Furniture	27	262
Music instruments	1	
Printing units	13	58
Clothing	64	104
Candles	3	
Popular art	15	5
Wine bottling	2	2
Distilleries	2	10
Breweries		1
Refreshment bottling	1	2
Honey	2	7
Oil presses	5	27
Diary units	2	2
Food preparation, bakeries etc	41	175

Table 5: Hotels in Kos per municipality in 2004.

Municipality	Units		Rooms		Beds	
	1989	2004	1989	2004	1989	2004
Heraklidon	34	81		6835	2858	14197
Dikaioi	12	53		3820	1913	8242
Kos	135	137		9258	11456	19178
Total for Kos island	181	271	16495	19913	16227	41617

Table 6: Hotels in Rhodes per municipality in 2004.

	Units		Beds	
	1989	2004	1990	2004
Kallithea	67	84	13427	16828
Ialisos	68	94	14088	16606
City of Rhodes	136	148	14968	16575
Afandou	28	49	3198	6673
Lindos	15	53	1470	5516
South Rhodes	12	27	317	3411
Petaloudes	22	43	2214	3357
Arhagelos	15	19	671	1044
Attavros	0	4	0	79
Kamiroi	0	1	0	127
Total for Rhodes island	366	522	50353	70216

4 Infrastructure, transportation and energy

Each island has its own international airport. Both airports have a considerable throughput of passengers each year, especially during the tourist period (May -



October). Figures 1 and 2 present the trends in passenger arrivals in the two islands for the period of 1978 – 2004.

Table 7: Entertainment businesses in Kos and Rhodes 2004.

	Rhodes	Kos
Food delivery	32	
Delicatessen	1	
Restaurants, taverns, fish taverns	519	247
International restaurants	35	11
Internet cafe	18	4
Children play grounds	28	34
Coffee bars	269	196
Confectioneries	66	
Cinemas, theaters	6	2
Creperie -crouasanterie	11	
Bar – restaurants	28	
Ouzo bars	20	
Ice cream shops	2	11
Pizza	78	18
Fast food, snack bar	46	130
Souvlaki taverns	84	52
Music halls	15	
Bars and - pubs	129	
Bowling	2	
Disco	8	
Night clubs	23	17

Table 8: Businesses in Kos and Rhodes in 2004.

	Rhodes	Kos
Food companies	565	283
Clothes, boutiques and sewing things	644	184
Shoes and shoes repairing	79	11
General trade	678	368
Constriction and general equipment companies	998	346
Cleaning companies and equipment	176	48
Electric equipment etc	651	166
Company equipment, computers	284	75
Popular art, photography, photo stores, music instruments, theatres, cinemas	123	44
Press and radio stations	48	26
Cars, car services-engineers	217	98
Car rentals	130	50
Motorbikes and motorbike services	82	52
Motorbike and bicycle rentals	3	73
Oil and lubricants	126	38
Transport companies	75	18
Maritime companies and agents	39	34
Other companies and organizations	351	76

Rhodes has 6 and Kos 3 operational ports serving both recreational as well as professional (fishing) craft, as well 4 and 2 oil terminals respectively [8].



Table 9: Professions in Kos and Rhodes in 2004.

	Rhodes	Kos
Engineers	305	66
Accounts	137	36
Lawyers, notaries, business consultants, economists	393	130
Education	258	54
Beauty salons, hairdressers body centers, gymnasiums	290	49
Vets and pet shops	30	4
Agronomist, laboratories seedbeds	29	3
Doctors, psychologists pharmacies, dentists, clinicians, physiotherapists	419	119

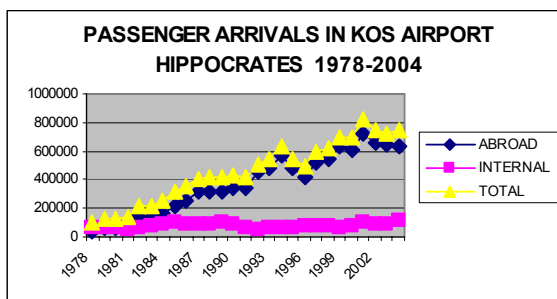


Figure 1: Arrivals in Kos Airport.

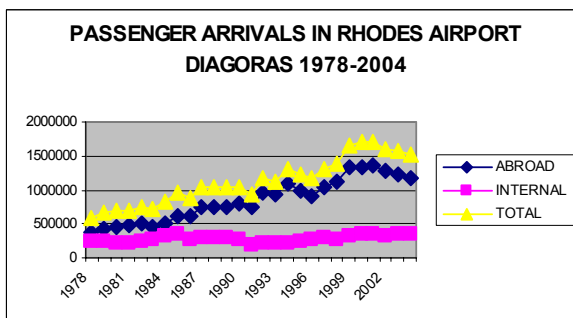


Figure 2: Arrivals in Rhodes Airport.

Both islands have their own electricity generation factories owned by the Greek National Electricity Board (GNEB). It is important to note that year energy consumption has increased throughout Greece (see Table 10). Electricity demand has increased substantially, placing pressure on existing electricity supply network. This is more evident in remote islands such as Rhodes and Kos which depend on power generation plants fuelled by oil (see Figures 3 and 4). Although the plant at Mastihari (Kos) is relatively new (1999) and can cope with the demand of Kos and nearby smaller islands, the factor in Rhodes at Soroni is

incapable of responding to local electricity demand during the summer period. As indicated by the data presented in Tables 11 and 12, although Greece leads the EU in the use of solar energy for water heating, overall only 1% of the country's total energy supply is derived from renewable sources. It is evident that Greece must turn to renewable energy production processes, such as wind, sun, as well as geothermal deposits, to supplement the conventional processes of energy production and thus help mitigate the negative environmental impact of power generation. In addition to the environmental benefits, generating energy from solar, wind and geothermal sources offers a solution to the problem of maintaining power supplies to Greece's remote islands, many of which are not connected to the mainland electricity grid.

Table 10: Energy demand statistics, by fuel product, for Greece (in Mtoe).

	1990	1995	2000	2002
Solid fuels	1.07	1.08	0.89	0.75
Oil	10.05	10.80	12.58	13.32
Gas	0.01	0.01	0.25	0.35
Electricity	2.45	0.93	3.71	4.00
Renewables	0.95	0.98	0.05	1.05
Other			0.03	0.03

Table 11: Gross electricity generation in 2002 (in TW/h) [7].

	Total	Coal	Oil	Gas	Other	Nuclear	Pumped storage	Renewable *
EU25	3018	895	186	543	11	964	32	387
EU15	2678	687	173	517	9	894	29	369
GR	54.6	34.6	8.6	7.1	0.2	-	0.7	4.2

*Not including hydro from pumped storage.

Table 12: Gross electricity generation from renewable sources in 2002 (in GW/h).

	Renewable Total *	Hydro	Biomass	Wind	Geothermal	Pumped storage
EU25	386671	297386	48821	35706	4758	32019
EU15	368876	280928	47556	35634	4758	29397
GR	3451	2800	-	651		663

* Not including hydro from pumped storage.

5 Business opportunities relating to Kos and Rhodes

Previously presented data on the economy of the two islands, indicates that the tourist trade is by far the predominant. It is evident that industries and services such as food and beverages, traditional clothes, ethnic and cultural products, wine etc., have a comparative advantage compared to others. It must be noted however, that as the tourist trade seeks novel high quality products, environmental issues become highly important. New services and professions

will appear, addressing demands placed by the recently developed national and international framework for environmental protection and management.

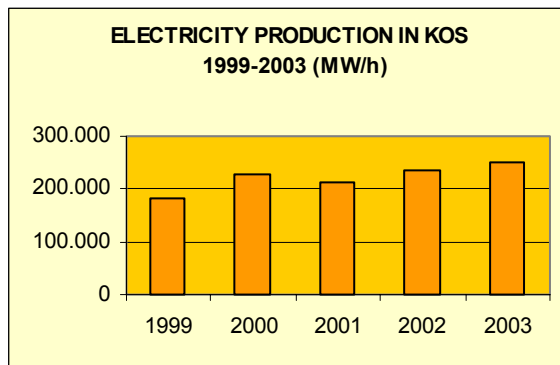


Figure 3: Electricity production in Kos.

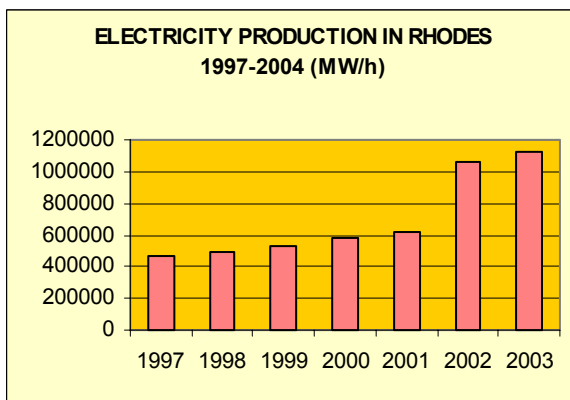


Figure 4: Electricity production in Rhodes.

6 Problems associated to potential financial proposals

Due to the island character of the economies of Rhodes and Kos, certain limitations exist:

- Geographical
- Natural resources
- Structure and “culture” of recent economic development
- Seasonal business: The permanent population of Kos is 30,000 and of Rhodes 120,000 inhabitants. During the high season the population increases by 275% and 100% respectively. It is evident that such high fluctuations place extreme pressures on local production and management of natural resources in general [3].

- Transport costs: High transport costs impose restrictions to product exports, which, at present, only travel to the nearest islands.
- Employment: The cost of employment in Greece is higher than other Mediterranean countries, placing serious disadvantages to the competitive pricing of many products.

7 Proposals for development

Energy production from renewable sources should rise by more than ten-fold over the next decade, in order to mitigate the negative environmental impact of power generation. Although some photo-voltaic systems designed to convert sunshine to electricity already exist on the Aegean islands, and in individual domestic installations, the total capacity of these systems is still very small. Introduction of such systems is bound to increase, especially as technology improves and costs are expected to decrease, opening up new opportunities for solar electricity production. Wind energy is also a promising resource for Greece, and the Greek islands offer ideal conditions for the generation of wind power. As wind technology is cheaper than photovoltaic solar systems, wind installations are appearing on many islands, such as Crete, which are isolated from the mainland electricity grid. Studies have identified the Aegean islands, in particular, as having ideal conditions for wind energy generation. According to the Greek National Electricity Board (GNEB), such installations could generate up to 30% of the Aegean islands' energy requirements, a ten-fold increase on current capacity. Private investors are beginning to take advantage of financial incentives, provided by the Greek government and the EU, for the setting up of wind-driven power generators. Whilst previously GNEB owned the majority of wind stations, private investors now predominate. As the production of turbine equipment develops in Greece, it is expected that further investment opportunities will appear in this area. Perhaps the most interesting investment opportunities in the coming years will be in the field of geothermal energy. Several sites suitable for such energy harvesting, including Milos, Nisyros and others in Northern Greece, have been identified and although at present the use of geothermal energy is limited to district heating plants and agricultural purposes, such as greenhouses; the prospects for its use in electricity generation, look promising.

In these small island economies the production factors are limited and difficult to be substituted. Based on findings from our market research study [5], the following investment proposals can be made:

- Alternative tourism activities based on ecology and culture [8]
- Urban waste collection and treatment plants for both Kos and Rhodes
- Solid waste management and recycling activities for both islands
- Tourist attractions in order to extend the tourist season
- Beer distillery (establishment of a brand name)
- Wine production and marketing (especially for Kos island).



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