TOURISMOS: AN INTERNATIONAL MULTIDISCIPLINARY JOURNAL OF TOURISM
Volume 8, Number 2, Autumn 2013, pp. 159-178
UDC: 338.48+640(050)

DETERMINING THE TOURISM DEVELOPMENTAL DYNAMICS OF THE GREEK REGIONS, BY USING TALC THEORY

Serafeim Polyzos
University of Thessaly

Dimitrios Tsiotas
University of Thessaly

Alexios Kantlis
University of Thessaly

This paper utilizes the theoretical framework of the Tourism Area Life Cycle (TALC) model and applies an empirical analysis on the data for the period 1980-2009. The TALC multi-stage process is simulated to a logistic curve and thus it obtains a characteristic growth coefficient r(t) expressing its time duration. This study considers three versions for the logistic growth coefficient and presents the spatial distribution of each coefficient on the Greek interregional map. This approach allows to distinguish the regions that they have reached their tourism developmental capabilities faster than the others and to distinguish these that are still capable for further development. The overall treatment provides the developmental potentials of each Greek prefecture and elects some interesting issues for the tourism policy making in Greece.

Keywords: *Tourism Area Life Cycle, Greek regions, tourism development*

JEL Classification: *L83, M1, O1*

INTRODUCTION

Tourism in Greece

Greece constitutes a popular touristic destination of the Mediterranean Sea and its touristic development is based on natural beauty, historical and cultural heritage, on good weather conditions and on the rich island morphology. Tourism is one of the major dynamic

economic sectors in Greece affecting the configuration of the social and economic structure of its regions and it is regarded as one of the most important factors contributing to population stability, especially for remote regions (Andriotis, 2003; Polyzos and Minetos, 2011).

Greek tourism after the 50's presented a rapid and constant diachronic development, participating today in the GNP with a percentage of over 18% and creating an import of exchange greater than 9 billion dollars, fact that contributes to the country's income and employment (Polyzos et al., 2007; Polyzos and Tsiotas, 2012).

Tourism in Greece has grown into a major economic component contributing importantly to income and employment. Within the last three decades, touristic flows have been increasing rapidly in certain locations. A lot of coastal and insular regions have become popular destinations for leisure tourism and recreation (Polyzos and Tsiotas, 2012).

The growth of tourism is an outcome of many factors, such as the rising standards of living, the transportation's development, the growth of income and free time and the "industrialization" of tourism. Moreover, tourism has many impacts, both positive and negative, on the economy, society, the natural, built and cultural environment of the host community of a destination (Polyzos and Sdrolias, 2006).

Tourism constitutes a subject of research in economic, social and environmental sciences (Zhong et al., 2008) and a major topic of interest concerns its sustainable development that avoids environmental damage and protects long-term natural and cultural resources, in a socially and economically acceptable way (Rodrıguez et al., 2008).

The quality of the environment constitutes probably the most important factor for the attractiveness of a tourist destination and thus the environmental protection becomes an issue of critical importance for tourism development. Sustainable tourism aims to turn tourism development into a positive experience for local people, tourism companies and tourists themselves.

Impacts of touristic development

Tourism is the cause for a great number of environmental problems especially during the peak periods. The over-utilization of natural and cultural resources by tourist activities brings many times tourism into a conflict with the environment (Coccossis and Parpairis, 1995). In addition, a lot of negative social impacts are evident too, such as loss of local traditions and abandonment of traditional economic activities, which undermine the social structures and lag the local identity of each place.

The environmental and other consequences result to the development of alternative environmental friendly forms of tourism, such as the *ecotourism* (Navratil, et al., 2013), the *agro-tourism* (Chatzigeorgiou et al., 2009) or *rural tourism* (Sharpley and Jepson, 2010; Partalidou and Koutsou, 2012), the *green* and the *soft tourism*. The development of such alternative forms of tourism in Greece mainly concerns the non coastal regions, since the seaside attribute suggests a strong determinative factor for the classic touristic development (Polyzos and Tsiotas, 2012).

In general, the touristic development of a region is highly connected with the maximum number of tourists that each place is able to accommodate, without causing any environmental harm. This critical value is called *tourism carrying capacity* (Simon et al., 2004) and it has recently become an important parameter for sustainable tourism development issues.

Life Cycle Assessment in tourism analysis

Life Cycle Assessment (LCA) suggests a common approach for the interpretation of tourist regions' development (De Camillis et al., 2010). It concerns a process of constructing a hypothetical model for resort evolution, developed by Butler in 1980, attempting to illustrate the stages of tourism development in a certain region (Butler, 2006).

This assessment seems to be the most widely accepted until now, suggesting that the number of visitors in a tourist region increases as time passes and its carrying capacity saturates after a certain level. Consequenlty, the attractiveness of an established touristic destination declines to time and this region is set unable to compete with other newer tourism destinations.

This paper utilizes the LCA and specifically the *Tourism Area Life Cycle* (TALC) Theory for studying the tourism developmental dynamics of the Greek regions. The purpose of the study is to determine the level of saturation for the touristic development of each Greek prefecture and thus to elect these regions that are capable for further touristic evolution. The TALC assessment is expected to mine some information that would be useful for the Greek tourism policy making, especially *at the current period of the economic crisis* (Polyzos et al., 2013), where the country is facing high decline rates and needs more than ever to utilize its developmental potentials.

This article is organized as following: Section 2 describes the methodological framework of the TALC model, its limitations and its

version used in this study. Section 3 presents the results of the analysis and an evaluation and, finally, at section 4 some conclusions are drawn.

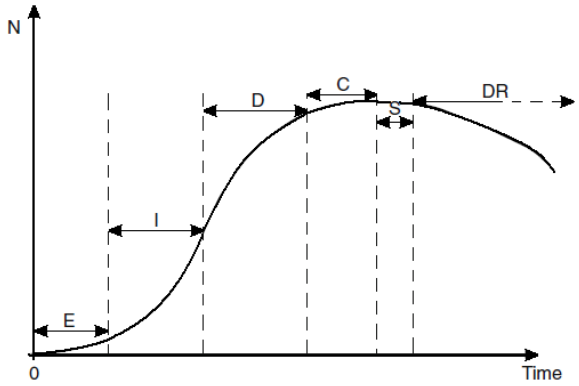
METHODOLOGICAL FRAMEWORK

The TALC model

The TALC model (Butler, 2006; Zhong et al., 2008; Candela and Figini, 2012) was introduced by Butler in 1980 and describes the evolution process of a tourist destination, by utilizing the product cycle concept as used in marketing. According to this theory, each tourism area passes through a process of certain stages as the number of visitors increase, which are *exploration*, *involvement*, *development*, *consolidation*, *stagnation* and *decline* or *rejuvenation* stage (figure 1).

The first four stages signify the *growth phase*, describing the restriction of the number of visitors by some factors such as low accessibility, inadequate facilities, and local knowledge, which grows rapidly as facilities are improved and awareness grows.

Figure 1 The evolution phases of TALC theory



E=exploration, *I=involvement*, *D=development*, *C=consolidation*, *S=stagnation*, *DR=decline* or *rejuvenation*

The stages that are next to *stagnation* describe the *phase of gradual decline* as an effect of mass tourism to a set of factors concerning the *quality of environment* (land scarcity, water quality and air quality), the *level of provided facilities* (transportation, accommodation and other

services) or to some *social factors* (crowding, resentment by the local population). Gradually, both the rate of increase in visitor number and the relative attractiveness of the area will decline, due to overuse and to the impact of visitors. Eventually, the visitors' number will reach the tourism area's carrying capacity.

According to Butler (2006), the *exploration* (*E*) stage describes the process where few adventurous tourists visit places with no public facilities, while non-local visitors have been attracted to the area by its unique or considerably different natural and cultural features. At the *involvement* (*I*) stage the number of visitors increases, while a limited interaction between tourists and some local residents begin to provide facilities for visitors that begin to emerge (some advertising specifically to attract tourists can be anticipated here) as this stage progresses.

The stage of *development* (*D*) concerns growth of additional tourist facilities and increased promotional efforts, reflecting a well-defined tourist market area shaped in part by heavy advertising in tourist-generating areas. The number of tourists arriving in the destination increases and tourism begins to be dominated by external interests and as this stage progresses, local involvement and control of development will decline rapidly. At the *consolidation stage* (*C*) the destination becomes a fully fledged part of domestic and international tourism that becomes a dominant economic sector for the region.

At the *stagnation* (*S*) stage the number of visitors reaches its potential peak (upper limit) electing this area a destination for conservative tourists and no longer a fashionable destination. Tourism operators must proceed to major promotional investments in order to maintain the total number of tourists and to make positive profits. This phase is related with the beginning of serious environmental, social, and economic difficulties for the tourism destination (Candela and Figini, 2012).

Finally, the last stage of TALC theory is described by a fork potential, the *decline* or *rejuvenation* stage (*DR*). At the *decline* potential tourists are progressively more attracted by other newer and more popular destinations and so the tourism destination loses its volume of visitors and becomes more dependent on short-term trips of countryside or tourists of neighbour countries. At this stage tourism infrastructures become obsolete and may contribute to alternative uses. Local tourist operators may start planning new projects to recover the destination's attractiveness, and to *rejuvenate* the tourism product (Candela and Figini, 2012).

Limitations and criticism of the TALC model

TALC theory has been criticized mainly for its simplicity, its lack of precision and its limited application scale (Prideaux, 2000; Uysal et al., 2013). Bianchi (1994) disputes this natural sequence of stages supporting that not necessarily all touristic destinations pass through this particular sequence of stages. According to Hovinen (1981), the developmental process is unique for a destination, described from a different length and shape of the LCA curve. Haywood (1986) pointed that geographic and morphological peculiarities (such as are between the States of the USA) is reasonable not to produce a pattern life cycle curve, since they form an entire mosaic of different resorts and tourist destinations that asynchronously participate to this stage-defined process of diachronic development.

Haywood's approach also drives the consideration of Cooper and Jackson (1989), described the singularity in the study of tourism destinations, as in the cases of the *Island of Man*, where the exploration stage lasted almost a century, and of *Cancun* (Mexico), where the certain stage was covered within a decade. In correspondence to the Life Cycle Theory of a product, the form of TALC's curve has been proved sensitive to a wide set of factors, such as the *rate of change of economic growth*, the *national policies*, the *accessibility infrastructures*, the *surrounding competitive environment* countries, as well as the *evolving preferences of tourists* (Prideaux, 2000).

TALC theory has been criticized as a mono-parametric procedure, since TALC curve's determination is primarily defined by the number of visitors of each destination. Of course this suggests simultaneously a benefit, because data on tourist numbers are more easily available in comparison to other qualitative, demographic and socio-economic indicators, such as the tourist income or the number of individuals occupied by sector.

Such differences are being reflected on the form of the curves of each indicator. For example, tourist revenue for a destination can present an increase, despite the decrease of the number of tourist arrivals, in the case that visitors have the potential of making higher expenses (Prideaux, 2000). Moreover, in each stage the carrying capacity (Simon et al., 2004) or the ability of each destination to serve visitors changes. This is particularly important at the end of the evolution stage and after the stage of decline, when the quality factor of "*tourist experience*" starts to lose its glamour, indicating thus that the carrying capacity of the destination has been exceeded.

Another aspect in the criticism of TALC theory regards its tendency to simplify the unique and complex developmental process describing tourism, since this model tends to classify the endogenous social, political and economic parameters that are unique for each destination. This statement is obviously inaccurate, because also the non tourism-number indicators may lack of a desirable microeconomic treatment (Candela and Figini, 2012).

The above criticisms do not invalidate the undeniable utility of the TALC model regarding tourism policy, planning and forecasting, but they rather aim to point out the multivariate nature (Cooper and Jackson, 1989) of this phenomenon in the tourist industry. The TALC model is effective for initializing the touristic process of a region and thus for providing a framework motivating further analyses, fact that advances tourism evolution research (Butler, 2006; Candela and Figini, 2012; Uysal et al., 2013). TALC assessment is particularly popular for the geographers, since it incorporates to the analysis the dynamic component of spacetime touristic growth (Simon et al., 2004; Zhong et al., 2008).

Methodology and Data

The TALC model has been traditionally associated with the *Product Life Cycle* and the *Logistic Curve* (Tsoularis, 2001; Hernandez and Leon, 2007). Letting t represent the time variable, $N(t)$ the number of visitors to a tourist destination and $r(t)$ the growth coefficient for the total number of tourists, then the growth rate for the number of tourists $dN(t)/dt$ for the destination is expressed by relation (1).

$$\frac{dN(t)}{dt} = r(t) \cdot N(t) \tag{1}$$

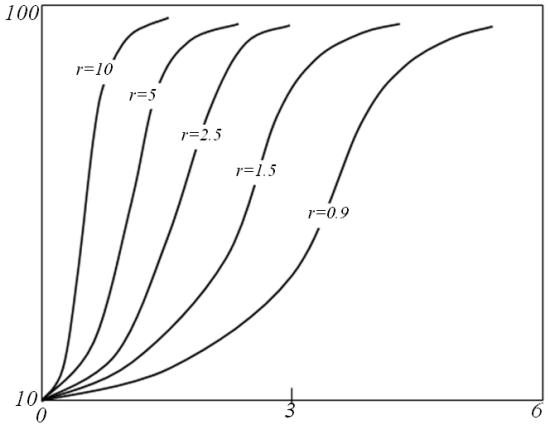
The ordinary differential equation (ODE) shown in relation (1) is solved using the method of *separation of variables*, obtaining an exponential solution shown at relation (2), where A is a coefficient depending on the starting conditions.

$$N(t) = A \cdot exp\{r(t) \cdot t\} \tag{2}$$

This exponential model can be augmented by the factor $1 - \frac{N(t)}{K}$, where the parameter K is the upper limit $\lim_{t \to \infty} N(t) = K$ related with the tourism destination's environmental carrying capacity (Tsoularis, 2001).

The growth curve of relation (2) depends on the coefficient $r(t)$, where, for positive values, it gets a sigmoid shape that asymptotically equals to the carrying capacity. Several logistic curves may be drawn for different $r(t)$ (figure 2), under the same set of starting conditions describing N and K (Tsoularis, 2001). As larger the $r(t)$ is, the faster in time the curve reaches the tourist carrying capacity K. Moreover, it seems that in cases of small $r(t)$ values, where the sigmoid curve is more extended in the time axis, the growth curve fits better to the TALC curve of figure 1.

Figure 2 Several logistic curves for a set of $r(t)$ coefficients (N_o=10 and K=100)



Given that the tourist carrying capacity K is both non-constant and unknown as well as that variable $N(t)$ varies for each tourism region, then the term $1 - \frac{N(t)}{K}$ is impractical to be included in this analysis. The formula of the TALC model of this study is shown at relation (3), which originates from relation (2) after applying a logarithmic transformation.

$$ln(N(t)) = ln(A) + r(t) \cdot t \Rightarrow r(t) = ln(N(t)) + ln(A) \qquad (3)$$

Under the homogeneity assumption, according to which all regions have equal starting points describing their touristic developmental potentials, the parameter A is considered constant, since it depends just on the starting conditions.

The available data refer to the diachronic *total number of visitors* (tourists) $N_t(t)$ and the *total number of overnight stayings* $N_s(t)$ per Greek prefecture, for the period 1980-2010. These data are treated as integer variables describing the Greek regions that *attract greater number of tourists* (touristic *load*) or are *more popular for long-term vacations* (the *duration* of the touristic load), and their coefficients $r_t(t)$ and $r_t(t)$ are expected to reveal the level of saturation per region.

For a further evaluation, a third variable $N(t)=N_s(t)/N_t(t)$ was introduced to the analysis, targeting to elect these Greek regions that are *more popular for long-term vacations per tourist capita* (*duration*/*load*). This ratio suggests a measure that is conceptually closer to carrying capacity than the other variables are, in the extent that it can describe the *pure touristic load that a tourism monad* (visitor or tourist) *applies to the destination*. Consequently, the TALC coefficient $r(t)$ may operate as an alternative carrying capacity index for the Greek regions, regardless the omission of the K term in the mathematical relation of the TALC model.

Since the available data do not distinguish the domestic or foreign origin of tourists, some perspectives from the Greek tourist geography are not taken under consideration. The following section presents the results of the analysis and discusses them through a Regional Economic and an Environmental perspective.

RESULTS AND DISCUSSION

The results of the TALC analysis are shown in table 1 and are drawn at the maps of the figures 3, 4 and 5. The auxiliary map at the appendix shows the names and the morphology of the Greek regions. The map of figure 3 depicts the interregional distribution of the growth coefficient $r_t(t)$ that expresses the total number of tourists per prefecture. The darkest areas correspond to the most touristic saturated regions that are more popular in attracting tourism masses and they are facing, in parallel, a faster touristic saturation process.

As it is shown in figure 3, the darkest regions correspond to the prefectures of *Thessaloniki* (47), *Attiki* (6), *Herakleeo* (21) and *Dodekaneesa* (10). Among these prefectures, the (10) and (21) are insular and the (47) and (6) are coastal regions. This indicates the maritime

orientation of tourism in Greece that is due to obvious morphological reasons.

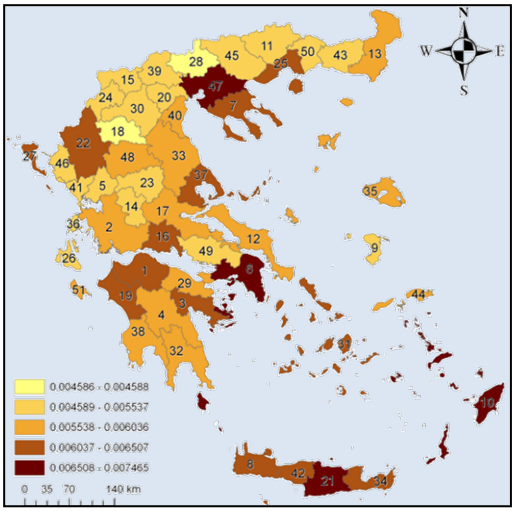
Table 1 Numerical results of the TALC growth coefficients

PREFECTURE	r(t)	$r_t(t)$	$r_{st}(t)$	PREFECTURE	r(t)	$r_t(t)$	$r_{st}(t)$
ACHAIA	4,66	62,16	66,82	KERKYRA	10,36	65,07	75,43
AITOLOAKARNANIA	3,66	58,62	62,29	KILKIS	3,95	45,88	49,83
ARGOLEEDA	4,99	63,1	68,09	KORINTHIA	6,6	60,36	66,95
ARKADIA	3,71	56,14	59,85	KOZANI	3,68	54,98	58,66
ARTA	3,44	51,78	55,23	KYKLADES	7,07	63,25	70,32
ATTIKI	4,67	74,65	79,32	LAKONIA	2,79	59,08	61,86
CHALKIDIKI	10,07	61,89	71,96	LARISSA	4,21	58,42	62,63
CHANIA	8,3	62,56	70,86	LASITHI	9,74	62,47	72,21
CHIOS	7,04	52,37	59,41	LESVOS	8,21	56,55	64,76
DODEKANEESA	10,56	70,45	81,01	LEFKADA	6,43	52,28	58,71
DRAMA	4,11	51,2	55,31	MAGNESIA	5,73	62,88	68,61
EVOIA	7,83	60,1	67,93	MESSEENIA	4,58	59,08	63,66
EVROS	3,69	59,39	63,07	PELLA	4,3	51,35	55,65
EURYTANIA	5,15	51,82	56,97	PIERIA	7,05	57,55	64,59
FLORINA	3	53,73	56,72	PREVEZA	6,12	55,24	61,36
FOKIDA	1,63	60,88	62,52	RETHYMNO	10,63	61,19	71,83
FTHIOTIDA	6,15	57,53	63,68	RODOPH	3,84	55,09	58,93
GREVENA	3,23	45,86	49,09	SAMOS	9,79	57,08	66,87
HELEIA	3,56	62,15	65,7	SERRES	3,93	53,94	57,87
HEMATHIA	3,44	53,65	57,09	THESPOTIA	3,93	52,7	56,63
HERAKLEEO	9,79	67,32	77,11	THESSALONIKI	3,67	67,44	71,11
IOANNINA	2,99	61,42	64,41	TRIKALA	1,54	59,95	61,5
KARDITSA	4,77	53,18	57,94	VEEOTIA	3,33	54,35	57,68
KASTORIA	2,99	55,36	58,35	XANTHI	3,91	54,24	58,15
KAVALA	6,13	60,71	66,84	ZAKEENTHOS	9,7	58,47	68,17
KEFALLONIA	8,7	55,37	64,07				

$r(t)$= number of the stayings per tourists capita
$r_t(t)$= total number of tourists
$r_s(t)$= total number of overnight stayings (values x10^{-4})

The coastal couple of the darkest areas (6) and (47) (figure 3) refer to the most dense populated Greek prefectures *Attiki* and *Thessaloniki*, which are considered as megacities (Tsiotas and Polyzos, 2013) for the scale of the country. The insular prefecture (21) is also of great population possessing the fourth place in the country's ranking. Consequently, the touristic load of these three darkest regions may be regarded as an effect of population. The information for the growth coefficient $r_t(t)$ provided at figure 3 is more creditable for environmental assessment whether is considered in common with the quality of infrastructures and facilities that affect the capability of a region to prevent environmental degrading and related issues caused by touristic overloading.

Figure 3 Map illustrating the interregional distribution of the growth coefficient for the total number of tourists $r_t(t)$



Nevertheless, the case of *Dodekaneesa* (10) seems to correspond to a clearer result, since this region of insular clusters does not have a significant population compared to the country's total. This region constitutes a tourism destination located in the *South-East Aegean* and its darkest status in the map denotes that it is comparatively one of the most saturated regions in *Greece* in terms of touristic load. The core figure of prefecture (10) is the island of *Rhodes*, constituting a receptor suitable for sustainable touristic development, since its large insular area favors developing larger transportation and urban infrastructures and thus attracting larger numbers of tourists.

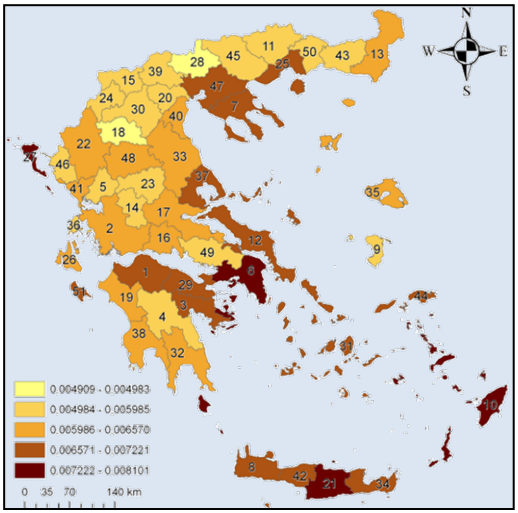
The developmental potential of *Rhodes* should be considered in common with its vicinity to *Turkey* (figure 6), fact that may operate either positively or negatively. Through the positive perspective, *Rhodes* should invest in attracting tourist masses from the dense populated touristic origin of *Turkey* and thus to establish a developmental channel that may provide all-season tourist arrivals to the island. On the other hand, this state of neighborhood may operate negatively and induce tourist leaks from the Greek side into the Turkish side, fact that may accelerate the TALC-stage shifting and finally the saturation of the *Dodekaneesa* prefecture.

The regions of figure 3 that are next in the colored ranking are also insular or coastal, except the case of *Ioannina* (22). According to the map, the islands of *Southern-East Aegean* (figure 6) appear to have high levels of saturation, indicating that it is more likely to be lying into one of the TALC meta-consolidation stages. This raises some critical issues concerning the proper developmental policies that should be followed to maintain the tourism vitality at this sector of the *Aegean*, especially since this region lacks of land transportation connections and thus of homeostatic mechanisms with the rest of the country. The multi-productive economy of the island of *Crete* seems to be efficient here to play a determinative role in this further development.

The non-insular prefectures of Greece that belong to the second ranking group of figure 3 do not seem to follow a standard typology. Some regions probably owe this tourism performance due to their central urban role in local scale, such as the prefectures of *Ioannina* (22), *Achaea* (1) and *Kavala* (25), while some other prefectures probably owe this performance due to their neighborhood with the Greek metropolitan areas of *Athens* and *Thessaloniki*, such as the prefectures of *Argoleeda* (29) and *Chalkidiki* (7). An interesting evaluation in this case can be made if taking under consideration the impact of environmental degrading that the tourist overcrowding causes to a tourism destination (Zhong et al., 2008). According to this point of view, the high ranking status of the prefectures of *Achaea* (1), *Fokida* (16) and *Magnesia* (37) seems to be correlated with higher environmental risk, since these regions are accessing bays or closed parts of the sea.

The second map (figure 4) depicts the interregional distribution of the *growth coefficient* $r_s(t)$ for the total number of (overnight) stayings in touristic lodgings per prefecture. The overall impression produced from this map is that the *Aegean Sea*, located at the *East Greece*, seems to outperform in saturation the *Ionian Sea*, located at *West Greece*, implying that the *Aegean Sea* is more popular than the *Ionian* in the preferences of tourists. This kind of popularity interprets, in terms of the TALC theory, that the *Aegean Sea* receives greater in duration touristic loads than the *Ionian Sea* and that it is consequently being subjected to faster TALC stage-shifting.

Figure 4 Map illustrating the interregional distribution of the growth coefficient for the total number of overnight stayings $r_s(t)$



1.ACHAIA
2.AITOLOAKARNANIA
3.ARGOLEEDA
4.ARKADIA
5.ARTA
6.ATTIKI
7.CHALKIDIKI
8.CHANIA
9.CHIOS
10.DODEKANEESA
11.DRAMA
12.EVOIA
13.EVROS
14.EURYTANIA
15.FLORINA
16.FOKIDA
17.FTHIOTIDA
18.GREVENA
19.HELEIA
20.HEMATHIA
21.HERAKLEEO
22.IOANNINA
23.KARDITSA
24.KASTORIA
25.KAVALA
26.KEFALLONIA
27.KERKYRA
28.KILKIS
29.KORINTHIA
30.KOZANI
31.CYCLADES
32.LAKONIA
33.LARISSA
34.LASITHI
35.LESVOS
36.LEFKADA
37.MAGNESIA
38.MESSEENIA
39.PELLA
40.PIERIA
41.PREVEZA
42.RETHYMNO
43.RODOPH
44.SAMOS
45.SERRES
46.THESPOTIA
47.THESSALONIKI
48.TRIKALA
49.VEEOTIA
50.XANTHI
51.ZAKEENTHOS

The above interpretation elects a twofold issue for the Greek tourism policy. On the one hand, it indicates to the policy makers to target at developing the tourism of the *Ionian* side (*West*) of *Greece*, which seems more capable in accepting longer term touristic loads according to the current Greek economic and political framework. On the other hand, it rings the alarm for adopting more sustainable tourism policies and innovative practices for the *Aegean Sea*, in order to avoid its consequent TALC tourism decline, since the *Aegean Sea* diachronically suggested a vital productivity coefficient for the Greek economy.

Moreover, it seems that *the darkest colored prefectures* in figure 4 *configure coastal foreheads that allow the access to the sea, mainly to the Aegean,* for the rest of the Greek regions. For example group of prefectures (7), (25) and (47) constitutes a coastal forehead for the prefectures (50), (11), (45), (28), (39) and (20), for accessing to the *Northern Aegean* Sea. Also the group of prefectures (37), (12) constitutes a coastal forehead for all the regions of *Central* and *West Greece* for accessing to the *Central Aegean*. Next, the group of prefectures (6), (1), (29) and (3) constitutes a coastal forehead of the regions of *Peloponnesus* (19), (38), (32), (4) and of *Central Greece* (2), (16), (49) for accessing to the *Southern Aegean*.

This observation implies that the interregional distribution of the total number of overnight touristic stayings in Greece is determined more by endogenous touristic acts rather than it depends on exogenous causes. This interprets either that the foreign touristic load in Greece is inconsiderable in contributing to the geography of Greek tourism or that the Greek tourism infrastructures and facilities were structured to serve the *Aegean's* tourism, undermining with this way the total developmental dynamics of the country. According to diachronic imprint of the Greek tourism, the second interpretation appears more rational, since foreign tourism in Greece cannot be considered inconsiderable.

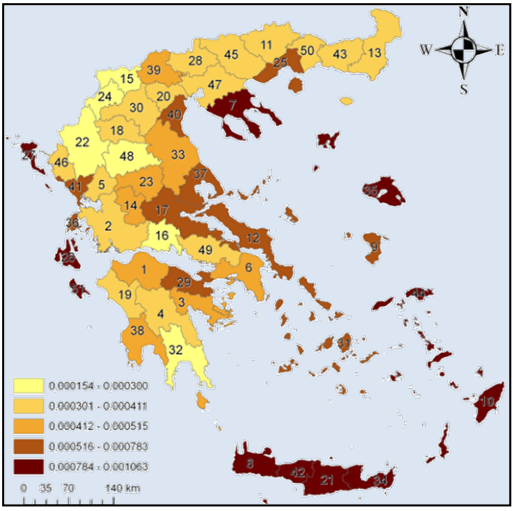
Next, figure 5 depicts the interregional distribution of the *growth coefficient* $r(t)$ for the number of the touristic stayings per tourists capita, allowing to apply a scale free assessment for the Greek tourism dynamics. This map combines the information of the two previous $r_t(t)$ and $r_s(t)$ maps and thus it leads to a more effectual assessment. The growth coefficient $r(t)$ expresses the density of the touristic stayings or the intension of touristic loads per unit and it suggests a transformation of the map of figure 5 after removing the number of tourists effects.

At figure 5 three (3) darkest tourism zones are distinguished in the map of Greece. The first consists of the prefectures of *Chalkidiki* (7) and *Lesvos* (35), shaping an ellipsoid extended at the *Northern* and *North-East Aegean*. Despite their geographical proximity, there are remarkable differences between this pair of prefectures. First of all, prefecture (7) is a coastal region while prefecture (35) is an insular region. Next, the prefecture of *Chalkidiki* (7) suggests a coastal touristic forehead that mostly specializes in receiving domestic tourism from the *Northern Greece*, while the prefecture of *Lesvos* (35) does not present such a specialization. On the other hand, prefecture (35) is adjacent to *Turkey*, fact that elects a considerable externality for its local economy. Such differences describe a bipolar rather than a clustering role for this pair of prefectures, implying that supplementary policies are more suitable for their sustainable tourism development.

The second darkest zone in figure 5 is located at the *Southern* and *Southern-East Aegean*, shaping an arc of islands that includes the *Cretan* prefectures (8),(42),(21),(34) the prefecture of *Dodekaneesa* (10) and the prefecture of *Samos* (44). The geographic location and the regional economic profile of these prefectures distinguish them into a pair of tourism destination groups, where the first consists of the *Cretan* prefectures and the second of the prefectures (44) and (10). This separation is driven by the self-contained economy of the multi-

productive *Crete* and by the proximity of the prefectures (44) and (10) to the *Turkey*.

Figure 5 Map illustrating the interregional distribution of the growth coefficient for the number of the stayings per tourists capita *r*(*t*)



1.ACHAIA
2.AITOLOAKARNANIA
3.ARGOLEEDA
4.ARKADIA
5.ARTA
6.ATTIKI
7.CHALKIDIKI
8.CHANIA
9.CHIOS
10.DODEKANEESA
11.DRAMA
12.EVOIA
13.EVROS
14.EURYTANIA
15.FLORINA
16.FOKIDA
17.FTHIOTIDA
18.GREVENA
19.HELEIA
20.HEMATHIA
21.HERAKLEEO
22.IOANNINA
23.KARDITSA
24.KASTORIA
25.KAVALA
26.KEFALLONIA
27.KERKYRA
28.KILKIS
29.KORINTHIA
30.KOZANI
31.CYCLADES
32.LAKONIA
33.LARISSA
34.LASITHI
35.LESVOS
36.LEFKADA
37.MAGNESIA
38.MESSEENIA
39.PELLA
40.PIERIA
41.PREVEZA
42.RETHYMNO
43.RODOPH
44.SAMOS
45.SERRES
46.THESPOTIA
47.THESSALONIKI
48.TRIKALA
49.VEEOTIA
50.XANTHI
51.ZAKEENTHOS

Next, the third darkest zone in figure 5 is located at the *Ionian* side, including the prefectures (27), (26) and (51). The mixed $r_s(t)$ and $r_t(t)$ consideration provided by figure 5 implies that a tourist who visits the *Ionian* side of Greece seems to spend the same time for vacation with a tourist who visits the *Aegean* side, fact that sets no comparative advantage to the TALC potentials of the *Ionian* side. Nevertheless, according to figure 3, the *Ionian Islands* are more capable in receiving larger number of tourism, implying a direction where the tourism development should invest to.

The second rank of saturation in figure 5 seems to concern more the hinterland rather than the insular Greece. The only insular regions at this saturation level are the prefectures (31) in the *Aegean* and (36) in the *Ionian*. The popular *Aegean* tourism destination of *Cyclades* (31) appears not to have yet reached its upper limit of tourism capacity, probably due to existence of numerous and scattered island destinations. On the other side, the *Ionian* prefecture of *Lefkada* (36) seems to maintain yet its

touristic vitality, due to its direct road connection with the rest of the country.

At second rank of saturation, the most distinguished among the hinterland regions of figure 5 is the cluster of the *Central Greece*, consisting of the prefectures (37), (17) and (12). This status is obviously due to the central position of this cluster, providing an access to the *Aegean Sea*. Finally, the prefectures (25), (40) and (29) that belong to this saturation group are satellites to metropolitan prefectures of *Attiki* and *Thessaloniki*, implying that their tourism activity is mainly of domestic orientation.

An especially interesting observation in figure 5 concerns the unsaturated status of the metropolitan prefectures *Attiki* (6) and *Thessaloniki* (47). This interprets that the touristic loads received by these regions are of small intension (duration) and thus that these metropolitan regions operate as short-term tourism stations that intermediate to air or maritime transportation routes, offering a break for relaxation, shopping or sightseeing before the tourism destinations. Finally, the other unsaturated regions in figure 5 are non-insular or non-coastal, deviating from the fundamental maritime orientation of the Greek tourism. The unsaturated coastal regions of *East Macedonia* and *Thraca* provide a receptor for developing the tourism at the *Northern-East Aegean*.

Under an overall assessment, the saturated status for most of the insular and coastal regions in Greece places them at the consolidation or meta-consolidation stages of the TALC chain. This elects critical political issues for the country, concerning the essential investments in infrastructure and facilities for preserving sustainable tourism or the policies that are capable to develop alternatives in the Greek tourism. The unsaturated Greek regions suggests receptors for developing alternative forms of environmental friendly tourism, such as *ecotourism*, *agro-tourism,* (Chatzigeorgiou et al., 2009; Sharpley and Jepson, 2010; Partalidou and Koutsou, 2012), *green* and *soft tourism*.

CONCLUSIONS

This article used the theoretical framework of the Tourism Area Life Cycle (TALC) model, in order to determine the tourism developmental potentials of the Greek prefectures.

The TALC theoretical process was based on logistic growth curves and the empirical analysis used data of the period 1980- 2009. The foregoing analysis distinguished regions that have reached their tourism

developmental capabilities faster than others and these that are still capable for further tourism development.

The TALC analysis recognized the maritime orientation of the Greek tourism and elected that the most of the insular areas cover the peak in the TALC developmental process, fact that should alert the tourism policy makers, especially under the seasonality constraint of the Greek maritime tourism.

Furthermore, the TALC analysis indicated a higher level of saturation in the *Aegean Sea*, in comparison with the *Ionian*, and the necessity for some saturated regions, such as *Rhodes* and *Crete*, to rearrange their tourism orientation for playing a leading role to the tourism sustainability of the *Aegean*.

The analysis also elected some unsaturated coastal regions, such as the *East Macedonia* and *Thraca*, capable in becoming receptors for the further development of the *Aegean Sea*. Moreover, the insular and coastal side of the *Ionian Sea* seems to be shifted at slower rates in the TALC chain, providing another tourism developmental receptor.

Finally, when an area faces touristic saturation then it is more likely to face a great number of environmental problems. The results of the foregoing TALC analysis illustrate zones of great environmental concern, due to tourist overloading.

The previous empirical TALC analysis is considered a useful tool for the Greek tourism policy making, especially *at the current period of the economic crisis*, where the country is facing high decline rates and needs more than ever to utilize its sustainable developmental potentials in all dimensions.

REFERENCES

Andriotis, K. (2003). Host, guests and transformation of the coast: Implications for sustainable tourism development in Crete. *Paper Presented at the International Scientific Conference "Sustainable Tourism Development and the Environment"*. University of the Aegean, Chios Island, Greece: 2-5 October 2003.

Bianchi, R. (1994). Tourism development in resort dynamics: An alternative approach. In Cooper, CP. and Lockwood, A. *Progress in tourism, recreation and hospitality management*, Vol. 5, Chichester, UK: Wiley.

Butler, R.W. (2006). *The Tourism Area Life Cycle, Vol. 1 Applications and Modifications*. Channel View Publications.

Candela, G. & Figini, P. (2012). *The Economics of Tourism Destinations* (*Springer Texts in Business and Economics*). Berlin, Germany, Springer-Verlag Publications.

Chatzigeorgiou, C., Christou, E., Kassianidis, P. & Sigala, M. (2009). Examining the relationship between emotions, customer satisfaction and future behavioural intentions in agrotourism. *Tourismos: An International Multidisciplinary Journal of Tourism*, Vol. 4, No.4, pp.145-161.

Coccossis, H. & Parpairis A. (1995). Assessing the Interaction between Heritage, Environment and Tourism: Mykonos, In H.Coccossis and P. Nijkamp (Eds) *Sustainable Tourism Development*, Hampshire, UK: Avebury Press.

Cooper, C.P. & Jackson, S. (1989). Destination life cycle: The Isle of man case study. *Annals of Tourism Research*, Vol. 16, No.3, pp.377-398.

De Camillis, C., Raggi, A. & Petti, L. (2010). Tourism LCA: state-of-the-art and perspectives. *International Journal of Life Cycle Assessment*, Vol. 15, pp.148–155.

Haywood, M.T. (1986). Can the tourist area life cycle be made operational? *Tourism Management*, Vol. 7, No.3, pp.154-167.

Hernandez, J. & Leon, C. (2007). The interactions between natural and physical capitals in the tourist lifecycle model. *Ecological Economics*, Vol. 62, pp.184-193.

Hovinen, G.R. (1981). The tourist cycle in Lancaster County, Pennsylvania. *Canadian Geographer*, Vol. 25, No.3, pp.283-286.

Navratil, J., Picha, K., Knotek, J., Kucera, T., Navratilova, J. & Rajchard, J. (2013). Comparison of attractiveness of tourist sites for ecotourism and mass tourism: the case of waters in mountainous protected areas. *Tourismos: An International Multidisciplinary Journal of Tourism*, Vol. 8, No.1, pp.35-51.

Partalidou, M. & Koutsou, S. (2013). Locally and socially embedded tourism clusters in rural Greece. *Tourismos: An International Multidisciplinary Journal of Tourism*. Vol. 7, No.1, pp.99-116.

Polyzos S. & Minetos, D. (2011). An Ordinal Regression Analysis of Tourism Enterprises' Location Decisions in Greece. *Anatolia*, Vol. 22, No.1, pp.102-119.

Polyzos S. & Sdrolias L. (2006). Strategic Method of Confrontation of Tourist Competition: The Case of Greece. *Journal of Travel and Tourism Research,* Vol. 6, No.1, pp.12-28.

Polyzos, S. Arabatzis, G. & Tsiantikoudis, S. (2007). The Attractiveness of Archaeological Sites in Greece: A Spatial Analysis. *International Journal of Tourism Policy and Research*, Vol. 1, No.3, pp.246-266.

Polyzos, S. & Tsiotas, D. (2012). The Evolution and Spatial Dynamics of Coastal Cities in Greece. In S. Polyzos (Eds.) *Urban Development*, Rijeka, Croatia,: Intech Publications.

Polyzos, S., Tsiotas, D. & Sdrolias, L. (2013). Greek regional productivity at the period of the economic crisis: obtaining information by using Shift–Share analysis. *MIBES Transactions,* Vol. 7, pp.92-109.

Prideaux, B. (2000). The resort development spectrum - a new approach to modeling resort development. *Tourism Management*, Vol. 21, pp.225-240.

Rodriguez, JRO., Parra-Lopez, E. & Yanes-Estevez, V. (2008). The sustainability of island destinations: Tourism area life cycle and teleological perspectives. The case of Tenerife. *Tourism Management*, Vol. 29, pp.53–65.

Sharpley, R. & Jepson, D. (2010). Rural Tourism: A spiritual experience? *Annals of Tourism Research*, Vol. 38, No.1, pp.52–71.

Simon, F., Narangajavana, Y. & Marques, D. (2004). Carrying capacity in the tourism industry: a case study of Hengistbury Head. *Tourism Management*, Vol. 25, pp.275–283.

Tsoularis, A. (2001). Analysis of Logistic Growth Models. *Research Letters in the Information and Mathematical Sciences,* Vol. 2, pp.23-46.

Tsiotas, D. & Polyzos, S. (2013). Introducing a new centralities measure from the interregional road transportation network analysis in Greece. *Annals of Operations Research*, DOI 10.1007/s10479-013-1434-0.

Uysal, M., Woo, E. & Singal, M. (2013). The Tourist Area Life Cycle (TALC) and Its Effect on the Quality-of-Life (QOL) of Destination Community. In M. Uysal, R. Perdue and J. Sirgy (Eds.) *Handbook of Tourism and Quality-of-Life Research: Enhancing the Lives of Tourists and Residents of Host Communities*, London: Springer Science+Business Media Publications.

Zhong, L., Deng, J. & Xiang, B. (2008). Tourism development and the tourism area life-cycle model: A case study of Zhangjiajie National Forest Park, China. *Tourism Management*, Vol. 29, pp.841-856.

SUBMITTED: DEC 2012
REVISION SUBMITTED: MAR 2013
ACCEPTED: APR 2013
REFEREED ANONYMOUSLY

Serafeim Polyzos (spolyzos@uth.gr) is an Associate Professor at University of Thessaly, Department of Planning and Regional Development, Pedion Areos, Volos, 38334, Greece.

Dimitrios Tsiotas (tsiotas@uth.gr) is a PhD candidate at University of Thessaly, Department of Planning and Regional Development, Pedion Areos, Volos, 38334, Greece.

Alexios Kantlis (kantlisa@outlook.com) is an Urban & Regional Planner, MEng, MSc, 5th I. Galanou, Karpenissi, 36100, Greece.

APPENDIX

Figure 6 Map indicating the names and the morphology of the Greek regions (source: Google maps – self edited)