

The concept of Urban Metabolism in Insular Communities and it's the relation to Sustainability

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Abstract This paper focuses on the understating of how one are metabolism through tourist development without any specific planning from the beginning. As a case study the City of Agia Napa was chosen which presented unique characteristics the last 45 years as was and still the main player for Tourism Development in Cyprus as can guest more than 30% of the total tourism that visit Cyprus while at the same time offer millions of € in the Government. The last 45 years Agia Napa developed very fast a huge Hospitality Industry giving limited attention to the correct development. Considering the fact that in 1980s most tourists were looked for cheap destinations, with good food, nightlife, beaches and safe environment Ayia Napa became an attraction. Green areas were dramatically reduced, essentially lost the orientation point which was the Medieval Monastery as in the nearby areas were developed and expand restaurants, pubs, nightclubs, discos, etc. There was essentially an integrated design that does not respect the environment and the society. The only objectives in the past were to cover quickly the needs and the requirement for the tourist with the maximum economical profit. Main objective is to understand the metabolism of the city in the framework of Sustainable Development.

Keywords: city metabolism; tourist and environment; sustainable development; strategic plan, smart cities

1. Introduction

Tourist Industry is part of global tourism trend. Benur and Bramwell (2015) mentioned that tourist destinations mainly depends on destinations tourist products as well as on several factors which motivate tourist to visit them. According to Zorpas *et al.*, (2008) the most widely tourism development model used in the Mediterranean region is based on seaside summer holidays and attainment of quantitative goals. Moreover tourism provides significant contributions and donations to local economies by generating employment and investment opportunities, but rapid and sometimes chaotic development is against sustainable development and has adverse social, environmental and economic impacts. Hotels constitute a

key element of the organized chain of activity in the travel and tourism industry, and occupy a crucial place in concerns over environmental protection related to tourism and travel. Smith (1994) argues that primary tourism products comprise a complex amalgam of elements, such as physical plant (including natural features and weather), the input of services, hospitality, choices for tourists, tourist involvement in the delivery of services, and also experiences. Among these elements some are more tangible and others are more intangible. The more intangible elements, for example, include the representations and images of primary tourism products, which the tourism industry or other communication channels may promote, as well as the cultural and symbolic meanings tourists associate with these products (Morgan, 2014; Murphy *et al.*, 2000).

Sustainability can be defined as a development process that minimizes consumption of environmental resources and the resulting environmental impacts while simultaneously providing economic and quality of life benefits (Voukkali *et al.*, 2014). Newman (1999) investigated urban sustainability by using the analogy of an urban metabolism and also accounted for aspects of livability to give sustainability a practical meaning. These studies suggested that in addition to the need to reduce a city's use of natural resources and production of wastes, livability should be considered as an important goal of urban sustainability. Cities or even more urban area as well as tourist destinations are large and densely populated areas in which human impacts are concentrated. Tjallingii (1993) emphasized that human activities are dynamic, and that cities must be considered as complex, dynamic ecosystems. A city's social, economic, and cultural systems, though clearly artificial, nonetheless cannot escape the constraints imposed by natural abiotic and biotic laws (Lei *et al.*, 2016). When Wolman (1965) introduced the concept of an "urban metabolism", he was the first to treat cities as analogous to ecosystems (i.e., to describe them from the perspective of natural abiotic and biotic laws), and used that analogy to describe how materials and energy flow into the urban system.

The development of primary tourism goods and products in any destinations is complex and face multipart due to the many elements associated with these products. The development of tourist area affect in depth the urban planning, the strategic development and the metabolism of the area. Metabolism, as a typical dissipative system, demonstrate the large amount of anabolic energy used to provide food, goods, housing, and transportation for the city's residents and tourists and to provide a suitable living environment results in proportionally high heat dissipation as a result of losses due to entropy (Lei *et al.*, 2016). Urban metabolism may be defined as "the sum total" of the technical and socio-economic processes that occur in cities or in destinations or in urban or peri-urban areas, resulting in growth, production of energy, and elimination of waste. Moreover metabolism can be defined as the changes that occurs in one area due to the fact that this area is modified as a results of tourism development. Typically this means that in this area several services/infrastructures are developed (like hotels, bars, restaurants, clubs, shops, market, squares, museums, green areas, infrastructures including roads, pavements, wastewater treatment plants etc) aiming to cover the needs of tourists. In practice, the study of an urban metabolism involves a "big picture" quantification of the inputs, outputs and storage and consumption of energy and water, materials and wastes production, enterprises characterization and their status, etc, even though city metabolism is affect from the citizens or the tourist needs, wants, attitude and behaviour (Zorpas *et al.*, 2017). In order to measure the metabolism of one area, indicators are the necessary metric to track sustainable performances and they provide a comprehensive basis for assessment of progress against environment, economic, social policy targets. Indicators reflect the status and tendencies of, for example, biodiversity; waste generated, jobs, etc.

The paper described the changes that happens in the city of Agia Napa the last 45 years.

2. Material and Methods

Area Description: There is a paradox in Municipality of Agia Napa as presented with 3212 permanent citizens according to the last inventory report on 2011 (Ministry of Interior Affairs, 2016) and produced more than 12000-15000 t/y of waste while water consumption in more than 2 m t/y. This is happen because the equivalent population is more than 50000 citizens (including permanent citizens, senior citizens which are EU citizens ages 65+, and tourist). According to the statistics of 2015 the Municipality has the ability to guests almost 30-35% of the tourist that visit Cyprus every year. More than of 250 hotels, more than of 1500 restaurants, bars, night clubs, souvenir shops ect exist. The rapid tourism development in Agia Napa offer thousands jobs directly and indirectly related with tourist services in the area (approximately 20000 jobs positions) as well as more than €700 million/y taxes to the Government. It's well known that Agia Napa hold the whole economy of the Island followed from Protaras (Paralimni Municipality)

Data Collection: In order to collect data and to identify how the area were metabolism a survey audit was established. A survey audit is a relative fast process for

gathering information without detail verification as well as is a systematic research method which will identify strengths and weakness in the area. The survey covers:

Step 1, determine the area to be audited: The area include a square of almost 500 x 1000 meter and consist the core of the Municipality (Map 1), where the tourist industry was developed after 1970 until the late of 90's as now the tourist enterprises and hotels were mostly moved closed or nearest to the sea.



Map 1. Centre of Agia Napa Municipality

Step 2, Statistics: several statistics were collected from the urban development office of the Municipality

Step 3, Public participation: Public participation is the involvement of citizens, stakeholders, decision makers etc. in a problem-solving decision machining process that may or could interest and affect them (directly or indirectly).

Step 4, identification of indicators to calculate the level of metabolism: Those indicators covered the sustainability pillars of economy, social cultural and environment. The indicators enable a region to determine (a) the level of development already is, (b) the prefer level which the city could be and (c) the difference between the two situations.

3. Results and Discussions

For almost 5 decades Agia Napa hold the economy of Cyprus as has developed a huge hospitality industry without any specific urban planning at the beginning of the development. This phenomenon results to a chaotic model without any specific character. Without any model and strategic planning hotels, restaurants, and any kind of enterprises were grown anywhere in order to cover the needs of tourism. Municipality become an attraction due to the fact that everything were very cheap (accommodation, food etc) and the destination actually sell sun and coast as well as safe environment and hospitality. The chaotic development results to minimization of green areas (as those were replaced from buildings). Although in the core of the Municipality exist a Medieval Monastery (from 12th century in the name of Mother Maria) was not enough to retain the character. There was essentially an integrated design that does not respect the environment, the society and the culture as the development was focus on how to cover the needs of the tourist with the maximum profit. Several enterprises were developed between early 80's and late 90's. The survey audit indicated what was already more or less known but no one from the council wants to believe it as the hospitality industry was slowly moved closer to the beach and the total tourist which visit the City were increasing. The area under study was presented with some negative results due to the continual crisis and as

result of these: (i) numerous enterprises closed one behind the other increasing the unemployment's to 25%, (ii) there is limited infrastructure focus on accessibility and especially for guest with disabilities, (iii) several bars, clubs were open until late without noise control and were extremely annoying to the guest staying in the nearest hotels located in the centre and slowly one behind the other couldn't signed a contract and closed (iv) the chaotic development at the begging didn't developed any green areas, parks or other specific routes beside buildings and most of the tourist didn't had any motivation to visit the area (v) there was a huge lack promoting the medieval Monastery which was the only lung to attract tourist in the area and promoting local culture. Photo 1 indicated how was the centre of Agia Napa during 1970 and how was developed during 1985.

Agia Napas has more than 250 hotels and hotels apartment which now can guest almost 30-35% of the total tourist which visit Cyprus. For the 75 which located in the study area were slowly closed and until the end of 2006 remain only 6 of them. This had a directly affect in all kind of enterprises located closed to them. Among them where restaurants, snacks and bars, pubs, clubs, discos, souvenir shops, hairdressers, food stores, etc. Hundreds of job positions were slowly lost and at the end of 2010 (2 years before the economic crisis) more than 65% of the existing enterprises were closed. This has had a direct impact on the local economy as several jobs were lost as well as the total incomes were reduced either on a local or a central level. A significant reason was also that other areas of Municipality were developed under specific strategic and urban planning, with infrastructures "smells more European" as well as the new largest hotels could play in different level offering all-inclusive package filling that they can keep tourist into their properties increasing their incomes. Very important was the fact that the downgrading of the area increase the illegal waste disposal in open space with several negative impacts on the environment and for the citizens.

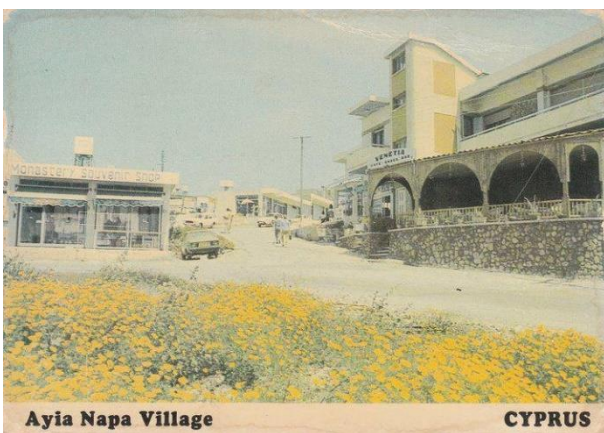


Photo 1. The centre of Agia Napa closed to Medieval Monastery during 1970 and at the end of 1985.

Indicators can be derived using qualitative and/or quantitative approaches, and the application of indicators can help elucidate complex realities (Holden, 2006). As an indicator, sustainability has become a keystone for tourism, environmental management, and environmental studies (Lee and Hsieh, 2016). Indeed, sustainable tourism indicators are broadly recognized as useful tools for planning rural or cultural tourism (Blancas *et al.*, 2011; Lozano-Oyola *et al.*, 2012), managing crises (de Sausmarez, 2007), managing community tourism (Choi and Sirakaya, 2006), assessing tourism destinations (Pérez *et al.*, 2013), measuring responsible behaviour and tourism practices (Blackstock *et al.*, 2008), and selecting criteria for policy implementation and scientific recognition (Tanguay *et al.*, 2013).

Indicators are the essential metrics to prove sustainable performances and they deliver a comprehensive basis for evaluation of the progress against economic, environment, and social policy targets. Indicators reproduce the status and tendencies of, for example, economic impact, water consumption, energy consumption, waste generated, jobs, etc. For the selected area, a number of indicators (Table 1-3) were set in order to measure the level of sustainability for the selected area. Indicators indicated what was already known and more specific the development of the historical centre during the beginning of 70 until the late of 80s didn't consider any or followed any specific planning.

As the Municipality Council realized that citizens as well as enterprises owners and Tour operators demand for a New Strategic Planning, they called several public participations in order to hear and collect ideas how to develop the historical Center. The call for public participation was done through social media, local radio station, leaflets which have been sent via post mail to all citizens and enterprises located in the Municipality. A period of 30 days was given to everyone (citizens, stakeholders, enterprises etc) in order to submit any comments and what they believed that may be useful and related with their worries. Participatory processes must be designed in a way that makes citizens realize that their input can have an effect. This can be achieved by creating a relationship of trust and mutual understanding (Kantemeridou *et al.*, 2013). Public participation in tourism planning can take many forms, including organizing tourism advisory committees or boards, holding

public hearings, and conducting focus group sessions and/or surveys (Spenser *et al.*, 2010).

Table 1. Social Indicators in the study area

Index Aging Population	9.93%>64 y 58.5% 25-63 y
Non Cypriot Citizens	37%
Economical active population in the centre	335/1681 total local employees
Roads that can be fixed	90 %
Bicycling roads	0
Social supports centres and other social infrastructures	0
Museums	0
Accessibility to citizens with disabilities	Limited to zero
Unemployed from the permanent population	20 %
Local employees / 1000 tourist guest	300
Medieval restaurant	1
No. of Museum in the study area	0
Number of Museum in Agia Napa	8
Training centres	0
Citizens service Centre	zero
Social services	Limited
Use of public transportation from the total employees and guest that visit or work in the centre	< 10 %
Parking spaces for peoples with disabilities	6
Beeps for blinds when they cross check	Limited

Table 2. Economic Indicator

Population below the poverty line	15.8%
Relation of local citizens /1000 tourists	300
Hotels that have been withdraw	60.8 %
Restaurants that had been closed	55 %
Coffee shops/pizzas which closed	29 %
Pubs and Bars that had been closed	22%
Recreation centers that are closed	32.5 %
Loss of jobs (from the 1000)	45 %
Economical Active population	275/1381
Permanent population / tourist	1200/2000
Number of beds in the centre in relation with the total capacity	< 16.5 %
Total SMEs per 1000 tourist guest	250
Average occupancy March/April	< 30 %

Average occupancy January / February	< 18 %
Total number of SMEs in the Centre	166

Table 3. Environmental Indicators

SMEs and ISO 14001/EMAS	0
Green areas ratio	1.55 m ² /tourist
Noise pollution	Extremely high 175 penalties on 2013 252 penalties on 2008
Public open green areas in relation to the total area	1.41%
Building with energy performance	0
Number of building permits granted during the year	142 since 1982 and from 2005 until today <5
Waste production	2.01 Kg/ tourist 1.15 Kg/local citizen
Illegal waste disposal sides within the study area	7 (all of them were closed until the 2013)
Building with energy consumption since 2013	zero
Energy consumption in roads in study area	199838 Kwh on 2013 214009 Kwh on 2008
Liquid waste production in the study area	10.5 % of the total production
Density of public lighting	8.9-123.5 lights/metre
Renewable Energy	4 photovoltaic panels (= 1Kwatt)
Preserved buildings	1
Roads, pavement which needs replacement	90% (in study area)
Length of pavements in relation to the total length of roads in the study area	1700 m / 11196 m (15.18%)
Bicycling rout, parkings	zero
Electric cars to be used	zero

4. Conclusion

Without any specific urban planning for tourism development any destination cannot retain its character and over time will collapse if specific measures and a development of new strategic planning as well as a brand name will not be developed. As the destination was very cheap (for many years, and still value for money) the urban planning was more or less uncontrolled, chaotic and sometime lawless. And as Municipality council turn into a new strategic paining focus on eco-tourism after the public participations the destination can be sustainable if development meets the needs of tourists and local residents while protecting future opportunities. Ecotourism offers benefits for local residents, conservation, development and

educational experiences. Mainly focuses primarily on experiencing and learning about nature, landscape, flora, fauna, habitats, cultural. The new strategic plan must focus on several different things to different people.

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