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Guest-Editors:

Associate Professor Dr. Zacharoula Andreopoulou,
Teaching Assistant Dr Stefanos Tsiaras
Professor Dr. Giovanni Quaranta
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EDITORIAL NOTE

Special Issue "An approach to the sustainability pillars: Studying Environment, Society and Economy for a better future"', Journal of Regional Socio-Economic Issues

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Sustainable development is a complex modern issue with many aspects. 30 years after the publication of "Our common future", also known as "The Brundtland Report", the concept of sustainability is still a matter of research.

This Special issue aims to provide an interdisciplinary approach to the three pillars of sustainability: social equity, environmental protection, and economic growth.

The 9 papers found in the special issue under the title "ICT for sustainable agri-environment" come from different fields of science: environmental sciences, social sciences and economics. They constitute an updated and extended version of papers presented in the International Workshop "Information Technology, Sustainable Development, Scientific Network and Nature Protection" which took place in Edessa, Greece, 8-11 October 2017, during the 18th Panhellenic Forestry Congress. The selection of the studies appearing in this special issue was based on the relevance of their subject to the scope of the Journal of Regional & Socio-Economic Issues.

Paper 1 proposes a new approach to food sustainability, studying circular economy and food issues while focusing mostly on proximity agriculture. Paper 2 studies each of the Renewable Energy Sources commercial brands in Southern Greece, and analyzes the services offered through the Internet, discussing how e-commerce is used by commercial brands. Paper 3

assesses the role of local protected areas in regional development, presenting the case study of the Prefecture of Pella Greece under the European Green Belt Initiative. Paper 4 records the views and perceptions of citizens in Orestiada, Greece regarding municipal waste management policies. Paper 5 presents a preliminary attempt to estimate the public awareness on circular economy and to explore factors of its promotion in Greece. Paper 6 provides a theoretical framework for distance environmental education, focusing on Forest Policy. Paper 7 highlights the importance of sustainable forest management, mainly adopting the principles of Prosilva Europe in forest practice. Paper 8 investigates the views of the technical employees of the Municipality of Thessaloniki on issues related to improving planning and management of urban green. Paper 9 studies the opinions of undergraduate students in the Department of Political Sciences in the Aristotle University of Thessaloniki towards forest areas of Greece.

We believe that this special issue will continue the scientific discussion and stimulate the advance of research in these topics, progressing to new trends and solutions that can result in both theoretical and practical progress.

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Circular Economy and Food Issue: A New Approach to Food Sustainability

Abstract

Starting point of this paper is to consider that today more than ever sustainable territorial wellbeing pathways are increasingly demanded by local communities. In this context, food systems are called to satisfy global instances and to contribute to the implementation of a “Territorial Sustainability Paradigm” (TSP), offering a decisive contribution by orienting its stakeholders towards behavioural models that are in line with the fundamental principles of a Circular Economy.

The pillars of a TPS, a “quality system approach” and a “non homologation strategy”, in particular, become fundamental for a sustainable competitive positioning of territories only if there will be based also on new production process capable of internalizing costs of scarcity and new marketing strategies aimed to recognize value to a new model of proximity agriculture.

Starting from these considerations, the paper aims to investigate whether a stakeholder’s approach based on a move from linear economy to circular economy is the economic paradigm capable to give strength to this new model of proximity agriculture.

Keywords: circular economy, proximity agriculture, territorial sustainability paradigm, food system, non homologation strategy.

JEL Classification: Q01, Q18, O13

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1. Introduction

On September 25th, 2015, the United Nation's General Assembly adopted the 2030 Agenda for sustainable development, featuring 17 Goals and 169 Targets that take all of the dimensions of societal wellbeing into account. The agenda has observed the current model of development, highlighting its unsustainability and looking at the instruments for sustainable development. More precisely, globalization, climate change and international conflicts are the three fundamental determinants of the evolutionary dynamics of today's society. The combination of these three forces, closely interconnected, is increasingly threatening to escape the control of multilateral institutions and the governments of countries historically responsible for such dynamics. Desertification, structural changes in economic and social systems across the world, accentuation of inequalities, rising youth unemployment, migration, deterioration of the quality of the environment are some of the major consequences for which, in the absence of global governance, territories risk to be "crushed" in the absence of an effective, efficient, ethical and fair endogenous response strategy (Viola et al., 2016).

This means new challenges for the different territorial systems and new threats or opportunities for the productive sectors that are fundamental for the relative economies. It creates the need for all economic systems to define a "wellbeing sustainability project" which, even though there are no global responses to the above-mentioned emergencies, can, by way of example, be able to cope with mitigation or adaptation strategies. This means that territorial systems must be able to independently search for a new "Territorial Sustainability Paradigm" (TSP) that sees all of their stakeholders involved through the assumption of new behavioral patterns (Freeman, 2010; Bäckstrand, 2006).

In such context, a new issue emerges: the food issue (Cesaretti & Misso, in press).

The last few years have seen significant progress in the fields of agriculture, the environment and food security. Science and technology advancements have led to an increase in agricultural productivity and a reduction of hunger across the world. However, global population growth and a rising prosperity could drive demand for food up by 50% in 2050 (Shakir et al. 2016; Pretty, 1995; Antimiani & Henke, 2007). Humanity is approaching the limits of planetary boundaries: the Earth's land and water resources, which are at the basis of food production, are under severe stress and the oceans, forests and other ecosystems are seriously degraded. Conflicts over natural resources and the devastating effects of climate change risk leading millions more into hunger and poverty (Ghisellini et al., 2016; Murray et al., 2017; Schulte, 2013; Sen, 1984; Friedman, 2006).

In other words, food for its strong connections, now called upon and recognized, with the various aspects of territorial well-being (health, environment, identity, etc.) is called upon to contribute to the implementation of the TSP.

In the light of these considerations, this paper proposes a focus on "proximity agriculture", considering the latter as a central element that necessarily needs to be given a completely new meaning and in line with a new model of development local.

To this end, the transition from an economic paradigm focused on the linear Economy to the one based on the Circular Economy, if done by all stakeholders in the agricultural system, can be an important and no longer prorogable answer. The paradigm of territorial sustainability proposed in this paper wants to offer useful insights for territorial stakeholder for the implementation of a strategy based on the circular economy (Shakir et al., 2015).

2. The Food Issue

The current model of development strongly centered on the global exchange system, not accompanied by globally shared rules, has led to an increase in inequalities in the developmental rhythms and in the determinants of individual and collective well-being.

The projection over time and space of these last in particular has demanded a debate at both scientific and institutional level that today translates into the concrete commitment of Agenda 2030.

The adoption of the 2030 Agenda explicitly denounces the current development model's inability to fulfil everyone's «Right to sustainable wellbeing» and recognizes, at the same time, the need for an integrated approach to development that considers its economic, social, environmental and governance dimensions. This last represents a strong challenge for the territorial systems with an agrifood vocation because they have to find in this sector the opportunity to tune the well-being sustainability strategies on their development strategies. The international community's will to persist in dedicating an ever growing attention to the issue of wellbeing sustainability is also confirmed by the adoption of the global agreement on climate change, negotiated in Paris in the end of 2015 (COP 21) and in Marrakesh in November 2016.

Compared to this framework, each production sector as each territory must rethink its development strategies and, above all, the approaches needed to hinder that inequalities in the levels of economic, social and environmental well-being could exasperate the conditions needed for sustainable development. In such optics, world food systems, today more than ever, are called upon to meet global demand instances (nutrition, quality, safety, access to food) but also and above all to offer their contribution in the reference territories to implement a paradigm of territorial sustainability strongly focused on the exclusivity of its stakeholders: businesses, consumers, support sectors and frontier policies.

In other words, these evolutions pursuit at global level recognize that the role of food production is fundamental to avoid that this sector become an issue, or better, a limit to pursuit the well-being sustainability of a territory.

3. A new idea of agriculture

In the current socio-political and institutional scenario, a new idea of agriculture has emerged, increasingly rooted in the territory and, when projected in global markets, is increasingly careful to recover competitive margins in time and space, or more sustainable (Cesaretti et al., 2014). At the same time, the boundaries of markets lose meaning when the ultimate goal of agricultural products has to be re-centered on the well-being of a person, a community, a territory, and above all about its sustainability. This is more true than ever since the Agenda 2030 for Sustainable Development has definitively sealed the relevance of agriculture in relation to each dimension of human life.

It is an agriculture that is now entering the city life that is invoking innovative ideas that can satisfy the consumer's demands for freshness and integrity of the product and able to respond to particular health needs. But this is an agriculture that has a new task to accomplish: to be closer to itself by affirming itself as the main engine for the relaunch of a territory. In fact, the unmanufactured component of agriculture is inextricably linked to the distinctive features of a territory that for example gives a particular taste to wine or a particular flavor for the vegetables. We could say that if the *humus* of agriculture is its territory, then the responsibility of agriculture to get closer to itself is a responsibility of its territory (Misso et al., 2015).

In this framework, it is therefore necessary to re-think the role of the territories and the consequent responsibility of the relevant stakeholders to implement more and more "appropriate" strategies for the sustainability of well-being (Cesaretti et al. 2013; Misso et al., 2013; 2017).

In relation to this background, a new question is emerging about the pillars of a "Territorial Sustainability Paradigm" (TSP) able to give concrete meaning to the objective of sustainability in a territory.

In this regard, examining the "not homologated" component of the well-known "proximity agriculture" it is necessary to leverage two elements capable of ensuring the implementation of a TSP in the territories:

- a non-homologation strategy;
- the quality system approach.

More specifically, it is necessary to define the ways in which a strategy of "non-homologation" of the Asset "Proximity Agriculture System" should be supported by:

- ❖ production models based on the "Quality System Approach", namely on internalisation of the cost of scarcity, by the producers concerned, and on new territorial marketing strategies capable of recognizing the "economic, environmental and social value of the new production model;
- ❖ new consumption models capable of creating a stronger "proximity market";
- ❖ a local knowledge system capable of forming human capital (citizens and professionalism) consistent with that strategy;
- ❖ a system of non-profit organizations capable of integrating the requirements of protecting the quantity and quality (of the conditions) of the local factors (environmental, natural, cultural and landscaping fields) with that of a strategy able to transform these environmental wealth in drivers for sustainable development.

4. Circular economy and agriculture

The characterization of this approach requires that you look at a new economic model, especially the circular one.

The concept of "circular economy" is so deep-rooted one cannot trace it back to a single moment or author, however its practical applications to modern economic and industrial systems gained momentum towards the end of the 70s thanks to a small number of scholars and businesses. The literature on sustainability dating 30 years back already mentioned circularity, just like the concept of nature recycling resources has always appeared in the field of natural science. The main schools of thought who have analysed the circular economy model are the following: Cradle to cradle; Performance economy; Biomimicry; Industrial Ecology; Natural Capitalism; Blue Economy; Regenerative Design (Andersen, 2007; Bracke & Albrecht, 2007).

The circular economic system model advanced by Pearce and Turner (1991) constitutes one of the first examples, while only referred to natural capital, of this relationship between productive factors, businesses, consumers and wellbeing. It has become the predominant theme as a way to overcome the existing production and consumption model based on constant growing and increasing resources amounts. Circular economy aims to increase the competence of resource usage to reach an equilibrium and synchronization among economy, environment and society (Andersen, 2007; Murray et al. 2017; Schulte, 2013; Witjes & Lozano, 2016).

With regards to agriculture, if it is able to recover resources from the land and waste from agri-food industries, as well as favour soil enrichment and the regeneration of resources, it qualifies as "circular" and differs from traditional (linear) agriculture in that the latter uses and consumes raw material inputs to function, and is not able to recover or regenerate the resources it consumes. Nowadays, in fact, the linear model is the paradigm at the basis of most of the world's primary sector activities, which, however, will not succeed in the long run for a number of reasons: statistical data reveals that to feed almost 10 billion people in 2050 the current agricultural system would have to be able to double the production of basic commodities and increase the production of cereal by a third in a relatively short amount of time. Not to mention the limited availability of raw materials, pollution and soil degradation.

In this scenario, Expo 2015 and the Agenda 2030 are two milestones recognizing the centrality of food systems in territorial strategies for sustainable wellbeing.

From a “food for food” approach (anthropocentric approach), one therefore shifts to a more “universal” approach of “food for sustainability” (Misso et al., 2013). The production of goods and services in the food system through choices made in relation to products, processes, distribution and marketing strategies thus has the capacity to impact significantly on a territory’s dimensions of wellbeing and sustainability (Jurgilevich et al., 2016).

Yet this new “food for sustainability” theory requires consumers, support activities and territorial policy makers to follow completely different behavioural paradigms.

With a new culture of territorial identity, consumers will increasingly recognize the value of markets of proximity with respect to the global market, thus offering local producers new opportunities for development.

It is up to local policy makers, as well as the research, education and communication sectors, to support and lead these new behavioural paradigms of production and consumption.

In this new approach to production and consumption, the fundamental principles of the circular economy constitute the different tool that can lead territorial food systems to sustainable pathways.

Compared to this, we can state that moving from the linear to the circular paradigm is the key to implementing a new model of proximity agriculture based on three key elements:

- (1). the strengthening of the unmatched component of agriculture, ie the enhancement of the distinctive features of agricultural products in a territory, the only carriers of a multiplying effect on the territory and its different dimensions of well-being;
- (2). the consolidation of the social function of agriculture;
- (3). recognizing the important role of agriculture in generating positive environmental externalities.

5. A new approach to food sustainability: the proximity agriculture

In the current socio-political and institutional context, a new type of agriculture has begun to emerge, which was increasingly rooted in the territory and, when projected into global markets, increasingly attentive to recover margins of competitiveness projectable in time and space, in other words, more sustainable.

This new configuration of agriculture and related economic systems has led, over time, to a new interpretation of the classic determination of its reference markets. International markets, European markets, national and local markets all lose their meaning when the ultimate goal of the agricultural product must be refocused on the well-being of a person, a community, a region, and in particular, on its sustainability (Misso, 2011).

Surely, agricultural systems are organized to compete in a exclusively global market, focusing on competitive advantages based on environmental and social dumping as well as purely economic advantages. The acquisition of these advantages, in particular, has begun to determine the elevation of a real entry barrier into the global market, in which, products that did not have these requirements could not enter (Antimiani & Henke, 2007; Bracke & Albrecht, 2007).

On the other hand, agriculture has found that in regional systems of management, such as the internal European market, there is a shield against standardization and therefore the possibility of evolving into a system without consideration to economic, social, environmental, territorial and generational functions.

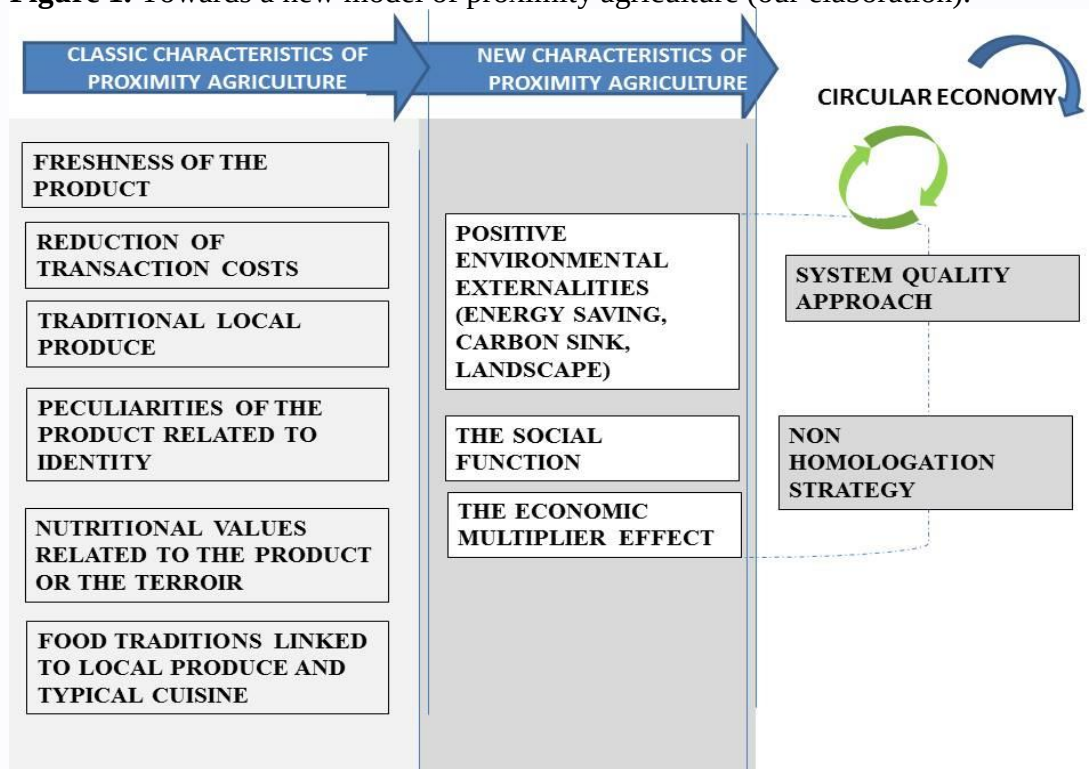
While in global markets products that do not seem to respond or otherwise reflect the needs of the different populations of the world continue to be promoted, a more sustainable market closer to the demands of our society is developing (Wolf, 2000; Roloff, 2008). In proximity markets, agriculture regains its original function as support for humanity, as an economic and social activity, and as territorial and environmental promoter.

The proximity to the economic and social needs of the environment and society allows agriculture to be able to respond effectively and more closely to a real interest in the citizens and well-being of social, economic and ecological stocks. It also promotes the identities of the protected areas of reference and satisfies the relevant and specific lifestyles of local communities.

From these considerations it emerges the need to highlight the motivations that should push local stakeholders to adopt a new proximity agriculture model leveraging on the non-homologated component of proximity agriculture. This is because the latter allows both to internalize the costs of scarcity and to fuel new formulas and strategic forms of territorial enhancement. In fact, as stated by Cesaretti and Misso (in press), to pursue sustainable development it is required, given the capital stock «scarcity» (either in the terms of quality or quantity):

- Efficiency and Efficacy in capital stock allocation (in order to maximize production);
- Ethic in capital stock accumulation between financial capital and physic capital;
- Equity in wealth distribution among: People – Territories - Material living conditions - Quality of life i.e. between areas of well-being.

Figure 1. Towards a new model of proximity agriculture (our elaboration).



From the achievement of the aforementioned objective, some very important reflections have emerged that characterize the functions and characters of what the new model of proximity agriculture should be compared to the classic one.

More specifically, the affirmation of proximity agriculture has been due to its ability to secure certain conditions such as:

- freshness of the product;
- reduction in transaction costs;
- food traditions linked to local produce and typical cuisine;
- traditional local products;
- peculiarities of the product related to identity (terroir-craftsmanship);
- nutritional values related to the product or the terroir.

The new model of agriculture, however, includes new elements that make it possible to implement a TSP, namely:

- (1). the economic multiplier effect;
- (2). the social function;
- (3). positive environmental externalities (energy saving, carbon sink, landscape).

These can be precisely defined as the three characters of the new proximity agriculture model.

6. Discussion and conclusions

A circular economy is an economy conceived for the production and consumption of goods and alternative services compared to the linear model (for example through the use of renewable energy sources instead of fossil fuels) and the role of diversity as a characteristic of resilient and productive systems.

In this context, the food system, looking at the principles of the circular economy, can actually contribute to the pursuit of the sustainability of well-being by pointing to "Zero Waste" territorial development strategies capable of combating waste that is born from wrong consumption patterns and has ethical implications.

The transition to new proximity agriculture necessarily requires an integrated stakeholder's approach to circular economy. In fact, only the latter possesses the intrinsic and value elements that ensure lasting prosperity over time and space, stimulating agriculture to become the field of experimentation of the strategic actions necessary for the purpose.

The proximity to society allows agriculture to respond effectively to a real interest of citizens to be able to see where their food comes from and how it is connected to local social, economic and natural capital, and to see how local culture is protected and helps brand local products. The latter, in particular, is important because it does not conform with "time-saving" but rather to "the time necessary to preserve their well-being", not necessarily in a position to "enhance a territory", but rather "to recognize the value of the agricultural product as a heritage for the welfare of humanity".

In order that agriculture can reposition itself within this new system of values it is necessary that various and local stakeholders base their actions on a sustainable territorial governance, the only way to ensure the achievement of local objectives, but also the overall objectives to be shared with other local systems on the planet.

The future debate in particular will have to cover the elements and the social actors called to give concrete answers to determine a cultural change in the approach to agriculture itself.

Agriculture and proximity, in fact, must not be understood as synonymous with agriculture that chases the demands of society and consumers or as agriculture that chases the city.

Rather as a synonym for a "city that chases agriculture" with a greater interest of the territories also with strong urban connotation to welcome the countryside into the city with all the externalities and benefits that it can determine for its population.

This change in the cultural approach to agriculture will be determined by the contemporary transition from the idea of "proximity agriculture" to "proximity to agriculture" (Cesaretti et al., 2014).

Once defined the key role of the circular dimension in the determination of well-being and its sustainability and demarcated the geographical and institutional levels of intervention, however, various questions arise about: who are the actors that have to build a proximity agriculture model; which are the groups or who are the individuals mainly affected by the connected issues and which should be safeguarded, and finally, which is the intervention strategy in order to implement this model in the territories.

To answer such questions there is need to turn to three determining aspects inferable from the economic and political literature and, substantially, attributable to the idea of territory, to the possible approach and to the governance tool to be used.

Undoubtedly, regarding the idea on which to base the strategic guidelines, we should refer to the new multidimensional and integrated idea of territory, recently defined, for which it represents a vital and open system. In such perspective, the actors of a territory, before being geographically confined, will be joined by shared sustainability objectives and they will compare each other both on an awareness of a feeling of belonging to the places both on the basis of the relative participation in extra-territorial contexts.

Regarding instead the feasible approach, it is necessary to turn to that proposed in literature in order to face the global food challenges according to which the stakeholders of a territorial system, taking on decisions concerning the determiners of sustainability, make a demand of food services that indeed affect the repeatability of the natural, social, economic and human capital stocks, determining an orientation to well-being sustainability.

Finally, regarding the usable models of governance, it is important to consider that the best way to manage the well-being complexity in spatial, social, economic, cultural and environmental terms, is always more equipped with comparison and inclusion systems, in the decision processes of all the territorial stakeholders (consumers, enterprises, institutions, organizations, etc.). Obviously, today, more than ever, the enterprises of the various territorial systems are called upon to give their own important contribution to a sustainable growth, able to operate as a multiplier of socio-economic and environmental well-being. More in particular, the companies are those that can influence the determiners of sustainability and, therefore, summoned to ensure the repeatability of the capital stocks (natural, social, human and economic). They represent the main stakeholders of a territory that, surely, cannot operate individually in order to face the challenges that presently threaten the achievement of sustainability: climate changes, loss of biodiversity, territorial imbalance, health threats. These last, in fact, don't require an independent or disconnected lines of actions with respect to the initiatives and strategies of other stakeholders.

In conclusion, which territorial governance and, above all, which tool must be chosen to develop it? A good governance allows to stimulate the inter-organizational co-ordinations on a territorial level and, differently from a sectorial guideline, tends to generate and accompany both sectorial and inter-sectorial dynamics responding better to the socio-economic and environmental strategic challenges relatively less considered by the public sectorial regulation for example: increase of productivity through organizational and technological innovations, better quality of life, safeguard of the environment, maintenance of territorial identity, protection of health, etc.. In other words, a good territorial organization should allow the creation of complementarity between public governance and private governance within the territory. In such perspective, an efficient governance tool will be the one able to generate the positive effects linked to the geographic proximity of companies, that even though distant, are joined by the identical orientation to the well-being sustainability.

These organizational models are real sustainable governance tools of the local systems able to increase the sharing of the objectives, but they especially permit to create a greater compliance of the government actions with really expressed needs by certain categories of local actors.

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E-Commerce and Renewable Energy Sources in Southern Greece

Abstract:

E-commerce is without doubt an exceptional part of new generation technology. It provides all the information for exchanges between commercial brands and consumers, as well as how we tend to use the Internet in our lives. The renewable energy sources (RES) have been developed with the aid of e-commerce and new opportunities have spread worldwide for further usage of them. This paper describes all the aspects of e-commerce through the view of RES commercial brands in southern Greece and searches if and how it is used effectively. Thus, great information is provided for further analysis in the future as for e-commerce and product promotion in the Internet.

Keywords: e-commerce, renewable energy sources, Internet promotion

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1. Introduction

The Internet is a global computer network system connected with each other that offers its services to millions of users around the world daily. Messages/packets are exchanged between computers, based on communication protocols for both hardware and software. Each computer or device in general connected to the Internet is able to exchange data directly and bidirectionally as well. The technique of network connection based on communication protocols and packet exchange is called Networking. Web applications are related to many sections, such as education, politics, newsfeed, health, relaxation, entertainment and communication (Jones 2001).

The Internet creates a new business environment, offering plenty of applications and services and making a significant contribution to increase their flexibility. It is an excellent opportunity for entrepreneurs who want to promote their business and their products, significantly reducing all costs. Plenty of advantages are offered, meaning that the Internet contributes via e-commerce to profit (Tsekouropoulos et. al 2013). Thus, in the Internet a business may be displayed for commercial advertising purposes or have more choices related to it, such as buying products (Bambury 1998, Andreopoulou 2012). More and more companies are now using the Web for their promotion, as it allows great flexibility at low cost. Also, thanks to the Internet, communication is comfortable between commercial brands and partners/clients (Jones 2001).

The role of Internet in socio-economic development has been very important lately (Koliouska and Andreopoulou, 2013). Modern commercial brands participate in the ecommerce society since the benefits are high and electronic systems are ready to serve clients all over the world 24 h per day 7 days a week when the cost keeps decreasing (Andreopoulou et al. 2008, Andreopoulou et.al. 2012). It is convenient for buyers that can look for products and services all day long at their own convenience (Tsekouropoulos et.al 2012). E-commerce employs now mobile digital technologies available on the Internet. However, with the arrival of mobile technologies such as PDAs, 4G smart phones etc terms are expanded to include these new media technologies. Also, Social Media commercial profiles such as Facebook, Twitter and more can enhance marketing through Internet, as the online target group is already connected. Anot online campaign is practised that identifies an online community and sells the products and services effectively. Therefore, it is important to build targeted online clients communities across Social Media (Andreopoulou et.al 2012).

E-commerce structure can be clarified as a “set up of a company web site to share information, maintain relationships as well as carry out transaction using electronic networks” (Zwass 1996). Also, e-commerce is identified as “the electronic exchange of information, goods, services and payments” (Harrington and Reed 1996). Choi et. al. (1997) described e-commerce as “the utilization of electronic equipment to carry out business”. Another definition of E-commerce is “the process of purchasing and selling products or services using electronic data transmission via the Internet and www” (Grandon and Pearson 2004). The sum of definitions is concluded with explanation of e-commerce as a “computer system and internet to propose the businesses including selling, buying, exchanging products, servicing and information (McKay and Marshall 2004). Commercial brands have to implement strategies through the Internet in order to support their commercial benefits. Thus, electronic marketplaces, together with development and further spread of services are becoming extremely important for monetary income (Christians and Markus 2003).

Strategically, it is vital using the Internet for product promotion, not to mention that this way distance is eclipsed (Strzębicki 2015). Other benefits from using e-commerce instead of traditional market are reduced costs, increased accessibility for consumers and great efficiency in collaborations with the sellers (Fenech and O’Cass 2001, Rayport and Jaworski 2001, Khatibi et al. 2003, Turban et al. 2006, Afhsar Jahanshahi et al. 2011, Magutu et al. 2011). However, commercial brands from developed countries have significant bonuses compared with the ones

from developing countries. Monetary fund is crucial and lets them to further expand into the market, while less developed provinces hold back local commercial brands only to find that Internet can be used for searching only purposes (Pare 2003). In other words, small commercial brands don't realize that e-commerce will help them to be wealthy (Savru et al. 2014). Other problems in regard with e-commerce are dangers about security and privacy and maintenance cost of the websites (Watson et al. 1998, Lee 2001, Zhang and von Dran 2001). Commercial brands have to be aware of the above benefits and issues to trade effectively through the Internet (Kuzic et al. 2002). Generally, traditional ways for product sales became less useful and faded away in some cases, as e-commerce usage began to interact with the economic world (Turban et al., 2006).

E-commerce supports a variety of products and services through the Internet to consumers in a direct way. Each website with commercial purpose is designed to attract buyers, proving that it has been a strategic factor in the market (Tsekouropoulos et. al 2013). Commercial brands active in the renewable energy sources (RES) industry belong to this category as well. Internet allows them to offer their products worldwide in a great variety of selling and money trading nodes (Andreopoulou et. al 2012, Andreopoulou et. al 2014). Internet services are provided through the websites and both seller and buyer reach high levels of satisfaction (Andreopoulou et. al 2014).

Figure 1: Map of Greece (research areas are highlighted)



Renewable energy sources (RES) are forms of exploitable energy derived from various physical processes, such as the wind, the geothermal, the sun, the water circulation and others (Liserre et al. 2010, Panwar et al. 2011). In particular, energy forms coming from renewable, non-mineral sources are wind, solar, aerothermal, geothermal, hydrothermal and ocean energy, hydropower, biomass, landfill gases, sewage treatment plant gases and biogases (Kalkanis 1997, Herzog et al. 2001, Liserre et al. 2010). Generally, RES is considered to be the alternative of the traditional. They have been studied as a solution to the depletion of non-renewable energy sources, such as fossil fuels. In recent years, the green growth model, which is based on the

application of renewable energy sources to be as a motion power of the transition from non-renewable sources to the new ones, is being promoted (Adams 2003, Andreopoulou 2009).

The aim of this paper is to register each of the RES commercial brands in Crete and Peloponnese, to analyze the offered services through the Internet and to present how e-commerce is used by commercial brands. In a few words, the researcher is able:

- to find information for each region in these areas
- to collect data related to the connection ability offered by the commercial brands
- to gather statistical data for all data range offered by the commercial brands on their website
- to find connectivity between e-commerce and RES
- to understand the level of productivity boosted by e-commerce

2. Materials and Methods

The RES commercial brands were searched and found by using the Internet search engines. Next step was to register all data in a Microsoft Excel worksheet, where we had a general view of it. Finally, the commercial brands were classified by area of interest and then all results were presented with tables and statistical graphs.

Search progress was based mainly on Google search engine but also on less known search engines such as Xo.gr and Vres.gr, which filled up the empty blanks with more information.

During searching, some suitable keywords were used, related with the desired search objects. These are presented below in Table 1:

Table 1. Keywords for data search

Keywords used for data gathering	
energy	pellets
internet	geothermal energy
search engines	geothermal
renewable energy source commercial brands	Corinthia
Peloponnese	Argolis
Crete	Achaea
renewable energy sources	Elis
renewable energy sources in Crete	Arcadia
renewable energy sources in Peloponnese	Messenia
wind energy	Laconia
solar energy	Chania
water-powered energy	Rethymno
hydropower energy	Heraklion
biomass	Lasithi
e-commerce	ISO

3. Results

In this chapter, the search results on the Internet about RES commercial brands for each region are presented. Specifically, 24 commercial brands were found in Crete, while in Peloponnese a total of 81 were located. There were plenty of data about displayed information. These results were categorized depending on:

- the area of interest
- how frequently Internet is used (how many commercial brands use it or not)

- the foreign languages on website
- the offered ways of contact between clients and commercial brands
- the RES forms
- information connected with e-commerce, including order online, price list and ISO

These are the conclusions about RES commercial brands in Peloponnese:

- After searching in Achaia, sixteen RES commercial brands were found. Five of them possess a website (31,3% of total number) and three of them use foreign language. All commercial brands possess phone number, 60% of total also have an e-mail and 20% of them maintain accounts on Facebook and Twitter. In total, 56,3% use wind energy, while 25% use solar energy and 18,7% hydropower.
- In Corinthia ten RES commercial brands were found. Four of them possess a website (40% of total number) and three of them use a foreign language. All commercial brands have a phone number, 50% of them a Facebook account, and also 50% have e-mails and 25% a Twitter account. Half of them use solar energy and the rest use wind energy.
- In Argolis, eleven RES commercial brands were found. Three of them possess a website (27% of total number), while only one uses foreign languages. All commercial brands have a phone number and e-mail as well. About 82% of them use solar energy and the rest 18% use wind energy.
- In Arcadia, eight RES commercial brands were found. Two of them possess a website (25% of total number) and only one uses foreign languages. All of them have phone numbers and e-mails. About 63% of them use wind energy, 25% solar energy and the rest 12% hydropower.
- In Elis, four RES commercial brands were found. Two of them possess a website (50% of total) and use foreign languages as well. All of them have phone numbers and e-mails, while 50% use Facebook as well. About 75% of them use solar energy, while 25% use wind energy.
- In Messenia, twelve commercial brands were found. Only two possess a website (17% of total) and only one uses foreign languages. All of them have phone numbers and e-mails, while 50% use Facebook and Twitter. About 58% of them use solar energy, 33% wind energy and the rest 9% hydropower.
- In Laconia, twenty RES commercial brands were found. Eight of them possess websites (40% of total number) and four of them use foreign languages. About 88% of them have phone numbers and e-mail as well. Furthermore, 12% of them use Facebook and Twitter. About 65% of them use solar energy and the rest 35% use wind energy.

Then results for RES commercial brands in Crete follow:

- ❖ In Chania, a total number of eight RES commercial brands was found. Four of them have websites (50% of total) and two of them use foreign languages. All commercial brands have phone numbers and 75% use e-mail. About 88% of them use wind energy and only 12% use solar energy.
- ❖ In Rethymno there are several projects to be started, mainly wind farms and a project for hydropower that are going to be built in the near future. At the moment, there is a wind farm in the area of the village Akoumia with a power of 7,2 MW that belongs to the Country. Other significant progress in the area was not found at all. As a result, it is impossible to show statistic results in our paper for this region of Crete. Some efforts are in progress to achieve use of the wind as a main target, meaning that it will enroll great energy push in the area.
- ❖ In Heraklion, eight RES commercial brands were found. Three of them possess a website (38% of total number) and two of them use foreign languages. About 67% of them have phone numbers and e-mails, while 33% use Facebook and Twitter. About 88% of them use wind energy and only 12% use solar energy.
- ❖ In Lasithi, eight RES commercial brands were found. Three of them have websites (38% of total number) and all of them use foreign languages. Furthermore, all of them have phone

numbers and e-mails. About 25% of them use solar energy, while 75% of them concentrates on wind energy.

Finally, results about e-commerce generally in the area are presented:

- Out of a total 36 commercial brands using the Internet, 14 found active in e-commerce. A number of 6 offer the opportunity to order online their products, 7 commercial brands present information about the quality of their work (ISO) and only 1 shows a price list for the website visitors.
- A sum of 9 commercial brands are active in e-commerce in the area of Peloponnese and the rest of them (5) in Crete.
- Totally, the 38,9% of commercial brands use e-commerce as a tool for wealth, while the rest of them present general information about their activities.

For better visual results and effects of the above conclusions, it is thought to be necessary to use suitable tables and graphs. Accordingly to this, some general statistics are provided for further use by future researchers.

Table 2. Number of commercial brands and contact details

Commercial brands by prefecture and contact info						
Prefecture	Commercial brands	Website	Foreign languages	Phone number	E-mail	Social media
Achaea	16	5	3	5	3	2
Corinthia	10	4	3	4	2	3
Argolis	11	3	1	3	3	0
Arcadia	8	2	1	2	2	0
Elis	4	2	2	2	2	1
Messenia	12	2	1	2	2	2
Laconia	20	8	4	7	7	2
Chania	8	4	2	4	3	0
Rethymno	0	0	0	0	0	0
Heraklion	8	3	2	2	2	2
Lasithi	8	3	3	3	3	0

Table 2 shows arithmetic contents related to the RES commercial brands and how they communicate through the Internet. The dependent factor is the region for each commercial brand.

Percentage results are shown in the next Figures 2 and 3. It is stated that commercial brands in Peloponnese in comparison with those in Crete are less organized on the Internet (32% of them compared with 42%).

Figure 2. Percentage of commercial brands in Peloponnese with websites**Figure 3.** Percentage of commercial brand in Crete with websites**Table 3.** Exploitation of RES by each department

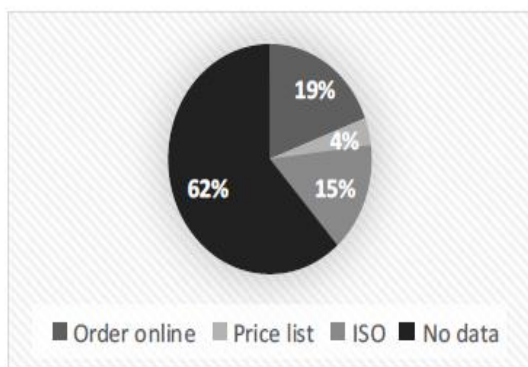
Search results for RES by each region				
Prefecture	Commercial brand	Wind	Solar	Hydropower
Achaia	16	9	4	3
Corinthia	10	5	5	0
Argolis	11	2	9	0
Arcadia	8	5	2	1
Elis	4	3	1	0
Messenia	12	7	4	1
Laconia	20	7	13	0
Chania	8	7	1	0
Rethymno	0	0	0	0
Heraklion	8	7	1	0
Lasithi	8	6	2	0

In Table 3, all results related to use of RES for each region are presented. The great difference between wind and solar energy in the two regions is quite interesting. More than half of the commercial brands in Peloponnese use solar energy, while the majority of commercial brands in Crete (about 83%) concentrates on wind energy.

Table 4. E-commerce activity of commercial brands in southern Greece

Search results for e-commerce applications			
Area	Order product	Price list	Quality of product (ISO)
Peloponnese	5	1	4
Crete	1	0	3

In Table 4, the exact details in e-commerce activity in the area is categorized in commercial brands offering online product order, price list and ISO. A bit of more information is gathered in the next Figures 4 and 5.

Figure 4: E-commerce details for commercial brands in Peloponnese**Figure 5:** E-commerce details for commercial brands in Crete

4. Discussion - Conclusions

It is certain and undeniable fact that the Internet is dominating in the information section, with a variety of applications and tools offered to the public. The easy way it is used establishes it as necessary and, having in mind how easy is to access it as well, it has been used by people regardless of age.

One of the major tools of the Internet is known as the Search Engines. Their main use is to find information through the Internet with the aid of keywords. All information gathered for the RES commercial brands in Crete and Peloponnese and presented in this paper was collected with these Search Engines.

E-commerce is a great factor for economy growth in many aspects of the market. The results of the paper are not extraordinary and not as great as expectations. E-commerce inactivity seems almost equal between the two areas of interest, but a percentage of 60% is high.

The renewable energy sources (RES) and, mainly, wind and solar energy, are used to a greater extent during our time as alternative energy sources. They are still behind though, compared with the non-renewable energy sources, like oil and natural gas. Perspectives are quite high, with many countries supporting electricity production from the sun and the wind.

These conclusions are calculated if we summarize our search results through the Internet in the regions of Crete and Peloponnese. Specifically, 24 commercial brands were found in Crete and 81 in Peloponnese. Moreover, a second conclusion is that wind energy is more developed in Crete than solar energy. This could be explained after taking into consideration the position of the island, the land shape, the available land, the mountains etc.

To summarize, we believe that the results of our paper in these areas of southern Greece could be used for further research, or even to encourage new commercial brands to use RES.

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Integrating Nature Conservation into Regional Development – the European Green Belt Initiative in the Prefecture Pella, Greece

Abstract:

With the increasing multifunctionality of landscapes and the need for sustainable development, the integration of nature conservation is a major challenge in regional development approaches. The European Green Belt Initiative has been initiated as a large-scale project aiming at conserving biodiversity along the former borderline of the Soviet Union under consideration of (sustainable) regional development. The prefecture Pella in Greece is one of the areas subject to the initiative: Bordering the Former Yugoslav Republic of Macedonia (FYROM), the region possesses a high grade of biodiversity and a dominantly rural character. At the same time the area shows major lacks in nature conservation and suffers from the border area status. To find out about the potential economic and social benefit of the initiative for Pella as a case study, surveys were conducted with local stakeholders and experts in the region. The aim of the survey was to assess the role of local protected areas for the regions' development, current problems and needs for change and improvements. The results showed that nature conservation is indeed integrated in regional development approaches but in practice the protected areas play a rather passive role: Illegal activities like logging and hunting by the inhabitants obstruct the achievement of the conservation goals and alternative tourism potential as additional income is not fully used. Furthermore the cooperation with FYROM is inefficient if not lacking.

Keywords: Pella, European Green Belt Initiative, regional development, nature conservation

JEL R (Q)

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1. Introduction: The European Green Belt Initiative for sustainable development

In the last decades sustainable development has grown to a topic of high importance on the global as well as the local level. With its economic, ecological and social dimensions a range of challenges have to be tackled including those dealing with communities' economic and social needs in the frame of regional development as well as those concerning the conservation of nature and natural resources (Council of the European Union, 2006).

Today the connection or rather integration of nature and/or biodiversity conservation into regional development approaches is often stressed as an important factor for achieving sustainability (Saunier et al., 1995; Vasilijevic et al., 2011). Next to the Environmental Impact Assessment (EIA) for evaluating the human impact on the environment in e.g. development projects (Moussis, 2009), the protection of the environment and biodiversity is considered widely in strategic plans and programs. South-eastern Europe is considered as region with a very high ecological value due to its remaining healthy (forest) ecosystems as home for many important and endangered plant and animal species (Vasilijevic et al., 2011). At the same time the area has a great cultural heritage due to its history and its variety of ethnical groups (moepp.gov.mk, no date). Thus, nature conservation and regional development are current challenges for South-eastern Europe and approaches are implemented on European and local level. One initiative aiming at the conservation of ecosystems and (sustainable) regional development in the region is the European Green Belt Initiative, a large-scale project along the former border line of the Soviet Union and stressing the need for transboundary cooperation (Vasilijevic et al., 2011; Terry et al., 2009).

Officially founded in 2003 the European Green Belt Initiative today is structured in several zones with specific regional coordinating organizations including the non-governmental organization EURONATUR for the Balcan (European Green Belt, no date). For realizing the implementation of the initiative the Federal Agency for Nature Conservation (BfN) in Germany, one of the founding institutions, financially supports workshops for the national focal points as well as regional stakeholders like conservationists as experts. Furthermore projects contributing to the implementation on local level are being conducted. The financing is being realized in a wide range of forms, for example by governmental support, NGO's, private sponsors or EU programs and funds (Terry et al., 2009).

Despite progresses in achieving sustainable regional development and nature conservation approaches along the Green Belt, successes in the South-eastern European zone of the initiative are obstructed due to a range of challenges, among others in terms of border issues, geopolitical issues, hunting, infrastructure development as well as a lack of knowledge (Schneider-Jacoby, 2003). Therefore the aim of this study was to find out about the potential economic, ecological and social benefit of the European Green Belt Initiative on the local level for contributing to sustainable development and to what extent the initiative is successfully implemented so far.

The aim of this study was to find out about the potential economic, ecological and social benefit of the European Green Belt Initiative on the local level and to what extent it is successfully implemented.

2. Methodology and study area

The data collection for this study was carried out between March and July 2011 and included, next to an initial theoretical research, the implementation of surveys with local stakeholders as well as decision makers or rather experts involved in nature protection and regional development in the prefecture Pella, Greece, as study area. In total 12 experts, in particular members and employees from development agencies, environmental education centres and other organizations, participated in two surveys: One concerning former and current projects and programs in the study area, the other one about their perception of the nature conservation and regional development approaches. The latter survey was also implemented with the group

of local stakeholders, which encompassed altogether 55 local farmers, foresters and tourism enterprises. Furthermore it included a mixture of open and closed questions in order to receive not only quantitative but also qualitative information. The other survey, concerning the projects and programs, included only open questions for qualitative information.

The study area was the prefecture Pella in Greece, presented in Figure 1 and popular for the town Pella as former capital of the Macedonians during the Hellenistic period and bordering the Former Yugoslav Republic Of Macedonia (FYROM) (moepp.gov.mk, no date).



Figure 1: The prefecture of Pella (Source: greek-islands.us, no date)

Pella is characterized by a high amount of rural structures and its diverse landscape with a high share of mountainous area and water ecosystems (NSSG, 2009; County of Pella, 2007).

The local, dominantly small-scale, agriculture, shaped by the high share of cherry and peach trees, is the leading economic sector, followed by tourism and forestry (County of Pella, 2007). The highest mountains of the regions are the Voras, Pinovo, Paiko and Tzena mountains (Hellenic Statistical Authority, 2010). Major water ecosystems are the lake Vegoritida, partly belonging to the neighboring prefecture Florina, the smaller lake Agras-Vryta-Nisi, as well as the thermal baths in Loutraki and the waterfalls in the prefecture's capital Edessa, both major tourism attractions (County of Pella, 2007). The prefecture's character as border area is a major challenge for its development, as not only differences exist between Greece and FYROM in terms of the language, culture and legal systems, but also a current and unsolved conflict concerning the official name "FYROM" harms approaches for successful cooperation (Topaloglou et al. 2007; MEPPPW 2008; Kirby, 2008).

3. Results and discussion

The European Green Belt Initiative in the prefecture Pella is a 25 km strip along the mountainous border line including altogether five sites (Figure 2): four core areas as well as the lake Agras-Vryta-Nisi as satellite area.

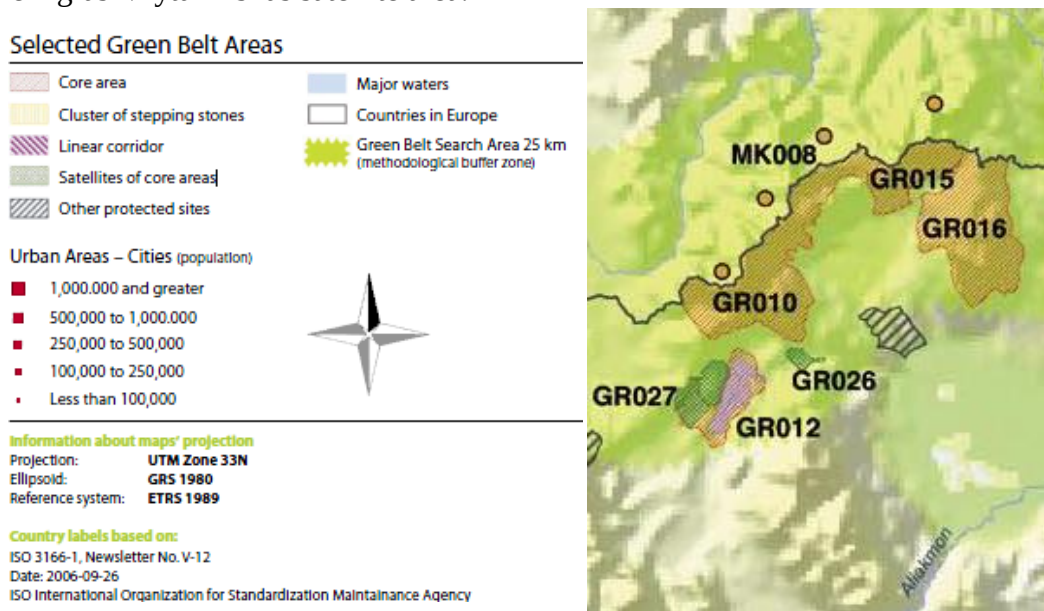


Figure 1: Map of the protected areas in Pella (source: Schlumprecht & Ludwig, 2007, modified)

All the areas presented are simultaneously designated as Natura 2000 sites as well as, to some parts, wildlife refuges under the national forest law. Consequently legislative frameworks around this approach are relevant for the implementation of the European Green Belt Initiative. Furthermore the EU cohesion policy includes a rural development and a regional development framework contributing to the regional development aspect of the initiative. The European frameworks foresee specific funds for their implementation, among those the cohesion fund, the European Regional Development Fund (ERFD) and the European Agricultural Fund for Rural Development (EAFRD) (Moussis 2009). Considering these funds several projects and programs have been implemented within the national strategic reference frameworks for the promotion of regional development and the protection of the natural resources in Pella. Among those were LEADER and INTERREG projects, aiming especially at the promotion of (eco-) tourism infrastructure, as well as a Life project supporting the lake Agras-Vryta-Nisi. Cooperation with FYROM as border country existed, however, only very little.

For the surveys applied with local experts and stakeholders questionnaires were used, which differed from each other in terms of only one question. The local stakeholders had an additional question regarding their knowledge of the European Green Belt Initiative. The result showed that only 20 % of the local stakeholders (11 out of 55 persons) knew the initiative at least from the title.

The surveys further showed that the protected areas are generally seen as very important for the prefecture Pella in terms of natural resource protection and tourist attraction. However, the management of the sites was evaluated as rather inappropriate: 44 % of the local stakeholders and 58 % of the experts stated the management was only partly appropriate, 36 % and 33 % respectively answered that it was not at all (Figure 3).

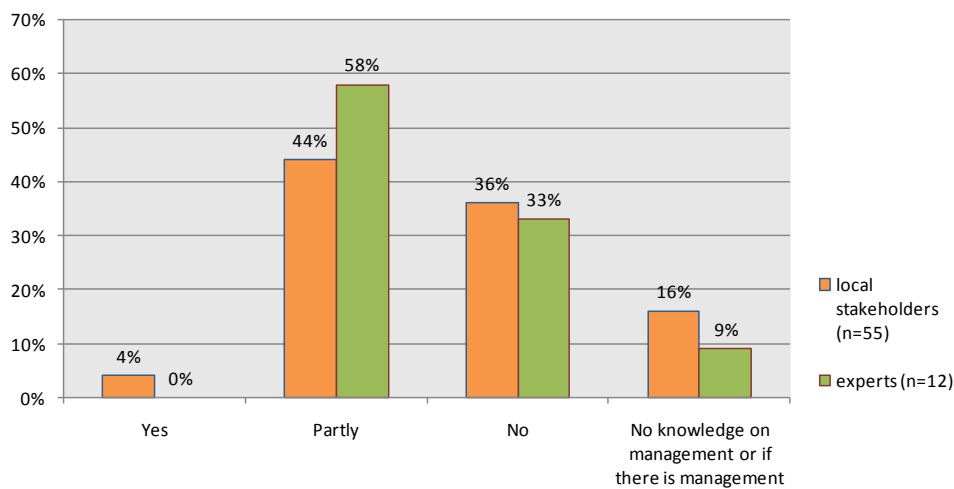


Figure 2: The appropriateness of the current management practices

In order to evaluate the effect of the protected areas on the prefecture Pella, the respondents could indicate if the sites have a positive and/or negative impact in terms of economic, social and ecological aspects. The results (Figure 4) show that the protected areas are seen as benefiting for all three aspects. Reasons stated by the respondents were the tourist attraction and jobs (economic aspects) and the leisure opportunity, better life quality and local products as well as job creation especially for young people (social aspects). The answers stating negative aspects were, unfortunately, not justified. However, two persons stated that the areas would have no influence at all due to a lack of active management.

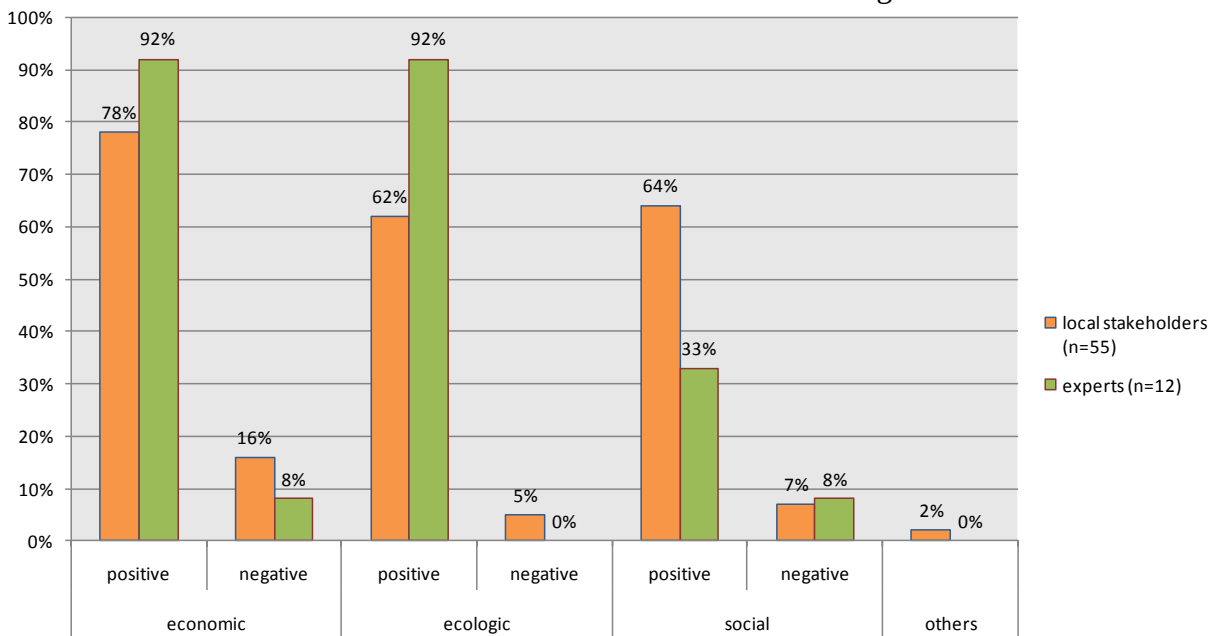


Figure 3: The impact of the protected areas according to the experts and local stakeholders

When considering the fact that the management of the protected areas in the prefecture Pella is viewed as insufficient if not even absent, it is interesting to know to what extent the interests of the inhabitants as basis for a working protection scheme are integrated in the decision making. The survey showed that both the experts and the local stakeholders predominantly evaluate their integration in decision making processes as not enough.

Furthermore the respondents identified a variety of current problems connected with the protected areas and their integration into the prefecture's development. Those problems stated most often are presented in Table 1.

Table 1: The major problems according to the experts and local stakeholders

Percentage of experts (n=35 answers)	Current problems	Percentage of local stakeholders (n=120 answers)
20%	Illegal hunting	28%
11%	Illegal logging	21%
17%	Insufficient planning & management	7%
9%	Conflicts (between interest groups)	11%
9%	Lack of awareness/education/information	8%
6%	Inappropriate designation of protected areas	8%
11%	Pollution (pesticides)	1%
3%	Ignorance of legislation / lack of controls	4%
/	Lack of appropriate personnel	5%
3%	(Illegal) land transformation (fruit farming) (buildings)	1%

The illegal activities within the protected areas as well as the insufficient planning for and management of the sites are representing the most prevalent current problems according to the respondents. As solutions for the problems presented in the table the respondents of the surveys stated a variety of required changes and/or improvements of the current situation. In Table 2 are presented those stated most often.

The table shows that the suggestions by the experts and local stakeholders coincide to a certain extent. Altogether four aspects were stated by each more than 16 % in both groups: the need of improvements in management and protection of the protected areas, support for environmental education and sensitization, support for and development of tourism and more monitoring and law enforcement in the protected areas. A quite remarkable difference can be observed between the answer concerning increased cooperation between the different interest groups in the prefecture: whereas 42 % of the experts stated this, only 5 % of the local stakeholders did so.

Table 2: The suggestions by experts and local stakeholders and the percentage of respondents stating the answers. The areas of required improvements were stated in the surveys, the suggestions were specifications by some of the respondents

suggestions of experts	areas of required improvements & percentage			suggestions of local stakeholders
more active involvement	50	improve management & protection	25	elaborate management/strategic plan
by responsables				restrict management to forest services
create a managing authority				
conduct activities in schools	33	support sensitization/environmental education	22	activities with children
adapt daily life to				education for schools
environmental needs				create information web page for citizens
				clarify/inform about legislation
agro-/ecotourism	17	support/develop tourism	24	agro-/ecotourism infrastructure
/	17	more monitoring & law enforcements	16	organize specific activities (families) stricter punishment for lawbreakers
cooperative management	42	more cooperation between interest groups	5	cooperative management
cooperative elaboration of strategic plan				
/				
/	/	more promotion/support for the areas	15	more marketing (TV, radio etc.)
/	/	increased interest & active participation of all people	11	/
/	8	better support for sustainable development	/	/

4. Conclusions

The main goal of this study was to find out what potential benefit a large-scale nature conservation project like the European Green Belt Initiative bears for the (sustainable) development of a region. In theory the approach seems to be an ideal strategy towards efficient nature protection and sustainable development in border regions: while focusing on the conservation of ecosystems it considers the need for local communities' involvement through regional development and local participation. The legal frameworks, in particular the EU policies and the Greek national framework implement theoretically the need for integrating nature conservation in development processes.

In the prefecture Pella, however, the European Green Belt Initiative seems to play a passive role, in particular not effecting the regional development as initiative itself. The protection of the natural resources is not fully ensured due to the illegal activities.

Nevertheless, the local economy depends on the ecosystems (agriculture, tourism and forestry) and if the protected areas would be increasingly integrated into the local development process, they could evolve to an integrated part not only in ecological but also economic and social aspects. The goals of the European Green Belt Initiative in the prefecture Pella are, however, currently rather missed. In comparison, more successful examples can be found in Greece: The Prespa-lakes in the west of the prefecture Pella are subject to a transboundary National Park between FYROM, Greece and Albania (Vasiljevic et al. 2011; Terry et al. 2006).

With the ongoing financial crisis in Greece it is very uncertain to what extent improvements of the current situation in the prefecture Pella are feasible. For the prefecture Pella the vision for the future development is “re-structuring the social web and lines of production, improving living conditions and quality of life for the citizens of this prefecture, guided by the dream of development, by expanding entrepreneurial activity,...” (see page 7 in County of Pella, 2007). The consideration of the protected areas in this development is essential for the future, as the natural resources are the basis for the local economy. With the increase of environmental awareness on global level and the continuing strong influence of EU regulations on the development in Greece, an improvement of the protected areas’ status is likely. The competition with other areas and countries for example in terms of tourism seems to be too strong for not taking action. However, the cooperation with FYROM is an essential factor.

With the results of the study some suggestions can be made here for possible changes in order to designate the European Green Belt Initiative and the achievement of its goals more efficient.

- Reconsideration of the protected areas’ status:

The current status of the protected areas as Natura 2000 sites is passive. There is no additional management, the human activities are hardly restricted and the economic benefit from the areas is low – in contrast to the benefit from the natural resources themselves. Other or rather additional forms of protected areas like a National Park show a better performance in terms of efficient nature conservation. Also in Greece such an example can be found: The Prespa-lakes in the west of the prefecture Pella are subject to a transboundary National Park between FYROM, Greece and Albania (Vasiljevic & Petzold 2011; Terry et al 2006). For Greece and the prefecture this could also be a solution.

- Increase monitoring and law enforcement:

Due to the strong negative impact of the illegal activities increased monitoring and law enforcement is necessary. With the protected areas’ status as only Natura 2000 sites the economic activities are not controlled as for example in a National Park. Thus, it is essential that the human activity is restricted also in practice.

- Increase level of participation and transparency:

As local participation is considered as very important for sustainable development, the level of integrating the local communities’ and residents’ interests into the decision making in the prefecture should be promoted. The establishment of the protected areas was a top-down process and the local stakeholders were not involved. Thus, public information meetings or workshops could be advantageous for raising the awareness on the areas and for clarifying existing regulations like for example on land use.

- Increase marketing for (diversified) tourism:

Although there is some awareness on the existence of and the need for the protected areas, more marketing about the attractiveness is necessary. The nature in the areas could be increasingly subject in (outdoor) activities and excursions. Agrotourism could be intensified, offering “holiday on a farm” or excursions connected with the popular orchards. Furthermore tourism on the history in the border area, in particular the time of the iron curtain, could represent an alternative form attracting new types of tourists, like for example school classes.

- Intensify efforts to cooperate with FYROM:

Networks are very important not only in terms of ecological aspects but also in order to answer to social and cultural needs (Terry et al 2006). The cooperation with FYROM is essential for the successful implementation of the European Green Belt Initiative. Thus, consensus-building is necessary in terms of development goals and interests as well as problem solving for ongoing conflicts between the border communities. Currently conventions as well as successes in the cooperation are limited to the regions east and west from the prefecture Pella (European Commission 2006).

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Assessment of Municipal Waste Management Policies by the Citizens of Orestiada, Greece

Abstract:

Municipal waste management constitutes a pivotal challenge that Greek cities are to face in accordance with the rapid technological and institutional advances that are closely affiliated with sustainability and quality of life.

In the case study the locals' views and perceptions on local waste management policies were recorded. The survey was conducted in Orestiada, a Greek city where recycling programmes were introduced very recently (January 2015), with the use a structured self - management questionnaire. The citizens were called to assess the various means they use in order to derive information for waste management issues. Finally, they were asked to assess the local waste management policies.

The citizens' acceptance is based on waste management measures such as recycling of useful materials, recovery for new use, special management for hazardous waste, reduction of waste production by the citizens, source separation systems, the production of soil fertilizers, waste to energy practices such as incineration and biogas exploitation, the placement of special bins for the organic waste, the proper management of sanitary landfills such as daily coverage with soil and waste weight for every Municipality, as well as its proper rehabilitation. The citizens also argue that additional profits arise from waste management fees while that waste management is a common field for political conflicts.

Keywords: Orestiada, waste management, means of information, quality of life, citizens' views, reliability analysis, factor analysis

JEL: Q2

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1. Introduction

In the beginning of the 21st century the pivotal environmental problem that modern Municipalities are to face is effective waste management involving integrated systems, strategies, measures and also motivations for the citizens in order for them to adopt environmentally friendly attitudes. The reduction of waste production and the proper treatment of waste on a tailor – made plan for every different case, are some of the issues standing on the top of the agendas in international conferences for environmental problems closely affiliated with climate change (Andrea, 2015)

Whereas, in Greece waste management issues are resolved with the implementation of conventional and also outdated solutions which perpetuate certain environmental, social, financial and political problems. In fact, according to (Eurostat, 2016) the main waste management method Greece implements is sanitary landfilling, while recycling and recovery for new use are still holding low percentages. According to (Karanikola et al., 2005) and (Tampakis et al., 2004) Greek citizens acknowledge that recycling is an effective method with many environmental and financial benefits whereas they claim that public awareness is inadequate and at the same time they have limited access to relevant information. Not to mention, that in many cases citizens have limited knowledge on the cleanness regulation and waste treatment methods embedded across their area (Babaei et al., 2015; Karanikola and Tampakis, 2008). However, some of the major factors affecting policy planning, such as land demand has made other overpopulated countries, like China, to move towards incineration methods (Li et al., 2015). While, another method which is though environmentally friendly is composting. According to Awasthi et al., (2014) composting, comprises an ideal solution for the full use of the organic fraction if sorted effectively from metals, stones or other wastes and can be also used as soil fertilizer. Furthermore national policies are oriented towards source separation systems in order to ensure clearer useful materials collected from the recycle bins, as paper, plastic, glass etc. (European Commission, 2016).

As regards landfilling, it is still a necessity at least for the remaining fraction of waste after treatment or as mentioned before as the main method for waste management through disposal, which is nonetheless the least environmentally desirable method. There is also a need for special treatment of hazardous waste which is not acceptable to be disposed without incineration or other special treatment. For instance, healthcare waste contaminated with blood and radioactive waste are listed as hazardous waste, which in case of disposal, mixed with municipal solid waste, can serve as serious soil, air or water pollutants (Daou et al., 2015; Bochorée, 2014). In addition, as for sanitary landfilling (Ferentinos et al., 2004) appraise the importance of the proper waterproofing of the cells as according to Audebert et al., (2016) landfill bioreactors that take place within the cells, are based on an acceleration of in-situ waste biodegradation by performing leachate recirculation, containing organic and inorganic pollutants. Moreover, it is also significant for the proper management of the landfill that waste are compressed and covered with certain quantities of soil on a daily basis (Ferentinos et al., 2004). Last but not least, it crucial that biogas, which is the released by the anaerobic digestion of the organic disposed waste (Cheremisinoff, 2003) should be recovered and used for power, heat of combined generation (Li et al., 2015; Chang et al., 2014).

Despite that there are many tools for every Municipality to manage its waste, sustainable waste management constitutes an integrated process including complex and sophisticated methods and technologies which inevitably increase management costs. Citizens' willingness to pay these costs is usually affected by demographic characteristics, such as age, annual income, education and other factors (Zeng et al., 2016). Moreover, the Municipality is responsible to collect waste management costs. These costs are closely affiliated with waste weighting. Flat charging models as tax – based system and Pay-As-You-Throw (PAYT) strategies are used for charging management of waste flows (Elia et al., 2015). While, the last decade there has been a great interest in moving towards PAYT strategies as

citizens are to pay in accordance with their individual waste production rate and the use of provided services, where different ways of waste treatment are charged accordingly (disposal, waste to energy, recycling etc) (Hong et al., 2014; Kontogianni et al., 2014).

Not to mention that far from its complexity waste management frame is followed by policies that are designed and aspire to be implemented into an era of barriers and conflicts within the different stakeholders (Andrea, 2015; (Sarmiento dos Muchangos et al., 2015). According to (Zurbrugg et al., 2012) local people usually react with “Not in my backyard” behaviors when local authorities present a new plan for the construction of a waste management plant of a sanitary landfill near their area. While (Rentizelas et al., 2014) claim that such disapproving attitudes are closely affiliated with ineffective functioning of similar waste management plants with negative impacts on human health (unpleasant odors, fires, noise pollution, and traffic) and fall of land value for the broader area. Not to mention that the land value of this areas after their rehabilitation is also calculated in costs of construction and management of a sanitary landfill (Liu et al., 2014).

2. Methodology

The Municipality of Orestiada formed the research area. Simple random sampling was applied, due to its simplicity and the fact that it requires less possible knowledge about the population, compared to any other method (Burgess 1984, Maheshwari 2013). The population under investigation was the total of the citizens in the Municipality of Orestiada. The estimation of the arithmetic mean and the typical error of the population (s), the proportion of the population and the standard error of the proportion of the population (sp), were estimated according to the types of simple random sampling.

In order to estimate the sample size we carried out a pre-sampling for 50 people. Also the sample size for every quantitative and qualitative variable was estimated according to the types of simple random sampling (Rahardyan et al. 2004). Thereby the actual population proportion and sample size was estimated to 400 citizens (for the probability $(1-\alpha)100=95\%$, $e=0,049$ and without the correction of the finite population). The collection data was carried out in 2015 and for their analysis the Statistical Package SPSS was applied.

For the multi – variable «trends in waste management» reliability and factor analysis were applied. To estimate the reliability of any measurement process means defining the degree of variance with regard to the ranking given by the inhabitants of Orestiada. In particular, we mean the degree which is due to real differences (and standard errors) and the degree which is due to inconsistencies of measurement (Rahardyan et al. 2004). In order to find the internal reliability of a questionnaire we use the alpha co-efficient (or the reliability co-efficient α -Cronbach), in order to find if the data have the tendency to measure the same thing (Garson, 1998). When the alpha coefficient is 0.70 or higher it is regarded as satisfactory (Garson, 1998), and when it is higher than 0.80 it is regarded as very satisfactory. In practice, lower alpha co-efficients, with values not lower than 0.60 may also be accepted (Garson, 1998).

Factor analysis is a statistical method that aims to find the common factors within a group of variables (Rahardyan et al. 2004). More specifically, we used the principal components method. The selection of the number of factors is a dynamic process presupposes repeatedly the estimation and evaluation of the model and in particular we employed the criterion of smooth slope on scree plot (Costello and Osborne, 2015). We also resorted to the rotation of the principal components matrix by using the maximum variance rotation method by Kaiser (Harman, 1976). Finally, we are interested in finding if there are some factors which can explain the correlations between the variables of our data and attempt to provide an interpretation (if possible) (Rahardyan et al. 2004). According to (Garson, 1998), the variables

that “belong” to each factor are those whose loadings, on the table indicating the loadings of the factors after rotation, are over 0.5 for that factor.

3. Results

The citizens’ assessment concerning policies – strategies for waste management within a scale from 1 (lowest acceptance) to 10 (highest acceptance) are illustrated in Figure 1.

Therefore the highest acceptance receive recycling of useful materials, recovery for new use, special management for hazardous waste, reduction of waste production by the citizens, source separation systems, production of soil fertilizers, waste to energy practices via incineration, landfill cell waterproofing, biogas exploitation, the placement of special bins for the organic waste, plant trees around the landfill site, proper management of sanitary landfills such as daily coverage with soil, waste weight for every Municipality, proper rehabilitation and available space for new use after the landfill closure, additional profits for the Municipality arise from waste management fees, common field for political conflicts.

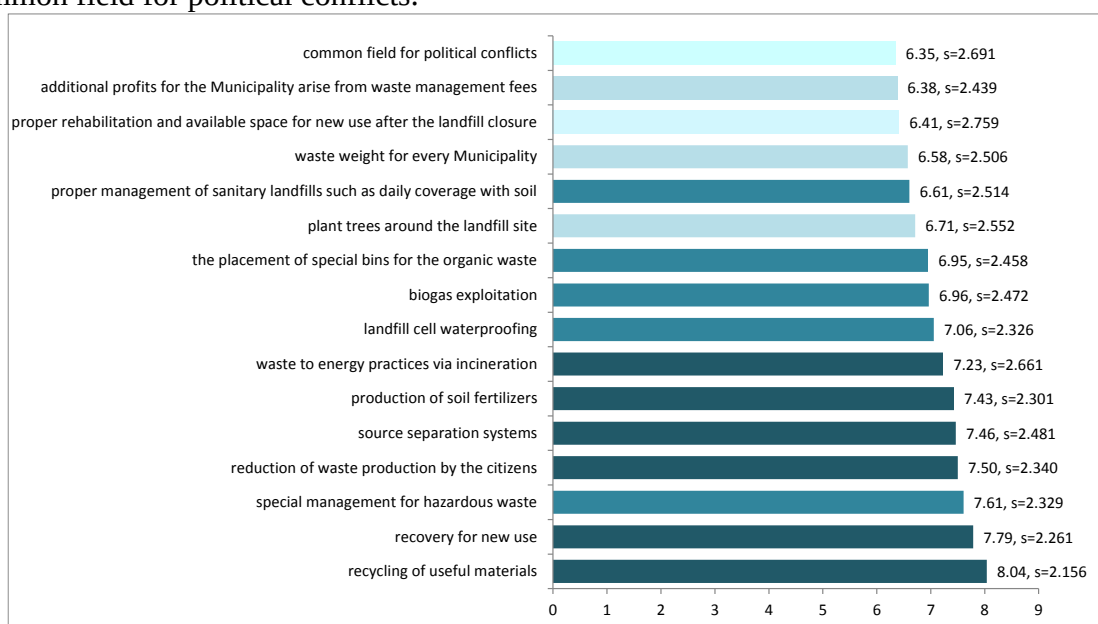


Figure 1: Citizens’ assessment concerning policies – strategies for waste management

To the above questions, after completion of all necessary checks, we applied reliability analysis. The value of the reliability coefficient alpha is 0.888. This constitutes a strong indication that our data have the tendency to measure the same thing. Before proceeding with the factor analysis, we conducted all the necessary checks. The value of the Keiser-Meyer-Olkin indicator was 0.879. Furthermore, Bartlett’s test of sphericity rejects the null hypothesis that the correction table is unitary and that the partial correlation coefficients are low. The fact that the measures of sampling adequacy have high to very high values also supports the view that the factor analysis model was acceptable. The results of factor analysis are recorded in Table 1. Table 1 lists the load of the partial correlation factors of the sixteen variables with each of the four factors extracted from the analysis. The higher the load of a variable in a factor, the more this factor is responsible for the total degree of variance of the considered variable. The burdens are given in bold show which variables included to each factor.

Table 1.Table with factor burdens, after rotation.

Variable	Factor burdens			
	1	2	3	4
Special management for hazardous waste	0.713	0.373	0.011	0.014
Landfill cell waterproofing	0.700	0.193	0.260	0.100
Daily coverage of the waste with soil	0.636	0.025	0.272	0.313
Biogas exploitation	0.617	0.231	0.093	0.316
Placement of special bins for the organic waste	0.524	0.196	0.447	0.055
Recovery for new use	0.112	0.839	0.146	0.189
Recycling of useful materials	0.465	0.707	-0.017	0.050
Reduction of waste production by the citizens	0.040	0.645	0.320	0.146
Waste to energy practices via incineration	0.326	0.618	0.176	0.061
Production of soil fertilizers	0.546	0.576	0.016	0.136
Source separation systems	0.467	0.490	0.231	-0.109
Additional profits for the Municipality arise from waste management fees	0.167	0.026	0.847	0.003
Waste weight for every Municipality	0.085	0.364	0.706	0.142
Plant trees around the landfill site	0.305	0.205	0.483	0.357
Common field for political conflicts	-0.014	0.194	0.139	0.776
Proper rehabilitation and available space for new use after the landfill closure	0.369	0.011	0.012	0.700

The first factor includes the variables „Special management for hazardous waste“, „Landfill cell waterproofing“, „Daily coverage of the waste with soil“, „Biogas exploitation“ and „Placement of special bins for the organic waste and it can be titled as waste management policies – strategies concerning the landfill site. The .second factor involves the variables “Recovery for new use”, “Recycling of useful materials”, “Reduction of waste production by the citizens”, “Waste to energy practices via incineration”, “Production of soil fertilizers”, “Source separation systems” and it can be named as general waste management policies – strategies.

The variables “Recycling of useful materials”, “Production of soil fertilizers” and “Source separation systems” receive high rates at both first and second factor serving as a bridge between them and stressing the correlation between general policies and the policies and measures affiliated with landfill sites.

The third factor titled waste management policies – strategies concerning the Municipality and consists the variables “Additional profits for the Municipality arise from waste management fees”, “Waste weight for every Municipality”, “Plant trees around the landfill site”.

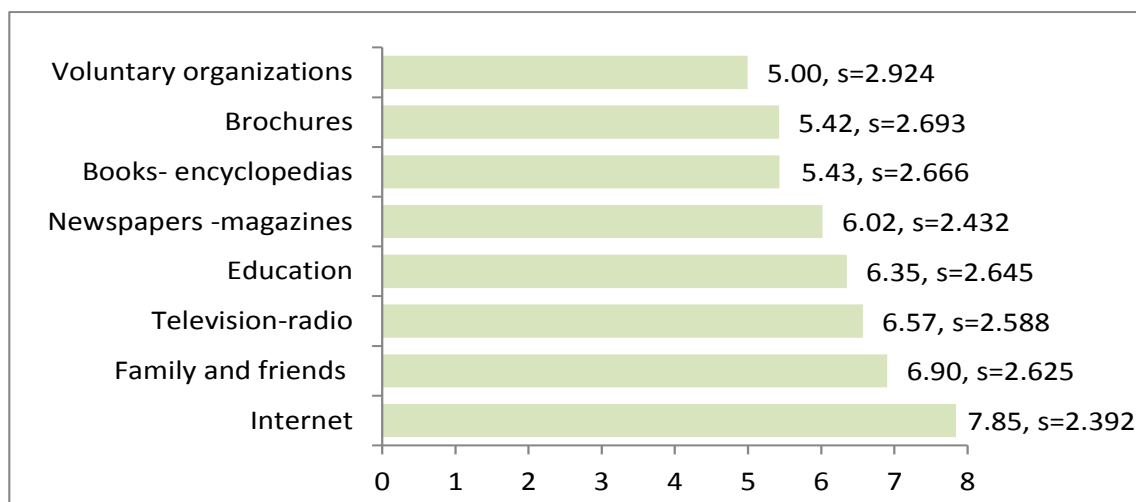


Figure 2: Citizens' assessment concerning means of information for waste management issues

The fourth factor includes the variables “Common field for political conflicts” and “Proper rehabilitation and available space for new use after the landfill closure” and can be titled as waste management policies – strategies that do not affect the citizens of Orestiada as there is not any landfill site in area while there are not any plans by the Administrative Authorities for the construction of a landfill site in the Municipality of Orestiada.

The citizens' assessment concerning means of information for waste management issues is presented in Figure 2. Overall, the citizens report lack of information especially as regards voluntary organizations, while most of them consider the internet as the most important source of information for waste management issues.

4. Conclusions – Suggestions

The citizens of Orestiada are environmentally conscious in waste management issues on an integrated basis. Recycling and reuse issues are of outmost importance for them.

Moreover, certain policies and strategies such as waste prevention, source separation systems, production of soil fertilizers and waste to energy through incineration are also issues stand out for their significance, according to the citizens. In fact, the aforementioned variables are classified in the same factor titled general waste management policies – strategies, which reveals that citizens acknowledge how important is to incorporate these policies into the local waste management plan for the city of Orestiada.

Next in the sequence come waste management policies – strategies concerning the landfill site and the Municipality. Not to mention that the last factor titled waste management policies – strategies concerning the Municipality includes the variables that are regarded as less important as there are not any plans for the construction of a landfill site in the geographical area of Orestiada.

Nevertheless, when aiming to successful waste management results, taking into consideration only the technical parts of the problem is not a solution. There are specific strategies and measures the Municipality has to apply and certain cleanness regulations to control the whole procedure, from waste production and minimization to collection, treatment and final disposal. Some of the important parts of this procedure are the waste weight and the management of the additional costs the Municipality receives from the existence of a waste management plant across its territory.

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Investigation of Factors Affecting Consumers' Awareness on Circular Economy: Preliminary Evidence from Greece

Abstract:

Unlike the traditional linear economic model based on a 'take-make-consume-throw away' pattern, a Circular Economy (CE) is based on sharing, leasing, reuse, repair, refurbishment and recycling, in an (almost) closed loop, where products and the materials they contain are highly valued. In practice, it implies reducing waste to a minimum. Moving towards a more circular economy could deliver opportunities including reduced pressures on the environment; enhanced security of supply of raw materials; increased competitiveness; innovation; growth and jobs.

This paper presents a preliminary attempt to estimate the public awareness on circular economy and to explore factors of its promotion in Greece. Further, opinions about practical implications of the model in citizens' everyday living and the benefits that could derive by adopting the specific model of production and consumption were investigated in this survey. The data reported in this paper were collected by conducting a questionnaire survey among 203 individuals in the city of Thessaloniki.

The results indicate that the residents have limited awareness and a poor understanding about the circular economy model, although they hold a positive attitude toward it. The initial findings are encouraging for the development of the circular economy model in the Greek, but a new culture needs to be also established regarding the Greek economic model shifting towards closed loop solutions.

Key words: Circular Economy, resource efficiency, innovation, market research,

JEL: O13, O44, Q01, Q56

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1. Introduction

The concept of Circular Economy was first proposed by Pearce and Turner (1990). It offers a path toward environmental degradation and resource scarcity arising from rapid economic development, two of the most urgent problems needed to be tackled with. The main goal of, the so-called circular economy, would be to attain the decoupling of economic growth from natural resource depletion and environmental degradation (Liu et al., 2009; Xue et al., 2010). Meanwhile this approach aims to the achievement of increased growth, but with decreased environmental damage. So, it promotes resource minimization and the adoption of cleaner technologies (Andersen, 1999).

With increasing pressures on natural resources, the concept of more effective use of materials and resources has rapidly become an imperative issue around the world. The transition to a more beneficial economy, where the value of products, materials and resources is maintained in the economy for as long as possible, and the generation of waste minimized, is an essential contribution to develop a sustainable, low carbon, resource efficient and competitive economy. Unlike the traditional linear economic model based on a 'take-make-consume-throw away' pattern, a circular economy is based on sharing, leasing, reuse, repair, refurbishment and recycling, in an (almost) closed loop, where products and the materials they contain are highly valued (Bourguignon, 2016; Ellen McArthur Foundation, 2013). According to Hu et al. (2011), circular economy concept can be briefly described as a 4R approach: reduce, reuse, recycle and recover. In practice, this process minimizes the amount of waste from generation to disposal and manages the waste more effectively. As it has pinpointed, the development of a circular economy could constitute an approach to solving environmental problems affecting human health and social development, reinforcing a growth model characterized by resource conservation, and encouraging healthy consumption behavior, all via a shift in growth models and protection of the natural environment (Zhijun and Nailing, 2007). However, the shift also poses challenges such as financing; key economic enablers; skills; consumer behavior and business models; and multi-level governance (EY, 2016; Tukker, 2015; Ghisellini et al., 2016).

2. Background

The circular economy concept is generally described as one in which products and the materials they contain are highly valued, unlike in the traditional, linear economic model, based on a 'take-make-consume-throw away' pattern. This production and consumption model is based on two complementary loops drawing inspiration from biological cycles: one for 'biological' materials (which can be decomposed by living organisms) and one for 'technical' materials (which cannot be decomposed by living organisms). In both cases, the aim is to limit the leakage of resources as much as possible (Ellen McArthur Foundation, 2013).

In practice, a circular economy implies reducing waste to a minimum. When a product reaches the end of its life, its materials are kept within the economy wherever possible. These can be productively used again and again, thereby creating further value. Measures leading towards a circular economy include reusing, repairing, refurbishing and recycling existing materials and products. What used to be considered as 'waste' can be turned into a valuable resource. (EY, 2016; European Commission, 2015; 2017).

The concept of the Circular Economy has been gaining momentum since the late 1970s (Ellen McArthur Foundation, 2013.). It comes originally from Germany and Japan, where there was a pressure to form a more closed loop society. In any case Sweden, Germany and Japan are frequently named in research as countries that have passed legislation towards waste reduction and recycling programs (Lieder and Rashid, 2016). The nation that has most fully embraced the implementation and development of circular economy concepts thus far is China, having developed an ambitious program of applying the concept (Zhou et al., 2014).

Particularly, in the case of China CE has been introduced as a new development model to help the country leapfrog into a more sustainable economy structure (Geng and Doberstein, 2010). However the concept has also gained traction in European level, with policymakers to encourage member states for the implementation of a circular economy model. It is sealed from the fact that EC has published policy recommendations in which the movement towards CE is explicitly promoted (European Commission, 2014), while on December 2015 the European Commission presented a new circular economy package. This package contains an action plan for the circular economy, mapping out a series of actions planned for the coming years, as well as four legislative proposals on waste, containing targets for landfill, reuse and recycling, to be met by 2030 (European Commission, 2015; 2017).

Apart from the attention which has gained among policymakers, circular economy has received increased interest in academic research. There has been a strong publication increase in the field of CE with a peak in this year 2015, while it is worth mentioning the fact that the most publications for CE research focus explicitly on issues within China, which makes up the majority of all CE research articles (54%) (Lieder and Rashid, 2016). The particular areas of attention are on the topic of circular business models, product design and closed loop value and supply chains. In addition to, it is recorded a range of reviews by Andersen (2007), Su et al. (2013); Tukker (2015); Ghisellini et al. (2016) and Lieder and Rashid (2016). Nevertheless, under-investigated but essential is the issue of public understanding and public awareness of CE. There are restricted reports specializing on this topic (Liu et al., 2009; Edbring et al., 2016). To the best of our knowledge, the present paper makes a first attempt to investigate consumers' awareness on circular economy, in Greece.

3. Opportunities and challenges

Moving towards a more circular economy has both an environmental and economic rationale. Potential opportunities include: (EY, 2016; Tukker, 2015; Ghisellini et al., 2016).

- Reduced pressures on the environment: a circular economy would significantly reduce greenhouse gas (GHG) emissions through better waste management and reduced use of resources (such as energy, water, land and materials) in manufacturing, with positive impacts on the climate. Large-scale reuse of raw materials could help reduce landscape and habitat disruption as well as marine littering, which would in turn help to limit biodiversity loss.
- Enhanced security of supply of raw materials: a circular economy would mitigate risks associated with the supply of raw materials, such as price volatility, availability and import dependency. According to Eurostat data, the EU currently imports, in raw material equivalents, about half the resources it consumes.
- Increased competitiveness: a circular economy could bring savings to businesses and consumers through improved resource efficiency. The report of Ellen MacArthur Foundation (2013) estimates that by 2030, a shift towards a circular economy could reduce net resource spending in the EU by €600 billion annually, bringing total benefits estimated at €1.8 trillion per year once multiplier effects are accounted for. Additionally, research suggests that stricter environmental legislation can provide a competitive advantage to businesses.
- Innovation: a circular economy could trigger a large innovation drive across sectors of the economy because of the need to redesign materials and products for circular use. The McKinsey & Company consultancy highlights that this would apply even in sectors not normally considered as innovative, such as the carpet industry.
- Growth and jobs: a circular economy could strengthen growth and create new jobs. It is estimated that the transition would increase GDP by 1 to 7 percentage points by 2030, depending on whether a higher pace of technological change is taken into account,⁶ and that it would have an overall positive impact.

4. Materials and Methods

The present research investigates consumer attitudes toward the model of circular economy. It is based on primary survey of respondents belonging to the city of Thessaloniki, Greece. Thessaloniki is the second largest city in Greece, one of the two Greek metropolises. The Municipality of Thessaloniki, where focuses this survey, has an official population of 322,240 according to the census of 2011 which is the latest available.

The survey conducted during the months of April and June 2017. To carry out the survey a questionnaire developed in order to collect the necessary information. Prior to the survey a pretest was executed with 20 persons, to discuss their understanding of the questions on the questionnaire. Based on its results, we refined the questionnaire, so as to facilitate a fuller understanding of it by the respondents.

Some of the questionnaires (25%) are collected through face-to-face interviews and the others (75%) through an internet survey, which used as an alternative. Google documents were used as a platform to create the online questionnaire, which then promoted through social media. Google docs platform allows free design of electronic questionnaires and at the same time it constitutes a user-friendly application to fill in online questionnaires and submit it directly. According to the international literature the Internet is a fruitful area for conducting survey research for many and various reasons, as it can overcome some problems and enhance consumers' willingness to respond to a survey. First of all, an Internet-based survey research can save time for researchers as it allows a researcher to reach people in a short amount of time (Taylor, 2000; Yun and Trumbo, 2000). Online survey researchers can also save a great deal of money, as they eliminate the travel costs to conduct interviews. On the other hand, a face-to-face interview can ensure the accuracy of the information to a better extent. Physical presence, which is the base of a face-to-face survey, can assist the understanding of questions and concepts which arise during the interview (Bonnell and Le Nir, 1998). Moreover, according to the same authors, a personal interview gives the interviewer the opportunity to better hold the respondent's attention or to better evaluate the respondent's omissions or inconsistencies.

Consumers were invited to complete the questionnaire that looked at specific issues related to circular economy. It was divided into four distinct units, to assist participants in completing it. The first section examines participants' level of knowledge throughout the meaning of circular economy. The second section deals with practical implementation and promotion of circular economy, while throughout the third one attempted the identification of consumers' attitudes towards the benefits that can be derived from the application of described model. The last section contains questions on demography and socioeconomic status, to outline the profile of the participants. A simple random sampling is used in the survey, as it is the most widely-used probability sampling and it provides satisfactory results. It is also pinpointed that a pilot study conducted, in order to assess the reliability of the questionnaire.

Simple data analysis techniques were adopted such as descriptive statistics, cross tabulation and chi-square test, using SPSS 22.0, to analyze the factors influencing the consumers' level of awareness on circular economy model.

5. Empirical findings

This survey yielded 203 usable responses. All the questionnaires were returned fully completed and they contained valid answers, this is the reason why they were included in the survey results as a whole. There is a balanced sex composition within the survey, as 107 of the participants are men and 96 women.

Table 1 provides awareness of circular economy across socio-demographics of sample individuals. Of the total 203 respondents surveyed, 135 respondents stated unawareness on circular economy model i.e. 66.5 percentage of total respondents. Males are comparatively

more aware than females, a fact implied by the results of chi-square test ($\chi^2 = 11.044$, $p < 0.10$). The majority of participants in the survey were people under the age of 40 years, with the 31-40 years age group to be highlighted as the largest group of respondents (29.06%). As far as the educational level is concerned, it is a crucial factor in enhancing consumer awareness. The results of chi-square revealed significant difference in the profile among interviewees ($\chi^2 = 52.367$, $p < 0.00$), which indicate that educated people are comparatively more aware of circular economy model. It is also evident that about 74 percent, of those states aware on the investigated model, have attained higher education.

Table 1. Consumer awareness of circular economy model

Socio-demographics	Aware		Unaware		Total		Chi-Square	Sig.
	N	%	N	%	N	%		
Gender								
Men	47	69.1	60	44.4	107	52.7	11.044	0.001
Women	21	30.9	75	55.6	96	47.3		
Age category								
<20	9	13.2	16	11.9	25	12.3	6.791	0.237
21-30	21	30.9	26	19.3	47	23.2		
31-40	19	27.9	40	29.6	59	29.1		
41-50	5	7.4	25	18.5	30	14.8		
51-60	9	13.2	20	14.8	29	14.3		
>60	5	7.4	8	5.9	13	6.4		
Education level								
Primary school	0	0	2	1.5	2	1.0	52.367	0.000
Secondary school	1	1.5	9	6.7	10	4.9		
High school	8	11.8	32	23.7	40	19.7		
Associate degree	9	13.2	36	26.7	45	22.2		
Bachelor' s degree	14	20.6	40	29.6	54	26.6		
Master's degree	19	27.9	16	11.9	35	17.2		
Doctoral degree	17	25	0	0	17	8.4		
Annual income								
<5000	16	23.5	51	37.8	67	33.0	9.680	0.046
5001-10000	24	35.3	35	25.9	59	29.1		
10001-15000	20	29.4	39	28.9	59	29.1		
15001-20000	8	11.8	6	4.4	14	6.9		
>20000	0	0	4	3	4	2.0		

Annual income plays, also, a worth mentioning role to reinforce awareness among people. Particularly, moderate-income participants are proven to be more aware. This finding may be explained as being related to the fact that most respondents in this survey were under 40 years of age. But, in Greece, young people are not well rewarded and their potential wages were above the minimum wage.

Subsequently, consumers were asked about their level of awareness related to circular economy. It is obvious from the results, which are depicted on the Picture 1, the very high percentage of those who are not aware at all (66%). Contrariwise only about 12% of the participants declare that they are well aware about the meaning of circular economy.

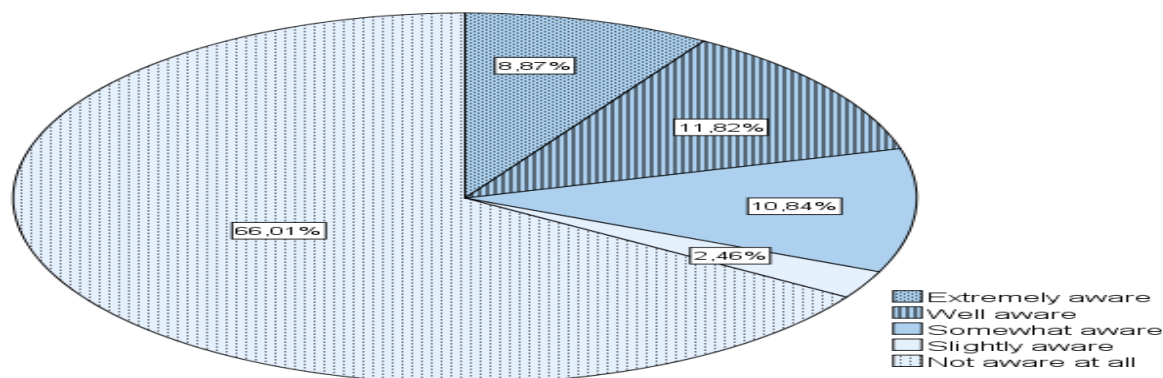
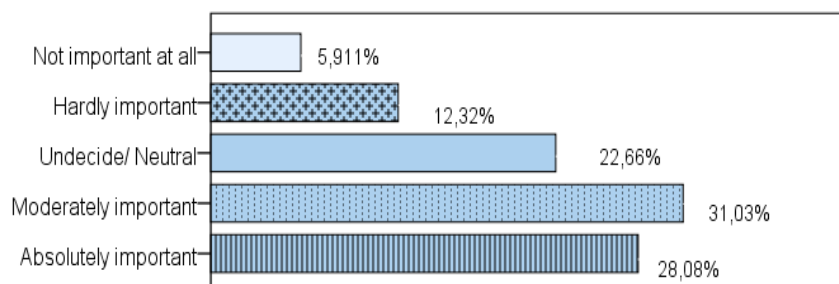


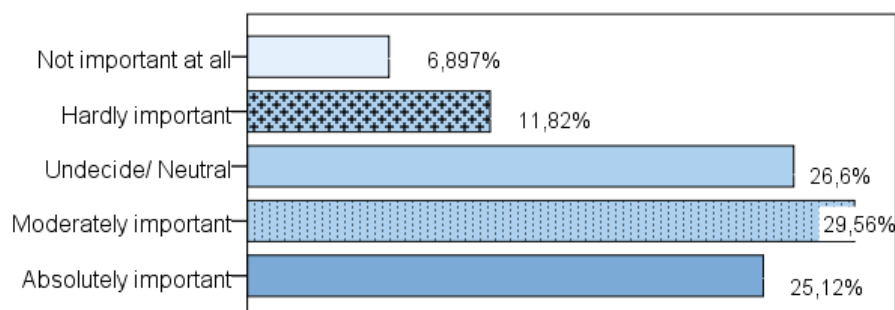
Figure 1. Awareness of consumers regarding the circular economy model.

Among the others, people surveyed were asked to rate five options best represent the circular economy model. From the results of analysis, presented in Figure 2, arises that the circular economy is mainly addressed as a “new business model”. In particular, 29 percent of our sample perceives it as “absolutely important” and 31 percent as “moderately important”. In addition to, 28% of respondents claimed that it can be “absolutely” characterized as a “new model of economic growth” behavior and 31% as a new model of economic growth. The description of “a model of consumer behavior” matches perfectly to circular economy according to 25.1% of the responses and moderately according to 33.5% of the answers. It is recorded, also, percentage about 30% of the people surveyed who characterize as moderate the contribution of circular economy to natural resources management.

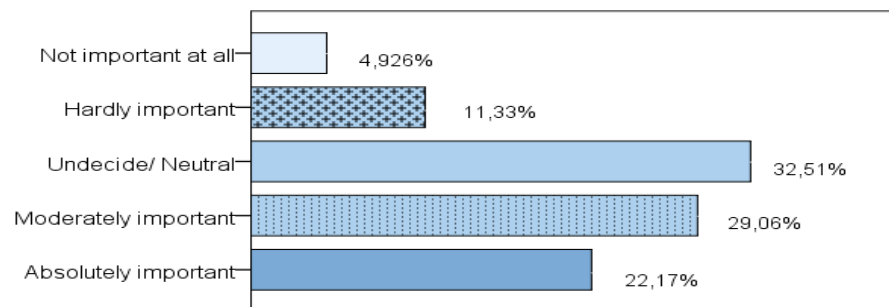
A new model of economic growth



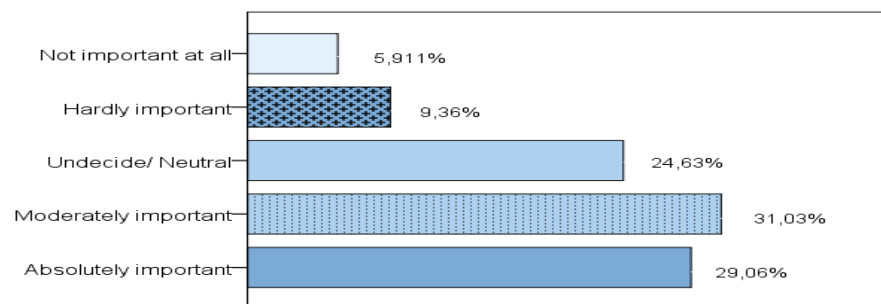
A model of natural resources management



A model of creating wealth and value for products



A new business model



A model of consumer behavior

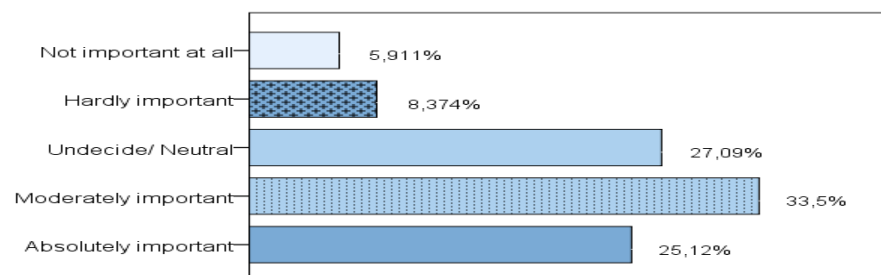


Figure 2. Respondents' options representing the circular economy model (n=203).

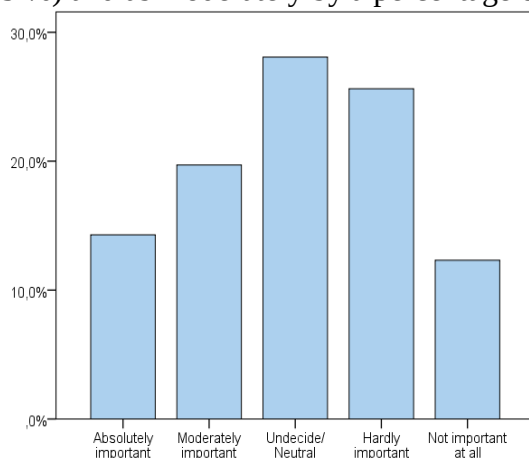
The third part of the questionnaire encompassed questions related to benefits arising from the application of circular economy model. As cited in the table below (Table 2) we enquired on the respondent's personal opinion about the areas where the circular economy model can positively affect consumers. As it is obvious from the results they rank very high the strengthening of environmental consciousness, as well as the option that circular economy contributes to waste reduction. It is also worth mentioning the fact that consumers believe that circular economy helps, to a certain extent, the improvement of living standards and contributes to households' energy saving. On the contrary, the input of circular economy in tackling the economic crisis is assessed particularly low.

Table 2. Areas where the circular economy model can positively affect consumers (n=203).

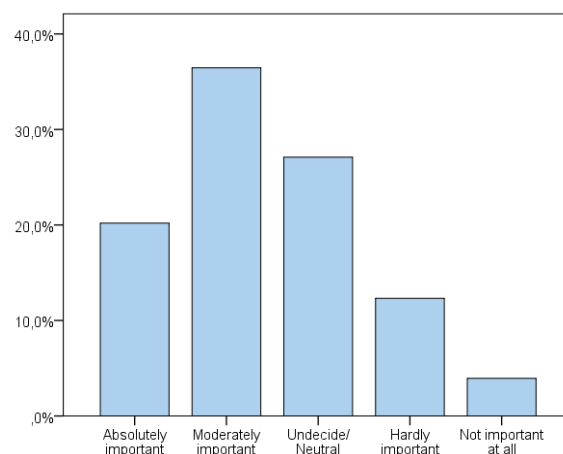
	Mean	Standard Deviation
Households energy saving	2.61	1.29
Saving/increasing annual income	2.96	1.38
Lower product prices	2.71	1.25
Access to quality products	2.76	1.35
Reduction of waste	2.26	1.30
Improving consumer health and safety	3.20	1.29
Creating new jobs	2.68	1.13
Developing "green" products and processes	2.62	1.14
Developing products that meet safety standards	2.66	1.12
Strengthening environmental consciousness	2.22	1.02
Improving living standards	2.44	1.14
Tackling the economic crisis	3.25	1.24

(*) When the Mean: 1= Absolutely important, 2= Moderately important, 3= Undecided/Neutral, 4= Hardly important, 5= Not important at all

When participants asked to rank the benefits could arise from the application of the circular economy model in the society and economy, 41 percent of respondents evaluate as extremely important the possibility of enhancement consumers' environmental sensitivity, as well as their responsible consumer behavior. Furthermore, particular high rated the likelihood the CE to strengthen the economic activity at a local level. Meanwhile, as absolutely important evaluated by a large proportion of consumers the possibility of new jobs creating (29 %) and as moderately by a percentage of 40%.



Jobs creating- reducing unemployment behavior



Development of responsible consumer

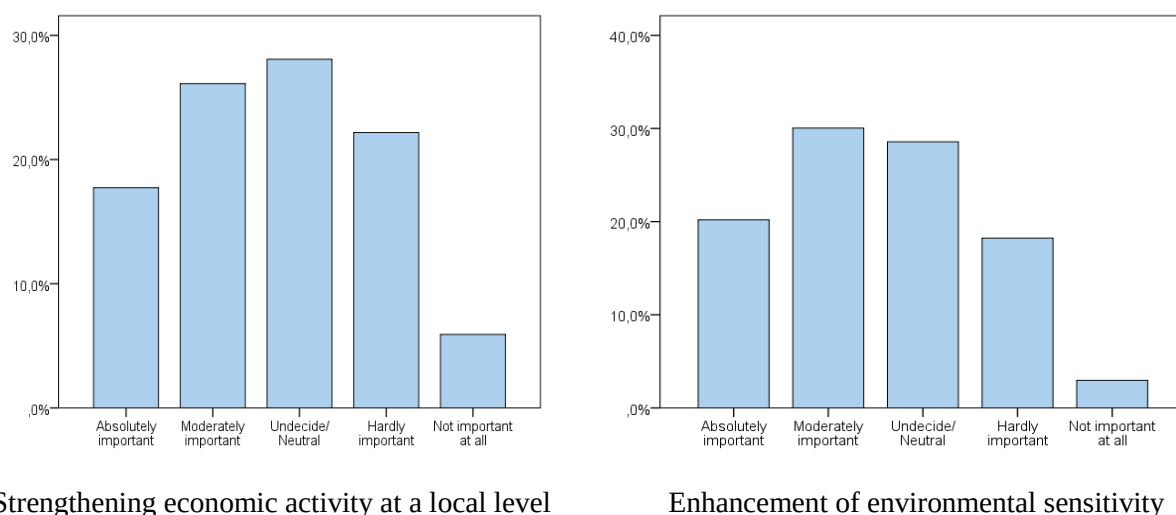


Figure 3. Ranking of benefits to society and economy from the application of circular economy (%).

Concerning the question, “Which procedures of businesses and environment can be helped by the implementation of the circular economy model?”, significant percentage of individuals replied that circular economy could contribute to waste minimization. As indicated by further results, the implementation of the circular economy in waste management have a significant recognition, given that 53% of the sample perceive it as “absolutely important” and 26% as “moderately important”.

Table 3. Procedures for businesses and environment which can be helped by the implementation of the circular economy model (n=203).

	Mean	Standard Deviation
Efficient use of resources	1.93	1.10
Recycling of materials/products energy/water	1.94	1.12
Production of energy/water	2.93	1.13
Use of environmentally friendly raw materials	2.08	1.09
Saving of raw materials/ Sustainable management of natural resources	1.97	1.12
Waste minimization	1.67	1.02
Waste management	1.75	0.97
Reduction of waste	1.86	1.02
Emissions monitoring	2.71	1.22
Creating wealth-Reducing production costs	3.03	1.16
Improving business liquidity	2.94	1.20
Develop of win-win collaborations	3.80	1.12
Innovation Development	2.57	1.30
Development of "green" products / processes	2.29	1.31
Strengthening Corporate Social Responsibility	2.78	1.16

* When the Mean: 1= Absolutely important, 2= Moderately important, 3= Undecided/Neutral, 4= Hardly important, 5= Not important at all

Moreover significant percent of our sample (61%) assessed as “extremely important” the reduction of waste, followed by 20.2% which regard it as “moderately important”. In

addition to, people maintain the view that the adaptation of circular economy model could reinforce the efficient use of resources and the recycling. On the other contrary, participants tend to believe that circular economy may not contribute to developing of win-win collaborations or improving business liquidity. Finally, respondents claimed not to regard important at all the input of circular economy in strengthening of Corporate Social Responsibility (CSR).

4. Discussion-Conclusions

Summary findings of survey indicate that Greek consumers have limited familiarity with the meaning of circular economy, since they have received fragmentary information about all its dimensions. Respondents connect circular economy, mainly, with environmental issues, as well as broader issue of sustainability. From their point of view circular economy **addressed as a model** of natural resource management, the implementation of which strengthen consumers' environmental consciousness. Nevertheless, they realize moving towards a more circular economy could deliver opportunities including reduced pressures on the environment and enhanced security of supply of raw materials. It is, also, arises that respondents awareness of the CE has a positive correlation to their educational level, whereas men proved to be more aware than women.

As it is apparent from the results, the implementing of circular economy strategy is not only beneficial to the environmental sustainability and resources conservation, but also to the development of economy and society.

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A Theoretical Framework for Distance Education with Forest Policy Aspects

Abstract:

Today, distance education is provided almost exclusively with computer support, and more concretely, in an internet environment. Forest Policy is a main course in the vast majority of the European Universities in the field of Forestry, and its content varies among countries, depending on the priorities of the forest sector. Continued forestry training and forestry education are typical informational instruments for Forest Policy, while the trend of long life learning offers the opportunity for Forest Policy to adapt. Although distance education has been developed in Greece over the past years, online environmental education is quite limited. The aim of this paper is to provide a theoretical framework for distance environmental education, focusing on Forest Policy. Methodology consists of five distinct steps: analysis of the educational needs; design of adult educational programs; evaluation of the program, development of the on line courses; and determination of the thematic units. The design of the online course will be based on the content, the communication potential, the support and other characteristics of online courses. The proposal enhances environmental awareness, while providing incentives for the reinforcement of the curriculum vitae of target group members. Furthermore, it could contribute to the extroversion of the involved parties, resulting to a "product" which will be available to the interested target groups.

Keywords: Forest Policy, environmental education, distance learning, certified learning, agriculture

JEL category: I2, Q23, Q15, Q18, O13,

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1. Introduction

The role of the environment in the modern era of climate change and economic crisis is extremely crucial. As a result, environmental education gained increased popularity during the past years. Universities across the world include environmental education in their courses curricula, but the need for environmental awareness is not limited in the Higher education, and many individuals are willing to take part in programs of distance learning or distance education focusing on environmental education.

The integrated approach to environmental policy is a matter of concern for governments worldwide in order to implement the Sustainable Development Goals within the framework of the Agenda 2030 (Nilsson and Persson, 2017). Forest Policy, as a part of Environmental Policy, it is strongly linked with Sustainable Development Goals. Until recently forest policy analysis was a field mainly addressed to foresters, while the involvement of policy scientists was limited (Arts, 2012).

Forest Policy is a main course in the vast majority of the European Universities in the field of Forestry, and its content varies among countries, depending on the priorities of the forest sector (Krott, 2005). Continued forestry training and forestry education are typical informational instruments for Forest Policy (Krott, 2005). The trend of long life learning offers the opportunity for Forest Policy to adapt. Many countries are modernizing the forestry education system; Russia for example, a country with a long history in higher forestry education, has made a number of steps towards this aim focusing mainly on forestry-related disciplines (Teplyakov, 2005). The resilience theory which was introduced in ecology, has recently affected the research for environmental education (Plummer, 2010).

Although distance education has been developed in Greece over the past years, online environmental education is quite limited. The Forest Policy sector in particular is absent from the Hellenic Open University curriculum as well as from the e-learning platform of Aristotle University of Thessaloniki (<https://opencourses.auth.gr>), which includes courses taught in the School of Forestry and Natural Environment, the largest School of Forestry in Greece.

The aim of this paper is to cover this gap providing a theoretical framework for distance environmental education, focusing on Forest Policy. The paper aspires to improve the adult learning conditions in Greece, a country falling short compared with the European Union average.

2. Distance Education / Distance Learning

Distance education or distance learning is the educational process in which the physical presence of students and tutors in lecture rooms is not always necessary like for example in the Open University (Holmberg, 1977). Today, distance education is provided almost exclusively with computer support, and more concretely, in an internet environment. The term “distance education” is used in order to describe the educational activities at which the learner is found in a natural distance by the instructor and uses some form of technology in order to communicate while the learner has access in the educational material (Schlosser and Simonson, 2002). The e-learning programs can be categorized in synchronous and asynchronous, depending on whether the learners participate in real time or not (Koutroumanidis and Andreopoulou, 2009). In other words, it is a combination of various forms of educational action, which leads to a modern and completed educational system, where the adult learners are in the core of the learning process.

Adopting an approach utilizing pedagogical and educational criteria to produce a definition that largely reflects the philosophy and logic of institutionalized distance education, as it has developed in recent years, defines it as "an educational process, which activates and teaches students how to learn, and how to function independently along the path of

exploratory, inductive learning by using creatively all the resources available, as well as all the media transferring information in pedagogical terms" (Lionarakis, 2005).

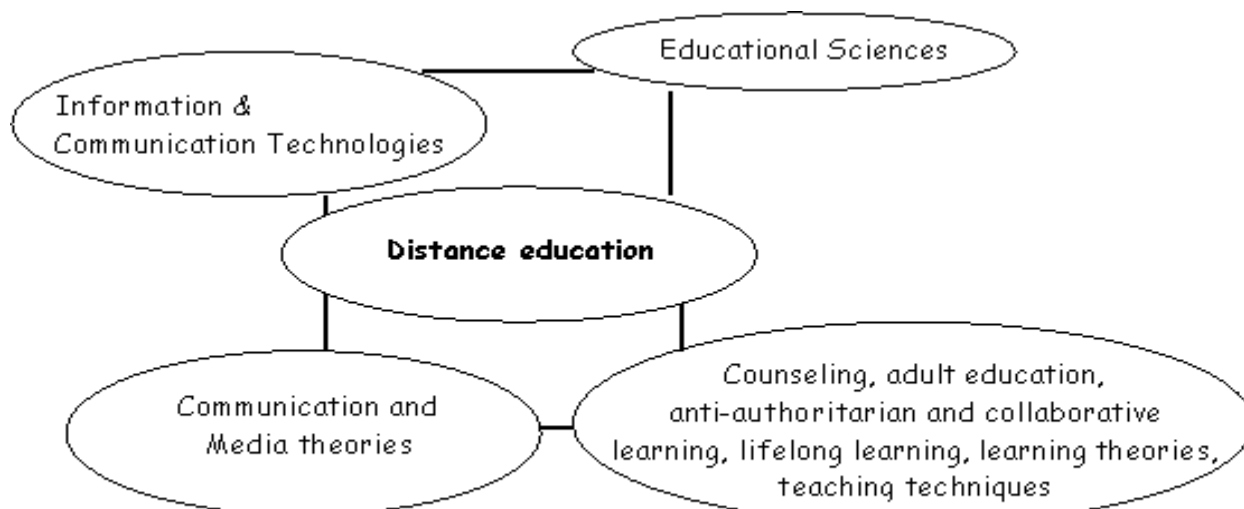


Figure 1. Distance education (Source: Lionarakis, 2008)

3. Distance Learning Providers

According to Keegan (1996), the categories of the providers for distance learning are:

1. Open Universities.
2. Universities which apart from the traditional studies provide distance learning programs.
3. Public Institutions
4. Private Institutions

According to Eurostat (2013), distance learning in Greece is quite limited compared with the European Union average. In Greece, the history of distance learning begins with the establishment of the Hellenic Open University in Patra in 1992. The development of Information and Communication Technologies led to the creation of online courses in many Universities of Greece. The importance of e-learning classes for Agricultural and Forestry Schools in Greece was recently proved (Kirkenidis and Andreopoulou, 2015).

Table 1. Distance education programs for Agriculture in Greece

A/A	Program	Provider
1	Program for the education of farmers "Isiodos"	General Secretary of Adult Training, Greek Ministry of Education, Research and Religious Affairs
2	Network for the Education and Training of Farmers - Agro-training Net	ELGO DEMETER
3	Agrogenesis - Network for the encouragement of the entrepreneurship of young farmers in rural areas	Pan-Hellenic Confederation of Unions of Agricultural Co-operatives (PASEGES)
4	e-ruralnet: http://eruralnet.wordpress.com/	EU
5	e-school by agronomist.gr: https://eschool.agronomist.gr/	EU

ICT technologies have also significant contribution to the agricultural sector by assuring the safety of agricultural products. Awuor et al. (2013) developed an e-agriculture model which could be used by farmers, public organizations and research institutes.

Unlike Forestry, the Agricultural sector in Greece has a state recognized provider for distance learning: The Organization of Agricultural Professional Education, Training and Employment of the Hellenic Agricultural Organization "DEMETER" (ELGO DEMETER).

Table 1 presents the distance education programs in the agricultural sector in Greece.

4. Environmental Education

According to UNESCO (2014), environmental education is vital in imparting an inherent respect for nature amongst society and in enhancing public environmental awareness.

Adult learning has increased in the European Union in the last years and the Renewed European Agenda for Adult Learning provides a vision for the development of adult learning in European Union by 2020 (European Council, 2011). The relation between adult learning and internet technologies has been mentioned (Zhang and Zeng, 2013), while Information and Communication Technologies (ICTs) has been recognized as an important tool to promote the environmental education (Andreopoulou, 2006; Andreopoulou, 2012; Koliouska and Andreopoulou, 2016; Varras et al., 2016).

Endter-Walda et al. (1998) proposed a framework regarding the role of social sciences in ecosystem management and environmental education, contributing to the development of a common language between researchers of Social sciences and Environmental sciences.

5. Theoretical Framework

According to Cook and Dupras (2004) the key steps in developing an effective educational on line course are: 1) analysis of goals and objectives, 2) determination of needs, 3) commitment of the participants, 4) encouragement of active learning, 5) evaluation.

Singh (2008) provided a graphical pattern for internet based distance learning (Figure 2).

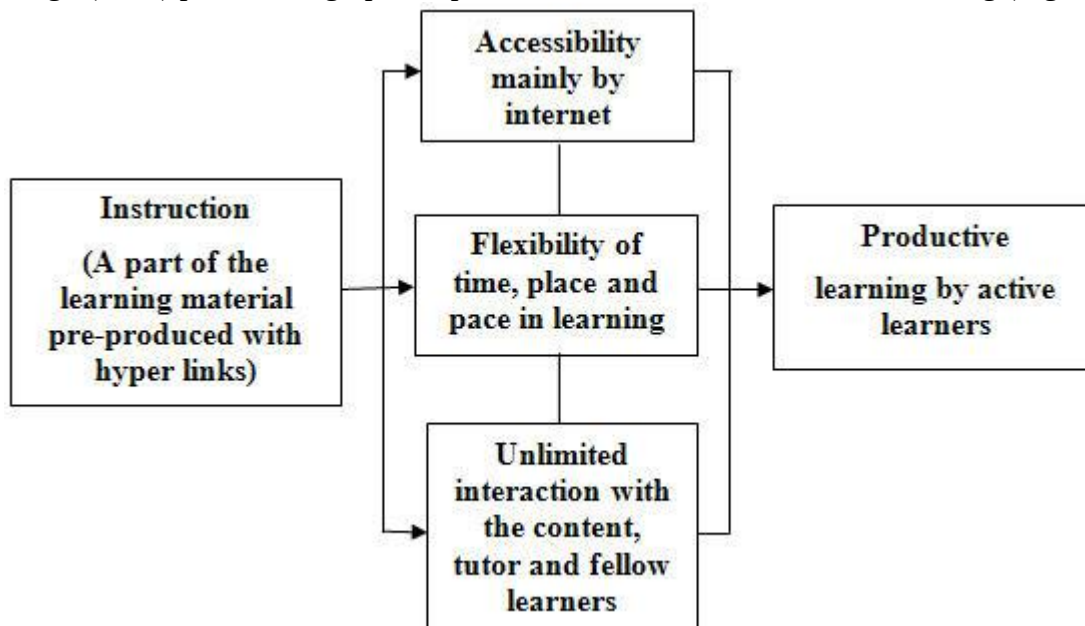


Figure 2. Internet based distance learning (Source: Singh, 2008)

According to Binkley (1997) three are the key elements for high quality forestry education: a) clear objective b) systematic approach to continuous learning and c) benchmarking against external norms. Furthermore, sufficient funding and adequate academic staff are also affecting Forestry Education (Bhat, 2005).

The methodology used for creating the theoretical framework consists of five distinct steps: 1) Analysis of the educational needs, 2) Design of adult educational programs, 3)

Evaluation of the program, 4) Development of the on line courses, 5) Determination of the thematic units.

The design of an online curriculum will be based on the content, the communication potential, the support and other characteristics of online courses.

The theoretical framework focuses on:

- the quality of the educational material (video, presentation-powerpoint, document-word) that will be available on the Internet
- the electronic communication through a forum for possible discussion between trainers and trainees
- the final exams which will be mandatory for all trainees in order to receive their certificate of attendance
- the course evaluation form, as feedback constitutes a critical part of planning and executing an interactive online course.

The Framework takes into consideration the Forest Policy of 2020 (FOEN, 2013), the guide of the Food and Agriculture Organization of the United Nations entitled "Developing Effective Forest Policy" (FAO, 2010), the Forest Policy principles described in the United Nation's source book entitled "International Forest Sector Institutions and Policy Instruments for Europe" (Bauer and Corredor, 2006).

6. Thematic Units

Taking into consideration the steps and the elements described earlier in the Theoretical Framework section, we propose a list of possible thematic units that cover the environmental education in Forest Policy:

1. Timeline of Forest Policy: Definitions, concept and adaptation in the modern era. The history of Forest Policy from the ancient years till today. The concept of Forest Policy and its importance in the modern era.
2. Principles of Forest Policy: The role of the stakeholders in the Forest Policy and an introduction to the rules and principles of Forest Policy.
3. Criteria and Decision Making in Forest Policy: Decision Making is a vital process when exercising policy, while robust Decision Making contributes to the welfare of Forest Policy.
4. Forest Policy and Natural Environment: The protective role of Forest Policy on Natural Environment and global issues that affect forests such as the climate change and deforestation.
5. Forest Policy, Forest Ownership and Forest Co-operatives: Forest ownership plays a major role in Forest Policy, while the stakeholders (either state or private) affect Forest Policy decisions.
6. Forest Policy and the social role of Forestry: The social role of Forestry is extremely important, because the forest help people to reduce stress, improve health, and provide positive energy.
7. Forest Policy and International Issues: The role of Forest Policy in the era of economic crisis and the absence of a common framework in a global level for forests.
8. Forest Law: An introduction to Forest Law and the Legislation Framework that applies in Greece.

7. Conclusions

In Greece adult learning has not been adequately developed and there is a gap in environmental education especially in the Forestry sector. The theoretical framework developed in this paper focusing on Forest Policy, aims to fill this gap.

The international developments in the economic - technological and socio - cultural sector led to significant changes in terms of production structures and highlighted the need for

modernization of national economies. Thus, the need emerges to improve the services that the employees offer and their continuous adaptation to the changing business context, since the development of science and technology contributes to the rapid obsolescence of professional knowledge. Every modern employee must possess specialized professional knowledge and develop a set of skills that will then be certified to be able to claim a better career path. Under these conditions adult education covers a necessary aspect of daily life in the society of knowledge.

The framework enhances environmental awareness, while offering incentives for the reinforcement of the curriculum vitae of target group members. Moreover, it provides the opportunity to effectively utilize the scientific educational staff in Greece specialized in environmental education.

Additionally, the framework contributes to the further collaboration between social sciences and environmental scientists, a matter of interest for the scientific community in previous decades. It also has a positive impact to the Environmental Policy Integration.

Of course sufficient funding is a crucial factor for success. The economic crisis that affects Greece for almost a decade now is a serious drawback for Forest Policy development and application. The research could be extended by using the integrated on line framework of certified learning in environmental education for sustainability as a prototype for the evolution of on line certified learning in Greece, providing qualitative electronic services and reliable educational material.

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Implementation of Close-to-Nature Silviculture in Greek Oak Forests

Abstract:

Oak forests comprise the most extensive forest ecosystem and are of significant ecological and socio-economic parameter over time. The Greek state set the strategic goal of the conversion of coppice oak forests into high forests since the early thirties. Technological advances, scientific knowledge and accumulated experience in forest management have led to a revision of the interventions applied in the coppice conversion system. In the present article, the first results of the application of the close-to-nature forestry and the principles of the Prosilva Europe on the oak coppice forests under conversion in Northern Greece are presented. It is proposed a more detailed forest division from the one that is currently being used and at the same time it adapts and implements the concepts of close-to-nature forestry in two demonstration plots of oak forest under conversion. Finally, silvicultural and management prescriptions that lead to oak forests with better ecological characteristics are recommended.

Keywords: Close-to-nature forestry, oak forests, conversion into high forests, ecological and socio-economic parameter.

JEL category classification: Q230, Q560, Q570

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1. Introduction

Forest ecosystems form the backbone of the natural terrestrial ecosystems of the planet and of our country, and because of the large extent they occupy today, they consist a site of development of multiple, often "opposing" activities and functions. In modern societies multifunctional forest and "multipurpose forestry" follow the obsolete concept of "woodland" and new needs and priorities are put into the forest management. As the society needs have increased due to increase in the income, free time and education, the sum of the goods and services that produced by forests without any management or from those forests that are managed only for wood production seems to be increasingly less satisfactory [Eleftheriadis, (1988)].

The forests in our country perform interconnected functions such as social (recreation, environmental education), economic (primary production, income generation) and environmental (ground water - atmosphere protection, water cycle, habitat, biodiversity, regulatory role in climate with positive contribution in the "upcoming" climate change) making its management combined and complex. The Greek forests are closely related to the economy of mountainous and semi-mountainous areas of the country, 81% of the country's communities are mountainous and semi-mountainous and have forests in their regions [Ministry of Agriculture, (2000)]. The forest sector contribution to GDP however, is generally low due to the fact that the forests of the country are of low productivity with a role rather protective than productive and moreover the benefits resulting from this role cannot always be assessed in terms of money [Ministry of Agriculture, (2000)].

The forests, as open systems, are subjected to continuous impact by humans and consequently interventions that degrade them. The Greek forest soils due to their mineral composition, the dominant mountainous relief, where more than 50% of the area has slopes above 10%, and the prevailing Mediterranean climate which characterized by rapid rains, along with the, for centuries, Anthropogenic interventions, resulted in severe erosion phenomena, the degradation and limitation of the area the natural forests occupy. It is well known that much of the country's soil, in the order of 30-35% [E.E.S.D.E., (2001)], is seriously threatened by degradation due to intense erosion, while the risk of desertification is also serious.

The productive reconstruction of the forests with an emphasis on the sustainable management has long been a challenge to integrate modern requirements (e.g. to enhance biodiversity), to maximize their contribution to the economy, employment and the environment [Forest Research Institute, (1986)]. In particular, for the oak coppice forests, which comprise the most extensive and of great socio-economic importance ecosystems, the change of their management form low coppice forests to high forests of seedling origin are still a challenge for Greek forestry. This, conversion of management form has to be implemented using the known three-fold of sustainable development: society - economy - environment [Zagas, (2013)].

The Country's oak forests are of high priority given the long term pressure they have suffered through the coppice management (clear cuts with short rotation times and grazing). Their rehabilitation and conversion of coppice forests into high forests will make a significant contribution to the development of the rural Greece both economically and in terms of quality of life [Smiris and Ganatsas, (1994)]. For more than half a century now, in a large proportion of their area, conversion into high forests is a good forestry practice, but new ideas of forestry knowledge should be incorporated. In this case, close-to-nature forestry assists and complements the forest conversion practice by answering important issues such as:

- Description and forest inventory on the basis of the silvicultural stand approach, as a prerequisite for an ecological forest management.
- Change of management and silvicultural forms from low coppice to high forests of seedling origin and from even aged to uneven aged group selection systems.

- Improving the stand structure through interventions in the species composition favoring the species mixing,
- Silvicultural measures and volume calculation of allowable cut that have to be applied in each stand type and age class of the oak forest.

It is widely known that for many years forests in Europe, particularly private owned, were managed by clear cuts and by the favoring of conifers, especially spruce, at the expense of broadleaf trees [Smaltschinski,(1990); Schieller and Schadauer,(1993); Schadauer,(1994)]. This has led to monocultures, to the lessening of biodiversity and, more generally, forest health problems. This has resulted in organizations supporting natural forestry such as Pro Silva. Pro Silva strengthens those management strategies that optimize the preservation, conservation and utilization of forest ecosystems in such a manner that their ecological and socio-economic functions are sustainable and profitable. The general approach to management includes marketable and non-marketable objectives taking into account the entire ecosystem. The general goals and objectives of Natural Forestry [PRO SILVA, (2012)] are the creation of uneven aged, mixed forest with multi-layer structures where they harmoniously combine wood production with habitat dynamics, biodiversity enhancement, aesthetics, soil protection, water regulation and other services. Various models have also been proposed in the past for the species expansion of plants by emphasizing the parameterization of biotic and abiotic factors [Harper, (1977); Blom, (1988)], but this should be carefully considered on a case-by-case basis, such as the conversion of Mediterranean coppice forests.

A basic prerequisite for the implementation of natural forestry in the forest management plans is the level of detail a forest is divided. According to [Panagiotidis, (1979)], the division of the forest should follow the shape: section, subsection and stand type, where the first two categories are identified with geographical-administrative characteristics, while the latter, which comprises the smallest area of temporal dynamic planning, with silvicultural and short term management characteristics. The planning and the potential interventions that are decided to be implemented in the managed forests should be based on the good knowledge and thorough analysis of the ecological and socioeconomic environmental factors. Analysis and comprehension of the forest ecosystem dynamics consists the fundamental knowledge for the planning of any forest activity especially if this concerns multiple forest use which often also means additional multiple burden on them [Vergos, (1988)].

The aim of this study was to: (a) highlight the importance of creating demonstration areas in oak forests under conversion into high forests for its scientifically sound management; and (b) highlight the importance of the detailed stand type level of forest division and its importance in sustainable forest management.

2. Materials and methods

The research was initially based on a review of relevant published articles in Greece and abroad, as well as on approved plans and studies of the country and on the local forest authorities.

The main criterion for choosing the Hungarian oak (*Quercus frainetto*) in which the experimental areas would be installed was that of its great ecological and socio-economic importance for Greece.

Two demonstration plots were selected - one in Edessa, Pella and one in Arnaia, Chalkidiki (table 1) - the dominant species was the Hungarian oak. The characteristics of the experimental plots are illustrated in table 1.

After the selection of the sites, data collection of the two demonstration plots was carried out in order to set up a monitoring system compatible with that of the Prosilva Europe

network so that it can be integrated later into the Prosilva's network of demonstration plots across Europe. The following data were collected for each experimental plot:

- (i). Site characteristics (data set A), using thematic maps.
- (ii). Biometrical characteristics (group B) using the existing forest management plans, vegetation maps.
- (iii). Meteorological data, phytosociological studies or surveys, site classification.

Table 1: Description of the two demonstration plots

Demo plot 1: Public forest compartment of Sotira, Edessa, Pella	Demo plot2: Public forest compartment of Olympiada, Arnaia, Chalkidiki
Section: 4	Section: 62 / stand: 62a
Area: 43,8 ha	Area: 60,0 ha
Silvicultural from: even aged	Silvicultural from: even aged
Management class: oak under conversion into high forest	Management class: oak under conversion into high forest
Age(2015): 60 years	Age(2015): 90 years
Intervention stage: thinning	Intervention stage: regeneration thinning

The synthesis of the above data sources resulted in a series of important decisions that should be taken into consideration for the uniform monitoring of the demo plots of the network, such as:

- Determination of the existing variability/diversity of the demo plots.
- Selection the sampling method (degree of intensity).
- Selection of the sampling grid (200X200m or 100X100m).
- Choice of the stand type in silvicultural sense as forest management unit.

The gathered data, georeferenced in the Greek reference system EGSA '87, and uploaded into a GPS device in order to be available for the control of spatial applicability of the principles of the natural forestry on the selected demonstration plots in the field.

For each experimental plot, control and forest division into stand types was carried out according to Panagiotidis (1979) classification. The division into stand types in the two plots was based on three criteria: the forest species, the site quality and the age class.

For the Arnaia, Chalkidiki experimental plot, the forest division into stand types based on the above mentioned criteria was existed and was available by the local Forest service. In this case, it was verified the accuracy of the stand boundaries. For the Edessa experimental plot, where there was no corresponding information, a new division of the experimental plot into stand types was carried out.

The stand type management method based on Natural Forestry which is supported also by the Prosilva principles was chosen as management method, aiming at the creation of a mixed uneven aged group selection forests.

3. Results

I. Demonstration plot 1: State owned forest compartment of SOTIRA, Edessa, section 4 and suggested management measures

Ia. Demonstration plot 1 – stand types division

Figure 1 shows the division of the forest into stand types and Figure 2 a view of the stand structure. It is clear that the stands are of one storey even aged and of coppice origin. Four different stand type were distinguished: pure Hungarian oak & middle site quality (A), mixed Hungarian oak & middle site quality (B), mixed Hungarian oak & poor site quality (C) and mixed/pure Hungarian oak & middle/poor site quality (D). The mean stocking volume of

the demonstration plot 1 is $65.3 \text{ m}^3 \text{ ha}^{-1}$ this very low stocking volume confirms the general rule of the coppice forests that are very low output forests. Despite the low stocking volume, the volume increment ($3.5 \text{ m}^3 \text{ ha}^{-1} \text{ year}^{-1}$) is considered good for this species and looks promising for the increase of stocking volume through conversion into high forest.

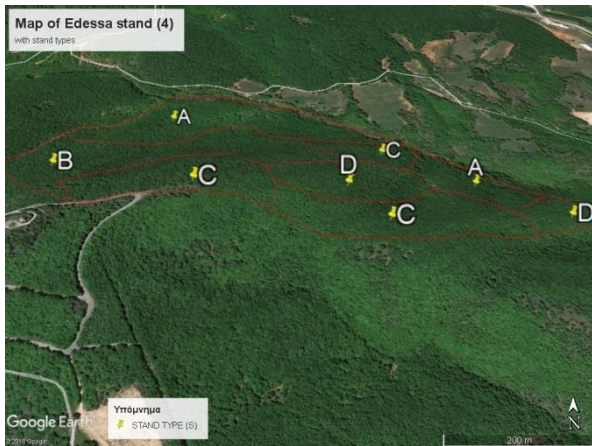


Figure 1: Part of Ortho-photograph from the demonstration plot 1 (section 4 – Sotira, Edessa) Basemap EKXA S.A. 2007-2008



Figure 2: Photograph from demonstration plot 1 (section 4 – Sotira, Edessa)

Ib. Suggested silvicultural - management prescriptions and results from the test tree marking

The suggested prescriptions for the chosen stand types A, C were as follows:

- High thinning and positive selection. Detection and mark of 40-50 future crop trees per ha and removal of 1 to 2 stronger competitors.
- Mixture enhancement by favoring noble broadleaved species such as ash, service and wild service tree, maple, wild cherry and elm releasing them from its competitors.
- Maintenance and/or creation of secondary stand with oriental hornbeam, dogwood and other available species of the understory.

The aim for vertical multi-layer structure and group selection forms is not possible today because of the young age and the coppice origin of the stand. More specifically, in the demonstration plot it is anticipated to be some regeneration in the near future in few small existed gaps. For the determination of the intensity and type of thinning a test tree marking was carried out in an area of one tenth of a ha. For the stand types A and C, 9 and 6 future crop trees were detected and chosen respectively and 1 to 2 strongest competitors per future tree were marked for thinning. So in the poor site quality a light thinning was carried out by removing 10.3% of the stocking volume and in the better site quality light thinning removing 15.4% of the volume. The forest labor for the above mentioned work is estimated in 1 ha per 8 hours per person and as pre-commercial thinning, no notable commercial wood products are expected to be produced.

II. Demonstration plot 2: State owned forest compartment of Olympiada, Arnaia, Chalkidiki suggested management measures.

Ila. Demonstration plot 2 – stand types division



Figure 3: Forest species map from the demonstration plot 2 (subsection 62a – Olympiada, Chalkidiki). Map source: Arnaia Forest Service



Figure 4: Photograph from demonstration plot 2 (subsection 62a – Olympiada, Chalkidiki)

Figure 3 shows the division of the forest into stand types and Figure 4 shows a view of the stand structure. The stands here are older than those in the demonstration plot 1. It is still clear that the stands are of one storey even aged but one cannot see the coppice origin because the trees have been long ago individualized from the mother stump. Two different stand types were distinguished: pure Hungarian oak & good site quality 90 years old (A), pure Hungarian oak & middle site quality 90 years old (C). An already naturally established gap with advanced regeneration it is shown in Figure 4. The natural regeneration process will be started from the existed gaps and by introducing new ones and expanding them covering the whole area. Finally the regenerated from seeds stand will have the form of group selection with various mixture degrees.

IIb. Suggested silvicultural – management prescriptions and results from test tree marking

The suggested prescriptions for the chosen stand types A, C were as follows:

- High thinning and positive selection. Detection of about 40-50 seed trees per ha and removal of all other competitors.
- Mixture enhancement by favoring noble broadleaved species and removing all of their competitors so as to feed the forest floor with lots of seeds.
- Treatment of the understory in small spots. In the case of stand type C removal of the Greek strawberry tree and the heath to facilitate the regeneration of the acorns.
- Establishment of new gap groups and expansion of existed; the gaps should be as large in diameter as approximately twice the height of mature trees. The small gaps will provide micro-environments suitable for shade tolerant species regeneration and the larger gaps conditions suitable for more light demanding species regeneration.

The total cut volume of the demonstration plot 2 was estimated at 85 m³ ha⁻¹ or roughly 51% of the standing volume for the stand type A and 55 m³ ha⁻¹ or roughly 45% of the standing volume for the stand type C. These cut percentages are considered as minimum threshold for the initiation of the natural regeneration under the shelter wood system giving the high light demanding nature of the oaks. However it is considered well enough for enhancing the already established regeneration and for the new acorns production in the next ten years.

As it results from the new suggested forest management prescriptions, the following differences and similarities can be distinguished compared with the up to date applied management:

Differences:

- Forest division based on site and silvicultural criteria
- Multilayer stand structure (uneven aged, group selection stand form)
- Mixed forest
- Natural sexual and asexual regeneration (seedling high forest or transitional middle forest)
- Production of more wood and non-wood forest products and not only fuelwood as it is the practice today
- Need for more rigorous forest planning and training of the forestry personnel (scientific and technical)

Similarities:

- Implementation of forest management in the same existed legal and administrative framework
- Satisfaction of local socioeconomic needs (employment, fulfilling of local demands in fuelwood)

4. Discussion

Nowadays, the country is experiencing a deep environmental and economic crisis and is in the phase of critical reforms also on forestry related issues. Therefore, inevitably, a review and reconsideration of its forest resources in relation to their situation and prospects needs to be made. There should also be an evaluation of the management system so that firstly significant gaps in Greek forestry, such as the conversion into high oak forests silviculture, and secondly the incorporation of new knowledge and experience, should be addressed.

In the present study, the first results of the application of the principles of close-to-nature forestry for two oak forests under conversion into high forests were presented and discussed both in the phase of conversion thinning and in the regeneration. Paying attention on the forest management at stand level, the two demonstration plots were divided into stand types determined by three criteria. The stand type boundaries were marked on the ground. New silvicultural prescriptions were discussed and determined for each demonstration plot. Generally, the conversion thinning at the first plot ranges between 10-15% applying the high thinning and positive selection as silvicultural prescription, and in the second case the thinning intensity ranges between 30-60% applying seed tree thinning mainly on group openings.

The transition from low coppice to the high forest of seed origin management and especially pursuing uneven aged silvicultural forms such as group selection as it is also suggested by the Prosilva network principles, demand managers and forest practitioners with great experience in silvicultural treatments both in tenting of young stands and in subsequent thinnings and regeneration. The added value for this transition is not only economic but also aesthetic and socio-economic. [Eleftheriadis and Tsalikidis, (1990)] stress that the socio-economic characteristics of the resource users is required for the management forests, particularly those used intensively for tourism. Despite the fact that farming exploitation facilities that also operate on agrotourism are less than 0,5% of the total enterprises in Greece [Karagiannis, (2011)] there is great potential of increasing this percentage through the suggested system of forest management.

The change of the management and silvicultural form of our coppice oak forests it is considered advisable because through these irregular forest forms the forest biodiversity will be increased and to a certain extent the people's life quality who live close to forests will also be increased. Additionally, the application of the principles of close-to-nature forestry will help the forest ecosystems to adapt to the already occurring global change.

5. Conclusions

From the present study the following conclusions can be drawn:

1. The division of the managed forests at the level of stand types it is considered advisable for the proper application of the principles of close-to-nature forestry.
2. The light thinning in the order of 12-15% of the stocking volume is considered satisfactory for the conversion thinning in oak coppice forests.
3. The long term goal of natural regeneration of the oak forests under conversion into high by creating group selection and where ever it is possible mixed group selection seed tree forests it is considered feasible and will also increase, among other values, the aesthetic and socio-economic value of the forests. The natural regeneration process should be initiated for all coppice stands that are already 90-100 years old so as up to the age of 130-140 years to have been regenerated pursuing group selection forms of two or three age classes.
4. We can support that adapting the principles of Prosilva Europe in our forest practice, our natural forests as basic green infrastructure can support the socio-economic issues, safeguard the habitats, provide services and contributes to sustainable and resilient natural forest ecosystems.

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Research on Urban Planning and Design in Thessaloniki: Stakeholders, New Technologies and Funding

Abstract:

Beyond any doubt, urban green helps to improve residents' quality of life. The lack of greenery in Greek cities is now provoking strong reactions from citizens, who vigorously defend the protection of green spaces. Municipalities in Greece generally lack infrastructure and services, mainly due to the inefficient administrative structure, the lack of specialized staff and the limited use of new technology. The tools of a modern environmental policy which will improve urban planning and management are mainly legal, financial, administrative and institutional. The objective of this study is to investigate the views of the technical employees of the Municipality of Thessaloniki on issues related to improving planning and management of urban green, in order to formulate appropriate policies and to draw useful conclusions.

Keywords: Urban Green, environmental policy, Municipality of Thessaloniki

JEL Q01, Q28

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1. Introduction

Urban green leads to the sustainable development of cities through the interaction of a number of factors, namely the social context, the management objectives, the means, the management's results and the various information (Dwyer et al, 2003). The use of parks and trees in towns, in order to groom them and to improve the living conditions of their inhabitants, is now the primary concern of city planners (Grey and Deneke, 1992). In general, there have not been enough moves to improve the aesthetics of Greek cities and the welfare of citizens (Yerolympos, 1996). The main objective of modern urban policy is to create cities that are booming economically, bustling with culture and being clean, green, secure and socially just. Cities should provide people with very good and quality living conditions and a good urban policy should offer citizens the opportunity to participate in their city administration, to feel that they are holding their fortunes in their hands (Hall and Pfeiffer, 2000). The tools for better management of these sites are legal, financial, administrative and institutional (Carbone et al, 2015).

Information and Communication Technology (I.C.T.) can play a key role in the environmental protection and the environmental sustainability (Andreopoulou, 2012). Especially nowadays, the organizations rely on their information. Thus, public sector should use Internet and new technology tools to become "e-ready" (Andreopoulou, 2011). More specifically, the adoption of I.C.T. in public administration namely e-Government, can improve public services and support public policies (Andreopoulou, 2009). E-Governance enables citizens to have access to information and to participate in the decision-making process (Andreopoulou et al, 2011).

To sum up, strategies for the urban environment should actively engage central administration, regions, municipalities, businesses, research institutions, non-governmental organizations and the private sector, while playing an important role the financial framework, the new technologies and the active participation of citizens (Tomalty, 2005).

The objective of the study is to investigate the views of the technical employees of the Municipality of Thessaloniki on issues related to improving planning and management of urban green, in order to formulate appropriate policies, to draw useful conclusions and furthermore, to find possible relationships and correlations between the research variables, by using appropriate statistical analysis methods. The present study is part of a wider research and the questionnaire that was used was weighed properly, as far as its reliability and validity are concerned.

2. Material and method

2.1 Research instrument (questionnaire)

The present study aims to investigate the views of the technical employees of the Municipality of Thessaloniki on issues relating to the planning and the management of urban green areas. More specifically, the participants were members of the scientific staff (engineers, agriculturists and foresters).

The research instrument that used for the data collection was a self-completed questionnaire, which is the main tool of research in the social sciences (Cohen and Manion, 1997). A relevant bibliography was studied for the development of the questionnaire (Gillham, 2007). The questions selected for analysis in this paper are a general question about the problems that hinder work processes concerning planning and management of urban green areas, and six questions which are proposals to improve planning and management of urban green. The first question offers multiple choices and the respondents could chose more than one answer. The other six questions are presented as statements measured on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree) (Babbie, 2011). Moreover, there are questions about some demographic data of the participants. The questions/proposals

that measured with the Likert scale are: (a) "Strengthening consultation, participation and awareness raising processes for citizens, professional bodies and chambers on issues related to recreation and the design/creation of new green spaces", (b) "Further public-private partnerships in designing and managing free spaces and green spaces", (c) "Better absorption and exploitation of European programs related to the implementation of urban regeneration and green constructions", (d) "Cooperation with non-governmental organizations", (e) "Use of new technologies (I.C.T.) in urban management" and (f) "Increase of fees for creation, maintenance and protection of green areas". The last question is a variation of the investigation for "Willingness To Pay" (W.T.P.), where respondents declare the amount they intend to pay for the use of certain environmental goods (Kula, 1994). Finally, there are questions (nominal variables) related to demographic data of the participants (whether they are residents or not of Municipality of Thessaloniki, gender, age and occupation).

2.2 Study population

The study population included the 57 technical employees (engineers, agriculturists and foresters) of Municipality of Thessaloniki that involved in planning and management of urban green. The census of the population was attempted, that is to record all its members (Cohen et al, 2005). The questionnaires were distributed in employees' workplaces. Furthermore, the questionnaires were sent by e-mail. In total, 52 employees participated in the study (88,14%). The research took place in the period from April to July 2016.

2.3 Statistical analysis

Data handling and analyses were conducted using the IBM S.P.S.S. Statistics 21 and the Microsoft Excel 2007. More specifically, statistical analysis included:

Descriptive statistics. Descriptive statistics deal with methods of organizing and presenting data (Anderson & Finn, 1996).

Correlations. Correlation estimates the degree or the relationship between two or more variables (Healey, 2015). When one or all of the variables are measured on an ordinal scale, Spearman correlation coefficient is used instead of Pearson correlation coefficient (Foster et al, 2006).

Mann-Whitney. This non-parametric test is used when the groups being tested are two and independent of one another and do not follow the normal distribution (Dawson and Trapp, 2004).

3. Results-Discussion

3.1 Results and discussion of descriptive statistics

1. Problems that hinder work processes": 71,2% answered *Co-responsibility between authorities*, 69,2% *Property issues*, 65,4% *Lack of money*, 55,8% *Lack of cooperation between contact points*, 55,8% *Involvement of locally elected representative*, 52,0% *Lack of craftsmen and workers*, 48,1% *Complex and inactive legal framework*, 44,2% *Bureaucracy*, 19,2% *Lack of agriculturists and foresters*, 15,4% *Lack of engineers* and finally 7,7% answered *Lack of administrative staff* (Figure 1).

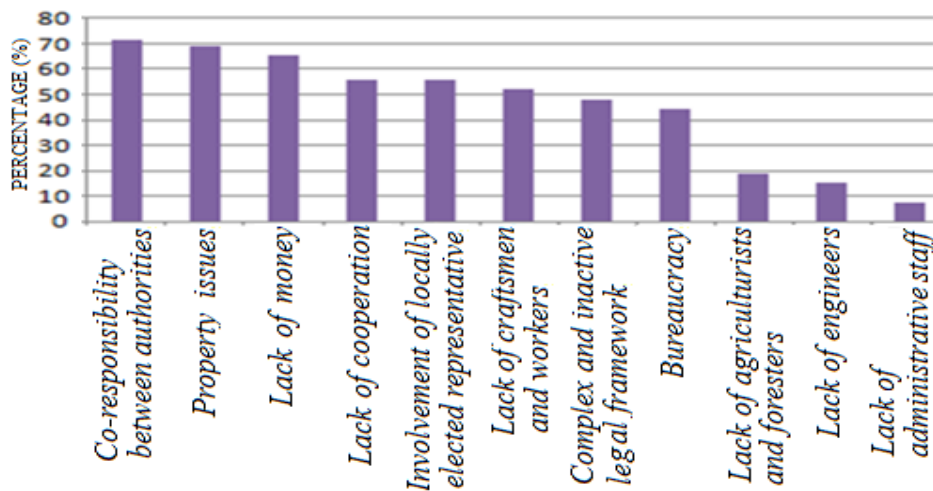


Figure 1. Rates of answers to the question "Problems that hinder work processes"

2. "Strengthening consultation and participation of citizens": 25,00% answered *Strongly agree*, 55,77% *Agree*, 15,38% *No opinion* and 3,85% *Disagree*.

3. "Further public-private partnerships": 11,76% answered *Strongly agree*, 43,14% *Agree*, 15,69% *No opinion*, 21,57% *Disagree* and 7,84% *Strongly disagree*.

4. "Better absorption and exploitation of European programs": 38,46% answered *Strongly agree*, 57,69% *Agree* and 3,85% *No opinion*.

5. "Increase of fees": 19,23% answered *Agree*, 25,00% *No opinion*, 40,38% *Disagree* and 15,38% *Strongly disagree*.

6. "Cooperation with non-governmental organizations": 25,00% answered *Agree*, 21,15% *No opinion*, 28,85% *Disagree* and 25,00% *Strongly disagree*.

7. "Use of new technologies": 51,92% answered *Strongly agree* and 48,08% *Agree*.

This description can easily be seen in Figure 3.

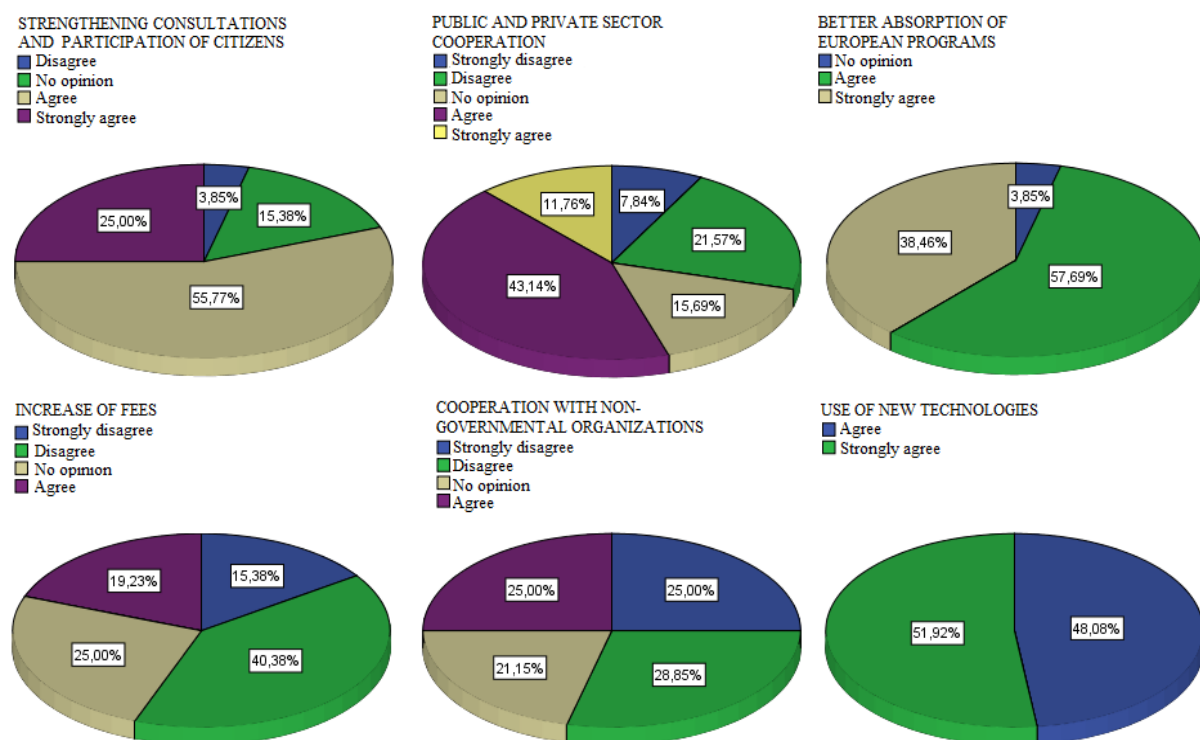


Figure 2. Presentation of responses

Concerning the demographic characteristics of the participants, 76,92% are residents or citizens of Municipality of Thessaloniki and 23,08% are not, 40,38% are male and 59,62% female, 26,92% are aged < 45 years old and 73,08% $\geq$ 45, 51,92% are agriculturists or foresters and 48,08% are engineers. This description can easily be seen in Figure 3.

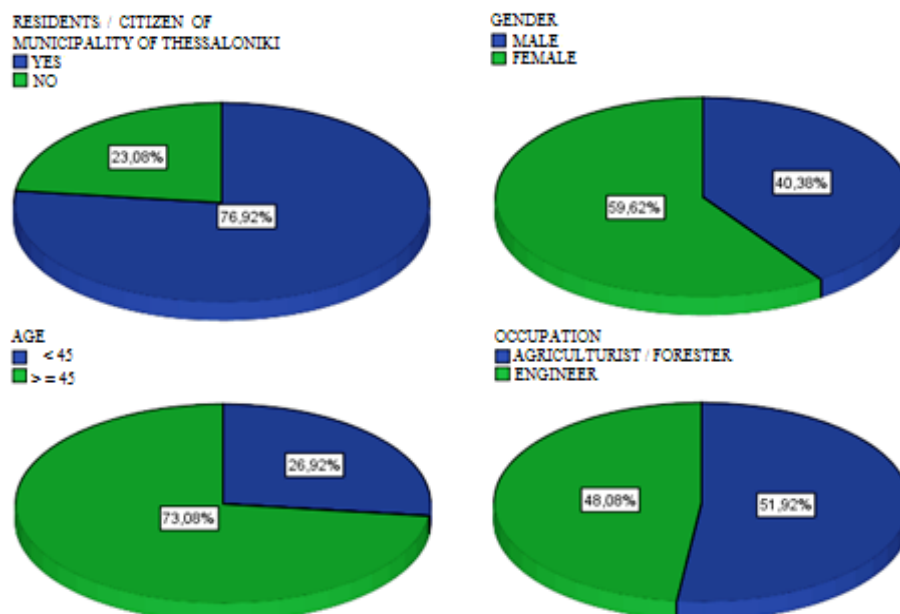


Figure 3. Demographic characteristics of the participants

The majority of the participants considered the co-responsibility between authorities, the property issues and the lack of money to be the most severe problems which they encounter in their work. About 50% considered the lack of cooperation between contact points, the involvement of locally elected representatives, the lack of craftsmen and workers and the existing legal framework and bureaucracy to be second in severity, while the lack of engineers, agriculturists and foresters were considered milder problems. The lack of administrative staff was set last in the ranking. Hence, problems relating to cohesiveness and lack of cooperation between contact points should be resolved, together with a more flexible legal framework which regulates, amongst other things, the property issues.

In the proposal "Cooperation with non-governmental organizations", 53,85% disagree or strongly disagree and 21,15% have no opinion.

According the answers, necessary conditions for improving urban planning and management are: Use of new technologies, better absorption and exploitation of European programs, and participation of citizens. Many respondents (54,90%) are positive about possible cooperation with private sector companies.

In the proposal "Increase of fees for creation, maintenance and protection of green areas", were given mainly negative and neutral responses, perhaps because officials think they will be more targeted by citizens if they do not actually use this income for green, coupled with the fact that they do not have as much financial capacity as they used to. The answers to the questions "Increase of fees" and "Cooperation with non-governmental organizations" are ambiguous and show relatively even rates.

Concerning the occupation, the ratio of engineers to agriculturists and foresters is almost 1 to 1. As far as gender is concerned, 60% of the respondents are female, which shows that they are no longer male-dominated professions. 75% are residents or citizens of the Municipality of Thessaloniki. Regarding the age, almost 75% of the respondents are older than 45 years old. So, there is an aging of the technical staff which will be more pronounced in the coming years, due to the lack of new recruits.

3.2 Correlations (results and discussion)

The correlations between the six ordinal variables and the variable "Age" are presented in Table 1. Spearman correlation coefficient was used.

Table 1. Correlations

	Strengthening consultation and participation of citizens	Further public-private partnerships	Better exploitation of European programs	Increase of fees	Cooperation with non-governmental organizations	Use of new technologies	Age
Strengthening consultation and participation of citizens	1,000	0,032	0,252	0,009	-0,028	0,153	0,194
Further public-private partnerships	0,032	1,000	0,207	0,083	0,049	-0,059	-0,166
Better exploitation of European programs	0,252	0,207	1,000	0,002	0,170	0,195	0,140
Increase of fees	0,009	0,083	0,002	1,000	0,302*	-0,151	0,079
Cooperation with non-governmental organizations	-0,028	0,098	-0,002	0,302*	1,000	-0,020	-0,060
Use of new technologies	0,153	-0,059	0,195	-0,151	0,219	1,000	0,370**
Age	0,194	-0,166	0,140	0,079	-0,060	0,370**	1,000

* $p < 0,05$ ** $p < 0,01$

"Age" is shown to be significantly associated with "Use of new technologies" ($p < 0,01$). "Cooperation with non-governmental organizations" is positively correlated with "Increase of fees" ($p < 0,05$).

3.3 Mann-Whitney (results and discussion)

Resident/citizen of the Municipality of Thessaloniki: No statistical differences were found between those who are residents/citizens of the Municipality of Thessaloniki and those who are not (Table 2).

Table 2. Mann-Whitney (variable "Resident/citizen of the Municipality of Thessaloniki")

	Strengthening consultation and participation of citizens	Further public-private partnerships	Better exploitation of European programs	Increase of fees	Cooperation with non-governmental organizations	Use of new technologies
Mann-Whitney U	224,500	184,000	216,000	234,000	222,000	182,000
Asymp. Sig. (2-tailed)	0,708	0,243	0,548	0,891	0,686	0,146

Gender: Statistically significant differences were observed in the scores between male and female concerning how the respondents answered to the question "Cooperation with non-governmental organizations" ($p < 0,05$) (Table 3). The mean rank for male is 21,10 while for female is 30,16. Respectively, the sum of ranks is 443,00 and 935,00.

Table 3. Mann-Whitney (variable "Gender")

	Strengthening consultation and participation of citizens	Further public-private partnerships	Better exploitation of European programs	Increase of fees	Cooperation with non-governmental organizations	Use of new technologies
Mann-Whitney U	275,500	309,000	311,500	320,500	212,000	271,000
Asymp. Sig. (2-tailed)	0,299	0,904	0,763	0,922	0,029	0,240

Occupation: No statistical differences were found between agriculturists/foresters and engineers (Table 4).

Table 4. Mann-Whitney (variable "Occupation")

	Strengthening consultation and participation of citizens	Further public-private partnerships	Better exploitation of European programs	Increase of fees	Cooperation with non-governmental organizations	Use of new technologies
Mann-Whitney U	268,000	254,000	321,500	285,500	253,000	337,000
Asymp. Sig. (2-tailed)	0,157	0,159	0,735	0,318	0,110	0,992

Women seem to be more cautious in their answers to the question "Cooperation with non-governmental organizations", compared to their male colleagues. The other demographic characteristics do not affect the way the participants answer to the questions.

4. Conclusions

According to the results of the study, it appears that:

In general, it is clear from the answers of the participants that the various forms of bureaucracy (coexistence, lack of co-operation, property problems, legislation) that they face daily in the exercise of their responsibilities, combined with the economic crisis (lack of money and inability to recruit workers) and the interventions of the elected for predominantly electoral reasons, constitute major barriers to their work. At the same time, the participants consider that the number of scientific staff is adequate, although the average age is steadily rising, due to the lack of new hirings. However, they agree with the recruitment of technicians and workers, in order to strengthen the implementation of the works and the maintenance by the permanent staff of the municipality.

The participants are cautious with increasing fees, perhaps because they are equally dissatisfied with the citizens concerning the effectiveness of this measure, coupled with the fact that both they do not have as much financial capacity as they used to. In addition, they are suspicious to non-governmental organizations, probably because of the bad financial management that these organizations have done in many cases in the past. Generally, they are open to new collaborations and methods, as they think that the necessary conditions for improving urban planning and management are (a) the use of new technologies, (b) the better absorption and exploitation of European programs, (c) the participation of citizens and (d) the cooperation with private sector companies.

As far as occupation is concerned, the participants are equally divided. Concerning the gender, a lot of women are employed in the technical services of the public sector in general which, even in our days, is a better workplace. Older employees appear to be more in agreement with the use of new technologies, probably because they are the majority, combined with the fact that all respondents agree or strongly agree with this proposal. The answers to the questions "Increase of fees" and "Cooperation with non-governmental organizations" are ambiguous and show relatively even rates. Thus, a significant positive correlation is demonstrated between them. Lastly, women are more cautious and suspicious concerning cooperation with non-governmental organizations, compared to their male counterparts.

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Students' Opinions and Attitudes about Forests. Case Study: Department of Political Sciences

Abstract:

This paper deals with the implementation of a survey in the Department of Political Sciences (A.U.Th.) concerning undergraduate students' attitude towards forest areas in Greece. The aim is to establish a more detailed overview about students' opinions, attitudes, perception or even appreciation of forests. In this study students' were asked to define what a "forest" is and we assessed their correspondence to Greek legislation regarding the constitutional forest definition. Alongside, is recorded students' comprehension about forests' beneficial effects and generally forests' contribution in quality of life. Students' awareness on climate change, environmental policy making, green technology and forests' protection acts are monitored. Also, we examine students' participation in environmental projects during primary or/and secondary education and analyse students' opinion about current environmental issues in Greece. Almost 200 undergraduate students participated in the survey one week before final exams by a face-to-face interview.

Keywords: forest, survey, green technology, environment

JEL: Q2

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1. Introduction

The definition (Lund, 2016) and the context of the word “forest” can have various meanings in a person’s (everyday) life and especially in a young person’s life. Students are a particular social group with discrete characteristics such as age, study field, background and different urbanization origin due to the fact that they are coming from different cities in the country.

The aim is to establish a more detailed overview about forests impact on students’ life and their understanding or even appreciation of the forests’ contribution to the environment. In detail, we recorded students’ opinion within an open question where they could define what area they consider to be a forest³, if they visit forests for recreational⁴ purposes (Bernath and Roschewitz, 2008; Kosz, 1998) how often/ or when was the last time that they visited a forest. Additionally, it was crucial to record students’ participation in environmental projects (Flogaitis and Alexopoulou, 1991) during primary or/and secondary education, the issues that they were occupied with (addressing problems or proposing ways to protect natural environment) and which areas had they visited during the project.

The survey, also, examines forests’ beneficial effects, their contribution to the quality of life in urban areas and the well-being of the citizens and forests’ inhabitants. The environmental protection and green technology are significant factors that can be in a long-term beneficial to everyday life. Therefore, this study (Elsasser and Meyerhoff, 2007; Elsasser et al., 2009) can be consider as an evaluation tool of students’ opinions and perceptions towards state’ actions, volunteering and protecting forests and their inhabitants. Moreover, we monitor students’ comprehension over forests’ protection acts in a national or E.U.⁵ level are recorded and their awareness on the climate change, environmental policy making and green technology.

In the following sections the organization of the survey (Cowling et al., 2014) the sampling methods (Frayer and Furnival, 1999), the realization of the survey (Chadjipadelis, 1998) and the quantitative methods that were put in practice in order to analyse students’ awareness towards environmental issues are described in more detail.

2. Materials and Methods

We apply multistage stratified sampling method based on gender and origin city by ‘face-to-face’ interviews during the last week of July. For data analysis, we used Correspondence Analysis, Hierarchical Cluster Analysis (Bartholomew, 2002) by the aim of S.P.S.S. and M.A.D. (Karapistolis, 1986). Sampling methods were based on faculty’s official population records and therefore 220 undergraduate students participated. In particular, 30.5% are male students and 69.5% are female students. According to semester, considering that “Methods” subject is in the 4th semester curriculum, 1% students of 2nd semester have participated in the survey, 53.6% of 4th semester, 19.5% of the 6th semester, 15.5% of the 8th semester and 10% of students belonging to a semester greater than 8th. According to origin, 34.1% come from urban areas, 41.4 % come from semiurban areas and 18.6% from rural areas.

3. Results

First of all, we analyzed students’ definitions about what a “forest” is (FAO, 2000) from their own perspective. We coded their definition in three different concepts about forests. The first set of definitions is focused on “flora and fauna”, the second one on “trees and plants” and the last one includes “human activities” and generally the use of forest by humans. Many students gave a precise definition of a forest based on living inhabitants⁶ or trees and plants. But there

³ or according legislations’ context.

⁴ walking, relaxing, nature study, bird watching, picnicking, etc.

⁵ FLEGT, proposal for an EU Action Plan, 2013.

⁶ European Commission. Managing NATURA 2000 sites, The provisions of Article 6 of the ‘Habitats’ Directive 92/43/EEC.

are some students that define forests from the physical and psychological effect to human beings based on beneficial⁷ aspects or human damaging impact on the environment. Those who defined forests based on harmful human activity seem to have less correspondence to legislation and less awareness on the climate change, environmental policymaking, green technology and forests' protection acts.

According to the Greek Constitution, article 24, “As forest or forest ecosystem is meant the organic whole of wild plants with ligneous trunk on the requisite land surface, which, together with the co-existing flora and fauna, form throughout their mutual interdependence and interactions, a certain biological community (forest biological community) and a certain natural environment (forest environment)”.

Figure 1. Forest Definition (%)

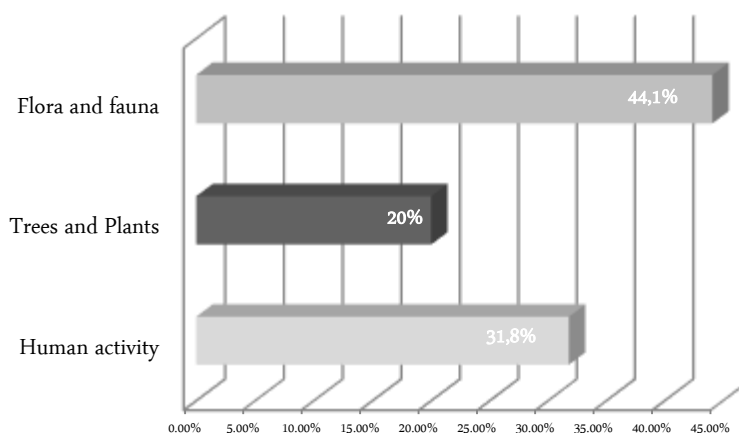
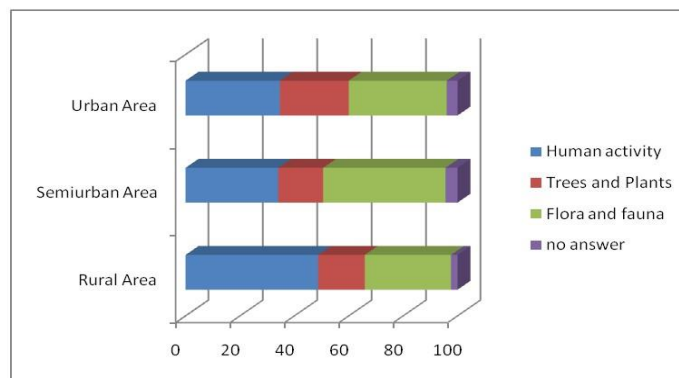


Figure 1, presents the different definitions of “forest” according to students of Political Sciences Department. It seems that 44.1% percent of the students is familiar with the legal framework and correlates forest’s ecosystem with forest environment but the 20% has limited knowledge about it by using the phrase “trees and plants” without mentioning the interdependence of “flora and fauna”. While, 31.8% of the students seem to acknowledge nature’s contribution in a person is physical and psychological state of mind rather than forest itself. In addition, in more detail, one out of three students describes forests by mentioning human activities that damaging the nature. But, this issue needs further and more detailed consideration.

According figure 2, it seems that students that come from rural areas pointed out the human activities over forests by 48.8%, 34.7% from urban areas and 34.1% from semiurban areas. Students from semiurban areas mention “flora and fauna” by 45% and students from urban areas tend to use the same definition by 36%. Thus, “trees and plants” is used less as a definition by 25.3% from students from urban areas, 16.5% by those from semiurban areas and 17.1% from rural areas.

Afterwards, we analyze students’ satisfaction and appreciation towards visiting forests. The 25% percent stated that they are “very satisfied” by visiting forest areas, 50.5% “satisfied” and 11.8% say they are “neither satisfied nor dissatisfied”. Whereas, 10.5% are dissatisfied and 1.4% are very dissatisfied by visiting forests.

⁷ such as a relaxing and stress releasing place.

Figure 2. Origin/ Forest Definition (%)

Generally, the 6.4% of the students stated that have visited a forest less than a week ago, 18.6% have visited a forest area 1-4 weeks ago. Also, 23.6% 1-2 months ago, 10% 3-4 months ago, 9.5% 5-6 months ago, 11.8% 7-12 months ago, 8.6% 1-2 years ago, 6.8% more than 2 years ago, 3.6% more than 5 years ago and only 0.9% stated than had never visited a forest at all. The average student visits forests within the two previous months.

Students from urban areas stated that they extremely enjoy visiting forests by 68%, from semiurban areas by 77% and from rural areas by 87%. Also, those who visit forests were asked the means of transportation they usually use. The 56.4% of them usually visits forests by car, 23.6% on foot, 10.9% on bike, 4.1% by motorbike and only 4.1% uses public means of transportation.

Table 1. Means of transportation/Origin areas (%)

	Origin Areas		
Transportation	Urban areas	Semiurban areas	Rural areas
Car	62.7%	49.5%	53.7%
Motorbike	4.0%	5.5%	2.4%
Public Transportations	6.7%	4.4%	0%
Bike	8.0%	14.3%	9.8%
On Foot	17.3%	25.3%	34.1%

Table 1, shows a correlation between means of transportation and origin. 62.7% of the students from urban areas use cars and 17.3% of urban origin visit forest areas by foot. The same holds for students from semiurban areas (49.5% by car and 25.3% on foot) and also from rural areas (53.7% by car and 34.1% on foot).

And as long as the purposes of visiting forests, students could point out up to three most common activities. The 65.9% of the students usually visit forest areas for relaxing, the 36.4% for hill walking/climbing, the 26.4% for taking photographs, the 16.4% for camping, the 16.4% observing/learning about nature, the 15.5% for picnicking, the 11.4% for cycling, the 7.7% walking the dog, the 3.6% for hunting/ fishing and the 3.2% horse riding. Further analysis indicates that 42% has chosen only one activity, 10% had chosen two activities, 47% three activities and 1% does not visit forests at all. Students who claim to have only one activity (42%) during visiting forests: 20% visits forests for hill walking/climbing, 7.7% visit forests for relaxing, 3.2% for taking photographs, 2.7% for picnicking, 2.7% for cycling and

2.7% for camping. Students who claim to have two activities (10%) don't seem to have two activities for more than 2% in each case. But those who have three activities 6.4% get to do hill walking/climbing-relaxing-taking photographs, 3.6% get to do relaxing-observing/learning about nature-taking photographs, 3.6% get to do hill walking/climbing-relaxing- taking photographs. 3.2% get to do hill walking/climbing- picnicking- relaxing and 3.2% get to do hill walking/climbing- camping-relaxing.

Concerning the participation in projects (Chadjipadelis et al., 2003) during school, 48.2% of the students did not participate in environmental projects. From the rest (51.8%) who participated, 18.6% participated only during Elementary school, 16.8% during Elementary and Middle-High school and 16.4% during Elementary, Middle-High and High school. In general, students during environmental projects are occupied with reforestation, recycling and projects dedicated to environmentally protected areas in Greece region. Concerning gender in correlation with participation in environmental school projects, table 2 demonstrates that during Elementary School male students participated by 16.4 percent and female students by 19.6 percent. The same holds for Middle-High School (m: 16.4%, f: 17.0%) and for High-School (m: 14.9%, f: 17.0%).

Table 2. Project Participation by gender (%)

Education	Gender		
	Male students	Female students	Total
Elementary school	16.4	19.6	18.6
Middle-High School	16.4	17.0	16.8
High-School	14.9	17.0	16.4
No participation	52.2	46.4	48.2

Generally, in this analysis, there are no differences observed about gender distribution regarding the participation in environmental school projects.

Table 3. Project Participation by origin (%)

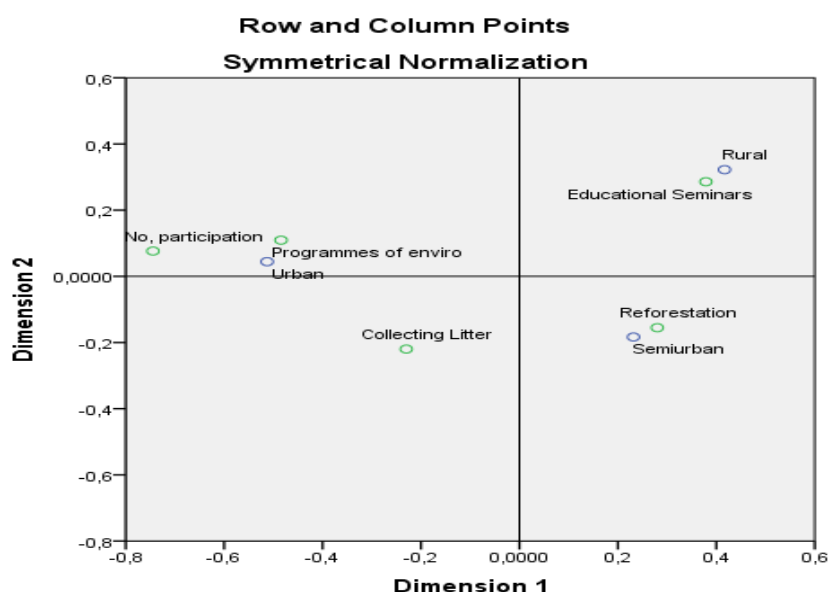
Education	Origin			Total
	Urban area	Semiurban area	Rural area	
Elementary school	18.7	22.0	14.6	18.6
Middle-High School (up to)	8.0	20.9	12.2	16.8
High-School (up to)	16.0	13.2	29.3	16.4
No participation	57.3	44.0	43.9	48.2

Table 3, illustrates that students from semiurban and rural areas tend to participate in environmental projects more than students from urban areas. During Elementary School, students from urban areas participate by 18.7 percent, those from semiurban areas by 22.0 percent and students from rural areas by 14.6 percent. During Elementary and Middle-High School students from urban areas participate by 8.0 percent, those from semiurban areas by 20.9 percent and students from rural areas by 12.2 percent. During Middle and High-School students from urban areas participate by 16.0 percent, those from semiurban areas by 13.2 percent and students from rural areas by 29.3 percent. It seems that origin is a significant factor for participating in such projects.

Next, the issue of protecting forest areas and its beneficial effects was analyzed and in this case students could point out up to two effects. 83.2% of the students estimate that forests offer a clean atmosphere, 38.6% climate adaptation, 30% flood protection, 12.7% clean water supplies, 12.3% relaxation and enjoying nature and 9.5% fertile soil. By using Hierarchical Cluster Analysis we define clusters for the mentioned benefits. One cluster consists of the benefits of “clean water supplies”, “fertile soil”, “relaxation and enjoying nature” and the second one includes “clean atmosphere”, “climate adaptation” and “flood protection”. The two clusters described as follows: the first cluster concerns factors that offer prosperity and the second one concerns the preservation of nature in order to protect and sustain life.

Additionally, concerning forests’ threats (Kaimowitz, 2003) students could point out up to two threats: fires (86.8%), litter (39.5%), the lumbering (26.4%), illegal hunting (19.1%), house building (12.3%), farming (4.1%) and noise pollution (1.4%). By using Hierarchical Cluster Analysis, we define threat’s clusters. The first cluster consists from “farming”, “house building” and “noise pollution” and the second one includes “illegal hunting”, “litter”, “fires” and “lumbering”.

Figure 3. Origin/ Participation in NATURA’s acts



The definition of NATURA⁸ area is also discussed. Students asked to select those characteristics that areas must have in order to be considered as NATURA area. Unfortunately, no one could identify all the given characteristics. The 87.3% pointed out that the protection of a natural environment and ecosystem can suggest that an area is protected, the 17.3% an area for environmental training and research, the 4.5% development of local communities and the 3.2% as a park of tourism and relaxation. It is estimated that students that select as a first characteristic “protected area of a natural environment and ecosystem”, select as a second characteristic “area for environmental training and research” by 15.1%, “a park of tourism and relaxation” by 3.1% and “development of local communities” by 3.1% as a second characteristic.

Students were asked if they would want to participate in NATURA’s acts in order to protect forest areas 36.4 percent stated that would want to participate in reforestation, 20.9 percent in programmes of environmental education, 20.5 percent in educational seminars for forests’ protection and 14.5 percent in collecting litter. Only 6.8 percent did not express any interest in participating in such protection actions. Concerning this issue, students reported that their information about NATURA 2000 is limited, the 30.5% stated that the information

⁸ Ministry of Environment and Energy, NATURA 2000 characteristics (in Greek) <http://www.ypeka.gr/LinkClick.aspx?fileticket=sAQ4jrOlk%2bo%3d&tabid=432&language=el-GR>

is insufficient, the 30.5% there is some sufficient, the 15.9% neither-nor, the 12.3% very effective and the 1.4% extremely effective.

Next, we applied Correspondence Analysis (SPSS) in order to investigate the correlation between students' origin and their participation in NATURA's acts. The first dimension explains 94.7% of total variability.

Figure 3 (first and second dimension plot), demonstrates that students from semiurban areas are willing to participate in reforestation actions while educational seminars seem to hold students' from rural areas interest. Moreover, students from urban areas are prone to programmes for environmental education and no participation at all. Further analysis (table 4) indicates that students from urban areas are more interested in participating in programmes of environmental education than the others by 25.3%. Reforestation is more appealing to students from semiurban areas by 39.6% and rural areas by 39%. And educational seminars are appealing to students from rural areas by 26.8%.

Table 4. Origin areas/Participation in NATURA's acts (%)

Origin	NATURA's acts				
	Programme s of Environmen tal Education	Reforestati on	Educational seminars	Collecting Litter	No participatio n
Urban area	25.3	30.7	17.3	16.0	9.3
Semiurban area	17.6	39.6	22.0	14.3	5.5
Rural area	17.1	39.0	26.8	12.2	4.9
Total	20.3	36.2	21.3	14.5	6.8

Also students seem to have limited awareness, as far as concern green technology. A list with green technology actions was given and students have to select the right ones. Students could note up to four acts. In particular, the 64.1% choose photovoltaic installations, the 46.8% recycling electrical appliances, the 49.1% electrical vehicles, the 43.6% green houses, the 36.4% biomass fuel, the 22.7% eco-friendly laptop and shell phones and the 15.9% artificial photosynthesis. Students of the Department seem to have limited awareness about green technology and all the appropriate actions that need to be made in order to protect, recycle and save earth's resources

4. Behavior Patterns

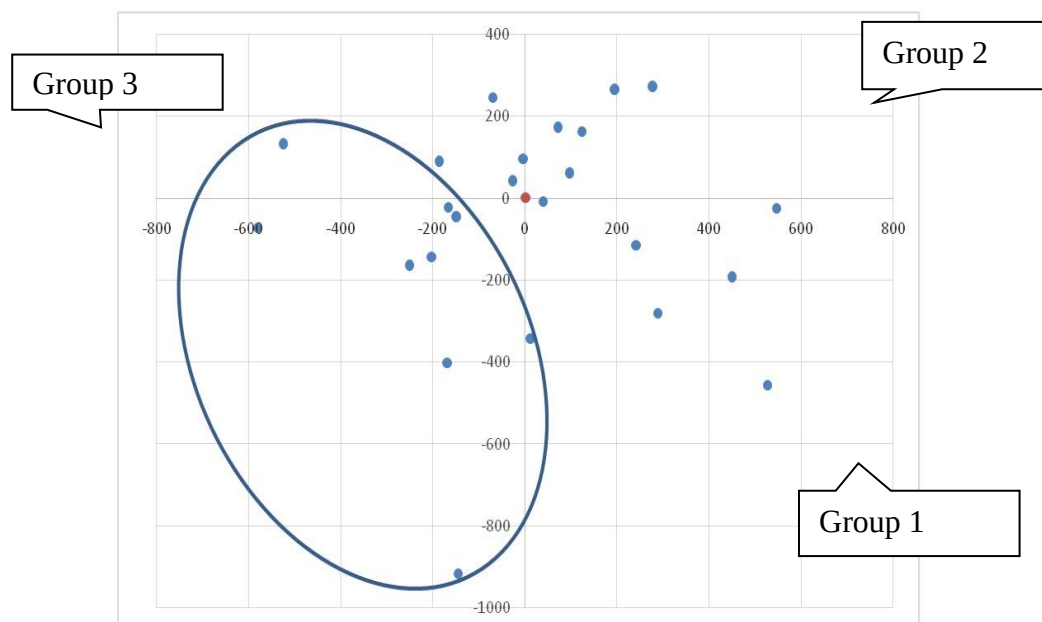
In order to examine and analyze behavior patterns we used the method of Correspondence Analysis and FACOR by M.A.D. software. For the analysis, we used the variables: "forest definition" (FOR_DEF) in 4 levels: namely [1: definition "flora and fauna", 2: definition "trees and plants", 3: definition "human activity", 4: no definition], "gender" (GENDER) in two levels: namely [1: male students, 2: female students], "origin" (CATEG_OTA) in three levels: namely [1: urban area, 2: semiurban area, 3: rural area], "satisfaction from visiting forests" (new_e1) in three level: namely [1: very satisfied. 2: satisfied 3: dissatisfied], "forest visiting frequency" (new_e2) in four levels: namely [1: within month, 2: within this year, 3: more than two years, 4: never pay a visit], "means of transportation" (new_e3) in three levels: namely [1: cars - motorbikes - public transportation, 2: bike, 3: on foot], "activities during visit" in ten levels: namely [1: hill walking/climbing, 2: cycling, 3: camping, 4: hunting/

fishing, 5: picnicking, 6: relaxing, 7: walking the dog, 8: observing/learning about nature, 9: horse riding, 10: taking photographs], “participation in environmental projects” (E6_NEW) in four levels: namely [1: no participation, 2: Elementary School, 3: Elementary and Middle-High School, 4: Middle-High and High school] and “forests’ acreage” (E5) in two levels: namely [1: do not exist. 2: exist in some extent].

According the analysis there are three different groups (figure 4). The first group (15% of the students) includes those students who give their definition based on “human activity” (FOR_DEF3) and extremely enjoy (new_e11) visiting forest areas frequently within a month (new_e21). Moreover, students of this group visit forests on bike (new_e32) and they participated in environmental projects during Middle-High and High school (E6_NEW4).

The second group (52% of the students) includes female students (GENDER2) that are satisfied (new_e12) by visiting forests and tend to visit them within a year (new_e22). Their definition is based on “flora and fauna” (FOR_DEF1) and the visit the areas on foot (new_e33). This particular group comes from semiurban and rural areas (CATEG_OTA2 and CATEG_OTA3) and they participated in environmental projects during Elementary and Middle-High School (E6_NEW3).

Figure 4. Groups of behaviour pattern in M.A.D.



The last group (33% of the students) includes male students from urban areas (CATEG_OTA1) who give their definition based on “trees and plants” or are unaware to the definition (FOR_DEF2 and FOR_DEF4). Those students do not regularly visit forest areas and if so, it’s in more than a year (new_e23) and use cars-motorbikes-public transportation (new_e31). They did not participate in any environmental project (E6_NEW1) and do not believe that there are enough forests in Greece (E51).

Afterwards, we applied Hierarchical Classification. Table 5 illustrates the polarization for the two first axis.

In the first axis, by blue and green color we represent the level of variables that are significant for the two poles. In the first pole, there are students from urban areas (CATEG_OTA1) who seem dissatisfied by visiting forests (new_e13), visit forest in more than a year (new_e23) and use cars-motorbikes-public transportation (new_e31). In the second pole, there are students that are very satisfied (new_e11) and have visited forests within a month (new_e21), use bike (new_e32), define forests by addressing human activity

(FOR_DEF3) and have participated in environmental projects during Middle-High and High School (E6_NEW4). In the second axis, are demonstrated also two colors that represent two poles: male students (blue color) and female students (green color). Male students believe that there are not enough forests in Greek region (E52) and do not give definition of “forest” (FOR_DEF4). But, female students define forests by “flora and fauna” (FOR_DEF1) and are satisfied by visiting forests (new_e12). Significance defined according Benzecri ($COR \geq 200$ and $CTR \geq (1000/(\#categories+1))$) (Benzecri, 1992).

Table 5. Polarization

IND	#F1	COR	CTR	#F2	COR	CTR
GENDER1	-169	85	21	-402	484	170
GENDER2	72	85	9	173	484	74
E51	-4	0	1	96	242	26
E52	12	0	1	-342	242	90
CATEG_OTAI1	-203	168	36	-144	84	25
CATEG_OTAI2	40	9	2	-8	0	1
CATEG_OTAI3	277	141	37	273	138	52
FOR_DEF1	-69	25	5	246	337	91
FOR_DEF2	-250	108	29	-164	46	17
FOR_DEF3	241	218	47	-115	48	15
FOR_DEF4	-145	6	2	-917	249	114
new_e11	289	193	48	-281	181	67
new_e12	124	120	19	163	207	48
new_e13	-580	640	186	-72	9	5
new_e21	450	472	124	-192	85	33
new_e22	-26	6	1	43	17	4
new_e23	-525	441	127	133	28	12
new_e31	-166	348	41	-22	5	2
new_e32	527	248	73	-457	186	81
new_e33	195	90	22	266	169	60
E6_NEW1	-149	158	25	-45	14	4
E6_NEW2	-186	62	15	90	14	6
E6_NEW3	97	11	4	62	4	2
E6_NEW4	547	433	125	-25	0	1

5. Environmental Issues in Greece

Beside the aforementioned students' overview about forests in general and legislation matters, the survey included current⁹ environmental issues (Davis et al., 2013) in Greece. We examined students' opinion on the issue of Ellinikon International Airport, “Scouries” gold mine and Aheloy river aberration in correlation with Greek parties' positions about the current affairs.

Ellinikon International Airport was the international airport of Athens up until 2001, when it was replaced by the new International Airport "Eleftherios Venizelos". Nowadays, it is examined on how this area could be reused for deferent purposes such as a park with green fields alongside (Table 6). The first option is to be transformed into a public “green area” accessible to all citizens. This proposition seems attractive to students (24.5% strongly agree, 49% agree). The other preposition is to be transform into a park with mild cost intervention but students are rather confused (45.5% agree, 37.3% neither) and the third preposition is that

⁹ July, 2017.

the Greek State could decide about the investments and defend citizens' rights over the area (39.5% agree, 30.5% neither). This issue is highly controversial and it seems that students are confused and indefinite.

Table 6. Agreement-Disagreement over local issues (%)

Ellinikon Airport			
Scale	“green area”	Park with mild intervention	Greek state, manager
Strongly Agree	24.5	6.8	11.4
Agree	49.1	45.5	39.5
Neither-nor	20.9	37.3	30.5
Disagree	3.2	8.2	12.3
Strongly disagree	0.9	1.8	0.9

This issue is also highly controversial in Greek Parliament which in those terms explains the confusion among students. In particular, SYRIZA's position is that the airport could be transformed into a public “green area” accessible to all citizens with public management which could be self-financed from its own means. According to SYRIZA (administration party) it could be used as park for recreational purposes, cultural events and several other uses for Greek citizens. On the other hand, ND (opposition party) claims that the private sector investments could take place but is the Greek State that is to decide about the investments and defend citizens' rights over the area. The “Ecologist Greens” propose to transform it into a park with mild and low cost interventions regarding the environmental protection acts and defending the development of a public green area without reconstructions. There are enough issues in this case, concerning the management criteria of the area (public or private), financial issues about the investments, environmental issues, the multiple uses of the area and the terms of reconstructing the area.

Indefinite conclusions are monitored about the issue of “Scouries” gold mine (table 7) and the question refers to employees strike. Students seem divided once again about this issue (strongly agree 10.9%, agree 31.4% and neither 42.7%).

This issue is based upon legislation and government politics between Greek government and an investment company acts in “Scouries” gold mine. There have been several positions about investments, vacancies and local people's disputes over the gold mine exploitation from the one hand and environmental issues from the other. Therefore, the employees of the gold mine declare strikes and try to raise state's awareness about their working future. Most of the parties try to combine vacancies and environmental protection acts but at the present it seems that there is no clear solution to this matter.

Table 7. Agreement-Disagreement over local issues (%)

Scouries	
Scale	Employees strike
Strongly Agree	10.9
Agree	31.4
Neither-nor	42.7
Disagree	10
Strongly disagree	3.6

The last issue refers to Aheloy river aberration; students are neutral about stopping constructions in the area 56.4%. And as for the use of Aheloy's water resources by households and industries in terms of producing energy, students seem to agree by 40% and disagree by 8.2% (table 8).

Table 8. Agreement-Disagreement over local issues (%)

Aheloy river		
Scale	Stop constructions	Using water resources
Strongly Agree	6.4	6.4
Agree	17.7	40
Neither-nor	56.4	42.7
Disagree	16.8	8.2
Strongly disagree	2.3	2.3

SYRIZA have decided to stop the constructions based on environmental and agricultural issues but the communist party KKE stated the importance of the constructions, suggesting that the river water could be used in terms of producing energy by households and industries.

6. Discussion-Conclusions

This survey provided a more detailed overview about forests' impact on students' life and their understanding of the forests' contribution to the environment. Students appreciate the contribution of forests in their life (75%) and frequently visit forests. The 56.4% of them usually visits forests by car, 23.6% on foot, 10.9% on bike, 4.1% by motorbike and only 4.1% uses public means of transportation.

In addition, as long as their habits (Zandersen et al., 2007) of visiting forests, the 65.9% usually visit for relaxing and the 36.4% for hill walking/climbing.

Three different approaches recorded, on what area can be consider as a forest. Firstly, it is defined by flora and fauna, secondly in correlation with nature (trees and plants) and last but not least a definition correlated with its contribution to a person's life. The 44.1% of the students is familiar with the legal framework and 31.8% of the students seem to acknowledge nature's contribution in a person's physical and psychological state rather than forest's environment.

Generally, students' participation in environmental projects is correlated with origin but as far as gender distribution there are no differences observed.

In the survey, students' opinion over the benefits and threats of forests, resource, contributions to the well-being of the citizens and forests' inhabitants are recorded. Students (83.2%) estimate that forests offer cleaner atmosphere and the higher threat is (86.8%) fires.

Students' information about NATURA 2000 is limited; the 30.5% stated that the information is insufficient and the 30.5% is somewhat sufficient. Students were willing to participate in NATURA's acts in order to protect forests. Environmental protection and green technology are crucial factors that can be in a long-term beneficial to everyday life in cities but students seem to have limited awareness about green technology and appropriate actions. Students are not sufficiently informed, but are willing to participate in such actions. Students from semiurban areas are willing to participate in reforestation actions and students' from rural areas are interested in educational seminars. Moreover, students from urban areas are prone to programmes for environmental education and no participation at all.

In addition, groups of students formed by M.A.D. By CAH there are three different groups. The first group (15% of the students) includes those students who give their definition based on “human activity” and extremely enjoy visiting forest areas frequently within a month. Moreover, students of this group visit forests on bike and they participated in environmental projects during Middle-High and High school.

The second group (52% of the students) includes female students that are satisfied by visiting forests and tend to visit them within a year. Their definition is based on “flora and fauna” and the visit the areas on foot. This particular group comes from semiurban and rural areas and they participated in environmental projects during Elementary and Middle-High School. The last group (33% of the students) includes male students from urban areas who give their definition based on “trees and plants” or are unaware to the definition. Those students do not regularly visit forest areas and if so, it's in more than a year and use cars-motorbikes-public transportation. They did not participate in any environmental project and do not believe that there are enough forests in Greece.

By using AFC for the first axis we define two poles. In the first pole, there are students from urban areas who seem dissatisfied by visiting forests, visit forest in more than a year and use cars-motorbikes-public transportation. In the second pole, there are students that are very satisfied and have visited forests within a month use bike, define forests by addressing human activity and have participated in environmental projects during Middle-High and High School.

In the second axis, we have: male students from the one hand and female students from the other. Male students believe that there are not enough forests in Greek region and do not give definition of “forest”. But, female students define forests by “flora and fauna” and are satisfied by visiting forests.

Finally, it was illustrated that students are rather confused and indefinite over national environmental issues that were asked in the survey in order to examine students' agreement or disagreement. But this issue needs further research on students' correspondence to parties' manifestos or even Greek legislation.

Therefore, this survey (Iarossi, 2006) can be consider as an evaluation tool of the perceptions of students towards state' actions, volunteering and non-profit organizations actions about protecting forests and their inhabitants. Moreover, it could record students' comprehension over forest protection acts in a national or E.U. level and finally their awareness on the climate change, environmental policymaking and green technology in the future. The next step for this survey is to be conducted to undergraduate students for all departments in Aristotle University of Thessaloniki. The aim would be to compare and contrast students' overview about forests' impact on their life, their understanding and awareness of the forests' contribution to the environment and to everyday life according their study field.

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