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Changing Livelihood Patterns: A Study of Sikkim Himalaya

Abstract:
The mountain area is characterized by fragility, marginality and niche. So, the livelihood options are comparatively lower and different than the plains. In Sikkim, the main livelihood options are – terrace cultivation, plantation, service, livestock rearing, petty trade or business and tourism. Previously, most of the people were dependent on forestry. The indigenous tribe, Lepcha, was totally dependent on forestry, and sometimes fishing and hunting. Initially, the Nepali people of Sikkim built terrace and started cultivation. Primarily, cereal based crop farming was practiced. Maize, wheat, rice, buck wheat, millet, etc., were cultivated dominantly. The cropping pattern has changed through the years. The population started to shift from traditional farming to cash-crop based farming. They started to produce mustard, potato, ginger and other horticultural crops. In the pre-merger period, more than 70 percent people were dependent on agriculture but in the 1990s it fell below 50 percent. The activity of plantation has increased enormously. In Sikkim, cardamom is the main plantation activity and it is the oldest cash-crop which was introduced by the natives. The plantation of some fruit trees, fodder trees and timber trees can be seen in the homesteads. Tea plantation is also introduced in Temi by the Government. Since agriculture is still at a subsistence level and it is too hard to maintain livelihood by the sole earning from agriculture, people are compelled to think for alternative livelihoods, like rearing livestock. Mainly, goats, pigs, mules, cattle, poultry, yaks, sheep are reared in Sikkim. Almost all households reared one or the other livestock for supplementary source of income.

Keywords: livelihood, agroforestry

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1.Introduction

According to dictionary, Livelihood is "means to living". According to Chambers and Conway (1992:7) - "Livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required to for a mean of living." This definition directs the link between assets and options people possess in practice to pursue alternative activities that can generate income level required for survival. The followers of Chambers and Conway have identified five main categories of capital contributing to assets in livelihood, which are as follows: i) Natural Capital, ii) Physical Capital, iii) Human Capital, iv) Financial Capital and v) Social Capital.

i) *Natural Capital*: It refers to the natural resource base (land, water, trees) that yields products for the use of human survival.

ii) *Physical Capital*: It refers to assets, which are essential for economic production process, e.g. tools, machines, terraces in mountains for cultivation and irrigation canals etc.

iii) *Human Capital*: It refers to education level and health status of population.

iv) *Financial Capital*: It refers to stock of cash to purchase production and consumption of goods.

v) *Social Capital*: It refers to the social networks and associations in which people participate for deriving support for livelihoods.

The definition of livelihood has been formulated in a most comprehensive way as follows:

"A livelihood comprises the assets (the natural, physical, human, financial and social capital), the activities, and the access to these (mediated by institutions and social relations) that together determine the living gained by the individual or household". [Frank Ellis]

But the elements cannot assume to be fixed. Rather available activities fluctuate seasonally and across the year. At present, in developing countries, the characteristic of rural livelihood is to adapt in order to survive. The shifting norms and events in the social and institutional context surrounding their livelihoods compel the individual household to change the access to resources and opportunities.

The objective of the study is to sketch the graph of changing livelihood patterns in the Sikkim Himalayas. Keeping in mind the bottlenecks and obstacles of the hills, the alternative options are to be explored.

The terms livelihood and income are not synonymous, rather income of an individual, at a given point of time, is the most direct and measurable outcome of the livelihood process.

Livelihood is the way to generate income for living. Income consists of both cash and in kind contributions to the material welfare of the household driving from the set of livelihood activities in which wages, rents and remittances are the components of cash income; and consumption of own-farm produce, payments in kind, and transfers or exchanges of consumption items are the components of in-kind income.

It is also important to know the difference between farm income, off-farm income and non-farm income.

Farm Income: The income generated from own account farming whether on owner occupied land or in tenant land. Broadly, it includes livestock income, crop income, consumption income of own–farm output as well as cash income obtained from output sold.

Off-farm Income: It typically refers to wage or exchange labour on other farm within agriculture. It includes labour payment in kind (either may be as harvest share system or other non-wage labour contracts). It may include the income obtained from local environmental resources such as firewood, charcoal, house-building materials, wild plants etc.)

Non-farm Income: It refers to non-agricultural income sources. It may include the followings - a) Salary income, b) Business income, c) Rental income, d) Urban to rural remittances, e) Pension payment and f) International remittances.

According to Frank Ellis, "Rural livelihood diversification is defined as the process by which rural households construct an increasingly diverse portfolio of activities and assets in order to survive and to improve their standard of living."

The evolution of rural livelihoods can be described by three main groups of theories, namely, agricultural development, political economy and population and technology theories.

The evolving role of agricultural sector to the development process has been described by the Agrarian Development Theories. The dual economy approach (Lewis, 1954; Fei and Ranis, 1964) envisaged no prospects for rising productivity in so called traditional agriculture, which could only therefore passively supply resources to the modern sector of the economy until the latter eventually expanded to take its place. Later models retained the core idea that agriculture would decline in its share of GDP as development process, as in the history of the industrialized countries.

In 1970, the central focus of agricultural development was the achievement of rising productivity in small-farm agriculture and it remained the orthodoxy well into the 1990. [Tomich et el., 1995]

The main livelihood activities in mountain areas are terraced agriculture, paddy farming and cash cropping, grazing, fishing, tourism, shifting cultivation, agroforestry etc. Thus the main source of livelihood revolves around agriculture. According to one study, livelihood of majority of the mountain people in the Hindukush Himalayan (HKH) region countries (Nepal, Bangladesh, Bhutan, Pakistan, India, China, Myanmar and Afghanistan) revolves around agriculture. In the HKH countries, a population of about 150 million inhabitants lives in an area of 3.4 million sq. km, with about 35 persons/sq.km. The actual pressure on sloping hills and mountains on the agricultural land is much greater in terms of food security and livelihood of the mountain people (Pratap, 2001).

2. Methodology

Sikkim is a small hill state with greater land elevation ranging from 270m. to 8580m. The altitudinal differences across the state caused variation in nature in all aspects. Administratively, the state is divided into four districts, namely, North, South, East and West. These four districts belong to different altitudinal locations. It can be called a Stratum. It is assumed that in a stratum, all people are homogenous in nature. So, the sample collected proportionately from each stratum. This type of sampling is literary known as Stratified Sampling. Data is collected from each district and the place is selected on the basis of secondary data. The data on livelihood options for various years have been collected to analyze the change.

Livelihood Options in Sikkim Himalaya:

Mountain area has various constraints in the way of maintaining livelihoods. Almost all the mountain area has limited livelihood options than in the plains. Common livelihood options prevailing in the mountain area are: terrace cultivation, forestry, service, petty trade, livestock rearing, plantations, cottage industries and tourism etc. In Sikkim, the main livelihood options are – crop cultivation, large cardamom plantation, livestock, agricultural labour, non-agricultural labour, service and business/shop and of late, tourism. Terrace cultivation is practiced in all the four districts. Though crop productivity is not so good in Sikkim Himalaya, most of the people in this state depend on agriculture for their livelihoods. Plantation is another important means of livelihood. In Sikkim, various plantation activities

are possible, e.g., of tea cultivation and processing, large cardamom cultivation and processing, mandarin orange, plum, pear and peach growing and packaging, etc. Large cardamom is the most important plantation crop in Sikkim. Livestock rearing is also an important livelihood option in Sikkim. It has both domestic and business aspects. Mainly pig, sheep, buffalo, cow, yak, poultry etc are reared in this area. The service sector has second largest contribution for the livelihoods of the Sikkimese. People working at state or central govt. offices, teachers, doctors etc. fall in this sector. Many people maintain their livelihoods through trading and female participation is quite good in this field.

Agriculture: As can be expected, agriculture is the main livelihood in Sikkim. More than fifty percent people of Sikkim depend primarily on agriculture to earn a living. Though mountain areas have many constraints, the population pressure has compelled the people to plough intensively by way of terrace farming. As flat piece of land is hardly available, people practice terrace farming on mountain slopes having moderate slope. In the pre-merger period, the state was much backward economically and more than 90% people depended on agriculture to maintain their livelihood. But, in post-merger period, the dependency declined to 52%. The people were primarily practicing cereal crop-based farming before 1975. Subsequently they have adapted certain cash crops.

Agricultural Labour: This livelihood option is not as widespread as in the plains, because, there are many constraints of agriculture and labour is a high priced commodity in the mountains. Most of the farm owners work in their own land for to raise crop.

Large Cardamom Plantation: Growing cardamom in small plantations and in forested areas is an age-old livelihood activity of the indigenous tribes of Sikkim. Most of the rural people grow cardamom to supplement their livelihoods. Larger plantations were created much later by wealthy indigenous farmers owing to high profitability and cash rewards brought home by exporting the crop. It is widespread throughout the state, particularly in humid forest areas. Large cardamom is also the main commercial crop in Sikkim. The state is the largest producer of this spice.

Livestock Rearing: The congenial temperate climate and sub-alpine vegetation in the Himalayas are highly favorable for exotic high producing livestock. The highlanders like Lachungpas, Lachenpas, Gurungs and Sherpas of Sikkim have a traditional pastoral economy which has been handed over from generation to generation with there typical kinds of livestock such as Yaks, sheep, mountain goats, pigs and poultry. With the increase in population and the limited availability of land (as 70% of the holding in Sikkim is smaller than 2 hectares) there is already great pressure on the cultivable land and forest and on the environment as well. Many farmers are complaining about the change in environment and decline in soil fertility. Under such situation livestock farming which requires minimal use of land, labour and capital would be ideal sustainable model for development in such difficult mountainous terrain. At present almost 70% of the farmers rear their livestock under stall fed condition and has drastically reduced pressure on land due to overgrazing. The development of livestock would not only provide supplementary source of income but would provide high protein rich food items such as milk, eggs and meat and organic manure for crop production.

Forestry

The land cover under forestry was always high in Sikkim. This forest is the hotspot of tremendous biodiversity with 4500 flowering plants, 515 orchids, 36 rhododendrons etc. The latest data of forest land as found from the Forest Survey of India (FSI), State Forestry Report 2003, has shown that the dense forest covered area has declined 29 sq.km., whereas the open forest area has increased 98 sq.km. and scrub area cover has increased also up to 19 sq.km. It can be concluded from the following table that the decrease in non-forest area came under the forest area, which was consequence of the measures taken to conserve the forest area for environmental aspects. Since most of the forests in Sikkim are protected, people cannot maintain their livelihood depending only on forestry. However they supplement their resources by collecting various forest products, such as, firewood, fruits, roots, resin, etc.

Table 1: Sikkim Forest Cover Change from 2001-2003(Sq.Km.)

Category	2001	2003
Dense Forest	2391	2362
Open Forest	802	900
Scrub	341	360
Non-forest	3562	3474
Total	7096	7096

Source: Forestry Survey of India, 2003, Dept. of Forests, GoI

Tourism:

The most upcoming economic activity in Sikkim is tourism. Nowadays, it is very important livelihood opportunity open to the people of the mountains like Sikkim Himalaya. The very rich natural and cultural heritage of Sikkim and scenic beauty of the hills make this small Himalayan state in Northeastern India an attractive destination for international and domestic tourists. With over 90,000 domestic and 6,000 international tourists in 1995, tourism is rapidly becoming an important livelihood activity for the Sikkimese people.

Agroforestry – the important Livelihood Option

Over the years, the people of Sikkim have evolved many agroforestry practices that proved to be beneficial to meet their need of food and shelter and also biological needs. As the population increased, per capita land availability decreased substantially. The low land-man ratio, low productivity per unit of land caused the rural people to shift from traditional crops to commercial cash crops. Also, the low cropping intensity due to mono cropping compelled the rural people to change their livelihood patterns. After the merger of Sikkim with India the land-use patterns changed at a faster pace. The imminent need to expand agricultural production while retaining the existing forests has given rise to agroforestry. Since the agroforestry practices are environment friendly, they may thus play an important role in developing more intensive, socially responsive, ecologically sustainable and economically efficient patterns of land-use for the people of Sikkim. Up to 1987, the ICAR identified three distinct agroforestry systems in Sikkim, which were as follows: I) Large Cardamom + Utis, Chillowani etc., II) Fodder trees with upland crops and III) Citrus + Maize (Ragi); Buck Wheat/ Soya bean/ Beans/ Ginger.

Later, the Indian Council of Agricultural Research (ICAR) identified four types of agroforestry systems in Sikkim. They are sylvi-horti systems, horti-agri systems, and miscellaneous fruit trees in homestead and agri-silvy systems. The main commercial and native spice of crop is large cardamom. In Sikkim, the Lepchas, the first inhabitants of Sikkim, used to collect the capsules from the natural forests. Eventually when the forests passed into village ownership the crop was domesticated. Now, Sikkim contributes about 53% of the world's production of large cardamom. A map of major large cardamom growing areas in Sikkim prepared by Sharma shows that the southern half of Sikkim produced the most of cardamom, i.e. within 600m to 200m or Sub-tropical to Temperate zone (Sharma, et al 2000). The Large Cardamom (*Amomun Subulatum*) is grown under the shade of thinned forest or

man-made forest under moist soil with high organic matter content, in the sylvi-horti systems. Up to 1993, 29 shade tree species have been identified which also serve as the main source of fuel, fodder and timber. The predominant shade tree is Utis (*Alnus Nepalensis*), which is a fast growing nitrogen-fixing non-legume. In the horti-agri systems Sikkim mandarins are intensively intercropped with various cereals, pulses and vegetable species. Ginger requires high dose of farmyard, which is also helpful for mandarins, and is the most remunerative cash crop. Guava, banana, drum sticks and few vegetable species like tomato and chili are found scattered over the lands around farmhouses. The agri-silvy system is largely based on fodder and fuel yielding tree species. Fodder trees become important source of fodder during lean period of October to March. Fuel wood is the main source of domestic fuel in Sikkim. Fodder and fuel trees are found growing on terrace risers of uplands and along farm boundaries. 24 fodder trees have been identified of which *Ficus Spp., Artocarpus Lokoocha* and *Litsea Polyantha* are found to be most popular among the farmers. *Guercu Lamellosa* was ranked at number one, followed by *Castonopsis Tribuloides*, *Eurya Japonica*, *Schima Wallichii* and *Alnus Nepalensis.* As such it is in the subsistence level.[7]

Large cardamom (*Amomum subulatum* Roxb.) is a native plant of Sikkim Himalaya and is probably one of the oldest spices known to the mankind. As mentioned by Susruta, it was used in Ayurvedic preparation as early as in the 6th century BC. It was known to the Greeks and Romans as Amomum. The spice was recorded by the Greek philosopher Theophrastus in the 4th Century BC. The cardamom capsule contains about 3% of essential oil rich in cineole. The indigenous tribe, Lepchas, used to collect the capsules from the natural forests. But later these forests passed into the ownership of villages and the plants have been domesticated eventually. Subsequently, Bhutia landlords, named Kazis, monopolized the cardamom plantations and started to cultivate in their large size land-holdings. Subsequently, the Nepalese community knew about this and they too started to harvest *Amomum subulatum* Roxb. as a cultivated species, but there are five more wild species planted in Sikkim, these are: *Amomum Linguiforme, Amomum Kingii, Amomum Aromaticum, Amomum Corynostachyum and Amomum Dealbatum*.

Cardamom is a perennial, low-volume crop, less dependent on external inputs, less infrastructure intensive, high value and non-perishable cash crop planted in marginal lands under tree cover. Normally, it grows in the altitudes of 600-2000m amsl. Humid sub-tropical semi-evergreen forests of mountainous sub-Himalayan regions are its natural habitats. But it is also cultivated in Nepal, Bhutan and Darjeeling hills. The areas receive 2000-3500mm annual rainfall apportioned over 200 days. The higher reaches of the warmer zones

and lower altitudes of cooler zones, which have proximity to snow-line, are best for the fast growth of large cardamom. The constant high relative humidity with temperature ranges between 6 to 30 degree C, are experienced in Sikkim. During the time of flowering, both heavy rainfall and frost or hailstorms may damage the growth of the plants and production. It is a shrub by habit and has several tillers consisting of pseudo stems with leaves on the upper part. The spikes appear on the rhizome from the point where the pseudo stems shoots up. It is propagated by raising seedlings from seeds in nurseries and also through separating the rhizomes from the plants. Harvesting of the crops start from August and lasts till November depending on elevations. It is cultivated under various shade trees. But the most familiar shade-tree Himalayan alder, *Alnus nepalensis* D.Don, locally named Utis, is planted in large area, which has both the ecological and economic importance. Intensive studies have been carried out to evaluate the ecological and economic aspects of Himalayan alder.

The recent study of ICAR, Tadong Centre, Sikkim, which has been published in the Indian Forester (July, 2007), sketched the various agroforestry systems in different altitudes in a comprehensive manner. According to the study, there are nine major agroforestry systems in the sub-tropical (300-900m amsl) and mid-hill temperate zones (900-1800m amsl). The systems are – agri-horticultural, agri-horti-pastoral, agri-silvi-pastoral, horti-silviculture, agri-horti-silvi-pastoral, livestock-based mixed farming, sericulture-based mixed farming, sericulture-based farming, bamboo-based farming, homesteads and tea plantation.

In the sub-apline zone (2700-4000m amsl), only one type of agroforestry system is observed. As this zone is in high altitudes, the horti-pastoral-transhumance is practiced here. During November to April in each year the local bhutia community migrates here for such practice. The *Quercus sp., Acer sp., Betula utilis, Sorbus sp., Carex sp., Trisetum sp., Allium sp.*, etc are produced with various horticultural crops like radish, peas, potato, beans, maize, cabbage, cauliflower etc

The most high altitude area is alpine zone (more than 4000m amsl). In this high altitude area, transhumance is practiced during certain time of each year. The local Bhutia community usually migrates there and practices the livestock-based mixed farming. In this system, the livestock like yak, sheep, and mules are reared with potato, cabbage, peas and Poa sp., Agrostis sp., Carex sp., Rumex sp. Etc. In this area, yak is reared as a main source of livelihood and also used as mode of transport.[9]

The horti-agri system is based on inter-cropping of horticultural and agricultural produces. This system is practiced in low to mid hills. Sikkim mandarin orange is inter-

cropped with annual food crops like maize. Ginger is also produced commercially. In the high hills of temperate zone, apple is inter-cropped with potato, barley, radish, cabbage and turnip. But the existing poor health of apple-trees puts doubt about the substantiality of this system. [10]

The mixed homestead garden type agroforestry system prevails almost everywhere in Sikkim. Around the homestead, a number of tree species such as tree tomato, guava, banana and some of the fodder trees are grown with crops such as vegetable beans, cucurbits, ginger and turmeric. These are grown for home consumption as well as for commercial purposes.[11]

Tea plantation exists in a small area between 1500m to 1800 m. altitudes. Wild cherry trees are planted as live borders in tea gardens. The quality of Sikkim tea is rated very high. However, of all agroforestry systems practiced in Sikkim, cardamom plantation has been found to be the most successful and widespread. The indigenous tribes (Lepcha and Limbu) of Sikkim used to collect large cardamom capsules from natural forests. Large cardamom was domesticated in thinned natural forests. The plantations have more than 30 tree species, which provide shade to the crop and fuel for large cardamom drying and domestic use. Among them alder, a nitrogen-fixing tree is most abundant. Local farmers have evolved a classical tree-cutting schedule in plantation area to get continuous supply of fuel wood and fodder without affecting the shade requirements of large cardamom. Some innovative farmers grow fodder trees as a shade to the cardamom plants. The fodder trees are lopped after harvest of cardamom capsule in November. Large cardamom plantations comprising of trees and perennial herbs resemble a natural forest ecosystem. Sikkim grows 90 percent of the total country's cardamom. There is enormous scope to study the role of cardamom, the chief agroforestry produce, in Sikkim's farm economy.[12]

The large cardamom farming is the main traditional farming system in the Sikkim Himalaya. This system prevails in the marginal lands of forests also. It is very much suited to the environment of Sikkim, because, cardamom cultivation is not only economically valuable but ecologically sustainable. It is not only labour-intensive, but it is a low-volume, non-perishable crop.

The total cropped area in the state increased by 106%, while the land under large cardamom increased by 135% in 20 years. Many new large cardamom plantations are on terrace fields that were previously used for cultivation of paddy and other crops. As found from the study, the gross income from large cardamom cultivation in Sikkim has increased

from US $1.9 million in 1975-76 to 5.7 million in 1985-86 and 6.4 million in 1995-96. [Conversion at the rate of US$1=Rs.50]

Workers

According to Census of India, "work" is defined as participation in any economically productive activity with or without compensation, wages or profit. Such participation may be physical and/or mental in nature. Work involves not only actual work but also includes effective supervision and direction of work. It even includes part time help or unpaid work on farm, family enterprise or in any other economic activity. All persons engaged in 'work' as defined above are workers. Persons who are engaged in cultivation or milk production even solely for domestic consumption are also treated as workers. Reference period for determining a person as worker and non-worker is one year preceding the date of enumeration. The workers are further sub-divided into Main Workers, Marginal Workers, Cultivators, Agricultural Labourers, Household Industry Workers and Other Workers.

Keeping in mind the earlier classification of workforce and the various livelihood opportunities available in Sikkim, the data of various workforce participation since 1971 to 2001, have been shown in the following table to graph the change of the participation.

Table 2: Work Force Participation in Sikkim since 1981 to 2001

Items	***1971***	***1981***	***% Change***	***1981***	***1991***	***% Change***	***1991***	***2001***	***% Change***
Population	*209843*	*316385*	50.8	*316385*	*406457*	*28.5*	*406457*	*540851*	*33.1*
Total Workers	*111609*	*152814*	36.9	*152814*	*168721*	*10.4*	*168721*	*263043*	*55.9*
Main Workers	*111609*	*147436*	32.1	*147436*	*164392*	*11.5*	*164392*	*212904*	*29.5*
a) Cultivators	NA	88610	NA	88610	97834	*10.4*	97834	101200	*3.4*
b)Agricultural Labourers	NA	4887	NA	4887	13793	*182.2*	13793	9081	*-34.2*
c) Worker in HHIndustry	NA	1586	NA	1586	1309	*-17.5*	1309	3168	*142*
d) Other Workers	NA	52353	NA	52353	55785	*6.6*	55785	99455	*78.3*
Marginal Workers	NA	*5378*	NA	*5378*	*4329*	*-19.5*	*4329*	*50139*	*1058.2*
Non Workers	*98236*	*163571*	66.5	*163571*	*237736*	*45.3*	*237736*	*277808*	*16.9*

Source: Adapted from Census of Sikkim and India, 1971, 1981, 1991 and 2001, GoI, New Delhi

The above table shows the broad categories of work-force participation in different censuses of Sikkim. Sikkim became the member of Indian Union in 1975. So, the workforce details were not available in the 1971 census. The detailed data were available in 1981, 1991 and the latest census of 2001. In the decade after the merger of Sikkim with India, the population of Sikkim increased by 50.8 percent. The number of total workers increased by 36.9 percent, but the increase in non-workers was alarming (66.5 percent). The main workers also increased by 32.1 percent. The high growth of population and high growth of non-workers was due to the merger of Sikkim with India. Many people from various parts of the country and even from Nepal came to Sikkim in search of livelihoods.

The second decennial change in population was smaller (28.5 percent) compared to the previous one. The rate of growth of non-workers too slowed down. By that time Sikkim already had substantial increase in total workforce. In that decade, there was 11.5 percent increase in main workers and a very high rate of growth was registered in the category of agricultural labourers, which was 182.2 percent. The most unusual change was seen in case of household industry and marginal farmers. In both the cases, the change was negative. But, during this period the rate of growth of non-workers (45.3 percent) was much higher than the rate of growth of main workers (11.5 percent). This gap proves that the unemployment rate was pretty high during that period.

During the last decade, the rate of growth of population was higher than in the previous decade. But the absorption of the workforce was mainly in 'other workers' category. The rate of growth in cultivators was much lower than the previous decade, which reflects the fact that the agricultural sector was saturated. People supplemented their livelihood by working in marginal work category. The non-agricultural activity, e.g., household industrial work too increased substantially.

Table 3: District-wise Comparative Workforce Participation (1991-2001)

Main Workers				**Marginal workers**		**Non-workers**		**Cultivators**		**Agricultural Labourers**	
District	***Area (km^2)***	***1991***	***2001***	***1991***	***2001***	***1991***	***2001***	***1991***	***2001***	***1991***	***2001***
North	4226	42.9	42.83	1.23	14.78	55.87	42.39	46.25	38.82	14.95	8.87
South	750	41.8	43.55	0.98	9.49	57.22	46.96	70.79	69.57	5.12	3.83
East	954	37.14	37.77	1.37	9.94	61.49	52.29	39.27	32.5	8.4	6.92
West	1116	44.32	36.67	0.54	6.46	55.14	56.87	77.41	67.3	7.29	7.69

Source: Sikkim: A Statistical Profile 2002, DESME, Govt. of Sikkim, Gangtok

The North district of Sikkim, with an area of 4226 sq. km, covers more than fifty percent area of the state. But, most of the area is uninhabited because of high altitude and very low temperature. In 1991, more than half (55.8 percent) of the population was non-workers and 42.9 percent was main workers. Very few (1.23 percent) were marginal workers. In 2001, the number of marginal workers has increased substantially, accounting for 14.7 percent while the number of non-workers decreased to 42.3 percent. It might happen that many people have got the opportunity to work for less than 180 days in a year during the decade. It is also to be noted that the number of agricultural labourers and cultivators have reduced remarkably, which indicates that, peoples were absorbed marginally in other works.

The South district, with an area of 750 sq. km is smallest district in Sikkim. The number of main workers in the district has increased marginally from 41.8 percent to 43.55 percent during this decade. The number of agricultural workers and cultivators has decreased marginally. There is a substantial fall in non-workers and substantial rise in marginal workers, which is same as in North district.

The East district is the most populous district though in terms of area (954 sq. km) it ranks third among the four districts of Sikkim. The percentages of main workers in the district have changed marginally during the last decade. The percentage decrease in cultivators is almost same to percentage increase in marginal workers. There is also decrease in agricultural labourers during 1991-2001. The percentage of non-worker has been reduced substantially, which might be due to increase in opportunity of non-farm activities.

There is a substantial fall in main worker in West district, which is 2nd largest in area (1116 sq. km). The fall in main worker is almost 8% and the increase in marginal worker is almost 6%. The fall in cultivator is almost 10%, which might have been absorbed by non-farm activities. Thus, it can be concluded from the workforce participation figure that the livelihood activity was shifting from farm to non-farm.

In the North, South and East districts the percentages of non-working population have decreased substantially during the last decade (1999-2001). The East district, which had 61.49% non-working population in 1991 has reduced the same to 52.29%. The North district has cut down its non-working population by a margin of 13.48%. The South district too has reduced the non-working population by nearly 10%. The only exception is the West district, where the percentage of non-workers has showed marginal increase. Overall, the state shows a positive shift from high non-working to moderate work-force participation.

3. Changing Livelihood Options: An empirical Study:

Table 4: Sources of Income(in Rs.) of the Sample Population

Districts	Sample Pop.	Monthly income (Avg)	Income from Agro forestry	Agri. prod. (cereals)	Milk	Fruits	Eggs & Poultry	Family remit.	Artisan earning	Trade Earning	Salary	Wages
North	145	1516.7	133.3	233.8	93.8	0.0	45.5	6.9	0.0	84.1	923.4	2.8
South	166	1288.5	30.7	63.3	7.8	0.0	4.1	0.0	0.0	200.7	953.1	0.7
East	445	558.7	47.4	43.8	33.6	5.5	7.0	0.0	0.0	0.0	94.8	22.4
West	137	1567.2	18.6	267.2	362.0	0.0	81.0	0.0	7.3	124.1	682.5	55.2
Total	**893**	**968.9**	**9.4**	**104.7**	**87.7**	**2.7**	**24.0**	**1.1**	**1.1**	**65.3**	**456.7**	**17.0**

Source: Primary Survey, 2007

Table 5: Primary and Secondary Occupation of the Respondents

Districts	No of Respondents	*Primary Occupation (no. of respondents)*				*Secondary Occupation (no. of respondents)*					
		Agri-Culture	Service	Petty Trade	Others	Agri-Culture	Service	Petty Trade	Others	Ag Lab	NIL
North	25	8	15	2	0	9	0	1	0	0	5
South	30	9	19	2	0	4	0	8	1	0	6
East	77	44	25	0	8	22	1	2	3	0	49
West	25	12	11	2	0	12	0	1	0	7	5
Total	***157***	**73**	**70**	**6**	**8**	**47**	**1**	**12**	**4**	**7**	**65**

Source: Primary Survey, 2007

Although around 60 percent of the respondents in the North district are primarily engaged in the service sector, nearly 80 percent of the respondents are engaged in agriculture, both as primary or secondary occupation. This explains very high per capita income among the respondents in this district since both primary and supplementary earnings are drawn from two dominant sources of earning, i.e., the service sector and agriculture. The average income from agriculture is the highest in North district. If the income from agroforestry is added to this income, the resulting income is thus higher than the other districts. However, it is evident that contribution of agroforestry to the monthly per capita income of the respondent group is largely responsible for the high per capita income in this district, when compared to the other three districts of the state. Similar picture can be drawn for the South district where engagement in the service sector is predominant among the respondent group, closely followed by involvement in agricultural activities. However, in this district, contribution from

agroforestry does not constitute a major earning source since earnings from trading activities are significant among the respondent group in the South district.

It is important to note that, in the East district, around 90 percent of the respondents (for both primary and secondary occupation) were found to be engaged in agriculture and allied activities. The average monthly income is the lowest in this district when compared to other districts of Sikkim, although the infrastructural facility is more adequate in this district, as noted earlier. The important aspect of East district is that most of the respondents did not have any secondary source of income as reported in the survey. The activity of petty-trade in some cases is chosen as secondary source of income rather than primary. The East district has lowest per capita income,

The highest monthly per capita income is evident in the West district, of which, income from the service sector is the highest. The income earned from livestock produce (milk) also has a substantial contribution in the total earnings of the households in this district signifying the strong impact of livestock rearing on the economy of the West district.

Table – 6: Crop Information – Present and Past – of the Sample Population

Districts	Present Crop Information			Past Crop Information		
	Spring	**Summer**	**Winter**	**Spring**	**Summer**	**Winter**
North	Wheat	Maize	Paddy	Wheat	Maize	Paddy, Wheat
South	Cereals, Potato, Soybean	Maize	Cereals, Ginger, Pulses, Pea	Cereals, Potato	Maize	Cereals, Pulses,
East	Maize, Millet	Maize, Paddy, Potato	Millet, Potato, Mustard, Paddy	Maize, Millet	Paddy, Maize	Millet, Potato, Wheat
West	na	Pea, Potato, Maize	Maize, Paddy, Ginger	na	Potato, Maize	Maize, Paddy

Source: Primary Survey, 2007

Genarally, North district is high altitude area and mostly uncultivated area. But, the surveyed area is among the cultivated one. The traditional cropping system is still prevailing with minor change in cropping pattern. Previously, the wheat production was familiar, but due to declining profitability, the cultivators started to switch over to plantations. South district has started soybean production in spring and ginger and pulses in winter, in addition to other traditional crops. In East district, the potato and mustard production have been started with other traditional crops. The West district, which is the important cultivated

district of Sikkim, also has minor change in the cropping pattern. The cultivators started to produce pea and ginger in summer and winter respectively. Thus it can be concluded that the change of cropping pattern can be followed in almost all the four districts and the shift is towards cash crops or plantations from traditional crops.

4. Conclusion

The mountain area is characterized by fragility, marginality and niche. So, the livelihood options are comparatively lower and different than the plains. In Sikkim, the main livelihood options are – terrace cultivation, plantation, service, livestock rearing, petty trade or business and tourism. Previously, most of the people were dependent on forestry. The indigenous tribe, Lepcha, was totally dependent on forestry, and sometimes fishing and hunting. Initially, the Nepali people of Sikkim built terrace and started cultivation. Primarily, cereal based crop farming was practiced. Maize, wheat, rice, buck wheat, millet, etc., were cultivated dominantly. The cropping pattern has changed through the years. The population started to shift from traditional farming to cash-crop based farming. They started to produce mustard, potato, ginger and other horticultural crops. In the pre-merger period, more than 70 percent people were dependent on agriculture but in the 1990s it fell below 50 percent. The activity of plantation has increased enormously. In Sikkim, cardamom is the main plantation activity and it is the oldest cash-crop which was introduced by the natives. The plantation of some fruit trees, fodder trees and timber trees can be seen in the homesteads. Tea plantation is also introduced in Temi by the Government. Since agriculture is still at a subsistence level and it is too hard to maintain livelihood by the sole earning from agriculture, people are compelled to think for alternative livelihoods, like rearing livestock. Mainly, goats, pigs, mules, cattle, poultry, yaks, sheep are reared in Sikkim. Almost all households reared one or the other livestock for supplementary source of income. Poultry farming is the most common form of livestock here. Main livestock produces are milk, cottage cheese, curd, *chhurpi*, butter, eggs, and meat etc., which are consumed domestically and the surplus used for business purposes.

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Passenger car ownership and commuting in Greece: An outline of recent developments

Abstract:
The emerging phenomenon of daily commuting in Greek cities -particularly in the two main metropolitan regions of the country- and the boom of the car ownership rates during the last three decades, appear to have a strong connection –even though this relationship is particularly difficult to disentangle, as many different factors influence it. During the past three-decade period, the car ownership rate in Greece has been roughly multiplied by seven, while the role of public transport in the evolution of the daily mobility of Greek population has been considerably limited, even in a higher degree than it has been in the rest of Europe. The average commuting rate in Greece, was, in 2001, 26.9%, which is still extremely low in comparison to most other European countries. Travel-to-work commuting, remains a phenomenon concerning mainly the two major metropolitan areas of the country, those of Athens (Attica) and Thessaloniki (44.6% and 35.8%, respectively). There is an extremely disparate diffusion of the phenomenon in the country -principally between highly urbanized and less urbanized counties- but as peri-urbanization continues to run its course in Greece, commuting is inavertibly expected to mark an important increase in the next years.

Key words: Commuting, travel-to-work, car-ownership-rate, peri-urbanization, metropolitan areas

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1. Introduction

In the post-industrial economies, the proliferation of urban functions and particularly that of urban residences, in the peri-urban rural space, gave birth to contemporary polycentric urban forms, having the characteristics of an 'urban-rural compound' and particularly to a new type of space, which in scholar literature is called 'exurbia', 'post-suburbia' or 'emergent city'. As Viard (1994) has noted, these modern 'urban archipelagoes' resulted from "the globalization of economies, of know-how and information, of (social) imaginary and culture, which is combined to a withdrawal in the private sphere, the residence, the body, the ego". The diffused and polycentric character of modern urban and peri-urban forms is responsible for the unceasing increase and expansion of commuting flows -as a process inherently associated to that of peri-urbanization. On the other hand, the growing complexity of contemporary commuting patterns (Chesneaux, 1995) is a factor which globally gave to the use of private car a particularly dominant role in the development of commuting (Dupuy, 1998; Wiel, 1999; Emangard, 2001).

In Greece, the lack of data on travel-to-work commuting before the latest Population Census of the Hellenic Statistical Authority (ELSTAT), in 2001, does not allow for the analysis of the recent evolution and the actual trends of commuting. Yet, the emerging phenomenon of commuting, particularly in the metropolitan regions of the country, and the recent boom of the car ownership rates, appear to have a strong connection –even though this relationship is particularly difficult to disentangle, as many different factors influence it and causality effects operate in both directions.

2. The decisive role of the increase of the passenger car ownership rate

The car ownership rate in Greece has been characterized by an extremely booming increase for many decades, and particularly from the end of the 70's until today. During this three-decade period, the car ownership rate in the country has been roughly multiplied by seven (Table 1). Thus, despite the fact that the car ownership rate in Greece still remains lower than that in most countries of the European Union (Figure 1), the marked increase (548%) of this rate during the three last decades is impressive. This increase is, by far, the highest among the 15 countries of the older core of the European Union. Paradoxically, it is closer to the rates observed in the countries of Eastern Europe, such as Poland (however these countries are not effectively comparable to Greece -because of their fundamentally different

political end economic history –and because of the fact that they disposed a far more developed public transport system).

On the other hand, the role of public transport in the evolution of the daily mobility of Greek population has been considerably limited, as in the rest of Europe - but even in a higher degree: Public transport in Greece, indeed, presented an important breakthrough, but this took place relatively late, in the first decade of the 21st century. It has also been geographically limited in the region of Attica (where the so-called "Olympic Infrastructures Project" included a new subway network, a small tramway network and the development of a suburban railway). But, despite these developments, in the "post-olympic era" of Athens there is a continuing increase of the use of private cars (which now represent nearly 50% of the city transport in Attica[3]). Far more dominant is the part of private cars in the city transport in the other urban areas of the country. The reason for this is that public transport is generally expensive (without state subsidies) while, at the same time, the level of the services is often very low and the network obsolete and limited.

Table 1. Passenger car ownership rates in 10 countries of the European Union: Evolution, 1977 – 2007

COUNTRIES	NUMBER OF PASSENGER CARS PER 1.000 PEOPLE IN 1977	NUMBER OF PASSENGER CARS PER 1.000 PEOPLE IN 2007	EVOLUTION 1977 - 2007
Belgium	291	473	+62%
France	312	508	+62%
Germany	326	501	+53%
Greece	*66*	*428*	*+548%*
United Kingdom	260	476	+79%
Spain	161	481	+198%
Italy	288	598	+107%
Netherlands	276	451	+63%
Poland	44	383	+770%
Portugal	105	412	+292%

Data source: *European Union Road Federation*-E.R.F

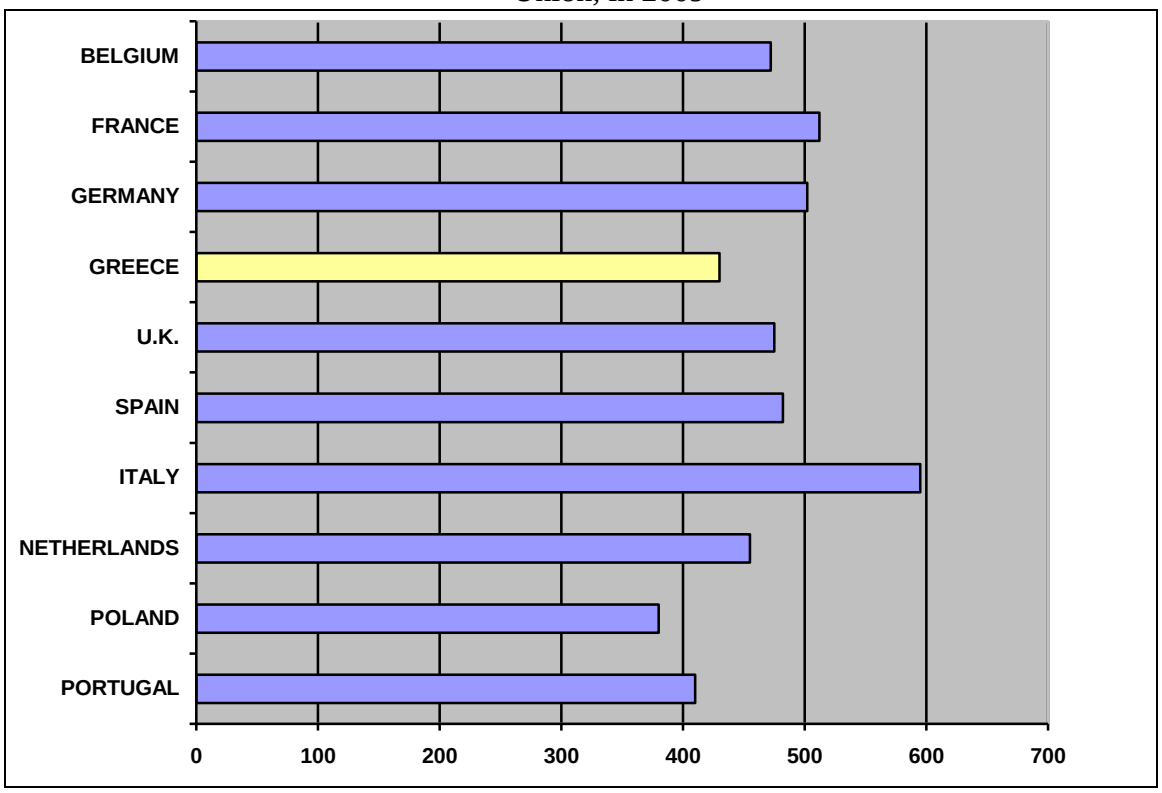
As it is obvious (Table 1 and Figure 2), an extremely rapid expansion of passenger car ownership in the Greek households, has been recorded during the last three to four decade period. This increase attained its peak period with a very significant time lag[4] in comparison

[3] According to the *Association of Greek Transport Engineers*, for 2009, the part of private cars in the urban transport in Attica was 48%. In spite of this fact, the part for public transport reached 31.4% -which is very close to the respective part of public transport in many other European capital cities, such as London (32%) or Paris (35%).

[4] This time lag corresponds to a roughly 20-year period (given that the passenger car ownership rate in Greece, in the mid-90's was still close to the passenger car ownership rate recorded in most western European countries in the mid-70's).

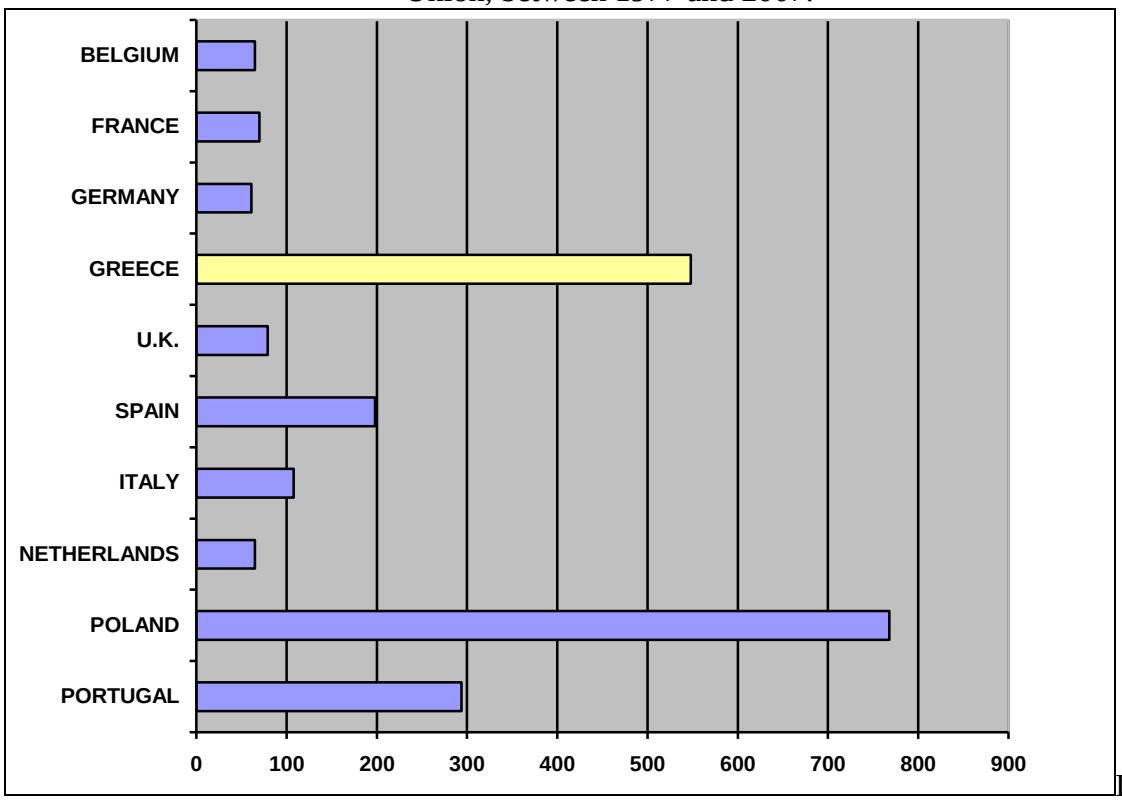
to the west-European countries and almost caught up with them in the first decade of the 21st century.

Figure 1. Number of passenger cars per 1,000 residents, in 10 countries of the European Union, in 2009



Data source: *European Union Road Federation* –E.R.F.

Figure 2. Increase (%) of the passenger car ownership rate in 10 countries of the European Union, between 1977 and 2007.



Data Source: *European Union Road Federation* –E.R.F

Even though there has been no systematic study in Greece, connecting the two phenomena, there is an explicit connection between the rapid growth of the passenger car ownership rate and the very dynamic peri-urbanization processes in the country, during the last three decade period (and particularly during the second half of this period). The generalization of private car ownership, in fact, leaded to a substantial reduction of the degree of dependence between workplace and residential location. As Kaufmann (2000) has pointed out, the diffusion of the use of private car is a major factor of the peri-urbanization process, because of the fact that, it is precisely the use of the private car –as a mean strongly associated with the freedom of choice- that often determines the destination of the user. This means that its role is fundamental in the diffusion of activities in a wide peri-urban area - and particularly in the diffusion of 'free-time activities'. This remark has a particular value in the case of Greek society, where, the relatively late access of large groups of population to the "privilege" of private car ownership, has contributed to the formation of particular mentalities and lifestyle conceptions, in which (private) car has taken an exorbitant place -and determines (in a higher perhaps degree than in that most other European countries), the relation of individuals with space.

However, the current proportion of passenger cars in Greece is 1.08 vehicles per family (which is considerably lower than that in most Western European countries, where this index is near 1.50). This difference is due to the fact that, in the case of Greece, the presence of two –or more- passenger cars in a family, is extremely current in the big metropolitan regions (in particular those of Attica and Central Macedonia) but not always dominant in the rest of the country. This is due to the difference of household incomes -but also to the regional variation of the female activity rates. (Particularly the rural population which, despite its rapid shrinkage, still constitutes a non negligible part of the total population in many regions of the country presents an extremely low female activity rate). That is to say, in the families that include only one economically active person, the potential need for daily travel-to-work by car is covered by a single car. This means that the (frequent) absence of a second car in many families is not directly linked to the relatively low rate of daily commuting[5] in Greece (which, according to the data of the Hellenic Statistical Authority from the 2001 population census, represented only 27%).

[5] The daily commuting rate of a population refers to the percentage of the economically active population which works outside the municipality of its residence.

3. Commuting in Greece: A phenomenon still associated to the metropolitan areas

Even though commuting is undoubtedly a major phenomenon for a country's economic and spatial planning, its empirical study in Greece has been hampered till the first decade of the 21st century by the complete lack of any statistical data. It was only in the 2001 population census that inter-municipal commuting has been recorded, while the complete data series became available only in 2008. This particularity makes impossible any cross-time analysis of the phenomenon and its evolution. In contrast, the cross-country commuting data reveal some interesting aspects of the spatial pattern of the phenomenon. In a national level, the average commuting rate in Greece, was, in 2001, 26.9%. This rate, not only is extremely low in comparison to most other European countries, but, interestingly, is even lower than the commuting rate recorded in countries such as France or Belgium many decades ago (Table 3).

Table 3. The daily commuting rate in Greece, in 2001, compared to that of Belgium and France in various periods.

Year	Greece	Belgium	France
2004			73
2001	26,9	67,4	
1999			61
1991		57	
1990			52,3
1982			46
1947		40	

Data sources: Baccaini *et al.*, 2000; Deschamps *et al*., 1991; Dickinson, 1957; Gascon, 2001; Thomas *et al*., 2008; Duquenne & Kaklamanis, 2009.

However, as we have already noticed, this extremely low average, masks a spatial pattern of extreme geographical differentiations, since the 51 counties (*nomoi*) of Greece record commuting rates scaling from 3.3 to 44,6% (Table 4).

From Table 4, it is obvious that, travel-to-work commuting in Greece, remains a phenomenon concerning mainly the two major metropolitan areas of the country, those of Athens (Attica) and Thessaloniki (since the respective rates for their counties were, in 2001, 44.6% and 35.8%). This absolute "primacy" is normal, since commuting is effectively a phenomenon particularly inherent and present to the function and the evolution of big metropolitan areas. Of course, it should be noted that, there is also an additional factor (a "technical" -or statistical- one) for which the commuting rates in these two counties appear substantially higher than those in other urbanized counties of the country: Both cities, Athens and Thessaloniki, are administratively divided in an extremely big number of municipalities - 48 for Athens and 12 for Thessaloniki. (Commuting rates effectively refer to cross-municipal

commuting –since most statistical systems cannot record intra-municipal short-range commuting flows).

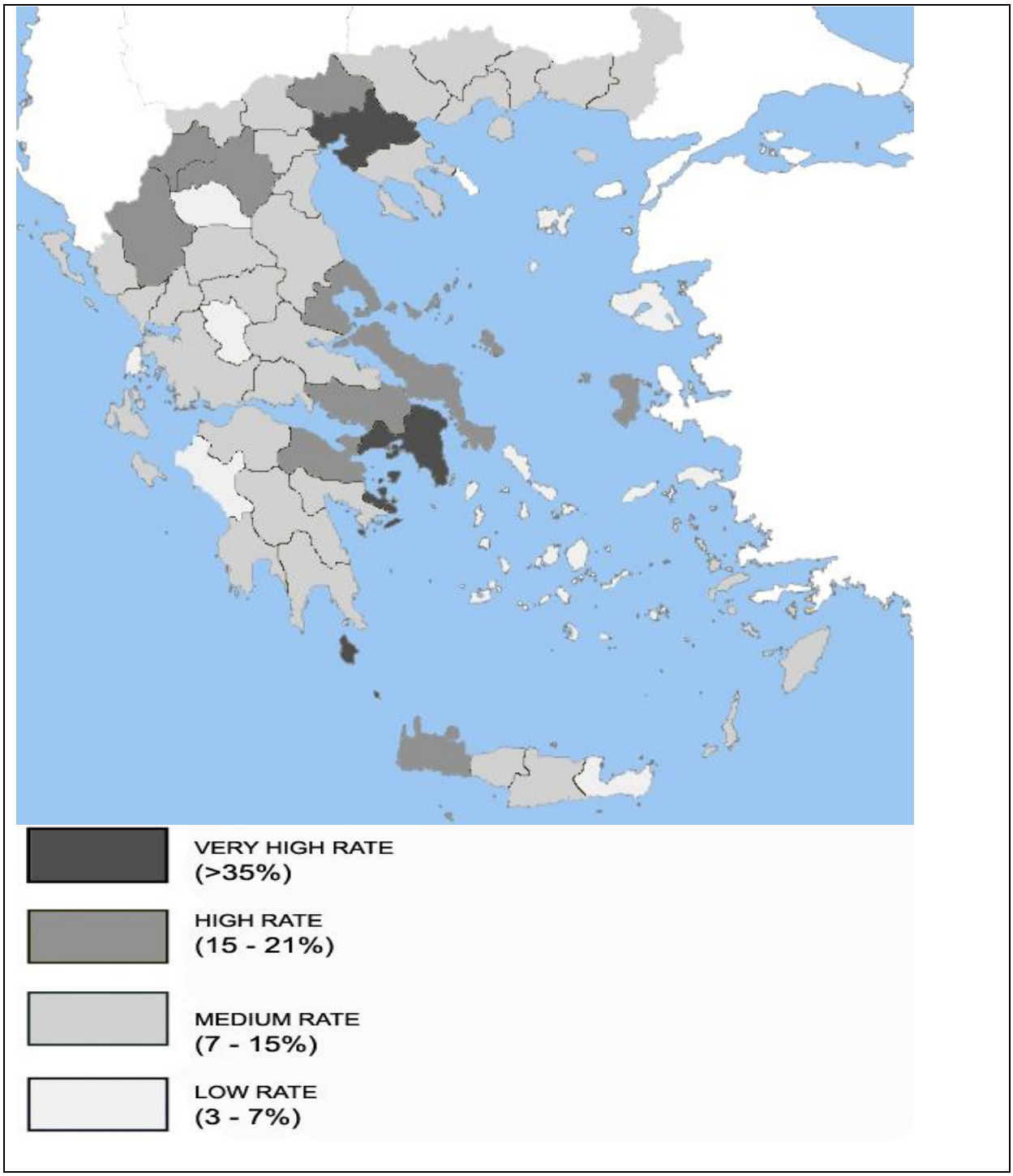
On the other hand, it is notable that if the counties of Attica and Thessaloniki are excluded, the average commuting rate for the rest of the country, is in an astonishing low level, of 12.5%. What perhaps is even more impressive is that this extremely low average still masks very important differentiations between the 49 counties (scaling roughly from one to six). It is equally interesting that, as the map (Figure 3) reveals, extreme differentiations are -in some cases- observed in an intraregional level, between adjacent counties.

Table 4. Commuting rates in the Greek counties, in 2001

County	Daily Commuting Rate	County	Daily Commuting Rate
Attica	44,6	Pieria	11,3
Thessaloniki	35,8	Xanti	11,2
Evoia	20,5	Chalkidiki	11,0
Kastoria	17,9	Argolida	10,7
Magnesia	17,2	Drama	10,2
Kozani	17,2	Karditsa	9,7
Kilkis	16,9	Arcadia	9,4
Ioannina	16,8	Thesprotia	9,4
Chania	16,6	Kefalinia	9,4
Corinthia	16,1	Preveza	9,1
Florina	16,1	Pella	9,0
Beotia	15,8	Aitoloakarnania	8,2
Chios	15,6	Messinia	7,8
Iraklion	14,3	Fthiotida	7,8
Arta	14,2	Evros	7,7
Zakynthos	14,1	Laconia	7,5
Imathia	14,1	Rodopi	7,3
Rethymnon	13,1	Ileia	6,8
Achaia	12,6	Lefkada	6,6
Corfou	12,5	Lesvos	6,3
Dodecanese	12,3	Grevena	5,8
Trikala	12,2	Samos	5,6
Kavala	12,0	Cyclades	4,6
Larissa	11,7	Lasithi	4,3
Serres	11,6	Evritania	3,3
Fokida	11,4	Greece	26,9

Data source: Hellenic Statistical Authority/ Duquenne & Kaklamanis, 2009

Figure 3. Daily commuting rates in the 51 Greek counties (2001)



Data Source: Hellenic Statistical Authority

The category of counties in which the higher commuting rates (after those of Attica and Thessaloniki) are recorded (>15%), appears quite disparate: This category is composed by 11 counties with different geographic, demographic and economic profiles. However, the (relative) importance of commuting in these counties could be associated to three basic factors, which namely are:

a) the geographical proximity to one the two major metropolitan areas of the country,

b) the presence of a big city, presenting the form of an 'Urban Agglomeration", administratively divided in several municipalities, and/or

c) the (relatively) high economic specialization, spatially focused in a particular city or area of the county.

Following these three features, the counties of this category could be classified in three respective groups:

- A first group is formed by the counties in the immediate proximity of one of the two major metropolitan areas of Athens and Thessaloniki -which also represent the two major labor markets in the country, (counties of Corinthia, Beotia, Evia and Kilkis). (Even though the commuting flows between the municipalities of these counties and the nearby metropolitan cities represent in all cases less than 25% of the total commuting in the county, these flows are very significant).
- A second group is that of counties with big regional cities, presenting the form of 'Urban Agglomerations", administratively divided in several municipalities; (counties of Magnesia, Ioannina and Chania). In these counties, commuting rates are relatively high because, additionally to the peri-urban commuting flows, there are strong intra-urban commuting flows (which are inter-municipal at the same time, thus amplifying the total commuting rate recorded in the county).
- The third group in this category is formed by three counties of the West Macedonia Region where the degree of economic specialization is particularly high and focused in particular cities. This is the case for the counties of Kozani and Florina (strongly specialized in the sector of Energy production) and for the county of Kastoria (with an even stronger degree of specialization, in the fur industry).
- A particular case within this category of counties in which the commuting rate is superior to 15%, is that of the island county of Chios (even though if it shares, in a certain measure, the basic characteristic of the second group). The relatively high commuting rate in Chios, should be primarily attributed to three particular features of this county: The first one is the very dominant urban character of Chios. (Indeed, Chios is in the fifth rank of the most urbanized counties of Greece –following those of Attica, Thessaloniki, Achaia and Magnesia- with 57% of urban population in 2001). This is in great part due to the traditionally dominant shipping sector (in the past), whose presence led to a polarization of the islands population in –and around- the island's harbor city, leaving merely a residual rural population. The second feature is the administrative form of the county's capital city (Chios), which is an 'Urban

Agglomeration', made up of three separate municipalities (the central one and two typically suburban municipalities). Finally, a third feature of the county that could explain the presence of high commuting rates, is undoubtedly the particularly high rate of passenger car ownership in Chios[6]. (This surprisingly high car ownership rate –for an island- is attributed to the socio-economic specificity of Chios -and particularly to the above-mentioned urbanization of its population).

- In the antipode, the category of the 8 counties (Ileia, Lefkada, Lesvos, Grevena, Samos, Cyclades, Lasithi and Evritania) recording the lower commuting rates (below the statistical threshold of 7%) appears less heterogeneous. The common -and determinant- feature in the counties of this category, is that they have particularly low urbanization rates (population living in urban settlements exceeding 10000 inhabitants) or have no urban population at all (which is the case for the counties of Lefkada, Samos and Evrytania).
- A quite particular case in this category is certainly that of the county of the Cyclades. This county presents one of the lowest commuting rates in the country, not only because of its low urbanization rate but mainly because of its geographical specificity, linked to the extreme geographical discontinuity of this archipelago, made up of 22 small and medium-sized inhabited islands. In most of them there is no (statistically recorded) commuting at all because they are composed of a single municipality. (In the opposite, the other archipelago county of Greece, the Dodecanese, presents a relatively high commuting rate, of 12.3%, because its main islands, Rhodes and Kos, have high urbanization rates and are composed of several municipalities).

4. Conclusions

In spite of the booming increase of the car ownership rate in Greece in the last two to three decade period, which gave an important impulse to the development of commuting flows, the commuting rate recorded in 2001 was still relatively low. On the other hand, there is still an extremely disparate diffusion of the phenomenon in the country, principally between highly urbanized and less urbanized counties. As peri-urbanization continues to run its course in Greece, commuting is inavertibly expected to mark an important increase in the next years. The findings of the imminent population census of May 2011 will substantially highlight the recent evolutions and the spatial trends of this important phenomenon.

[6] According to the Hellenic Statistical Authority, the passenger car ownership rate in Chios, in 2008, was 42,9 cars per 100 people, (a rate that placed Chios at the fourth national rank , following the counties of Attica, Thessaloniki and Iraklion).

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Regional Cohesion and Innovation Activities: A Measurement on the capacity of E.U. states

Abstract:
Innovation activities contribute essentially to the regional dimension and growth. The technological infrastructure and innovation capabilities affect not only the regional growth, but also the whole periphery and economy as well. In the last decades, OECD /introduced some measures and indexes, concerning the Research and Development Expenditures, patents etc., that measuring the innovation activities. However, there are a lot of problems and questions regarding the measurement of innovation activities at a regional level. This paper attempts to investigate the framework and to analyze the measurement of innovation activities.

Keywords: Innovation, technology, regional growth, cohesion, sustainability

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1. Introduction

We can distinguish between *technology transfer* and *technology capacity* (that is the flow of *knowledge* as against the *stock of knowledge*), and also the *technology of innovation* (which indicates the type of technology that gives to the recipients country's the capacity to establish a new infrastructure or to upgrade obsolete technologies).

The concept of Scientific and Technological Activities has been developed by OECD and UNESCO and EUROSTAT. There is a vast amount of literature concerning the study of the effects of innovation activities, however, only a small part of these address the issue of the effects to a regional level. One of the major problems for the measurement of innovation activities is the availability of dissaggregate data and the lack of information in a regional level (in particular, for the less advanced technological countries).

According to the definition provided by UNCTAD, it can be considered as: «Technology as the essential input to production which can embodied either in capital and in intermediate goods or in the human labour and in manpower or finally in information which is provided through markets» (United Nations, 1983).

The major sources of these data are coming from OECD, United Nations and European Union and local authorities. Since 1965, the statistics divisions of OECD and UNESCO have organized the systematic collection, publication and standardization of research and technological data. We can collect and present data both for Business, Government and Private non-profit sectors. The Business Sector including all firms, private and non-private institutions, organizations whose primary activity is the production of goods and services for sale to the general public at price intended to cover at least the cost of production; public enterprises are also included in the Business Enterprise sector. The Government sector includes all departments, offices and other bodies which normally do not sell to the community those services which cannot otherwise be conveniently and economically provided.

The Private non-profit sector includes private or semi-public organisations and also individuals and households, however be excluded all enterprises which serve government or those which financed and controlled by government and those offering higher education services or controlled by institutes of higher education. Higher education is comprise of all universities, colleges of technology and other institutes of post-secondary education. Finally, data from abroad includes all institutions and individuals located outside the political frontiers of a country, and all international organizations (except business enterprises) including facilities and operations within the frontiers of a country.

The various research and technological indicators attempt to explain *technological relationships* at a specific point of time or for a whole period. The aim is to measure the nature,

the capacity and the efficiency of scientific and technological activities both at a national level and at a sectoral level. Technological indicators related to *output measures* are more meaningful than those related to *input measures* (such as the number of scientists and engineers which are involved in research activities or the number of research institutions), since the later say little about the achieved research.

The most widely used definitions of research and innovation activities are provided by the *Frascati-Manual*. In an effort to standardize definitions and data collection on research expenditures, the Organization of Economic Cooperation and Development (OECD) has proposed in the so-called *Frascati Manual* (1981, and 1989) that:*«Research and Experimental Development* comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge....and the use of this stock of knowledge to devise new applications». The figures of GERD (*Gross Expenditures of Research and Development*) include the research and technological activities which are performed within a country, but excluding the payments for research and technological activities which are made abroad. The figures of *Gross National Expenditure on R&D* (GNERD) comprises the aggregate total expenditure on research and innovation activities which are financed by the institutions of a country during a given period can include the research activities which are performed abroad but financed by the national institutions; R&D performed within a country but funded from abroad should be excluded. In addition, according to Frascatti Manual, OECD, we can define as the *Gross Domestic Expenditure on R&D* (GERD), the total expenditures *on R&D* performed on the national territory during a given period. The main disadvantage of R&D input series expressed in monetary terms is that these are affected by differences in price levels over time and between countries.

In comparison to the *output measures*, the input measures do not offer qualitative or other efficiency indicators for current innovation activities and scientific manpower inputs. Scientific and technological indicators may also be used to measure the effects of a given technology on the welfare of a specific target group of people.

The measurement of the *personnel employed on research activities* involves firstly identifying which types of personnel should be initially included and secondly measuring research activities in the full time equivalent. Personnel is a more concrete measure and since labour costs normally account for 50-70 per cent of total R&D expenditures, its also a reasonable short-term indicator of efforts devoted to R&D. R&D personnel data are not affected by differences in currency values, however, the classification of full-time-equivalent and person-years-on-R&D posses some problems.

Technological balance can be considered as measures of the country's balance of payments and receipts concerning the sale and purchase of knowledge and technological information. Patent data applications can be considered as partial proxy measures of the output of R&D in the form of inventions. Information on the country concerned is completed with data for *external patent applications (EPA)* by residents of the country for patents in other countries. Patent statistics measure innovation activities, while the R&D data measures both innovation and imitating activities. From *the patent index*, it seems that the (absolute) technological difference is bigger than those indicated by research expenditures. This paper attempts to analyze the framework of innovation statistics, to examine the major indices and measures for innovation activities.

2. The Estimation of Scientific and Research Activities Based on Leading Indicators

2.1 The Collection and Presentation of Data-Indicators

We can collect data for both aggregate and dissaggregate scientific and research variables. In the 1994 budgetary year, just under 56 billion ECU were entered for R&D in the government budgets for European Economic Area (excluding Luxembourg, Iceland, and Lichtenstein) and the European Commission.

This represents a normal fall of 0.7 %. Of the 56 billion, almost 96 %, about 53 billion ECU accounted for fifteen EU member states. However, in the European Economic Area, the percentage share of Gross Domestic Product at market prices devoted to a government R&D has fallen from 0.97 % in 1986 to 0.91 % in 1993. Public financing of R&D plays an important role not only in the European Economic Area, but also in its main trading patterns, the USA and Japan.

Table 1 shows the distribution and the financial sources of Gross Expenditures for Research and Technology (GERD) using aggregate data for various countries. For the Less Favored technologically regions (namely, Greece and Portugal) the main figures for financial source of GERD is the public sector (government) and lesser the private sector. Data on domestic R&D expenditure at regional level is available for all member states (excluding Luxembourg, Netherlands, Finland and Sweden), at least for certain sectors and years.

Table 1: Gross Expenditures of Research & Development (GERD) (% share of GDP)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
EU-27	*1.86*	*1.87*	*1.88*	*1.87*	*1.83*	*1.83*	*1.85*	*1.85*	*1.92*	*2.01*	*2.00*
Euro area (EA-17)	1.84	*1.86*	*1.88*	*1.87*	*1.85*	*1.84*	*1.87*	*1.88*	*1.96*	*2.06*	*2.06*
Belgium	1.97	2.07	1.94	1.87	1.86	1.83	1.86	1.89	1.97	2.03	1.99
Bulgaria	0.51	0.46	0.48	0.48	0.49	0.46	0.46	0.45	0.47	0.53	0.60
Czech Republic	1.17	1.16	1.15	1.20	1.20	1.35	1.49	1.48	1.41	1.48	1.56
Denmark (1)	2.24	2.39	2.51	2.58	2.48	2.46	2.48	2.58	2.85	3.06	3.06
Germany	2.47	2.47	2.50	2.54	2.50	2.51	2.54	2.53	2.69	2.82	2.82
Estonia	0.60	0.70	0.72	0.77	0.85	0.93	1.13	1.08	1.28	1.43	1.62
Ireland	1.11	1.09	1.09	1.16	1.22	1.24	1.24	1.28	1.45	1.74	1.79
Greece	:	0.58	:	0.57	0.55	0.60	0.59	0.60	:	:	:
Spain	0.91	0.92	0.99	1.05	1.06	1.12	1.20	1.27	1.35	1.39	1.39
France (2)	2.15	2.20	2.24	2.18	2.16	2.11	2.11	2.08	2.12	2.26	2.26
Italy	1.04	1.08	1.12	1.10	1.09	1.09	1.13	1.17	1.21	1.26	1.26
Cyprus	0.25	0.26	0.30	0.35	0.37	0.41	0.43	0.44	0.43	0.49	0.50
Latvia	0.45	0.41	0.42	0.38	0.42	0.56	0.70	0.60	0.62	0.46	0.60
Lithuania	0.59	0.67	0.66	0.67	0.75	0.75	0.79	0.81	0.79	0.83	0.79
Luxembourg	1.65	:	:	1.65	1.63	1.56	1.66	1.58	1.57	1.66	1.63
Hungary (3)	0.81	0.93	1.00	0.94	0.88	0.94	1.01	0.98	1.00	1.17	1.16
Malta (3)	:	:	0.26	0.25	0.53	0.57	0.62	0.58	0.56	0.54	0.63
Netherlands	1.94	1.93	1.88	1.92	1.93	1.90	1.88	1.81	1.77	1.82	1.83
Austria	1.93	2.05	2.12	2.24	2.24	2.46	2.44	2.51	2.67	2.72	2.76
Poland	0.64	0.62	0.56	0.54	0.56	0.57	0.56	0.57	0.60	0.68	0.74
Portugal	0.73	0.77	0.73	0.71	0.75	0.78	0.99	1.17	1.50	1.64	1.59
Romania	0.37	0.39	0.38	0.39	0.39	0.41	0.45	0.52	0.58	0.47	0.47
Slovenia (4)	1.38	1.49	1.47	1.27	1.39	1.44	1.56	1.45	1.65	1.86	2.11
Slovakia	0.65	0.63	0.57	0.57	0.51	0.51	0.49	0.46	0.47	0.48	0.63
Finland	3.35	3.32	3.36	3.44	3.45	3.48	3.48	3.47	3.70	3.92	3.87
Sweden (5)	:	4.13	:	3.80	3.58	3.56	3.68	3.40	3.70	3.61	3.42
United Kingdom	1.81	1.79	1.79	1.75	1.68	1.73	1.75	1.78	1.79	1.86	1.77
Iceland	2.67	2.95	*2.95*	2.82	:	2.77	2.99	2.68	2.64	3.11	:
Norway	:	1.59	1.66	1.71	1.58	1.52	1.49	1.62	1.61	1.80	*1.71*
Switzerland	2.53	:	:	:	2.90	:	:	:	2.99	:	:
Croatia	:	:	0.96	0.96	1.05	0.87	0.75	0.80	0.89	0.83	0.73
Turkey	0.46	0.51	0.51	0.47	0.51	0.58	0.57	0.71	0.73	0.85	:
Japan (4)	3.04	3.12	3.17	3.20	3.17	3.32	3.40	3.44	3.45	:	:
United States	2.69	2.71	2.60	2.60	2.53	2.56	2.60	2.66	2.79	:	:

(1) Break in series, 2007.
(2) Break in series, 2000 and 2004.
(3) Break in series, 2004.
(4) Break in series, 2008.
(5) Break in series, 2005.
Source: Eurostat (tsiir020), OECD

Table 2 illustrates the Gross Domestic Expenditure on R&D by Sector 2005 and 2010 (as a share of % GDP) for the European Member States. Table 3 summarizes the Gross Domestic Expenditure on R&D by Source of Funds 2005 and 2010 (as a percentage of total gross expenditures on R&D). Non-oriented research tended to be lesser importance of most countries, while research in agriculture formed a small proportion of appropriations in most countries, like Greece, Portugal and Ireland which devoted more than 10 % of their total budget to this sector.

Table 2: Gross Domestic Expenditure on R&D by Sector 2005 and 2010 (% share of GDP)

	Business enterprise sector		Government sector		Higher education sector	
	2005	2010	2005	2010	2005	2010
EU-27	*1.15*	*1.23*	*0.25*	*0.27*	*0.41*	*0.49*
Euro area (EA-17)	*1.16*	*1.27*	*0.27*	*0.30*	*0.40*	*0.48*
Belgium	1.24	1.32	0.15	0.19	0.41	0.46
Bulgaria	0.10	0.30	0.31	0.22	0.05	0.07
Czech Republic	0.86	0.97	0.27	0.30	0.22	0.28
Denmark (1)	1.68	2.08	0.16	0.06	0.60	0.90
Germany	1.74	1.90	0.35	0.41	0.41	0.51
Estonia	0.42	0.81	0.11	0.17	0.39	0.62
Ireland	0.81	1.22	0.09	0.06	0.34	0.51
Greece	0.19	:	0.12	:	0.28	:
Spain (2)	0.60	0.71	0.19	0.28	0.33	0.39
France (3)	1.31	1.38	0.37	0.37	0.40	0.48
Italy (4)	0.55	0.67	0.19	0.18	0.33	0.36
Cyprus	0.09	0.09	0.13	0.10	0.16	0.25
Latvia	0.23	0.22	0.11	0.14	0.23	0.24
Lithuania	0.15	0.23	0.19	0.14	0.41	0.42
Luxembourg (5)	1.35	1.16	0.19	0.29	0.02	0.19
Hungary	0.41	0.69	0.26	0.21	0.24	0.23
Malta	0.38	0.37	0.03	0.02	0.16	0.23
Netherlands	1.01	0.87	0.24	0.22	0.66	0.75
Austria	1.72	1.88	0.13	0.15	0.61	0.72
Poland	0.18	0.20	0.21	0.26	0.18	0.27
Portugal	0.30	0.72	0.11	0.11	0.28	0.59
Romania	0.20	0.18	0.14	0.17	0.06	0.12
Slovenia (2)	0.85	1.43	0.35	0.38	0.24	0.29
Slovakia	0.25	0.27	0.15	0.19	0.10	0.17
Finland	2.46	2.69	0.33	0.36	0.66	0.79
Sweden (6)	2.59	2.35	0.18	0.17	0.78	0.90
United Kingdom	1.06	1.08	0.18	0.17	0.44	0.48
Iceland	1.43	:	0.65	:	0.61	:
Norway (7)	0.81	0.88	0.24	0.28	0.47	0.55
Switzerland	:	:	:	:	:	:
Croatia	0.36	0.32	0.21	0.20	0.30	0.21
Turkey	0.20	:	0.07	:	0.32	:
Japan (8)(9)	2.54	2.70	0.28	0.29	0.45	0.40
United States (9)	1.79	2.02	0.31	0.30	0.36	0.36

(1) Break in series, 2007.
(2) Break in series, business enterprise sector, 2008.
(3) Break in series, business enterprise sector, 2006.
(4) Break in series, higher education sector, 2005.
(5) Break in series, government sector, 2009.
(6) Break in series, business enterprise sector and government sector, 2005.
(7) Break in series, government sector and higher education sector, 2007.
(8) Break in series, higher education sector, 2008.
(9) 2008 instead of 2010.
Source: Eurostat (tsc00001), OECD

Table 3: Gross Domestic Expenditure on R&D by Source of Funds 2005 and 2010 (as a percentage of total gross expenditures on R&D)

	Business enterprises		Government		Abroad	
	2005	2009	2005	2009	2005	2009
EU-27	*54.1*	*54.1*	*34.5*	*34.9*	*9.0*	*8.4*
Euro area (EA-17)	*56.1*	*55.7*	*35.4*	*35.4*	*7.0*	*7.0*
Belgium	59.7	58.6	24.7	25.3	12.4	12.1
Bulgaria	27.8	30.2	63.9	60.5	7.6	8.4
Czech Republic	53.2	44.6	40.9	43.9	4.9	10.4
Denmark (1)	59.5	60.2	27.6	27.8	10.1	8.8
Germany	67.6	66.1	28.4	29.7	3.7	3.8
Estonia	38.5	38.5	43.5	48.8	17.1	11.3
Ireland	57.4	51.2	32.0	31.3	8.6	15.6
Greece	31.1	:	46.8	:	19.0	:
Spain	46.3	43.4	43.0	47.1	5.7	5.5
France	51.9	52.4	38.6	38.6	7.5	6.9
Italy	39.7	44.2	50.7	42.1	8.0	9.4
Cyprus	16.8	15.7	67.0	69.0	10.9	12.1
Latvia	34.3	36.9	46.0	44.7	18.5	15.4
Lithuania	20.8	21.0	62.7	53.9	10.5	13.1
Luxembourg	79.7	70.3	16.6	24.3	3.6	5.4
Hungary	39.4	46.4	49.4	42.0	10.7	10.9
Malta	46.8	51.6	25.9	30.0	26.9	18.4
Netherlands	46.3	45.1	38.8	40.9	12.0	10.8
Austria	45.6	47.1	35.9	34.9	18.0	16.8
Poland	33.4	27.1	57.7	60.4	5.7	5.5
Portugal	36.3	44.0	55.2	45.3	4.7	4.1
Romania	37.2	34.8	53.5	54.9	5.3	8.3
Slovenia (2)	54.8	58.0	37.2	35.7	7.3	6.0
Slovakia	36.6	35.1	57.0	50.6	6.0	12.8
Finland (3)	66.9	68.1	25.7	24.0	6.3	6.6
Sweden (4)	63.9	58.8	24.5	27.5	8.1	10.4
United Kingdom	42.1	44.5	32.7	32.6	19.3	16.6
Iceland	48.0	48.5	40.5	41.4	11.2	9.9
Norway	46.8	43.6	43.6	46.8	8.1	8.2
Croatia	34.3	39.8	58.1	51.2	2.6	7.0
Turkey (5)	43.3	41.0	50.1	34.0	0.8	1.1
Japan (2)(6)	76.1	78.2	16.8	15.6	0.3	0.4
United States (6)	64.3	67.3	30.2	27.1	:	:

(1) Break in series, 2007.
(2) Break in series, 2008.
(3) Break in series abroad, 2005.
(4) Break in series, 2005.
(5) Break in series business enterprises and government, 2008.
(6) 2008 instead of 2009.
Source: Eurostat (tsiir030), OECD

We can use these measures, in order to estimate and evaluate the effects on capacity, efficiency and growth. To measure the *technological capacity*, the *efficiency of the research and scientific structure*, and the effects on economic and regional growth it is necessary to use some of the above international indicators which relate to research, scientific and technological data. These indicators aim to evaluate innovation activities and technological infrastructure at a national level. In particular, the use of these indicators gives an overall view of *technological capabilities* and facilitates comparison between and within countries. Data on European Patent Applications refers to those field designated to European Patent Office (EPO); the data presented are based on a special extraction from the European Patent Office and therefore the figures of

total national patent applications are somewhat different from the national totals presented by European Patent Office itself.

Table 4: Patent Applications to the EPO and Patents granted by USPTO 2000-2008.

	Patent applications to the EPO			High technology patent applications to the EPO			Patents granted by the US Patent & Trademark Office		
	(number of patent applications)		(per million inhab.)	(number of patent applications)		(per million inhab.)	(number of patents granted)		(per million inhab.)
	2003	2008	2008	2003	2008	2008	2000	2005	2005
EU-27	52 318	59 468	119.5	10 446	5 375	10.8	32 009	18 153	37.0
Belgium	1 340	1 519	142.4	278	205	19.2	772	484	46.4
Bulgaria	22	32	4.2	3	2	0.3	4	77	9.9
Czech Republic	112	200	19.3	12	15	1.5	41	57	5.6
Denmark	1 071	1 275	232.9	260	106	19.3	597	349	64.5
Germany	21 994	24 557	298.7	3 537	1 934	23.5	13 127	7 766	94.1
Estonia	11	35	25.9	7	1	0.7	3	8	6.0
Ireland	223	324	73.7	51	37	8.3	192	179	43.5
Greece	85	127	11.3	22	10	0.9	21	33	2.9
Spain	948	1 545	34.1	135	126	2.8	396	229	5.3
France	7 902	8 557	133.7	1 908	1 145	17.9	4 441	2 759	44.0
Italy	4 378	5 349	89.7	489	250	4.2	2 086	1 152	19.7
Cyprus	6	10	13.2	3	1	1.3	5	3	3.8
Latvia	8	24	10.4	1	3	1.3	10	3	1.4
Lithuania	17	10	3.0	2	1	0.4	6	29	8.5
Luxembourg	88	115	238.1	6	2	4.2	51	43	94.0
Hungary	132	195	19.4	26	21	2.1	75	60	5.9
Malta	6	10	23.9	:	1	2.4	3	1	2.5
Netherlands	3 459	3 711	226.2	1 012	342	20.9	1 777	1 227	75.3
Austria	1 358	1 932	232.2	224	99	11.9	709	426	52.0
Poland	111	226	5.9	14	17	0.5	33	49	1.3
Portugal	65	144	13.6	10	16	1.5	16	20	1.9
Romania	16	36	1.7	3	10	0.5	6	17	0.8
Slovenia	73	119	59.1	6	8	4.0	32	10	5.2
Slovakia	31	50	9.2	4	5	0.9	9	8	1.4
Finland	1 278	1 327	250.3	578	199	37.5	1 060	636	121.5
Sweden	2 029	2 928	318.9	456	337	36.7	1 783	540	59.9
United Kingdom	5 555	5 511	90.1	1 399	482	7.9	4 754	2 195	36.5
Iceland	31	28	88.8	13	2	7.7	27	18	62.2
Liechtenstein	22	34	963.9	2	3	75.5	14	16	470.3
Norway	342	563	118.8	69	19	4.1	328	194	42.0
Switzerland	2 762	3 351	441.3	355	205	27.1	1 680	896	120.8
Croatia	42	32	7.2	1	3	0.6	18	10	2.2
FYR of Macedonia	:	:	:	:	1	0.2	:	:	:
Turkey	85	270	3.8	10	14	0.2	16	12	0.2
Japan	21 600	20 239	158.5	7 623	3 317	26.0	110 199	83 784	253.3
United States	32 601	31 602	103.8	11 150	2 967	9.7	43 396	32 358	283.0

Source: Eurostat (online data codes: tsc00009, tsiir060, pat_ep_ntec, tsc00010, pat_us_ntot and tsiir070)

Table 4 presents the total patent applications for member states. Most countries show a similar pattern in the development over recent years; after the peak in 1990, the number of applications falls in 1991 and then recovers gradually.

2.2 Modeling the Research and Scientific Activities

There is a huge literature suggesting and demonstrating that research and scientific indicators make an important contribution to the growth at the firm, industry and national levels. Most

of these studies have investigated the relation between productivity, employment, growth and R&D.

A higher level of innovation activities tend to have a higher level of value added per worker (or a higher GDP per head) and a higher level of innovation activities than others. Following the technological-gap arguments, it would be expected that the more technologically advanced countries would be the most economically advanced (in terms of a high level of innovation activities and in terms of GDP per capita). The level of technology in a country cannot be measured directly. A proxy measure can be used to give an overall picture of the set of techniques invented or diffused by the country of the international economic environment. For the productivity measure, we can use the real GDP per capita as an approximate measure. The most representative measures for *technological inputs and outputs* are the indicators of patent activities and the research expenditures.

For the level of productivity, we can use as a proxy real GDP per capita (GDPCP). For the measurement of *national technological level*, we can also use some approximate measures; for instance, we can again use the traditional variables of *technological input* and *technological output* measures, (GERD and EXPA). The majority of empirical studies in the estimations between productivity growth and R&D follow a standard linear model; on this context we use a similar approach. The reason is that even though a more dynamic relationship exists, the data limitations (lackness of time series annual data on R&D activities for most countries) prevent the application of some complex models.

We can test the basic technological gap model (with and without these variables) reflecting the structural change, in order to decide to what degree these variables add something to the other explanatory variable of the model. We will use the external patent applications (EXPA) and gross expenditures on research and development (GERD) as proxies for the growth of the national technological activities, GDP per capita (GDPCP) (in absolute values at constant prices) as a proxy for the total level of knowledge appropriated in the country (or *productivity*). Investment share (INV) has been chosen as an indicator of growth in the capacity for economic exploitation of innovation and diffusion; the share of investment may also be seen as the outcome of a process in which institutional factors take part (since differences in the size of investment share may reflect differences in institutional system as well). For the structural change we used as an approximation changes in the shares of exports and agriculture in GDP.

We have tested the following version of the models:

GDP(or PROD)= f[GDPCP, EXPA (or GERD), INV],(basic model), (**1**)

GDP(or PROD)= f[GDPCP, EXPA (or GERD), INV, EXP], **(2)**

GDP= f[GDPCP, EXPA (or GERD), INV, TRD], **(3)**

The first model may be regarded as a pure *supply model*, where economic growth is supposed to be a function of the level of economic development GDPCP (GDP per capita with a negative expected sign), the growth of patenting activity (EXPA with a positive sign) and the investment share (INV with a positive sign). However, it can be argued that this model overlooks differences in overall growth rates between periods due to other factors and especially differences in economic policies.

We can classify four-groups using four different scientific criteria of UNESCO, so as to be able to measure and to evaluate the *technological efficiency and capabilities strength*. Table 5 illustrates the classification according to scientific and research criteria. The first criterion refers to the *scientists and engineers engaged in research activities per million inhabitants (full-time equivalents)*. For instance, according to this, we can classify Greece in the third group of the new industrialised countries (those which had established a research and scientific apparatus).

Table 5: Classification of scientific and research capabilities

Groups of S & T Capabilities	countries:
Group A:	Most underdeveloped countries (without S & T capabilities)
Group B:	Most developing countries(with some fundamental elements of S & T base)
Group C:	New & semi-industrialized countries (i.e. Greece, Israel Finland, Singapore, New Zealand and so on (with S & T base established)
Group D:	Industrialized countries:(advanced EEC states) with effective S & T base.

Source: UNESCO, "Science & technology in developing countries-strategies- 1990s".

Using the second criterion of research and development personnel in higher education per thousand inhabitants (full-time equivalent), Greece belongs to the second group of the developing countries (the countries which had established some initial elements of innovation activities). The third criterion refers to the *third level students per 100,000 inhabitants*; according to this, Greece belongs to the fourth group of industrialised countries (indicate the countries with an effective scientific and technological apparatus).

According to the fourth measure of the *percentage of manufacturing in GDP and the growth of manufacturing in the value added*, Greece is classifying in the third group of the new

industrialised countries (those which had established a scientific apparatus). Finally, using the measure of *scientific and capabilities strength*, Greece belongs to the second group of developing countries (those which have established some initial elements of research and technological apparatus).

3. Conclusions

This article attempted to identify the R&D activities and to investigate the estimation-methods, the techniques of scientific and technological activities and the measurement problems. According to 'International Standardization of Statistics on Science and Technology', we can estimate the most important inputs and outputs of scientific and technological activities and also the Scientific and Technical Education and Training and Scientific and Technological Services.

The term of «Research and Development Statistics» covers a wide range of statistical series measuring the resources devoted to R&D stages, R&D activities and R&D results. It is important for science policy advisors to know who finances R&D and who performs it.

Series of R&D statistics are only a summary of quantitative reflection of very complex patterns of activities and institutions. In the case of international comparisons, the size aspirations and institutional arrangements of the countries concerned should be taken into consideration. One way of constructing reliable indicators for international comparisons is to compare R&D inputs with a corresponding economic series, for example, by taking GERD as a percentage of the Gross Domestic Product. However, its quite difficult to make detailed comparisons between R&D data and those of non-R&D series both because of the residual differences in methodology and because of defects in the non-R&D data.

UNESCO, OECD and EUROSTAT divisions organised the systematic collection, analysis publication and standardization of data concerning science and technological activities. The first experimental questionnaires were circulated to member states by UNESCO in 1966 and standardized periodical surveys were established in 1969.

The collection of R&D data of regional statistics implied a lot of problems in comparison to data of national statistics. For the collection of regional statistics, we should take into the local differences, local peculiarities and the difficulties emerging from these. In addition, we can use either the "local-units" or the "local-economic-units". The first method «top-to-the-bottom method» focused on the collection of aggregate R&D data (for the whole country) and after that on the distribution of these figures into a regional-level; the disadvantage of this method is that there is not a direct collection of data from the regions or the second method «bottom-to-the-top

method» for the collection dissaggregate R&D data (for the whole regions) based on the direct-collection at a regional-level and after that on the summation of these figures in order to obtain the aggregate-total R&D data (for the whole country).

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Hunting tourism, a special form of tourism as a toolbox and a lever for tourism regional development: The case of Greece

Abstract:
The present paper refers to the organization and the established conditions of hunting in Greece, as well as to its contribution to the regional development of tourism. The origins of hunting in our country are old. It is an ancient and traditional activity. It is a kind of an open-air recreation-hunting tourism for city residents. 2.7% of the total population (240,000 hunters) deals with hunting. This activity has a seasonable character, it happens during fall and winter time and it lasts for 6 months. Hunting's time period coincides with tourism's low season. At this time of the year hunting tourism begins, indeed stimulating national and regional economy of mainly continental Greece. In our country, only 32 species of birds and 4 species of mammals out of the 422 species of birds and 116 species of mammals accordingly, are allowed to be hunted. Greece's fauna is one of the amplest in variety among Mediterranean countries, due to its animal geographical position, the Mediterranean basin and the prevalent favorable climatic and earth conditions.

Keywords: game, hunting legislation, hunters, hunting in Greece, economics of hunting

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1. Introduction

From the prehistoric times, the relationship between man and nature was very powerful and direct. Within the hostile and wild natural environment man's life was depending directly on nature. Hunting was the first way to use land. Man developed part of the renewable resources, via the hunting, either as a hunter or as a user to satisfy his own needs and thus, he learned how to survive. He covered his basic needs like food, clothing, tools and transports by hunting. Based on archaeological discoveries (representations in pots, frescos, statues), it is being shown that hunting in ancient times was an important tool, used to develop strong and prepared for war citizens, apart from a bread winning action. It was linked to young people's breeding and practice (education, physical exercise). Today, hunting does no longer happen for survival and is not of vital importance like it used to be in prehistoric and ancient times. Nonetheless, it is a tour outdoors recreational activity-hunting tourism having as a main goal to satisfy mental and physical needs (physical exercise, recreation, walk, environmental information, dog's training or a combination of all of the above) (Tsachalidis E. & Tsantopoulos, 1998). Today tourism is the main expression of the leisure time. The tour within a country or from one country to another is expressed by knowledge and entertainment, which are the basic elements of the touristic idea. In these two words "knowledge" and **"**entertainment**"** (as well as in hunting tourism) there is a strong personal element, which sometimes narrows or widens their meaning (Karagiannis St. & Exarchos G., 2006). All social classes deal with hunting regardless of the age, the level of education and the income. The greatest supporters belong to the middle and the lower so called social classes (Tsachalidis et al., 1998). And it should be pointed out that the Federal Possum Sheriff of Hunting Federation reinforces all the country's provinces by including in its forces new vehicles-jeep, keeping up the effort, in order to be present in a wide and extensive range, to protect the natural environment, to prevent and prohibit any illegal activity (Deltio Typou G' Kynigitikis Omospondias Peloponnisou, 2006).

The main field of action is the mountainous area, where hunting may be considered as a forest recreational activity. It is also an activity which contributes to the regional economy and regional development, since it creates thousands of positions (hunting handicrafts, restaurants, petrol stations, dog-foods, veterinary hospitals, etc.) in times of non conventional tourism (Papastavrou A. & Makris, 1986). The state collects annually approximately 30,000,000 € only out of the fees coming from hunting licenses issued, with a weighted average price of hunting license coming to 122€ .

2. History of hunting in our country

Up until 1923 there didn't exist any law to regulate hunting's issues. There were ample games and hunting was totally free with no need of restrictions and prohibitions. As time passed by it was realized that there was a need to protect both hunters and game species, so there had to be taken some state legislative regulations. The hunters, who consisted an organized category of users-hunters of renewable natural resources (hunting resources), had to act now under certain necessary restrictions and rules, which contributed to the rule of sustainable benefit, via protection. This could be achieved only with the establishment of relevant legislation and with the appropriate planning. This involves a legislative frame about the game species and their habitat, as well as the users' (hunters) behavior. The first law to regulate hunting issues was published in Greece in 1923.

According to modern perceptions, which are characterized by the meaning of sustainability, a particular form of environmental protection has been made. Up to a big extend this is due to the modernization of the relevant legislation and the scientific development which is linked to the management of the wild fauna. The integrated management, which contributes to the sustainable use of game species, needs information about users' behavior and this is because the operations of the ecosystem are not only influenced by the actions of bio-community (interactions-interdependency) but by man's actions too.

Modern managers of wild life plan and operate the hunting resources with practices which are compatible with the natural environment and always in harmony with human actions.

3. Hunting legislation in Greece

One of the main issues of the Greek Forest Service that belongs to the Ministry of Rural Development and Food is the hunting activity. More specifically, hunting issues are being directed by the Directorate of Aesthetical Forest and Hunting. Hunting is being managed within the laws of national and European legislation in force, always according to hunting science rule.

Hunting policy is being applied in Greece by foresters and regional forest service technologists, who specialize in this field at the two University Forestry Departments as well as the three Technological Forestry Institutes of the country. One of the main issues in hunting management is the effort to recruit the appropriate scientific personnel.

For the protection of the game species the legislation includes some important restrictions. Hunting issues are regulated according to the articles 251-288 of L.D. 86/1969 (it was a further development of 1923's legislation). The main goal of the restrictions and prohibitions which are included in the above legislation, is the management of the game species in the most appropriate way (protection, feeding). This management is based on studies which mostly report the biological factors of the species (reproduction, breeding), as well as the migration (seasonal movements).

Our country's legislation allows the free traditional hunting, which offers rich emotions because it is characterized by difficulty, unpredictability and intense effort. Greek hunting legislation is one of the most liberal ones in Europe. The hunter can hunt freely in all the territories that hunting is allowed and he doesn't pay for the game species he kills, since it is considered to be *res remulus* (stray, it doesn't belong to an owner up until the time it will be killed).

Directives and international conventions related to the fauna have been incorporated in the national legislation. According to this, as well as the directive 79/409 (of the European Union), there are species that may be hunted and species that are not allowed to be hunted. Some species belong to the first category; 32 birds (18 of them are terrestrial and arboreal and 14 are aquatic and wading birds) and only 5 mammals (table 2), which are an important economic resource for regional economy and an important source of recreation for a lot of people, so, their protection and conservation as well as their hunting, are important for economic and social interest. In the second category there can be found species that are not allowed to be hunted. These species constitute the biggest percentage of the fauna, so their protection and their maintenance are important for the ecology and the natural heritage. According to legislation only those who are older than 18 and succeed in specific tests can have a hunting license.

4. Hunting in Greece

There are 240,000 hunters today in Greece who constitute the 2.7% of the common population of the country and the hunter/inhabitant ratio is 1:38, which means that 1 out of 38 residents is a hunter. This is a bigger percentage than the Mediterranean European countries' average, which comes to 1.9% or to 1:52 hunter/inhabitant (max Albania 1:212 and min Cyprus 1:15). Table 1 is cited in Karagiannis Stephanos, 2004 & Pinet 1995 & FACE 2007.

In the hunting region of Macedonia-Thrace, within an extent of 4,261.400 ha (32.5% extent of Greece) and in a population of 2,596,643 (29% of total Greek population) there were 68,125 hunters with the ratio of 1:38 hunter/inhabitant or 2.6% (Tsachalidis E., 2003). In means, the individual characteristics of the hunters mentioned above are: average age of 41 years, 14 years of average hunting experience and average age of first hunting license is the 26th year of age. Concerning the education level, the majority of them (44%) have finished the primary school and most of them (41%) are either workers or farmers. 36% of these people live in the regional areas. 72% of them are married and have an average family income starting from 1000 up to 2000 € (1993 prices). Today these indexes have been improved.

Table 1. *Hunting in Europe and in Greece*

Country	Extent (ha)	Population X10^3	Hunters		Relation between hunters per population	Inhabitants per ha (dencity)
			(N)	(%)		
Albania	2,900,000	3,600,000	17,000	0.5	1:212	1.24
Austria	8,385,800	8,160,000	115,000	1.4	1:71	0.97
Belgium	3,170,000	10,000,000	20,000	0.2	1:500	3.15
Bulgaria	11,100,000	7,300,000	95,000	1.3	1:77	0.66
France	54,700,000	63,700,000	1,313,000	2.1	1:47	1.16
Germany	35.702.500	82,560,000	338,580	0.4	1:244	2.31
Switzerland	4,100,000	7,600,000	30,000	0.4	1:253	1.85
Greece	***13,200,000***	***9,000,000***	***240,000***	2.7	***1:38***	0.68
Estonia	4,500,000	1,400,000	15,000	1.1	1:93	0.31
Ireland	7,030,000	4,100,000	350,000	8.5	1:12	0.58
Spain	50,500,000	40,400,000	980,000	2.4	1:41	0.80
Italy	30,100,000	58,100,000	750,000	1.3	1:77	1.93
Cyprus	900,000	800,000	45,000	5.6	1:18	0.89
Lithuania	6,450,000	3,600,000	25,000	0.7	1:144	0.56
Malta	30,000	400,000	15,000	3.8	1:27	13.33
Norway	32,411,500	4,600,000	190,000	4.1	1:24	0.14
Holland	4,152,600	16,600,000	30,000	0.2	1:553	4.00
Hungary	9,300,000	10,000,000	54,500	0.5	1:183	1.08
Poland	31,300,000	38,500,000	100,000	0.3	1:385	1.23
Portugal	9,200,000	10,600,000	230,000	2.2	1:46	1.15
Serbia	8,800,000	10,100,000	80,000	0.8	1:126	1.15
Sweden	44,996,400	9,000,000	290,000	3.2	1:31	0.20
Finland	33,814,500	5,220,000	290,000	5.6	1:18	0.15
Total	*406,743,300*	***405,340,000***	***5,613,080***	***1.4***	***72***	***1.00***

From the centre of Technological Institute in Crete – Laboratory of Applied Research in the Service Field (2005)

The hunting activity, the number, the species and the duration, depend on the game species and are defined by Minister's decisions which are released mainly according to biological and behavioral issues of the game species. The game species which are allowed to be hunted, the duration and the number allowed to be hunted are mentioned in table 2.

Table 2: *Per hunting species, period of hunting, days of week and number of permitted hunting items*

s/n	Game Species	Hunting Period	Days of the Week	Allowed Number
		Mammals		
1	*Oryctolagus cuniculus*	15/9-28/2	All	Under no restriction
2	*Lepus europaeus*	15/9 -10/1	Wed., Sat., Sunday	1
3	*Sus scrofa*	15/9 -20/1	"	2 individuals per group
4	*Vulpes vulpes*	15/9 -28/2	All	Under no restriction
5	*Martes foina*	15/9 -28/2	"	"
		Birds		
1	*Streptopelia turtur*	15/9-28/2	All	12
2	*Columba palumbus*	15/9-20/2	"	Under no restriction
3	*Columba livia*	15/9-28/2	"	"
4	*Coturnix coturnix*	15/9-28/2	"	12
5	*Alauda arvensis*	15/9-10/2	"	10
6	*Turdus philomelos*	15/9-28/2	"	
7	*Turdus pilaris*	15/9-28/2	"	
8	*Turdus iliacus*	15/9-28/2	"	25 individuals per day from every species
9	*Turdus viscivorus*	15/9-20/2	"	
10	*Turdus merula*	15/9-20/2	"	
11	*Pica pica*	15/9-28/2	"	Under no restriction
12	*Corvus monedula*	15/9-28/2	"	"
13	*Corvus corone cornix*	15/9-28/2	"	"
14	*Sturnus vulgaris*	15/9-28/2	"	"
15	*Alectoris graeca*	15/9-30/11	Wed., Sat., Sunday	4
16	*Alectoris chukar*	15/9-30/11	"	4
17	*Phasianus colchicus*	15/9-29/12	"	1
18	*Anas penelope*	15/9- 10/ 2	All	
19	*Anas crecca*	15/9- 31/ 1	"	
20	*Anas platyrynchos*	15/9- 31/ 1	"	
21	*Anas acuta*	15/9- 10/ 2	"	
22	*Anas querquedula*	15/9- 10/ 2	"	
23	*Anas clypeata*	15/9- 10/ 2	"	
24	*Aythya ferina*	15/9- 31/ 1	"	25 individuals per day from every species
25	*Aythya fuligula*	15/9- 10/ 2	"	
26	*Anas strepera*	15/9- 31/ 1	"	
27	*Fulica atra*	15/9- 10/ 2	"	
28	*Anser albifrons*	15/9- 10/ 2	"	
29	*Gallinula chloropus*	15/9 - 10/ 2	"	10
30	*Scolopax rusticosa*	15/9-28/2	"	10
31	*Gallinago gallinago*	15/9 - 10/ 2	"	10

This in space hunting activity is defined by the type of the hunting license that the hunter holds. There are 3 categories of hunting license in our country: the local, which allows hunting within the district that the hunter lives, the rural, which allows hunting within the limits of the hunting area of the hunter and the general, which allows hunting in Greece.

The hunter pays a fee, which is gradational according to the type of license he wants to obtain. According to the arrangements of L.D. 86/1969, the minister of agriculture publishes

every year the regulatory decision concerning hunting in Greece (protection of game species) and strictly specifies the restrictions that have to do with the place (where), time (when), number (how many), kind (which) and the means which are allowed to be used in hunting.

The hunting period begins at 20 of August and it ends at 28 of February. For most of the game species hunting is allowed throughout the whole week and for few of them it is only allowed during Wednesday, Saturday and Sunday. Hunting begins 30 minutes after sunrise and it ends 30 minutes after sunset. Every hunter deserves to have one (1) rabbit, four (4) partridges and two (2) wild boars per group. The hunting of the aquatic and pigeons is allowed every day in a limited number of games (table 2). The trade of the game species is prohibited (Karabatsakis, Th., 2005).

Hunting is allowed in some areas and it is prohibited in protected natural areas such as: wild life shelters, breeding grounds, national parks, wetlands, etc.

Evidence provided in table 2 show that there is a sufficient legislation frame for the protection of the games, since the hunter is not allowed to hunt wherever, in whatever time and as much as he wants. In some regions of the country, which are under special conditions, there are some different regulations.

The Greek legislation about hunting, in comparison to the legislation of other European countries and in combination to the common right, is one of the strictest, concerning game species and fauna protection issues, and one of the most liberal ones concerning the place and the means of hunting

In our country, there is the controlled hunting too, which is applied in very small areas, in defined public areas and in two (2) private (shooting preserves), apart from the free traditional hunting. This way of hunting does not offer the emotions such as the ones that the free hunting offers because the place, the game species and the number of the games released are known, thus the result is predictable. It is not really preferred by many hunters. The hunter pays a fee for special permission entrance as well as for the game he kills. The shooting preserves are being supplied mainly with pinnate games by the state breeding grounds.

The breeding grounds of games are small public enclosed and suitably equipped areas, where games are artificially reproduced (pheasant, partridge and deer). There are 12 breeding grounds (9 pinnate games and 3 furry games) throughout the country. The state has the management of the public shooting preserves and of the breeding grounds.

The state has legislated the wildlife shelters, in order to protect wildlife efficiently (fauna, flora) as well as biodiversity. The purpose of their establishment is not only the protection of the game species but also the conservation of the biodiversity of the rare and under extinction

species of the flora and the fauna. Today there are 604 wildlife shelters, which cover an area of 1,038,100 ha (including hunting areas and wetlands) and they are equal to 7.9% of the total land of the country.

5. Means of hunting and Hunting Organizations in Greece

The lawful means of hunting in Greece are: the shotgun, the bow and the knife. The use of car, boat or other automobile during hunting is prohibited. The owner of the shooting gun is obliged to bring with him the gun's license, which is released by the local police authority, as well as to keep it safe. The use of dog is allowed, but its possession is accompanied by certain obligations, such as an animal's identity card, a muzzle throughout the transfer, dog's training with pinnate game in certain areas etc.

The state has established the Hunting Organizations, in order to organize hunting issues per district more effectively. Hunting Association, whose members are the hunters, is an essential unit of organization. The Association's mission is to organize the hunters and their contribution to the preservation, development and protection of the games. 240.000 hunters approximately are organized in 248 Hunting Associations, seven (7) Hunting Federations and one (1) Confederation. The hunting organizations are under the charge of the Ministry of Rural Development and Food.

6. Hunting Licenses – Statistical Evidence

Through time, the number and the kind of the hunting licenses have changes. According to relevant research (Desk Research), which was conducted in the hunting area of Macedonia – Thrace, it was noticed that during the last 25 years (1975-2000) and especially during the years 1975, 1985 and 2000, 48,975, 76,637 (maximum number of hunting license) and 56,400 hunting licenses were respectively issued. From 1975 until 1985 the number of the hunting licenses was increased at 56.5% (which was the biggest number of hunting license since the Greek state was established), with 4.11% average annual rate of increase, and from 1985 until 2000 the number of hunting licenses was reduced in 26.35% with 1.76% average annual rate of decrease, as reports in figure 1 (Tsachalidis E., 2003).

According to the research, at the same time, there has been an important change concerning the types of the hunting licenses. There is an upward rate of the Local hunting license issued up until 1992 and from 1993 until 2000 is decreasing with a parallel increase in rural hunting licenses. The hunters in Macedonia – Thrace prefer to have Local hunting licenses until 1992, and rural hunting licenses from 1993 onwards. This behavior can be explained by

the vast migration of the rural population in the cities during the latest years, so these hunters had to get a rural hunting license, in order to hunt at their traditional hunting grounds. The above changes during the years 1975 – 2000, exist in proportion to the rest of the Hunting Unions of Greece. As a result the

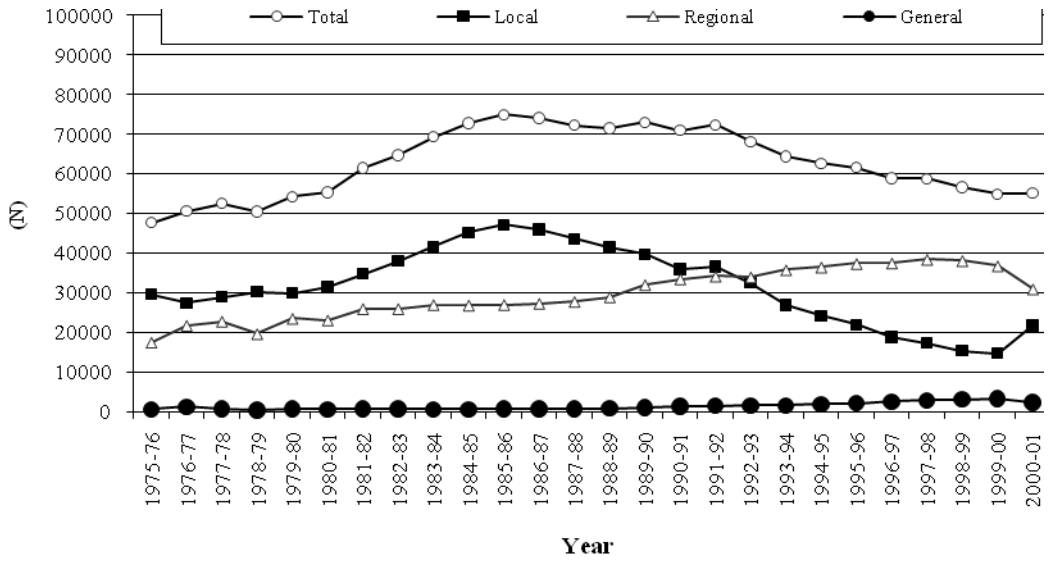

Figure 1: Hunting licenses issued per period and license types in Macedonia - Thrace (1975-2001)

maximum number (360,000) of hunting licenses recorded in Greece in 1985 had been reduced to 240,000 during the year 2005. After that and up until today the number remains almost stable with minute variations from year to year (Tsachalidis E., 2008).

These alterations have happened due to major social, economic and environmental changes, which have taken place in our country and internationally during the last 25 years. More specifically, one of the reasons for these changes might be the migration of the rural population, especially of the mountainous areas, to big cities (urbanism). The anti hunting propaganda, the alternative ways of recreation and the big anthropogenic interferences, which have negatively affected the habitat of the animals that resulted in the decrease of some species' population, are important factors (Heberlein & Willebrand, 1998).

7. Hunting Preference

One of the main characteristics of the hunter is the hunting preference, the kind of the game that he mainly prefers to hunt. The managers of the wildlife should take into consideration this parameter because it shows the demand of a game and the abundance of the game. So, if there is a great demand they should propose the appropriate measures. In our country there have been recorded 422 bird species and 116 mammal species. Out of them, hunting is allowed only to 32

birds (18 of them are terrestrial and arboreal and 14 are aquatic and wader birds) and only 5 mammals (table 1). Some of the above game species are preferred more than others by hunters.

According to hunting preference, hunters belong to different categories such as: hunters of hare, wild boar, partridges, etc. In this term we are referring to hunters who, regardless of the number of games they put in their bag, prefer specific game species when they go out hunting (Wright et al.1977).

According to researches that have been conducted in our country, with our university students, we have noticed that some games are more popular in comparison to others. Greek hunters' preference varies from place to place. It depends on a lot of factors such as: the abundance of the game, the age of the hunter, the area of living, the geomorphologic grand of the shooting area and the company with which he goes hunting. Based on the research program "Artemis", which refers to the total of Greek hunters, the first game preference between 1995 – 2003 is the woodcock (Scolopax rusticola) (18.5%) and then comes-to the rabbit (Lepus europaeus) (17.9%) and the thrush (Turdidae) (17.7%). According to this, it is obvious that the woodcock and the thrush are strong preferences. This behavior, up to a big extend, is due to the long hunting duration and the chances that the hunter has to shoot these species. In comparison to other species, these are allowed to be hunted every day of the hunting period, from 20 August until 28 February and in large scale (figure 2).

In northern Greece, the most traditional and important game for most of the Greek hunters is the rabbit, because it is ample and widely spread. It is first in the preferences of hunters in the regions mentioned above with a percentage of 22.7% (Karampatsakis 2005).

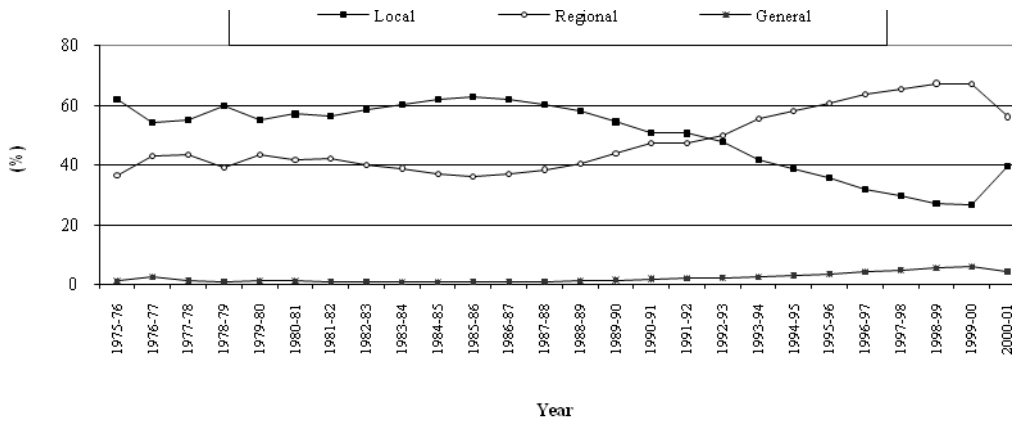

Figure 2. Yearly percentage evolution of the hunting license category in Macedonia and Thrace from 1975 up to 2000.

In a research conducted in 2005 at the 3rd Hunting Area of Peloponnese, an area in southern Greece, 36.600 hunters seemed to prefer the rabbit (Lepus europaeus) (38.02%) and

then the boar (Sus scrofa) (16.39%) and the rock partridge (Alectoris graeca) (15.13%) (Tsachalidis E., Konstantopoulos P. 2007). All the above species are endemic games.

There is a limited variety of games in Limnos and Lesvos and in other islands of our country, where the climate and the vegetation do not promote the creation of a variety of ecosystems, thus the choices for the hunters are limited. Hunters mainly prefer to hunt migratory birds such as: thrushes, woodcocks, etc, (65%) and then brown hares (Lepus europaeus) (35%). The first preference in the island of Limnos is the common rabbit (Oryctolagus cuniculus) (92%), because it is ample (Kougiou, 2005) whereas in the island of Crete the preference for the rabbit reaches 90%. Similar evidence is found in other islands too.

The hunters who live in urban areas prefer to hunt bird games and mostly the woodcock and the thrush, whereas hunters who come from regional and mountainous areas prefer mostly the furry games (rabbit and wild boar).

8. Economical dimension of hunting

According to the results shown in a research which was conducted by students of Democritus University of Thrace, Department of Forestry & Management of the Environment and Natural Resources, during 2007 and within three (3) districts of Northern Greece (Kozani, Kilkis and Drama), the estimated average rates showed that: the average hunter makes 2.7 hunting excursions a week and 54 excursions throughout the hunting period covering an average distance of 62 Km while throughout the hunting period the distance he cover is 3,348 Km .The average overnight stays was estimated to 2.8 stays per hunter-period again. 88% of the hunters own a dog (some of them own two dogs) while the average cost was estimated at 677 €. It was also estimated that the hunter spends 200 € on outfit and equipment, 40 € on guns preservation and 22.4 € on cartridge, during the hunting period. In the above average rate categories and costs there are not included: gun's replacement and new license release or its renewal which costs from 106 € to 145 € along with the annual special tax.

Table 3 was designed according to the average rates and it makes obvious the importance of hunting – hunting tourism for our country's national economy. Adding up all the activities we record that services and goods such as movement – walks, board, overnight stays, outfit, equipment etc., are offered along with hunting and this is the reason why visits are important for many of the hospitality businesses and especially the ones located in mountainous areas.

Table 3. *Categories of expenses during hunting period per hunter in Greece*

	Category of expenses	Average rage (€)	Number of hunters	Total during the hunting period (€)
1	Board	33.0	240,000	7,900,000
2	Fuels (58.00€/ hunter χ 54excursions)	313.0	240,000	75,120,000
3	Overnight stays (2,8 days/hunter χ 60€)	138.0	240,000	40,120,000
4	Dog treatment (88% of hunters)	677.0	211,000	121,747,000
5	Outfit and equipment	200.0	240,000	48,000,000
6	Gun's preservation	40.0	240,000	9,600,000
7	Cartridge expense (70 cart../hunter χ 0.32 € per unit)	22.4	240,000	5,376,000
	Total			***308,083,000***

9. Conclusion

Through the analysis of hunting and the special features of this hobby that has been adopted by a big social group of our country there can be seen the creation of a special kind of tourism, the hunting tourism which aims at the games and at the same time in the protection of the natural environment. This is obvious by the repeated seminars which have as a topic: rules of hunting and scientific knowledge, which certify that this special way of tourism analyzes to every hunter the scientific knowledge which is combined by suggestions to the hunters. This is happening because rural areas were abandoned and the hunters are the ones who live close to nature thus, they even replace the role of farmers and their mission is to protect and improve the biotopes, the habitat of the rabbit, meaning the forests and the fields, paying attention to the sustainability of the rabbit (Special seminar for hunters, 2006).

According to temporary data from Hellenic Civil Aviation Authority released by the Association of Greek Tourism Enterprises the arrivals of incomers at the main airports of the country, were reduced within 2010 about 0.38% in contrast to previous year's data and they were 10,647,157 in 2010 and 10,687,710 in 2009. At the same time, the tourist incomes showed a decline, of 7%, which was mainly because of the reduction of prices and of the offers which the hoteliers have made in order to reverse the negative environment that was created abroad about Greece (Free Sunday, 2011). Under these conditions, it is high time that Greece pays attention and supports more the special ways of tourism, such as hunting tourism.

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The Contribution of Corporate Social Responsibility to the Development of Local Communities

Abstract:
In the present paper, the relationship between Corporate Social Responsibility (CSR) and Local Employment Development, is being investigated. In the same way, the manner in which the first may influence the second in a positive way and therefore contribute to the development of local communities, is being investigated too. The research showed that CSR activities of companies, are provide added value to the tools of the public or tertiary sector. However, it is noted that these positive results may be limited, indirect, difficult to determine and detected only on a long term basis. Therefore, the CSR activities of private companies should not substitute public policy to develop the local economy, but should have a complementary role to that of public policy.

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1 Introduction

In the present paper, the contribution of CSR in the development of local communities is investigated. In order to answer the research question of how can CSR initiatives amplify the implementation of a strategic local development the following research approach is being carried out.

At first this paper attempts, through the historic evolution of CSR's concept, to give answers to the questions of when it has started (before almost a century), in which form it has started (as a philanthropic strategy) but also of what is nowadays its definition. Therefore, the term CSR today, means the obligation of a company to maximize its positive effects and to minimize the negative consequences, as a member that contributes to the society, and to the society's needs and desires.

In addition, the relationship between the Local employment development and Corporate Social Responsibility is investigated and the way in which the second term can effect in a positive manner the first and thus to contribute to the development of local communities is also investigated.

Subsequently, since the relationship between CSR and LED is evaluated, it is connected to the local and regional development. This is achieved so much through the SME (Small and middle sized enterprises) which constitute the cornerstone of the productive and economic base, as much as through the multinational enterprises which invest in the productive sources of local society.

At the end this paper delivers important findings and conclusions. Probably the most important of them all, is that CSR activities without constituting the substitute of public policy, they can however contribute to the accomplishment of many targets of public policy, which are related to local societies development.

1. The Evolution of the Corporate Social Responsibility concept

According to N. Capaldi's paper *Corporate Social Responsibility and the bottom line,* the contemporary discussion about CSR have four main streams the philosophical, the legal, the political and the geopolitics.

The philosophical stream of the discussion goes back, at the coming of modern philosophy. Many modern philosophers, like Machiavelli, and mainly Hobbes, Locke and the following English-American tradition, reject the classical and medieval conceptions concerning collective social good. The modern good is considered to be consisted of

procedural norms, with which we consent or "conventionally agree", while ontologically they consider that there is only the individual good.

The legal origin of CSR's discussion is estimated at least one century ago. There are two recognized views in this discussion. The first one is called libertarian and those in favor claim that enterprises are a "complex of contracts", which have inherent flaws and consequently there is an important need for a world unified legal system which gives plenty of space for citizens' claims. The second view, which is generally called communitarian, supports the existence of collective social good above the individual. Instead of legal battles, the effects of the third part (e.g. the social good) are more easily managed through the legislation.

The political version of this discussion has two dimensions the local and the international. The countries with market economies have a tendency to have two party political systems, where one party is libertarian in dealing or managing the economic and political issues and the other party is primary communitarian, with a tendency in the legal solution of issues. (Capaldi N., 2005)

Contrary to the above, Adam Smith's model has offered a frame for modern enterprises and their connection to society, and supported that capitalism encourages the pursuit of wealth and efficiency, succeeding in this way in the creation of greater wealth than any other economic system. (Smith, A., 2007) Therefore, in this economic system, property belongs to individuals who decide how to use it. While Miller and Ahrens claim that modern enterprise is characterized by professional managers who take decisions on behalf of owners and shareholders. These decisions effect tens of thousands citizens. Furthermore, enterprises need society's sources in order to survive and expand. Corporate taxes are not supposed to be sufficient in order to pay for these sources, therefore the company should have a sense of responsibility to help in resolving social problems (Bowie, 1995). Social contract's supporters claim that the company and the society are equal partners, where each one enjoys a series of rights and have respective responsibilities. (Lantos P. G., 2001)

However, Milton Friedman, as a representative of the liberal classical stream, calls the ideas of social responsibility and promotion of desirable "social" purposes, socialistic and that they are undermining the base of the free market and economy at the last decades. Friedman also supports that this governmental control of prices and wages which is promoted, is ideal in order to destroy in the best possible way the market's economy system and to replace it by a central controlled system. (Friedman M., 1970)

Caroll (2000), on the other hand, has proposed a definition of CSR suggesting that companies have four responsibilities or four "faces" to fulfill in order to be successful parts of the society, the economic, the legal, the moral and the philanthropic. (Makeover, J., 1994) According to the definition of the Journal of Consumer Marketing (2001), Corporate Social Responsibility is defined as a company's obligation to maximize the positive effects and to minimize the negative consequences, since the company is a part of the society which contributes to it and has an increasing interest in their long terms needs and wants. CSR is a good manager of the economic and human sources of the society. (Lantos P. G., 2001)

Bloom and Gundlach consider that the company's obligations towards the stakeholder groups – people and groups which can effect or are affected by the company's policies and practices – go beyond legal obligations and responsibilities of the company and its shareholders. The fulfillment of these obligations intends to minimize any damage and to maximize the long term profit effect of the company to the society. (Bloom, P.N. & Gundlach, G.T., 2001)

According to Lantos there are four levels of stakeholder groups in the society. The first level is the systemic / macro environment / general environmental level – larger social factors, including the whole business system, the social system and additionally the larger part of the society (institutions and forces such as economic, legal, political etc.). The second level of stakeholder groups is the micro environment of the company/ the functional/ the work environment – the direct environment is consisted of these partners in an exchange relationship (like the suppliers and the distributors), plus the competitors, the clients, the local society and the economic society (shareholders, bond holders and creditors). The third level of stakeholder groups, is situated inside the company's' organization and has to do with eminent seniors, juniors and other employees and also labor unions. The fourth level of stakeholder groups is consisted of other important factors for the company's decision making, like peers, family, friend etc. (Lantos P. G., 2001)

Generally, it is obvious that the fact that CSR initiatives are characterized as "socially responsible" is that companies are not motivated by governmental or intergovernmental intuitions in order to fulfill them, but are pursuit in a volunteer basis. Although different definitions are given for CSR, they all converge in three points. The first is the volunteer character of CSR where you find all the activities that go beyond the law. The second is the close relationship of CSR with the environmental protection concept and consequently with the sustainable development concept. The third and last is that CSR is a strategic choice of the company and not just a second circumstantial choice. (www.csrhellas.org)

2. The Interaction between Local Employment Development and Corporate Social Responsibility

In order to investigate the interaction between Local Employment Development (LED) and CRS (the extend in which the first part is dealing with the promotion of CSR and how the last can effect the first part), a research was conducted to all the member-countries of the European Union (E.U.) and also Australia and Canada. The results of this research showed that there is a certain interaction between LED and CSR. The E.U. has started to promote measures for the integration of CSR activities in LED policies, since 2000. European Committee and particularly DG Employment, Social Affairs and Equal Opportunities were concerned with these issues. (www.igfse.pt)

Following the dialogue started by the Green Bible, the European Committee (E.C.) endorsed the announcement: "CSR: A contribution of the companies to Sustainable Development" in July 2002. Almost at the same time, the European Union Forum concerning CSR was established (CSR Multistakeholder Forum). Its aim was the promotion of innovation, transparency and convergence of CSR practices and tools. This was accomplished through the exchange of existing E.U. initiatives and the pursuit of approaching CSR with guiding principles, and investigating the fields which require an additional action.

However besides the general E.U. policy, it must be noted that local initiatives are integrated in the national policies, which in their turn are oriented in E.U. guidelines (mainly the Lisbon Treaty for the development and labor and the European strategy for the employment). Quite often these policies are subsidized by European Financial Instruments. Only in a few countries (like Hungary and Luxemburg), Local Employment Development does not constitute an institutional politics field.

Given the fact, that there are important differences between the regions of E.U., it is quite difficult to show the impact of these general policies in such issues. This was not only noted in the E.U. region members-countries, but also in Australia and Canada.

However, the above research was a very good record of the main results of CSR and its contribution to LED. (www.igfse.pt)

- Labour market integration of disadvantaged or detached local population groups (also with a focus on diversity management and equal opportunities), such as the provision of (sheltered) workplaces for hard-to-place persons (e.g. in the form of social enterprises), the establishment of education/training programmes for women, youngsters, elderly, migrants etc. with a strong practical orientation that is safeguarded through the co-operation of the local firms;

- Development of the local economic activity, attracting businesses and counteracting delocalisation of entrepreneurial activity, e.g. joint efforts (financial or non-financial) of local authorities and local companies to foster business startups by regional inhabitants;
- Revitalisation of the local area, e.g. by establishing local quality labels or by providing local services/infrastructure to improve the local quality of life, e.g. schools, childcare facilities, sporting or cultural centres jointly raised or developed by public and private actors;
- Promotion of CSR among the local business community, e.g. through efforts to familiarise firms with CSR and provide practical information about implementation possibilities;
- Empowerment of local actors for (strategic) local employment development (e.g. by know-how transfer), realised, for example, in Germany with the implementation of the 'WABE' project - an initiative to integrate job-seekers successfully into the regular labour market while at the same time familiarising local stakeholders (enterprises, government, civil society) with the possibilities of cooperating for the benefits of the local area.
- Environmental protection, such as the introduction of environmentally friendly production processes within the local area to safeguard the economic sustainability of the businesses against rising expectations of clients or the awareness raising of local inhabitants and companies for environmentally friendly behaviour which is conducted by both, local governments and enterprises; the Canadian company 'Cascades', for example, not only engages in recovery through the recycling of industrial and domestic waste but also orients its donations and sponsorships towards the environmental sector, resulting in an image of respect, trust, accountability and quality safeguarding the sustainability of the enterprise employing about 14,000 persons in more than 100 plants .

The most important parties initiating/ involved in LED/ CSR initiatives refer to the following:

- Large, but also small companies are certainly key partners in LED/CSR initiatives as they set voluntary activities (CSR) that are advantageous not only for the individual company and its employees but also for the wider community.
- NGOs/NPOs often become the driving force in LED/CSR activities trying to convince both, potential public and private partners to participate.
- Regional and/or local governments adapt the national political strategies to the regional/local environment, initiate specific measures, act as (funding) partner and/or are engaged in marketing activities to increase the community's awareness on the social, labour market or environmental problem and to enhance the visibility of the individual initiative.

- National governments in most of the cases set the general framework strategy under which the individual initiatives are designed and elaborated and provide the financial means for their practical implementation.
- Social partners/employers' and employees' organisations in many cases play the role of a mediator between the public and the private organisations.
- Public Employment Services, education providers (e.g. universities) and research institutes constitute facilitators in the practical implementation and materialization of LED/CSR initiatives, supporting both public and private partners.
- Specialised CSR organisations or the media may contribute to the initiatives by increasing their transparency and thereby making them more attractive for companies to participate.

It can be concluded that the analysed initiatives lead to a an advantageous result for the involved companies, local authorities and the local community/inhabitants. However, while there exists good consensus that enterprises' CSR activities constitute a value-added to the instruments of public or third sector actors it has to be acknowledged that the resulting effects may be limited, indirect, intangible and manifest on the long run, only. Hence, CSR activities of private enterprises should not be seen as a means to substitute public intervention in the local economic development domain.

Potential advantages for all the stakeholder parties can be:

- The possibility to utilise the partners' specific resources and expertise
- (know-how, financial means, networks and social capital etc.). A local
- division of labour takes place, making available a wide variety of material and immaterial resources to the benefit of all.
- An enhanced local cohesion/co-operation; This may result in both, lower outmigration (and brain drain) tendencies as well as better business opportunities at local level and a better economic climate.
- LED/CSR initiatives targeted on the labour market integration of the local inhabitants may result in a better matching between supply and demand on the labour market as companies may influence the competence development of local inhabitants, add 'a sense of reality' to the offered training instruments and/or get (easier) access to the labour force they need.

Local communities benefit from companies' engagement in LED initiatives

- As the operative involvement of the business sector results in an immediate improvement of the labour market situation in the local area in terms of a higher rate of employment or better working conditions.

- As they realise a wider access to financial means for community initiatives. This is to be attributed to the investment of private companies for public purposes, increased tax revenues and decreased social/welfare payments due to the improved labour market situation.

As for CSR activities in general, enterprises' potential benefits are:

- a better visibility and image among clients and other stakeholders, fostered e.g. by media articles or prize awards
- in the longer run higher sales through more loyal customers or the development of new customer groups
- Furthermore, a better reputation among the business community may result in enhanced co-operation with other enterprises and additional business
- Opportunities with the other involved stakeholders (i.e. public and third sector). The thereby created business networks contribute to the realisation of better business opportunities and competitive advantages.
- An improved corporate image may also be helpful on the labour market in terms of attracting and/or retaining staff. Furthermore, companies often realise an increased employee loyalty or a better staff team building.
- This, in turn, results in a higher motivation of the workforce and, consequently, more efficient and productive work processes (hence, cost savings), often related to a higher degree of creativity and innovativeness.

3. Corporate Social Responsibility and the development of Local Communities

CSR according to the Green Bible for Corporate Social Responsibility is expanding beyond the company at the local community. This means development of local communities, in general development of the Regional economies and consequently Regional Development. Regional development is determined not only by the multinational companies who invest in the productive resources of the local community but also by the Small and Medium Enterprises (SME) which constitute the cornerstone of the production and economic base of the particular society. Similarly, the environmental dimension of CSR is one that can not be ignored as it constitutes an integral part of the concept. This applies regardless of whether the company which decides to undertake CSR initiatives is a multinational or SME.

It is noted that responsible businessmen have the following characteristics:

- They behave towards their clients, their business partners and the competitors with a sense of justice and honour.
- They care about their health, the security and generally the better living of the employees and their clients.
- They give motivation to the labour dynamic offering education and development opportunities
- They act as good citizens to the local community.
- They respect natural resources and the environment (a).www.ec.europa.eu)

Particularly, as far as Local Communities are concerned, CSR refers to a broad total of stakeholder parties of the Local Communities. They are not only the shareholders and the employees but also the business parties, the suppliers, the clients, the public authorities and the NGOs which represent the local communities or those involved with the environment.

The development of positive relationships with the local community consequently the accumulation of social labour is particularly related to non local companies. The multinational companies are using more and more these relationships in order to support the integration of their subsidiary companies into the several markets in which they participate. The close bonds which are developed between the companies and the local institutions, the traditions and advantages of the local environment constitute a capital from which they can benefit. (Mitoula R., 2006)

Particularly, CSR is related with local communities in the following sectors.

- Collaboration with the community and other organizations within the community, which means activities and initiatives that the company develops into the local community. The company collaborates with the community and invests resources in supporting issues that interest it. CSR projects application motivates many companies to participate in solving local problems.
- Benefits and grants are given to the community which means donations in money or in any kind and also in sponsorships of specific activities. The companies offer to the communities jobs, salaries, social benefits and also money in the form of taxes. On the other hand, the companies depend on the good health, the stability and the prosperity of the communities into which they function. Especially SMEs quite often derive their customers from the region which they are located. The reputation of a company in their location, its image as an employer, a producer and also as a local factor can effect the company's competiveness.

- Participation of employees which mean contribution of the employees in supporting the new employees during their training period or the encouragement and support of employees towards voluntarism. (www./metalibri.wikidot.com)

Generally CSR activities even in the frame of Regional Development are carried out mostly by multinational enterprises. How can Small and Medium Sized Enterprises undertake CSR initiatives and how can this question be answered when only in Europe the total of SMEs is approximately 25 million.

It becomes obvious that the knowledge referring to the effect of CSR activities to SMEs is relatively poor according to the research studies of the 25 member countries of the E.U.. As it is obvious that many SMEs are ethically responsible as far as environmental social and local needs are concerned. Many of the SMEs which are ethically responsible have no knowledge that this is called CSR. The successful SMEs offer in a frequent basis exceptional quality products and services. They commit to their employees and they provide them with motives, they cultivate their abilities aiming at the long-term success of their enterprises. They recognize on the one hand the value of informing and counselling their employees and on the other hand the value of their employees being organized in counselling teams.

Due to the fact that these SMEs are standby for human right, health and security issues, they encourage their staff to acquire new skills, to get a better balance between work and personal life, to recruit and promote according to skills – regardless of sex, race, age, handicapped and sexual orientation. Many SMEs in their effort to function sustainably they become responsible in the use of natural resources, cautious in their extraction, looking for ways to reduce the consumed energy and water and packaging and waste generated by the whole procedure of production. Also many SMEs have a tangible impact on local communities which is proved by the provision of working experience and specialization to students of local schools, of financing local community's organizations and of supporting environmental cleansing actions.

In addition, given the large number of SMEs approximately 99% of all the enterprises in the E.U. and the lack of homogeneity in experiences, ambitions, capabilities and sources, the measures supporting CSR initiatives by SMEs need to be as close to the market and to the consumer as possible. In a similar way this SMEs dispersion means that a variety of channels in local, regional, national, European Union and sectoral will be needed. (b)www.ec.europa.eu)

Therefore, it constitutes commonplace that local development relating to CSR initiatives, either applied by Multinational enterprises or by SMEs, can be seen as a procedure of economic development and structural changes which leads to:

- Creating working places and entrepreneurship, that is the initiatives of an enterprise to creating new working places and the assistance for developing small enterprises.
- Employability, which is the actions and initiatives to increasing the employed, by improving skills and lifelong learning.
- Projects for new people, which is the development of local economies by supporting the youngest generations through the adoption of several education activities.

The connection of CSR with the natural environment is referred to the sectors of:

- Sustainable development
- Green activities
- Waste management
- Prevention from pollution

It is encouraging to see that nowadays enterprises take into consideration during their business plans and efficiency measurements their impact on the environment. Sustainability also refers to several activities of an enterprise aiming to reduce the negative effect on society. (Economou Ag., Mitoula R., 2010)

The Green entrepreneurship is primary an entrepreneurship which brings out the natural and human environment as a cultural heritage and tradition, as a financial resource and as a field of business activities without polluting the environment. Similarly, a secondary green entrepreneurship is the adjustment of enterprises and economic activities to environmental conditions.

Several enterprises apply Environmental Management Systems (E.M.S.) like ISO 14000 or EMAS. Remarkable progress has also been achieved in the development of "environmentally friendly products» stimulated by the growth of green markets and government policies which are explained by the Integrated Product Policy (IPP)[12] of the European Union.

In general, it is necessary for all the enterprises to integrate environmental responsibility to all levels of their processes, to find sustainable solutions for the proper use of natural resources, to manage environmental risks and to secure the reduction of wastes, pollution and emissions. In the frame of a unified European ecological market, that is a

[12] All products cause environmental degradation in some way, whether from their manufacturing, use or disposal. Integrated Product Policy (IPP) seeks to minimise these by looking at all phases of a products' life-cycle and taking action where it is most effective.

market consisted of products that contribute at the most possible way to the reduction of environmental pollution saving of energy and resources at every stage of its life cycle and similarly the acknowledgement of these products directly from the consumer, the eco-label system was established. The European Ecolabel is a voluntary scheme, established in 1992 to encourage businesses to market products and services that are kinder to the environment. Products and services awarded the Ecolabel carry the flower logo, allowing consumers - including public and private purchasers - to identify them easily. While the logo may be simple, the environmental criteria behind it verify that the product meets these high environmental and performance standards. The adoption of the European eco-labeling is voluntary and is a method of introducing environmental criteria, incorporating also volunteer, another criterion for evaluation: an Integrated Environmental Management in enterprises. (www./metalibri.wikidot.com)

4.Conclusions

The above paper shows us that Corporate Social Responsibility is a concept that has received broad analysis, and was handled from a different perspective by each writer. Also it was analyzed by theoretical, philosophical, practical and moral side. Similarly, several definitions of the stakeholder parties were given in each case. While, there were those who reacted in a negative way, to the admittedly indeterminate and controversial results - benefits of the responsible corporate practices for the company, such as Milton Friedman.

In any case, what characterizes CSR initiatives as "socially responsible" is that companies are not motivated by governmental and intergovernmental institutes to carry them out, but are sought voluntarily. In addition, although different definitions are given for CSR, they all converge in three points. The first one is the voluntary nature of CSR, which are all actions that companies apply beyond the law. The second is the close relationship with the concept of environmental protection and thus sustainable development. The third is that CSR is a strategic choice for business and not just an occasional secondary option.

For businesses and 'controversial' benefits which may include the undertaking of CSR activities or initiatives, it is understood that the pursuit of profit can be combined with CSR practices that simultaneously promote and meet social needs.

Such Needs can be training in new technology and life term learning, maintaining a high quality of living for workers inside and outside the enterprise, and also to ensure happy customers.

In order to implement CSR in local and by extension at a regional level, there is an understanding of the concept of LED and its interaction with the CSR. It becomes clear that given the characteristics and the historical involvement of both the LED and CSR at European level, a convergence or a combination of these two concepts can be realized.

However, while there exists good consensus that enterprises' CSR activities constitute a value-added to the instruments of public or third sector actors it has to be acknowledged that the resulting effects may be limited, indirect, intangible and manifest on the long run, only. Consequently, the CSR activities of private companies should not be viewed as substitute of public intervention in the local financial sector development.

According to the above it is concluded, that CSR extends beyond the company to the local community. Local development is determined both by multinational companies that invest in productive resources of society, and SMEs which are the cornerstone of productive and economic base. In addition CSR initiatives, regardless of the multinational company or a smaller scale company which applies them, are characterized by an environmental dimension which is inherent in the concept.

The connection of CSR to the natural environment refers to the areas of sustainable development in "green" actions, waste management and pollution prevention. Finally, it must be emphasized again that Corporate Social Responsibility initiatives are not a substitute for public policy, but can help to achieve several public policy goals related to development of local communities.

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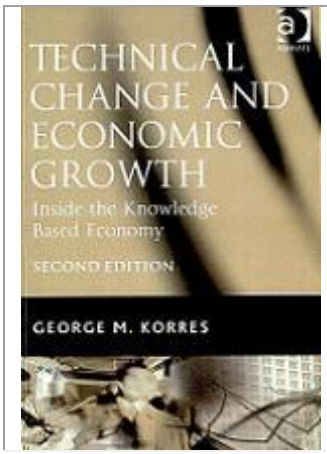

Technical Change and Economic Growth: Inside to the Knowledge Based Economy

George M. Korres,

University of the Aegean, and University of Leeds, UK.

Avebury-Ashgate publishing, London, pages 392,

Hardback, ISBN-13: 978-1-84014-992-0.

The growing importance of technological change in world production and employment is one of the characteristics of the last four decades. This book performs such an empirical analysis. It uses the unique example of the E.U. to analyze whether convergence or divergence occurred within the E.U. The book argues that regional economic development ultimately depends on technical change, social and human capital and civic entrepreneurship, among others. If so, technology, in all its facets, will be the crucial ingredient in regional improvement, in contrast with the usual regional pleas for better infrastructure, health care and banking facilities. The book is intended to provide a basic understanding of the current issues and the problems of knowledge economy, technical change, innovation activities; it will also examine many aspects and consequences of regional integration that are obscure or yet to be explored. The book consists of five main chapters. Chapter I is devoted to definitions and measurement of innovation activities and knowledge economy. Chapter II investigates the neoclassical growth theory and models of innovation activities and the knowledge based economy. This Chapter attempts to analyse and model the new economy, within the framework of knowledge and innovation activities; It also attempts to estimate socio-economic effects of technical change, using both a theoretical and an empirical approach. Chapter III deals with the main issues of technical change, knowledge economy and productivity growth. This Chapter attempts to identify the R&D activities and also to investigate the estimation-methods, the techniques of scientific and technological activities and the measurement problems for productivity growth. Chapter IV investigates the role of FDIs (Foreign Direct Investments) in the context of national systems of innovation. Finally, Chapter V deals with the challenges and the institutional matters for the European policy-makers encounter and the effects on regional growth and economic integration, including technology policy, other related policies, the distribution of E.U. funds, regional development and productivity issues.

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