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Business Research Challenges in a Turbulent Era

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GREEN ECONOMY: THE CASE OF SUSTAINABLE BUILDING CLUSTER IN GREECE

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Abstract

The aim of the present prototype for the Greek standards research was the nomination of the necessary conclusions in order to detect the critical mass of the professionals who really wish, either to involve actively or to support the establishment of a sustainable building cluster, contributing to green economy.

For the present research, which was realized in mid 2010, the methodology followed was this of editing, gathering and processing, of specially constructed questionnaires for the purpose of the study. The questionnaires were addressed to business and organizations that are directly or indirectly involved to the establishment of the sustainable building cluster. Data were processed and analyzed using SPSSWIN ver 17.0 and the relative statistical tests of Frequencies, Descriptives and Crosstabs, were made, independence tests between all variables using X2 criterion, correlation analysis and analysis of variance (t-test), as long as content validity tests of the variable used in the questionnaires.

Greek enterprises estimate that the tendency of "green buildings" is coming to Greece. Most of them are forecasting that in the next 5 years this will be institutional established and they are preparing for this to happen.

The set of targets of the most Greek enterprises, in order to support the sustainable building cluster and to be supported by it, is focused mainly to the development of new innovative products, to the improvement of products quality that they produce, to their conformation to environmental legislation and to the improvement of their business image/fame, the reduction of pollutants and wastes and the reduction of production cost.

For the development of sustainable building in Greece, the factors that have been detected to play the most significant role and should be especially attended by Greek cluster's enterprises, seem to be: the economic situation of the country, the nomination of advantages and benefits for the users of new "products" of sustainable building, the implementation of appropriate and effective ways of publicity, promotion and advertisement of sustainable building and the support of the investments by financing programs.

Clusters are gaining continuously growing significance and they can play a fundamental role towards the direction of "green economy", the improvement of innovative and entrepreneurial landscape of a country in the basis for cooperation and synergy creation of Greek construction companies and related organizations, in order to overcome the consequences of the national and global economic crisis and secure a further development.

This research is the first in Greece trying to investigate the critical factors that are incorporated and shape the meaning of sustainable building in Greece, through the prism of economic crisis, but also to investigate the challenges that arise for green economy and development.

Keywords: green economy, clusters, sustainable building, environment, entrepreneurship, sustainable development, innovation

Introduction – Aim of the Study

Sustainability towards a green economy and entrepreneurship

The updating of European strategy, as it was set up through the revision of Lisbon strategy by the "Europe 2020" strategy, is aiming to the exit of the economic crisis and the preparation of the E.U. economy for the next decade (Rizzuto, 2011; European Commission, 2010; European Policy Center, 2010; Erixon, 2010; Frazer *et al.*, 2010). Among others, priority will be given at: a) juncture of innovation with R&D, b) the efficient use of E.U. resources, in order a low carbon emissions economy to be achieved and c) the promotion of entrepreneurship and the development of new dexterities for the creation of million new jobs across Europe.

In the framework of this strategy and following the Kyoto Protocol, European Union is obligated to reduce its greenhouse gas emissions per 20% till 2020 in relation to the 1990 levels. The environmental policy of all the nations that have signed the Kyoto Protocol, in which Greece is also participating, is determined in its majority by actions which have to do with the reduction of human activities contribution in climate change and the conformation of the countries to the commitments and the targets of the protocol, based to the National Programs of greenhouse gas emissions reduction (Saikku *et al.*, 2008; Narayan *et al.*, 2007; Carraro, 2000; Oberthur and Ott, 1999; Grubb *et al.*, 1999).

The actions dealing with the confrontation of climate change are obligated to incorporate a change to the existing developing model, towards the direction of a sustainable, green economy of low or zero, if possible, carbon emissions with the use of modern technology. Besides the focus to environmental protection as a singularity, sustainable development is the result of the growing awareness of the global links between mounting environmental problems, socio-economic issues to do with poverty and inequality and concerns about a healthy future for humanity. It strongly links environmental and socio-economic issues (Hoppwood *et al.*, 2005). The development of this model has to be based and supported by the horizontal coordination of mitigation and reconciliation policies in the sectors of energy, industry, agricultural production and I many others such

as the sector of constructions and building (Blakely and Leigh, 2009; Haughton and Hunter, 2003; Russo, 2003; Adams, 2001; Breheny and Batey, 1992). The cost of emissions detention and adaptation to climate change, may seems relative high in the beginning, but is much lower in relation to the cost that we will have to pay because of any slack (Van Vuuren *et al.*, 2006; Nordhaus, 2001; Manne and Richels, 1999).

Concerning especially Greece, according to a recent report evaluating the cost of climate change (Bank of Greece, 2011), the unfortunate scenario from the side of the intension of human climate change, corresponds to the absence of any action for the reduction of the human gas emissions that cause this change and it was characterized, according to the report, as the Scenario of No Action. In this case it is estimated that the Greek GDP will suffer a reduction, in annual base, per 2% in 2050 and per 6% in 2100. The total accumulated cost of the No Action Scenario for Greek economy, concerning the period till 2100, expressed as a reduction of the base year GDP, is up to €701 billions (in fixed prices of 2008). According to the best scenario called the Adaptation Scenario, the Greek GDP will show a reduction per 2,3% and 3,7% during the years 2050 and 2100, respectively, and the reconciliation cost it is estimated up to €67 billions. As it is concluded, the adaptation measures are not able to erase the sum of the losses because of climate change, they just press them.

The tendency in most developed countries has to do with the turn of people towards the achievement of a better life quality, the sustainable management of natural resources showing respect to the environment. Thus, the interest of the market nowadays points to the development of a continuously growing "green development", "green economy", "green entrepreneurship", "green building", especially for the small and SME's, but also to the improvement of citizens quality of life (Allen and Malin, 2008; Berchicci, 2008; Henderson, 2007; Bansal, 2005; Brown, 2003; Milani, 2000; Pedler *et al.*, 1996; Pearce and Atkinson, 1993).

The key of green development and economy lies to the principal of *sustainability* and *sustainable management*. At this point, we have to mention that the meaning of sustainability has been developed originally by Carlowitz in 1713 (according to Speidel, 1972) and has started to be implemented by the end of the 18th century. At a next stage it has constituted the conceptual principal of the reasonable environmental management globally. *Sustainable development*, concerns development in such a way in order to satisfy the needs of today generations, without decreasing the capability for the satisfaction of the needs of future generations (Bell and Morse, 2008; WCED, 1987; Stamou, 1985).

Sustainable building (Radlin and Falk, 2009; Bunz *et al.*, 2006; Russo, 2003; Anink *et al.*, 1996) concerns the design, construction and operation of buildings and landscapes that incorporate energy efficiency, water saving, minimization of wastes, the prevention of pollution, resources efficiency of the materials that are used and the quality of living in buildings, during the sum of the different phases of a building's life. By definition, sustainable development, leads to "living cities" corresponding to residential and environmental needs,

not only through resources and energy saving, but also by the capability to support more productive, stable and innovative economies in urban areas (Haughton and Hunter, 2003).

Greece, incorporating these policies to its residential development, legislates in favor of a more environmental friendly building and house activity. The energy demand of the house sector in Greece, is expected to show a relative small increase during the next years, mainly because of the relative limited increase of population and of the infiltration of more efficient energy technologies (National Program of greenhouse gas emissions reduction – Governmental Paper A'-58/5-3, 2003). The average annual increase of energy consumption of the sector during 2000 - 2020 is expected to reach 1%. Energy activity is improving with an average annual rate near to 1.9% (National Program of greenhouse gas emissions reduction – Governmental Paper A'-58/5-3, 2003).

Following the previous analysis, the question that rises as a challenge for Greece is: Can sustainability and entrepreneurship in building and construction sectors constitute a common platform of policies and business strategies approach, for a greener economy?

The answer has already been given through the implementing policies, in the framework of NSSF 2007 – 2013 (National Strategic Statement Framework) and the Sector Programs "Environment – Sustainable Development" and "Entrepreneurship and Competitiveness". The main development object concerns the protection, improvement and sustainable management of natural environment, in order to become the background for the improvement of citizens' quality of life as long as to contribute to the improvement of competitiveness of Greek economy. Simultaneously, the improvement of the Greek business and production system competitiveness and extraversion is being pursued, giving significant emphasis to innovation through the promotion of the National Research, Development and Innovation System, to the products quality improvement and the promotion of business clustering.

The role of clustering

At the same time, more positive results are observed continuously concerning firms of many economic sectors, which are collaborating together and participating into a cluster and thus this participation is recognized as a valuable tool for economic development (European Cluster Observatory, 2010; National Observatory of SME's, 2009; European Commission, 2005, 2006 and 2007; Cortright, 2006; Robinson, 2002; Rosenfeld, 1997; Malmberg *et al.*, 1996). The growing focus at clusters and innovation systems, reflects the importance of specific initiatives at a regional level in order to constitute the driving force of innovation capabilities and of business competitiveness (Trigkas, 2010; Makios *et al.*, 2006; Gordon and McCann, 2005; Pittaway *et al.*, 2004; Prastakos *et al.*, 2003).

Porter (1990), describes the cluster idea under the prism of the "*diamond of competitive advantage*" which reflects the meaning of a cluster and how the position of an enterprise into it affects its strategy and productivity. The four elements of this diamond incorporate factors

dealing with the enterprises resources, demand factors, related and supporting industries and enterprises and finally, the business strategy, its structure and competition.

According to the Hellenic Organization of SME's and Craftsmanship and the National Observatory of SME's (2009) as clusters are defined "*groups of competitive enterprises, usually established in neighboring regions, which interact aiming to economies of scale (common procurement, logistics, storage etc.), to resources access (capital markets, development and flows of knowledge, specialized personnel), to direct and accurate information and in generally to initiatives undertaking concerning the reduction of production cost, the improvement of business - participants operation and competitiveness".* In these clusters, besides the enterprises – participants (known as body enterprises), are participating supporting enterprises and organizations such as industries associations and professional chambers, technological institutions, research centers and universities, governmental organizations, financing organizations, network brokers etc. which offer services of a horizontal character towards the cluster participants.

A cluster is formed by the participating enterprises, but also constitutes an individual operational entity, institutionalized or not. Each successful cluster, implements more effective activities that either the enterprises – participants promote individually, or they did not promote them at all till now. These activities aim to the participants' enhancement, as long as to their external business environment enhancement, from which the cluster takes resources and capabilities (National Observatory of SME's, 2006).

Clusters are mainly constituted by enterprises that are operating at the same economic sector (*horizontal clusters*) or into different sectors of production process, meaning that they belong to the same logistics (*vertical clusters*). Clusters are located to a specific geographic region, since the neighboring facilitates communication, inter transportations but also business interacting (Shields, 2003). If business transactions are not affected by geographic distance, clusters may develop at wider geographic regions. Thus, clusters exist at local, regional, national an international level. Clusters may also be developed at urban and agricultural environment.

Industrial clusters constitute a sum of enterprises and related financial organizations which are located close to each other (Cortright, 2006; Shields, 2003). These neighbouring enterprises often enjoy advantages because of this specific neighbouring (Cortright, 2006).

The importance of clusters is underlined also by O.E.C.D. (2002) through the investigation of the way by which business clusters help innovative activity of enterprises through knowledge flows, new ideas and information inside the cluster, under the framework of a wider innovation system. Cooperation with innovation organizations, in the framework of such a system, gives competitive advantages to the enterprises since the cooperative organizations have the capability to provide specialized know how towards the enterprises, specialized personnel, financing opportunities and R&D for the production of new products (Trigkas, 2010; Drucker, 1985). For that reason, we can state that innovation systems are

constituted by: a) the enterprises of a cluster along with the supportive units, b) innovation organizations, c) interactions between all the above.

The key for success of such an innovation system is the way that the above mentioned organizations and enterprises are interacting in such a network (Pittaway *et al.*, 2004) as long as individual elements such as, the applied policy, the existing legislation, infrastructures, the capability for market financing and development (Woolthuis *et al.*, 2005).

Also, firms that are exporting their products already, are more supportive to the establishment of a cluster, while the absence of new products development, the low promotion of products, the weakness of exporting and the tendency of focusing only to low prices of products as the only competitive advantage, are the most important problems in decision making for the creation of a cluster (Papadopoulos *et al.*, 2008).

A related study that was conducted in Greece concerning the establishment of a cluster for small enterprises has shown that, the main objective of businessmen for participating into a cluster is the growth of competitiveness through the implementation of new innovative activities for the promotion and development of new products, while their priorities concerning decision making in investing, are the improvement of quality, of productivity and the development of marketing (Karagouni *et al.*, 2009).

The European Community directions for the coherence policy of 2007-2013, have as a target the improvement of knowledge and innovation in the basis of economic development (GSRT, 2007). Concerning the growth and the improvement of investments for research and technological development, one of the priorities that has been set up is the enhancement of cooperation between enterprises and between enterprises and public institutions of research/higher education, supporting the establishment of regional and inter regional clusters of excellence (GSRT, 2007; National Observatory of SME's, 2006).

According to a recent report of the European Clusters Observatory (2010), clusters constitute a fundamental part of the European economic reality but also of the policy for innovation and entrepreneurship, as mentioned. The benefits of clustering concern the achievement of economies of scale and scope, reduction of transactions cost, increase of interactions and cooperation between the enterprises based to confidence relationships, reduction of costs because of specialized occupation, business services, products and raw materials, public investments for the satisfaction of specific sector needs, creation of markets for the satisfaction of specific products' needs. Furthermore, clusters are recognized as the driving force for innovation through knowledge flows between its members and because of their geographic closeness as long as through the creation of new knowledge.

Perspectives of a sustainable building cluster in Greece

According to the above, sustainable building cluster rises as a new form of economic activity, having as a core private green entrepreneurship, in cooperation with universities,

research centers, organizations etc. aiming to the development of cooperation and by extension the maximization of environmental protection, the improvement of business environment, but also as a new opportunity of competitive advantage and implementation of national strategic policy for a green economy. This new tendency and reality should be reclaimed by the Greek enterprises (producers, suppliers, scholars, constructors), but also by the citizens who wish to participate into a sustainable building network, in order to modernize the way of doing business and gain themselves significant and multiple benefits that will rise from this specific action.

In the construction sector and related activities, s significant number of clusters across Europe is operating, a fact that shows the dynamics of the sector. If we include also, the number of clusters concerning individual elements of construction – building sectors (wood, metal, aluminum, electric materials, real estate etc.), it is obvious that at a European level there is a significant perspective of clustering development (European Commission, 2007).

In Greece, according to the report of European Cluster Observatory (2010), there is great specialization in the construction sector, where a significant number of employees are occupied, with the rest of the sectors to follow. Concerning the regions where this accumulation exists, Attica stands at the first position with Northern and Central Greece, Aegean islands and Crete to follow (European cluster observatory, 2010). In Greece a few cooperative structures are operating comparatively to the rest European countries.

The construction sector in Greece

The construction sector in Greece constitutes one of the most dynamic sectors of economic activity having a total Gross Added Value in current prices for 2009 up to €9.581millions (Greek Statistic Service, 2010). In a GDP percentage is up to 4% for the same year. Counting in the data concerning related sectors of economic activity (ICAP, 2009 and 2008), which are in a direct or indirect relation to building sector, such as manufacturing industries, real estate, financing sector etc. it is obvious that the construction and related sectors hold a significant percentage of total national GDP and occupation.

The data concerning the basic financial figures in construction sector of Greece (Greek Statistic Service, 2010), show the clearly up warding tendency of the sector for the period 2000 – 2007. Thus, during 2007, in Greece were operating 108.829 firms in total, occupying 304.589 employees, which is a very significant number. The percentage change for the specific period is up to 35,5% concerning the number of firms, 42,4% for turnovers by constructive activities and up to 65,1% for the turnovers by building activities. It is considered that in general, the course of the numbers is positive, at least until the period before the financial crisis of 2008.

Nevertheless, the above positive ambience in the construction sector was inverted by the recent economic crisis. The positive course of the sector was inverted from 2006 and onwards while a dramatic decline occurs since 2008, whereon the effects of the crisis start to become visible in Greece too. The negative effects of the crisis that the Greek construction and

building sector experiences are better understood by considering the figures of the decade 2000 – 2009. For this period, the percentage change of the number of buildings was -22,1%, number of floors -26,8%, volume -29% and of their surface -29,7%, while their value has changed per 74% showing a positive sign, a fact that shows the great increase of the estate value, beside the reduction of demand.

The situation seems to get worse in a dramatic way during 2010, after the recent financial measures in Greek economy. During the period May 2009 – April 2010, the total building activity index (private and public), has shown a decline per 12,1 % concerning the number of building licenses, per 22,0% concerning surface and per 26,0% for volume in relation to the corresponding period of May 2008 – April 2009. During the same period May 2009 – April 2010, private building activity index shows a decrease per 12,2% in total concerning the number of issued building licenses, per 22,5% concerning surface and per 27% for volume, compared to the corresponding period of May 2008 – April 2009.

The above mentioned data, underline the imperative need that exists in the sector concerning the enhancement of production activity, the boosting of demand and competitiveness of the Greek constructive enterprises, in order to be able to successfully overcome the difficult economic circumstance, reversing the present negative ambience and boosting economic development of the sector and of the country in general.

The aim of the present prototype for Greece research, was the extraction of the necessary conclusions in order to study, at a first stage, the demand of "green buildings" and in continuation to detect the critical mass of professionals who really wish, either to involve actively or to support the establishment of the sustainable building cluster, as long as to indicate the importance of individual factors and obstacles considering the cluster's operation and to investigate, in what way this could contribute towards green economy in Greece.

Methodology

The research was based to the collection of primary data from statistical databases, which were processed, analyzed and presented their results, concerning the quantitative data of the mentioned cluster, such as the construction sector, building activity etc.

The implementation of a specialized research followed, concerning clusters and sustainable building in Greek market. For the data collection of this original research, as a method, was used the one of editing, collecting and processing of specially constructed for the purposes of the study questionnaires, according to the basic principles of marketing research, responsibility, transparency, validity, perception and connection to strategy (Gordon and Langmaid, 1988; Tull and Hawkins, 1990; Doyle, 1998; Aaker *et al*., 2004; Papadopoulos *et al*., 2010).

The questions that were used, were aiming to originally study the factors of demand, knowledge, willingness and philosophy of the involved stakeholders (scholars,

manufacturing industries, suppliers, constructors, research centers, universities, institutes, organizations) concerning the establishment of the sustainable building cluster.

The potential participants of the cluster, which constituted the study's population, were categorized in 5 major groups. The 1st group contained the materials production industries such as: wood, steel, concrete, gravel, glass, asphalt, plastics, petrochemicals etc. In the 2nd group belonged the frames manufacturers, furniture, plumping, electrical, sanitary, floors, solar collectors' manufacturers etc. The 3rd group involved the dealers and suppliers of timber, steel, aluminum, concrete and other raw materials. The 4th group was composed by civil engineers, architectures, decorators, constructors – contractors, real estate corporations, brokers etc. Finally, the 5th group included organizations that belong to the category of the cluster supporters which are the government and innovation supporting organizations, organizations that legislate, promote and educate and more specifically Universities and Technological Educational Institutes, Research Centers, Champers, Developing Agencies, Public Organizations, Consultants etc. Two different questionnaires were created, with some common questions, which were addressed, the one to the enterprises and the other to the organizations.

The questionnaire was pilot addressed to 5 enterprises and experts with experience in clusters. From this pre sampling these questions were detected that needed to be rephrased and thus the quality of the questionnaire was improved taking its final form (Dillman, 2000). The time period of questionnaires collection was August 2010. Finally, 33 enterprises and organizations have corresponded, so the research sample is considered as enough (>30) for the extraction of reliable conclusions.

The data were edited, processed and analyzed through the specialized statistic package SPSSWIN ver 17.0 and all the relative statistical tests were made such as frequencies, descriptive and crosstabs, independence tests between all variables using the X^2 criterion, correlation analysis and analysis of variance (t-test), as long as questionnaires content validity and credibility (Norusis, 2007; Howitt and Cramer, 2003).
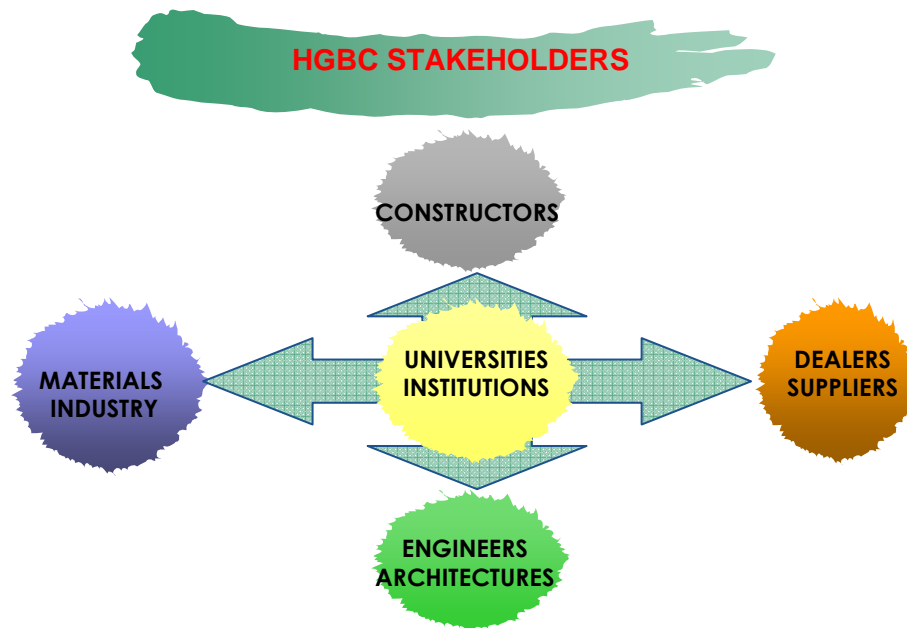
Figure 1: Groups of enterprises and organizations of the study

Results

Evaluation of the sustainable building demand in Greece under the framework of green economy

The participating organizations and enterprises to the relative market study that has been conducted, believe in total that the construction of single "green buildings" (buildings that have the minimum possible energy consumption and they use environmental friendly materials) could create a general positive "tendency of sustainable building" in Greece too.

Simply, several variations exist, concerning the time that the above mentioned "movement" will develop in a significant level in Greece too, with the existence of a capable number of "green" buildings. The majority of the organizations and enterprises of the research (53,6%) believe that "green" buildings will be able to consecrate in Greece in the next 5-10 years. The most optimistic (29,8%) forecast that this "movement" will be consecrated in the next few years (1-5).

The verification concerning the increase or not of the demand for sustainable building internationally during the last years, is that it is observed an increase in a moderate and satisfactory rate. The factors which have been observed to be altered concerning the demand for sustainable building, as long as their alteration rate, are shown in Table 1. These that have altered in a moderate level are the enhancement of the media's role, the enhancement of the role of environmental training and the financing of related activities.

The Pearson correlation analysis concerning the alterations of the demand factors for sustainable building has shown that:

- As much as this kind of activities are financed so the number of certified professionals is increasing, the number of certifying projects and acquisition of

experience and know how by the industry in subjects of sustainable building (Pearson correlation coefficient = 0.604, 0.721, 0.562, 0.475 respectively at a significance level of 0.01, 2-tailed)

- As the number of certifying projects in subjects of sustainable building increases so the greater the number of certified professionals will be, the number of certified buildings and the acquisition of experience and know how by the industry too, (Pearson correlation coefficient = 0.818, 0.796, 0.635 respectively at a significance level of 0.01, 2-tailed) and

- As much as the movement of "green buildings" is getting stronger so several business opportunities are developing, corporation schemes are enhancing along with environmental training and the role of the media is getting bigger (Pearson correlation coefficient = 0.564, 0.649, 0.547, 0.548 respectively at a significance level of 0.01, 2-tailed).

Table 1: Alteration rate of sustainable building demand during the last years (ranking 1-7, with 1 = not at all, 4 moderate and 7 in a very high rate)

FACTORS	Mean	Std	t-test
Enhancement of the media's role	4,07	1.44	15.5
Enhancement of the role of environmental training	4,04	1.46	13.3
Financing of activities	3,90	1.78	11.2
Acquisition of experience and know hoe by the industry in sustainable building subjects	3,73	1.55	13.2
Development of entrepreneurial opportunities in Greece and abroad	3,63	1.54	12.9
Enhancement of the "sustainable building" movement	3,60	1.61	12.2
Number of certified professionals in sustainable building subjects	3,47	1.48	12.8
Development of corporation schemes in sustainable building subjects	3,41	1.48	12.5
Number of certification projects in sustainable building subjects	3,32	1.47	12.0
Acquisition of experience and know how by the consumers in sustainable building subjects	3,03	1.45	11.5
Number of certified sustainable buildings	2,76	1.60	9.3

In a percentage of 93,3% it is considered that sustainable building will increase the construction price of buildings in relation to the conventional building, with an average percentage per 12,5% approximately. More specifically, this percentage of increase is estimated up to 5-10% greater by the majority of the questioned (46.4%).

Since it is forecasted that sustainable building will increase the construction of buildings price in relation to the conventional one, it is of great importance to investigate the percentage of increment that Greek consumers are willing to pay in order to gain the benefits (direct and indirect) from a construction that will be created under the principals of sustainability. This

percentage is estimated up to 7% approximately by the questioned of the research. The majority (82.8%) consider that this percentage can not overcome in any circumstance this of 10% (Figure 2).
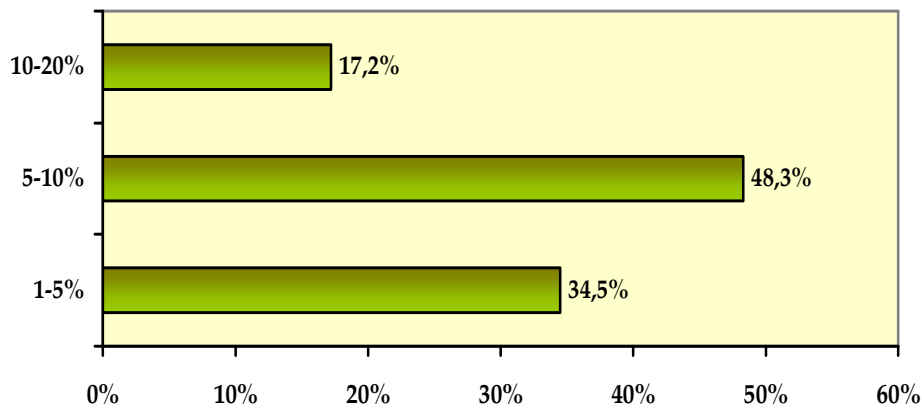

Figure 2: Percentage % that is estimated that the consumers are willing to pay extra in order to buy or construct sustainable buildings

The benefits that seem to enjoy the users of buildings that have been built according to the principals of sustainable building are at least the following:

- Greater energy efficiency in a percentage 20-50% (by the 66.7% of the questioned), or 44.7% in average.

- Greater water saving in a percentage 10-20% (by the 43.3% of the questioned), or 28.6% in average.

- Minimizing of wastes in a percentage 20-50% (by the 33.3% of the questioned), or 32.0% in average.

- Better prevention of pollution in a percentage 20-50% (by the 39.3% of the questioned), or 50.3% in average.

- Better efficiency of resources concerning the materials used in a percentage 20-50% (by the 46.7% of the questioned), or 37.4% in average.

- Better quality of life in a percentage 50-75% (by the 43.3% of the questioned), or 51.3% in average.

Approximately 5,000 are the enterprises that constitute the industry of sustainable building which can be developed in Greece in the next years. The main characteristics of this industry which seem to affect in a greater, average and smaller rate the development of sustainable building, mainly have to do with:

- The prices of the environmental friendly materials

- The customers and the predominant public opinion

- The import of new products with environmental characteristics

- The environmental legislation that affect the sectors dealing with building activity

- The existing demand for products with environmental characteristics

For the development of sustainable building in the Greek market, the elements which seem to play a very significant role and should be carefully attended by the Greek firms of the cluster, are: a) the economic situation of the country, b) the nomination of advantages and benefits for the users of "new" products of sustainable building, c) the implementation of appropriate and effective promotion and publicity methods of sustainable building and d) a set of other elements mentioned in the next Figure 3 which worth to be under seriously consideration, by the decision makers that will take the related decisions about the creation and operation of the sustainable building cluster.

The Pearson correlation analysis concerning the alterations of the factors affecting the development of sustainable building in Greek market, has shown that:

- The greater is the economic crisis of the country the more significant is the institution and the implementation of a legislation framework, for the development of sustainable building and the allowance of motivations and investments support by financing programs (Pearson correlation coefficient = 0.677 and 0.428 respectively at a significance level of 0.01, 2-tailed)

- The support of investment by financing programs should be accompanied by the institution and implementation of the legislation framework concerning subjects of sustainable building (Pearson correlation coefficient = 0.533 at a significance level of 0.01, 2-tailed),

- The bigger the competition between enterprises for sustainable building the more significant factor is the implementation of market studies (Pearson correlation coefficient = 0.617 at a significance level of 0.01, 2-tailed),

- The greater the investments ceiling for sustainable building the bigger is the entrepreneurial venture (Pearson correlation coefficient = 0.552 at a significance level of 0.01, 2-tailed),

- The more accurate is the accounting of sustainable building the better and more significant as a factor will be the pricing of the "product" (Pearson correlation coefficient = 0.664 at a significance level of 0.01, 2-tailed) and

- The better the business organization the more significant is the implementation of market studies concerning sustainable building, as long as, the more appropriate the information of salesmen for the comparative advantages and the specific characteristics of sustainable building (Pearson correlation coefficient = 0.588 and 0.671 respectively at a significance level of 0.01, 2-tailed).
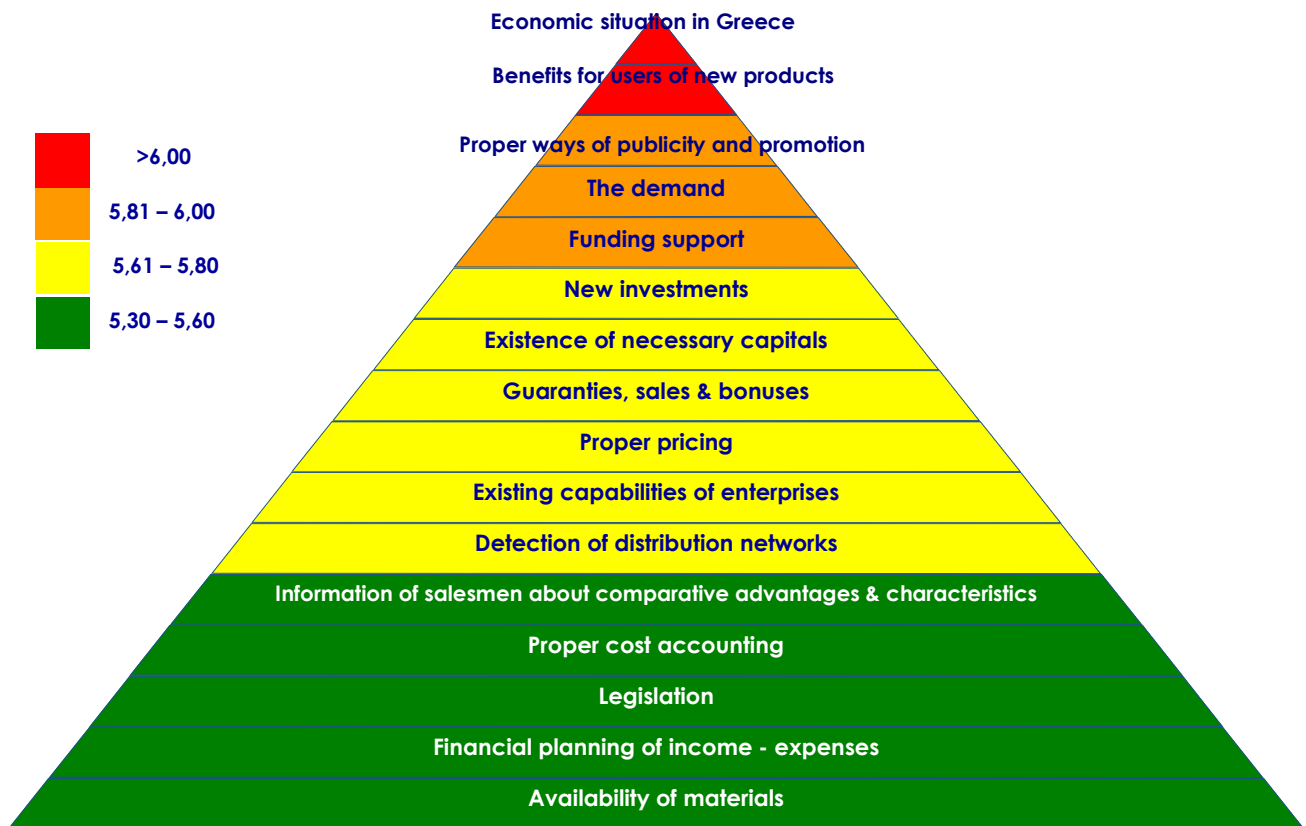
Fig. 3: Significance of sustainable building development factors in Greek market (7 the most significant)

Unfortunately, Greek enterprises are operating in an environment which creates many serious obstacles for their entrepreneurial activity. The most significant of them, that the present study has shown, seem to be by declining ranking: bureaucracy during the establishment as long as during the operation of enterprises, the intensely observed in nowadays economic uncertainty, the corruption of the system especially concerning public services as long as the operation of the banking system for the allowance of the needed working capital by the enterprises, their financing, as long as the ceiling of interests rates (Table 2).

Especially the factor of economic uncertainty seems to be significantly statistically correlated to the implementation or not of exports by the enterprises which are going to participate in the sustainable building cluster, according to X^2 test (Pearson X^2 = 3.027, Cramer's V = 0.323 for a significance level greater than 90% Approx. Sig= 0.099). This means that the enterprises that export are directed towards this activity when there is economic instability in their headquarters' country.

Also, enterprises which were established before 2000 consider the absence of information by related organizations, as a very significant obstacle for the development of their entrepreneurial activity. On the contrary, it doesn't constitute an obstacle for exports the existence of perchance political instability. Finally, corruption constitutes a more significant obstacle concerning smaller enterprises (that occupy less than 10 employees).

Table 2: Main obstacles in developing entrepreneurial activity of the Greek enterprises which could participate in the sustainable building cluster, until today

FACTORS	AFFECTION RATE
Bureaucracy	62,1%
Economic instability	51,7%
Corruption	50,0%
Operation of the banking system	41,4%
Institutional framework of business and labor legislation	34,5%
Absence of market	17,2%
Competitiveness arrangements	13,8%
Political instability	10,3%
Absence of information organizations	10,3%
Transparency	6,9%

Seeking financing sources for economic enhancement and support of environmental activities of the sustainable building cluster enterprises, it seems that Greek enterprises are focusing mainly to European Union which supports and co finance them (Figure 4). Financing by the firm's own sources seem to stand relatively high at the list of financing sources. This means that the study's enterprises don't hesitate, and they have proved it until today some of them, to spare a part of equity capitals for financing environmental activities, boosting their social accountability.

In order to find correlations between financing sources for economic enhancement of environmental activities of the study's enterprises, the Pearson correlation criterion was implemented. The analysis has shown that in order financing from the European Union to happen, it should exist a respectively financing by the central government of the country (Pearson correlation coefficient = 0.729 at a significance level of 0.01, 2-tailed). Of course the existence of the above mentioned financing is negatively correlated to the individual financing of enterprises (Pearson correlation coefficient = -0.417, at significance level of 0.05 level (2-tailed).
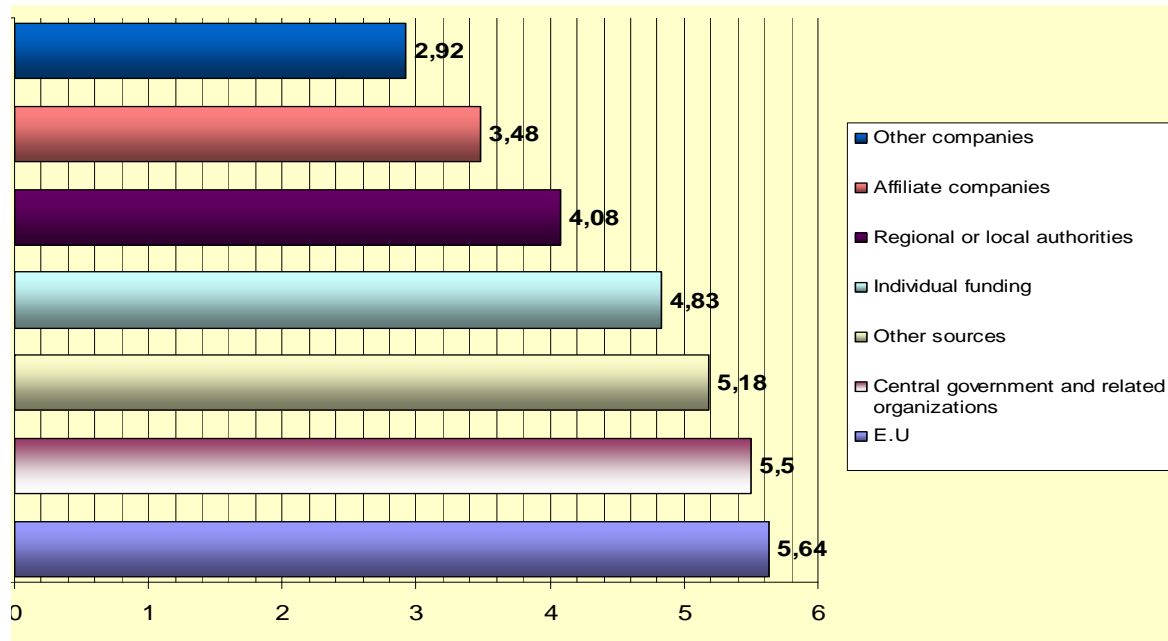
Fig. 4: Funding sources of Greek enterprises that could participate in HGBC for their environmental activities and evaluation of their significance (7 the most important factor)

Concerning the development of a sophisticated policy for the effective implementation of sustainable building for the enterprises themselves, the factors that seem to play a fundamental role are: the adoption of innovation strategies and culture (mean 5.82 with max 7.0), the leadership and management of new ideas (5.75), technology and information systems (5.75) and the development of new co operations with foreign firms (5.52). A minor role, but at an important level, seem to constitute the easy access to new markets (5.41), the engineering corporations (5.39), research institutes and the rest academic institutions (5.38), specialized personnel and certified staff (5.29), as long as construction companies (5.00). In a small rate stands the role of external business consultants (3.70).

Good leadership and appropriate management of new ideas for the development of sustainable building seems to be significantly statistically correlated to the choice of specialized personnel in their firm (Pearson correlation coefficient = 0.597) and the adoption of innovation strategies and culture (Pearson correlation coefficient = 0.557. Correlation is significant at the 0.01 level (2-tailed). Furthermore, the adoption of innovation strategies and culture is positively correlated to specialized personnel of the sustainable building cluster enterprises (Pearson correlation coefficient = 0.647 at significance level of 0.01).

On the contrary, the main obstacle for the development of a sophisticated policy concerning sustainable building seem to be the absence of appropriate financing sources (mean = 5.79, max = 7), at least until today (Figure 5). In high ranking stand also the factors of: a) the very high cost of the alterations needed and should be made by the enterprises themselves (mean = 4.93), b) the absence of customers response in new products and services (4.82), since until today it hasn't been implemented some kind of a fundamental promotion towards the public

opinion about sustainable building subjects, c) the very long period of the necessary investments, return of capital (4.81), d) the absence of know how and innovation flows organizations, in the building sector (4.79) and e) the existing weaknesses of the Greek legislation framework (4.75).
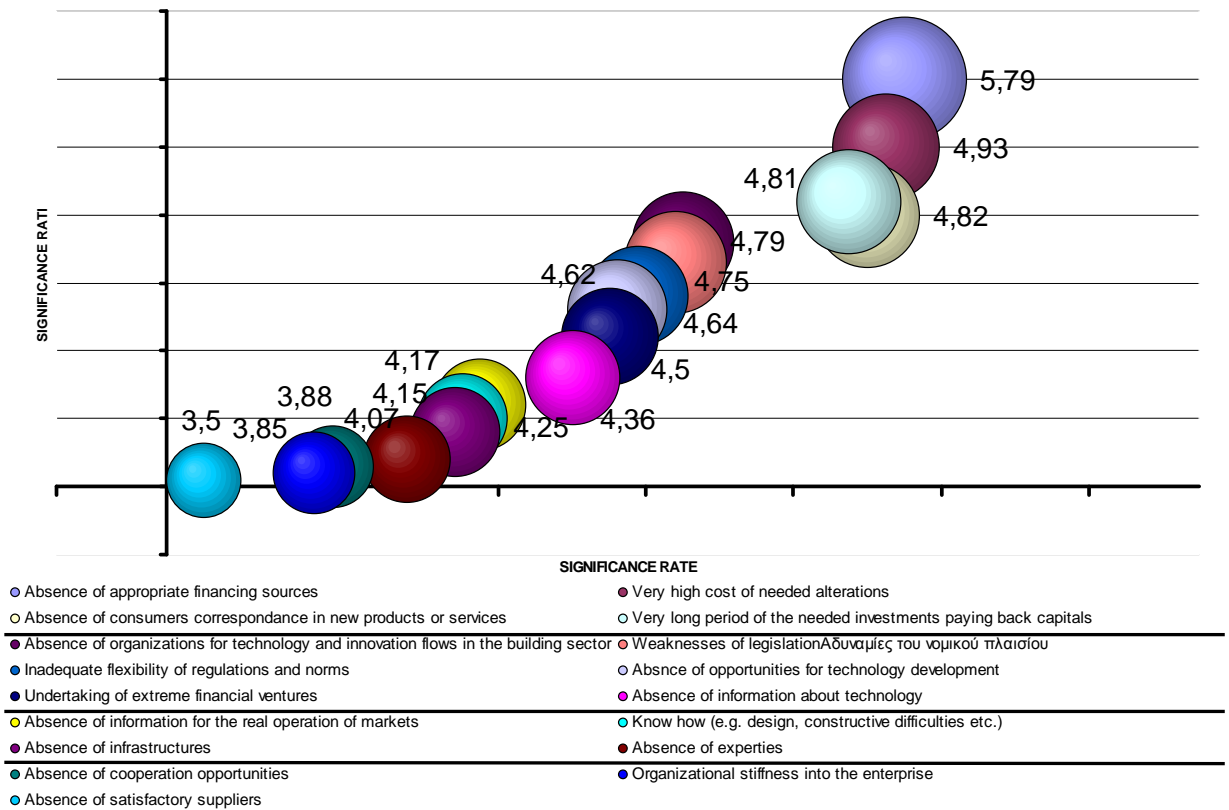

Figure 5: Significance of obstacles for the development of a policy for sustainable building, of the Greek enterprises that could participate in the sustainable building cluster (ranking 1-7, with 1 = not significant, 4 moderate and 7 very significant)

A very important parameter for the establishment of the sustainable building cluster is the intension and the attitude of the enterprises and related stakeholders to develop co operations between them. The present research has shown that the sum (100%) of the participants develop such co operations, a fact very encouraging for the cluster's first establishment.

By the up to date activity of the research participants, seems (Figure 6) that the most important co operations concern these with customers (mean=5.25, max=7.0), with the construction companies (5.09) and the engineering companies (4.92). Satisfactory seem to be the co operations with governmental or private non profit research institutes (4.55), with R&D enterprises (4.45), as long as with Universities and TEI (4.45). In a moderate rate until today, develop co operations with other enterprises of the same sector (3.91), as long as with their competitors (3.67). Through the participation of the enterprises and organizations into the

sustainable building cluster, co operation between them will be constrainedly developed and their benefits will be multiplied.
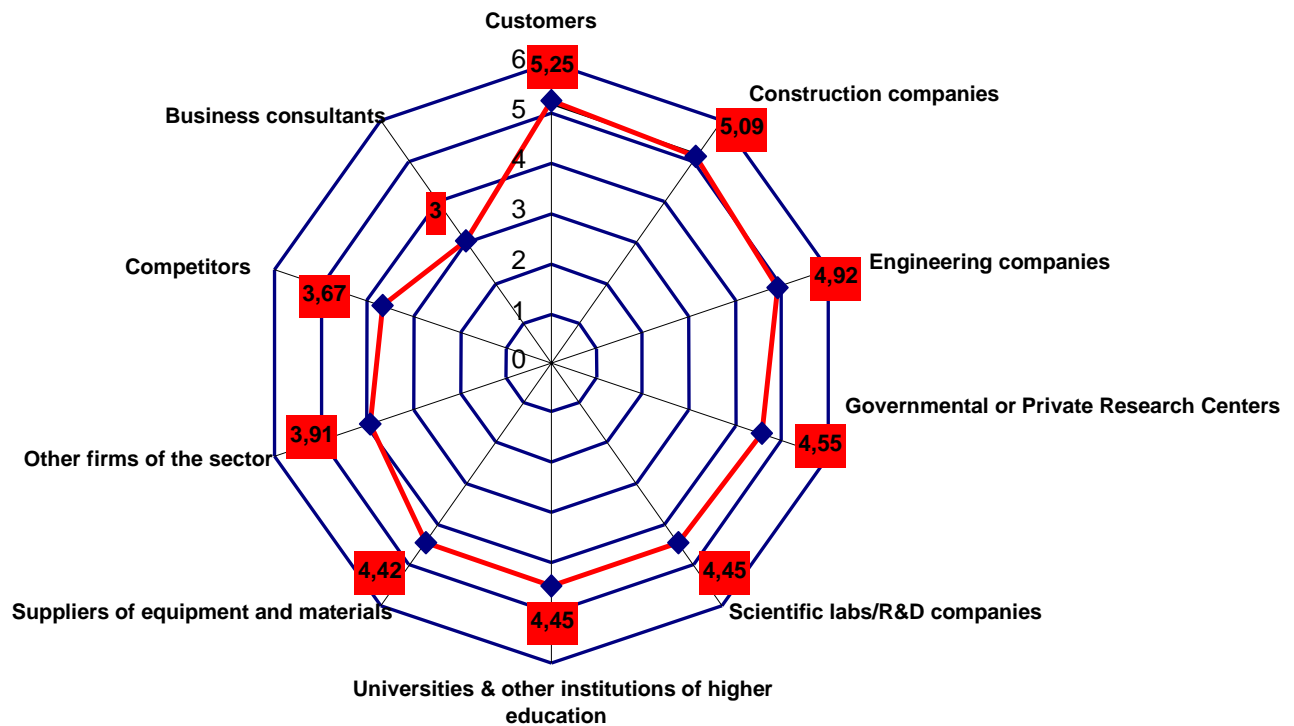

Figure 6: Co operation degree with several organizations of firms that could participate in the sustainable building cluster (ranking 1- 7, where 1= any, 4 = moderate, 7 = very much)

Seeking the short-term, mid-term and long-term demand and development of sustainable building in Greek market, it is estimated that the population percentage which will response to the institution of sustainable building will be: in short-term (1-2 years) the 4.7%, in mid-term (5 years) the 11.3% and in long-term the 27.6% per weighted mean. The greater percentage (41.4%) of the questioned estimates that in short-term will response the 3-5% of Greek households, the 44.8% estimates that there will be a response in 5 years by the 5-10% of them, while in 10 years there is a great optimism that the response will reach at a percentage of 10-20% by mean from the 27.6% of them (Figure 7).
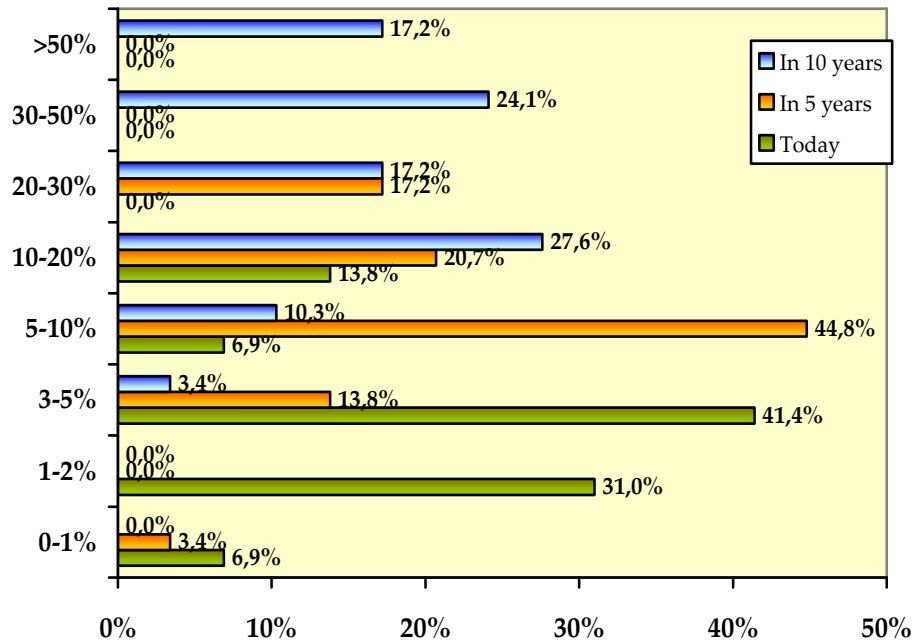
Figure 7: Percentage % that the enterprises which are going to participate in the sustainable building cluster, consider that the Greek population will correspond to the institution of sustainable building today, in the next 5 and 10 years.

Households which is estimated to response directly to the institution of sustainable building, regards in a percentage of 75.9%, these of higher income and only at a percentage of 20.7% the smaller and lower income households. This is logical, because in time of economic crisis someone seeks to ensure his survival and then to be interested for the environment (internal and external) into which he spends his life. By the end of economic crisis which is estimated in the next 3-5 years, sustainable building will expand to all income classes. Accordingly, the economic crisis does not constitute an inhibitory factor for developing sustainable building, at least in a mid and long-term period, since based to the previous result of the present study the market – target has been determined.

Conclusions - Proposals

The building sector which includes many other sectors and subsectors holds a very high and dynamic position in Greek economy. Its problems are well known, because of the global financial crisis, but also because of the Greek economic crisis. The increase of competitiveness and environmental protection constitute basic priorities for the European Union as long as for Greece. Best practices around the world should be potential fulfilled at the highest point. The idea that the society should live in an environment that is designed and operates incorporating energy efficiency, water saving, waste minimization, pollution prevention, increase of the efficiency of the sources in the materials that are used but also ensuring a better quality of life inside buildings based to the principals of "green economy", has grown already. Sustainable building with its multiple benefits for enterprises and the stakeholders,

cooperating organizations and consumers that have been pointed by the analysis, constitute a direct necessity and the expediency is given.

Greek enterprises estimate that the tendency of "green' buildings coming to Greece too, the majority of them estimate that in the next 5 years this institution will be established and they are preparing for this. The market study has shown that the percentage of Greek population which will respond to the institution of sustainable building in short-term period (1-2 years) is estimated at 4.7%, in mid-term (5 years) at 11.3% and in long-term (10 years) at 27.6%. But, in order this movement to be successful, the cooperation between many enterprises dealing with building is required with the form of a cluster, enjoying all the benefits that spring from that. The present research has proven the maturity of the enterprises and the directness of their participation in such a movement.

Whatever the rise of buildings construction price according to the principals of sustainable building, deserves their implementation, if we consider the environmental and economic benefits for the users concerning the whole period of the building's life, as long as the consumers intension to pay per average an amount of +7% in relation to conventional construction.

For the development of sustainable building in Greece too, the factors that have been detected to play the most significant role and should be especially attended by the Greek enterprises of the cluster, seem to be: the economic situation of the country, the nomination of advantages and benefits for the users of "new" products of sustainable building, the implementation of appropriate and effective promotion and publicity methods of sustainable building and the support of investments by financing programs.

Further research could be conducted in a much bigger sample of Greek enterprises and organizations that will participate in the sustainable building cluster and will contribute to the development of the Greek green economy.

The nomination of appropriate strategies that the cluster's enterprises will implement, in order to pass the message of "sustainable building" to the Greek consumers, should constitute the main point for continuing this research and connecting its results to the present study.

Furthermore, the present research could be conducted at an international level in countries such as: Cyprus, Italy, France, Germany, Bulgaria etc. in order to have comparable data concerning the situation and the ways of effective implementation of green economy through the promotion and publicity of the green buildings movement.

Best practices and case studies could also be investigated and nominated, in order to constitute roadmaps for the survival and development of the sustainable building cluster enterprises. Through this kind of research we will be able to detect several key points of sustainable building and of successful business activity in the frameworks of the cluster such

as, financing capabilities and viability of a cluster, staff training in subjects of sustainable building as long as of the citizens, protection of the household income through money saving and development of new entrepreneurial opportunities.

References

[1] Aaker, D. Kumar, V. Day, G. S. (2004), Marketing Research, John Wiley & Sons, Inc. 8th edition, New York, N.Y.

[2] Adams, W.M. (2001), Green Development, Environment and Sustainability in the Third World, Taylor and Francis group, London and New York.

[3] Allen, J.C. Malin, S. (2008), "Green Entrepreneurship: A Method for Managing Natural Resources?", Journal of Society & Natural Resources, Vol. 21, No. 9, pp. 828 – 844.

[4] Anink, D. Boonstra, C. Mak, J. (1996), Handbook of Sustainable Building: An Environmental Preference Method for Selection of Materials for Use in Construction and Refurbishment, James & James Science Publishers, London.

[5] Bank of Greece, (2011), The Environmental, Economic and Social Effects of Climate Change in Greece, Bank of Greece, Athens.

[6] Bansal, P. (2005), "Evolving sustainably: a longitudinal study of corporate sustainable development", Journal of Startegic Management, Vol. 26, No. 3, pp. 197-218.

[7] Bell, S. Morse, S. (2008), Sustainability Indicators. Measuring the Immeasurable, Earthscan Publishers, Cornwall, UK.

[8] Berchicci, L. (2008), Innovating for Sustainability: Green Entrepreneurship in Personal Mobility, Taylor & Francis.

[9] Blakely, E.J. Leigh, N.G. (2009), Planning Local Economic Development: Theory and Practice, SAGE publications, California.

[10] Breheny, M.J. Batey, P.W.J. (1992), "Sustainable development and urban form", European research in regional science, Vol. 2.

[11] Brown, L.R. (2003), Eco-Economy: Building an Economy for the Earth, Earthscan, London, UK.

[12] Bunz, K.R. Henze, G.P. Tiller, D.K. (2006), "Survey of sustainable building design practices in North America, Europe, and Asia", Journal of Architectural Engineering, Vol. 12, No. 1, pages 30.

[13] Carraro, C. (2000), Efficiency and equity of climate change policy, Kluwer Academic Publishers, Cornwall, GB.

[14] Cortright, J. (2006), Making Sense of Clusters: Regional Competitiveness and Economic Development, Impresa, Inc.

[15] Dillman, D.A. (2000), Mail and Internet Surveys: The Tailored Design Method, John Wiley & Sons, New York, NY.

[16] Doyle, P. (1998), Marketing Management and Strategy, 2nd edition, Prentice-Hall Europe, Chapter 3.

[17] Drucker, P. (1985), Innovation and Entrepreneurship. Practice and Principles, Harper and Row, New York, N.Y.

[18] Erixon, F. (2010), "The Europe 2020 strategy: time for Europe to think again" Journal of European View, Vol. 9, No. 1, pp. 29-37.

[19] European cluster observatory, (2010), European Cluster Organization Directory, Brusselles.

[20] European Commission Directorate-General for Enterprise and Industry, (2007), Innovation Clusters in Europe. A Statistical Analysis and Overview of Current Policy Support, DG Enterprise and Industry report, Europe Innova / PRO INNO, Europe, paper N° 5.

[21] European Commission, (2005), European Trend Chart on Innovation. Annual Innovation Policy Trends and Appraisal Report, Greece 2004-2005, publication from the Innovation/SMEs Programme, Brusselles.

[22] European Commission, (2006), Regions and Economic Changes. Innovation and Regional Policy of the E.U., General secretariat of Regional policy, Brusselles.

[23] European Commission, (2010), EUROPE 2020. A Strategy for Smart, Sustainable and Inclusive Growth, Brusselles

[24] European Policy Center, (2010), Europe 2020: Delivering Well-Being for Future Europeans Issue 20, Brusselles.

[25] Frazer, H. Marlier, E. Nicaise, I. (2010), A Social Inclusion Roadmap for Europe 2020, Belgian Ministry of Social Integration, Brusselles.

[26] General Secretariat of Research and Technology, (2007), Strategic Plan for Developing Research, Technology and Innovation in the Framework of NSPD 2007-2013, Administration of Planning and Development, Department of Planning, Athens.

[27] Greece National Statistical Service, (2009), Greek Statistical Yearbook 2008, Pireas.

[28] Grubb, M. Vrolijk, C. Brack, D. (1999), The Kyoto Protocol: A Guide and Assessment, Royal Institute of International Affairs and Earthscan Publications, London.

[29] Gordon, I.R. McCann, P. (2005), "Innovation, Agglomeration, and Regional Development", Journal of Economic Geography, No.5, pp. 523–543.

[30] Gordon, W. Langmaid, R. (1988), Qualitative Market Research: A Practitioner's and Buyer's Guide, Gower, Aldershot.

[31] Haughton, G. Hunter, C. (2003), Sustainable Cities, Taylor and Francis Group.

[32] Henderson, H. (2007), "Growing the green economy globally", International Journal of Green Economics, Vol. 1, No. 3-4, pp 276 – 298.

[33] Hopwood, B. Mellor, M. O'Brien, G. (2005), "Sustainable development: mapping different approaches", Journal of Sustainable Development, Vol. 13, No. 1, pp. 38–52.

[34] Howitt, D. Cramer, D. (2003), Statistics With SPSS 11 for WINDOWS, Kleidarithmos Eds, Athens.

[35] ICAP, (2008), Greek Financial Directory, ICAP Business Directories, Athens.

[36] ICAP, (2009), 40 Top Sectors of Greek Economy, ICAP S.A., Athens.

[37] Karagouni, G., J. Papadopoulos, G., Valergas, I., Sevopoulou, (2009). Value-Chain Clustering as an Alternative Strategy for Small-Scale and Micro Firms. Management of International Business and Economic Systems (MIBES) Transactions International Journal, Vol 3, Issue 1, pp 46-63.

[38] Woolthuis, K. Lankhuizen, R. Gilsing, V.M. (2005), "A System Failure Framework for Innovation Policy Design", Journal of Technovation, Vol. 25, No. 6, pp.609–619.

[39] Makios, V. Sanchez – Papaspiliou J.A. Vogiatzis, N. (2006), Study of Cooperative Formations. Networking and Development, Hellenic Technology Clusters Initiative – HTCI, C.A.T.C.I. – IRIS, Athens.

[40] Malmberg, A. Sölvell, O. Zander, I. (1996), "Spatial clustering, local accumulation of knowledge and firm competitiveness", Journal of Geografiska Annaler, 78 B, pp. 85-97.

[41] Manne, A. Richels, R. (1999), "A cost effective strategy for meeting environmental objectives", Journal of Efficiency and equity of climate change policy, pp 43-61.

[42] Milani, B. (2000), Designing the Green Economy: The Postindustrial Alternative to Corporate Globalization, Rowman & Littlefield, Boston Maryland.

[43] Narayan, C. Fernandes, P.M. Van Brusselen, J. Schuck, A. (2007), "Potential for CO2 emissions mitigation in Europe through prescribed burning in the context of the Kyoto Protocol", Journal of Forest Ecology and Management, Vol. 251, No. 3, pp. 164-173.

[44] National Observatory of SME's, (2006), The Existing Situation and Perspectives of Greek SME's. Annual report for 2006, National Organization of Small and Medium Sized Enterprises and Craftsmanship, Athens.

[45] National Observatory of SME's, (2006), Policies for Entrepreneurship and Innovation in Greece, National Organization of Small and Medium Sized Enterprises and Craftsmanship, Athens.

[46] National Observatory of SME's, (2009), Handbook of Entrepreneurship Networking and Clustering, National Organization of Small and Medium Sized Enterprises and Craftsmanship, Athens.

[47] National Programme of greenhouse gas emissions reduction, 2000-2010 - FEK A'-58/5-3-2003, National Printing Service, Athens.

[48] Nordhaus, W. (2001), Global Warming Economics, Journal of Science, Vol. 294, No. 5545, pp. 1283-1284.

[49] Norusis, M. (2007), A Guide of Data Analysis With SPSS 12.0, Kleidarithmos Eds, Athens.

[50] Oberthür, S. Ott, H. (1999), The Kyoto Protocol: International Climate Policy for the 21st Century, Springer-Verlag, Berlin, Heidelberg, New York.

[51] OECD, 2002. «Dynamising National Innovation Systems». Paris.

[52] Papadopoulos, J., G., Karagouni, G., Valergas, I., Sevopoulou, (2008), Clustering as a Means for Gaining Competitive Advantage in Small and Micro Furniture Firms' Marketing Opportunities. Proceedings Management of International Business and Economics Systems (MIBES) International

Conference, http://mibes.teilar.gr. /Larissa Greece, 4-5 July, Oral paper, ISBN 978-960-98411-1-5, pp 285-299.

[53] Papadopoulos, I., Karagouni, G., M. Trigkas and E. Platogianni, (2010), Green Marketing. The case of Greece in certified and sustainable managed timber products. EuroMed Journal of Business, Vol. 5, No 2, pp. 166-190.

[54] Pearce, D.W. Atkinson, G.D. (1993), "Capital theory and the measurement of sustainable development: an indicator of "weak" sustainability", Journal of Ecological Economics, Vol. 8, No. 2, pp. 103-108.

[55] Pedler, M. Burgoyne, J.G. Boydell, T. (1996), The Learning Company: A Strategy for Sustainable Development, McGraw-Hill, Cambridge.

[56] Pittaway, L. Robertson, M. Munir, K. Denyer, D. Neely, A. (2004), "Networking and Innovation: A Systematic Review of the Evidence", International Journal of Management Reviews, Vol. 5, No. 6, pp.137–168.

[57] Porter, M. (1990), The Competitive Advantage of Nations, The Free Press, New York.

[58] Prastakos, G. Spanos, G. Kostopoulos, K. (2003), Innovation: Determinant Factors and Thoughts for the Future of Greek Economy. Technological Perspective Integration in Greece, Athens University of Economics, Laboratory of Management Science, Athens.

[59] Rizzuto, C. (2011), Research Infrastructures and the Europe 2020 Strategy, ESFRI -European Strategy Forum on Research Infrastructures.

[60] Robinson, D. (2002), Cluster Theory as Constructive Confusion: With Applications to Sudbury, Sudbury Mining Supply and Services Cluster Project, Sudbury, Ontario.

[61] Rosenfeld, S.A. (1997), "Bringing Business Clusters into the Mainstream of Economic Development", Journal of European Planning Studies, Vol. 5, pp. 3-23.

[62] Rudlin, D. Falk, N. (2009), Sustainable Urban Neighbourhood: Building the 21st Century Home, Architectural Press, Oxford.

[63] Russo, M. (2003), "The emergence of sustainable industries: building on natural capital", Journal of Strategic Management, Vol. 24, No. 4, pp. 317-331.

[64] Saikku, L. Rautiainen, A. Kauppi, P.E. (2008), "The sustainability challenge of meeting carbon dioxide targets in Europe by 2020", Journal of Energy Policy, Vol.36, No. 2, pp.730-742.

[65] Shields, M. (2003), Tool 3. Use Location Quotients to Identify Local Strengths, Opportunities, and Industry Clusters. Penn State College of Agricultural Sciences.

[66] Speidel, G. (1972), Planung im Forstbetrieb, Paul Parey, Berlin, Germany.

[67] Stamou, N. (1985), Forest Economics, Aristotelian University of Thessaloniki, Thessaloniki, Greece.

[68] Trigkas, M. (2010), The Economic Dimension of Innovation in Wood and Furniture SME's. The Case of Thessaly, ph.D. Thesis, Laboratory of Forest Economics, Thessaloniki, Greece.

[69] Tull, D.S. Hawkins, D.I. (1990), Marketing Research, Measurement, and Method, Macmillan, New York, NY.

[70] Van Vuuren, D.P. Cofala, J. Eerens, H.E. Oostenrijk, R. Heyes, C., Klimont, Z. Den Elzen M.G.J. Amann, M. (2006), "Exploring the ancillary benefits of the Kyoto Protocol for air pollution in Europe", Journal of Energy policy, Vol. 34, No. 4, pp. 444-460.

[71] World Commission on Environment and Development, (1987), Our Common Future, Report of the World Commission on Environment and Development, Published as Annex to General Assembly document A/42/427, Development and International Co-operation: Environment.