An Empirical Investigation of Female Entrepreneurship & Innovation Activities in Greece

Abstract:
The importance of entrepreneurship for economic growth has been emphasised by economic literature. The recent debate on the determinants of output growth has concentrated mainly on the role of knowledge, typically produced by a specific sector of the economy, and furthermore in the role of entrepreneurship and the implications on economic growth. Much of the recent work on economic growth can be viewed as refining the basic economic insights of classical economists. The statistical analysis is therefore very important. Nowadays there are well-organized databases, and the researcher can easily decide about the sample, rather than some years ago. Research and Development, technical change and entrepreneurship are directly related with industrial infrastructure, productivity effects and regional development. Entrepreneurship aims to reinforce the competitiveness, and to succeed the modernisation process and the convergence between firms and industries in the member states, adopting statistical techniques, using the appropriate software.
This paper attempts to examine the role of entrepreneurship, and those of innovation activities (technical change, research and development and diffusion of technology) and the effects of output growth, using both a theoretical and empirical approach in a Greek case study. In particular, the purpose of this paper is to analyse the framework, the obstacles, the determinant factors using the appropriate statistical techniques and furthermore the role of female entrepreneurship in the Greek firms. It also attempts to examine the role of female entrepreneurship on innovation activities and the effects on sustainable development and in the implications on growth, economic integration, regional development and social change.

Key-words: Innovation, entrepreneurship, convergence, competitiveness, technological harmonisation convergence, and growth.

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1. Introduction

Innovation is a key determinant of firm competitiveness in both fast growing high-tech sectors and more traditional sectors. The ability of most enterprises to survive, grow and generate new quality jobs increasingly depends on their capacity to put innovation at the core of their business strategy in order to benefit from technological change and the globalisation of markets for products and resources.

Entrepreneurship is closely related with innovation activities. There are three million of small and medium sized enterprises in the eleven European member states employ approximately 20 million employees in total, while the number of unemployed amounts to more than 10 million. The EU in order to define an enterprise as medium–sized, sets the main criterion as a limit of 250 employees. In Greece, small and medium enterprises are defined as the enterprises which employ up to 100 salaried workers on average in the last three years and have an average turnover up to 2,4 million Euro, unless the small and medium enterprises are capital intensive in which case the maximum number of employees is limited to 50.

In a sense, innovation can be described as the combination of research turned into technology, talent and capital. Others may call this entrepreneurship because you need smart people, ideas, and ways to turn the ideas into products or processes that someone will buy. Successful entrepreneurs need a critical mass of skills, knowledge, markets and capital.

The objective of this paper is to integrate the literature on the entrepreneurial firm with that on the production and diffusion of innovations. In particular this paper is aiming to investigate and analyse the main determinant factors and the effects of entrepreneurship and innovation activities in Greek enterprises.

2. Entrepreneurship, Knowledge and the Innovation Activities

Terms like «innovation», «innovation policy» or «knowledge driven economy» are increasingly used although their exact meanings are seldom dealt with. *Innovation* can be defined as:

«The commercial application of knowledge or techniques in new ways or for new ends. It may involve radical innovation or incremental innovation. In each case the innovator achieves a competitive advantage, at least until another company catches up or goes one better»

Innovation can also be viewed as:

«The development of new ways of thinking, the creation of new ways of doing things, experimenting with them, accepting them and using them in human economic and social activities»

A *knowledge driven economy* is, therefore:

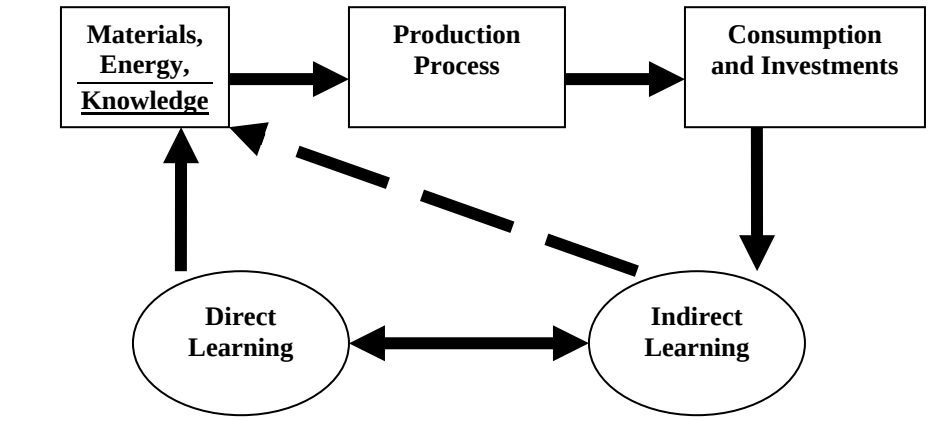
«One in which the generation and the exploitation of knowledge has come to play a predominant role in the creation of wealth. It is also about the more effective use and exploitation of all types of knowledge in all manner of economic activity»

We know well that university-based research plays a central role in the innovation process. Basic research that leads to fundamental discoveries provides the underpinning of more applied technologies. Education, knowledge, and intellectual capital were

believed to be outside of the system. The New Growth theory recognizes the tremendous role and impact of ideas.

It shows that economic growth doesn't arise just from adding more labor to more capital. Rather growth is derived from new and better ideas expressed as technological progress. Romer believes that technology – and the knowledge on which it's based – is an intrinsic part of the economic system, and that knowledge has, indeed, become the third factor of production in leading

Figure 1: The Knowledge and the Learning Process



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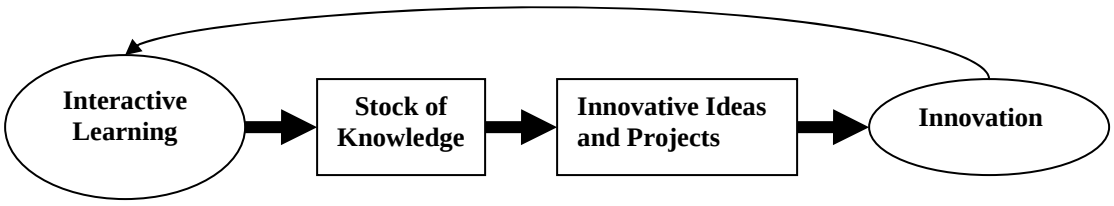
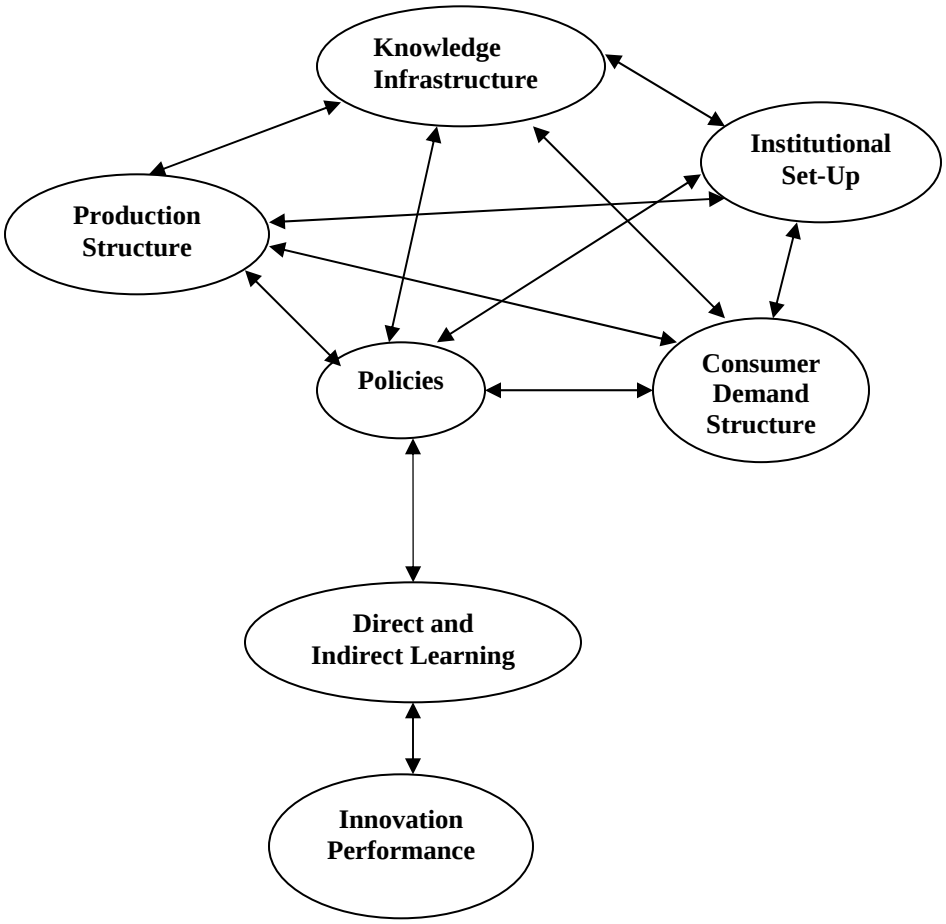
The «Innovation Centers» are the first step in fostering entrepreneurial opportunities. Every center should be managed by a person with strong ties and knowledge with a background in entrepreneurship, finance and business. In some communities and states, innovation centers often are directly or indirectly linked to universities, involve corporate participation and provide a variety of services and linkages including preseed/ seed capital.

Figure 2: Learning and Innovation



Figures 1, 2 and 3 show the flows for the knowledge and the learning process, and also the learning and the innovation process and finally the main factors that affecting the learning and innovation activities, respectively. The entrepreneurial culture of a university is perhaps the strongest and most pervasive influence on its technology transfer and commercialization performance.

Figure 3: Main Factors Affecting Learning and Innovation in a National System of Innovation



Creating an entrepreneurial culture is both bottom-up and top-down – requiring a combination of leadership from the top and entrepreneurial drive from the bottom. Part of the entrepreneurial culture inside and outside the university is networking. Corporations play a role not only by funding collaborative R&D, but also by participating in entrepreneurial activities and funding technology-based initiatives in the community.

3. Reviewing the Entrepreneurship and Innovation Activities in Greece

Greece is the laggard in terms of overall innovation performance among the EU15 and has already been overtaken by a number of the new Member States in terms of innovative performance. Although major changes have taken place in the economic, educational and research landscape in Greece over the last two decades, and several growth indicators outperform the EU average, the Greek innovation system remains insufficient. The relation between innovation performance and per capita GDP clearly demonstrates that economic growth is based on other sources that innovative production and this may imply a considerable danger for future competitiveness.

Emphasis is increasingly put on innovation policy, partly due to the funding offered by the Community Support Frameworks. However, the concept of innovation still does not receive appropriate attention from the policy makers, neither in the economy and finance area nor in the research and technological development sphere.

The contribution of the SME's in the development, the employment and social coherence in the European Union and in Greece is substantial. About the 92% of the enterprises in the EU are very small and family businesses which employ up to 10 people whilst 6% are medium-sized enterprises. In Greece, enterprises employing 50 persons and below form about 99,55% of the total number of enterprises and they employ 74% of the work force of the private sector. Apart from the above mentioned data, it should be mentioned here that the SME's provide 70% of the new jobs, reinforce the regional development and financial balance of the regions and make part of a cohesive financial and social link in Greek society. The role of SME's in the national economy and employment is vital, since the main business model in Greece is and it will remain the micro enterprise which employs less than 10 persons.

The public initiatives promoting innovation are a record 20 years old and over. The federations of entrepreneurs now include innovation on their agenda. Under the pressure of the Lisbon targets, the successive governments raised the transition to the knowledge-based economy as a policy priority, linked to the promotion of entrepreneurship and regional development. However, overall innovation policy and governance still need to be consolidated and need to find a prominent position in the public debate in favour of economic and social development

The most crucial challenge is lifelong learning, where Greece lags behind almost all advanced countries considered. While a substantial share of the EU structural funds are directed towards education including lifelong learning, the effectiveness of the system is contested and the government struggles to improve the infrastructure and quality standards.

The *very low business R&D expenditure is also a challenge* that the country has to face. Despite slight signs of catching up, these are clearly insufficient in the pursuit of the Barcelona target. The restructuring of the industrial landscape and business strategies is the major challenge to be faced by innovation policy, since the present structure of the economy does not contribute to the rapid growth of knowledge demand and the delivery of product innovation. Traditional sectors of slow technological development, including small firms addressing local markets with minimal international linkages, and low educational levels of entrepreneurs, still dominate this landscape.

Newer measures need more time to prove their effectiveness and impact, but the reception of their announcement by the business and research communities shows that the time for maturation will be long and will require positive action by the competent authorities for familiarisation.

Employment in high-tech manufacturing and services is also a major challenge, where the country is not catching up due to the slow and limited restructuring of the business sector. Traditional sectors of slow technological development, small firms addressing local markets with limited international linkages, entrepreneurs with a low educational level still dominate this landscape. The prime concern of entrepreneurs, relevant to innovation, is here again the modernisation of production equipment and quality improvement.

Table 2: Innovation in manufacturing enterprises: Greece

Indexes	1994-96*		1996-98*		1998-00**	
	% share in population	% innovative enterprises	% share in population	% Innovative enterprises	% share in population	% Innovative enterprises
Enterprises with innovation activity	26,50	100	30,30	100	27,3	100
• Product innovators	22,5	85,1	25,2	83,3	18,4	67,3
• Process innovators	18,5	70,2	23,7	78,1	17,5	64,1
• Intramural R&D	20,6	77,9	21,2	69,8	21,8	79,8
Research and experimental development - R&D	15,8	59,7	18,9	62,3	17,3	64,7
• Continuous R&D	5,1	19,3	7,1	23,3	7,1	26,1
• Occasional R&D	10,7	40,3	11,8	39,1	na	na
Enterprises with Cooperation arrangements on innovation activities	4,7	17,7	6,5	21,4	5,1	19,9
Product innovators that introduced new or improved products to the market	10,4	39,2	14,0	46,0	10,3	37,8
Enterprises receiving public funding	11,4	43,1	10,9	35,8	17,0***	16,4

Sources: GSRT (2001), European Commission, (2004).
Note:*>20 employees;**>10 employees;***Central government

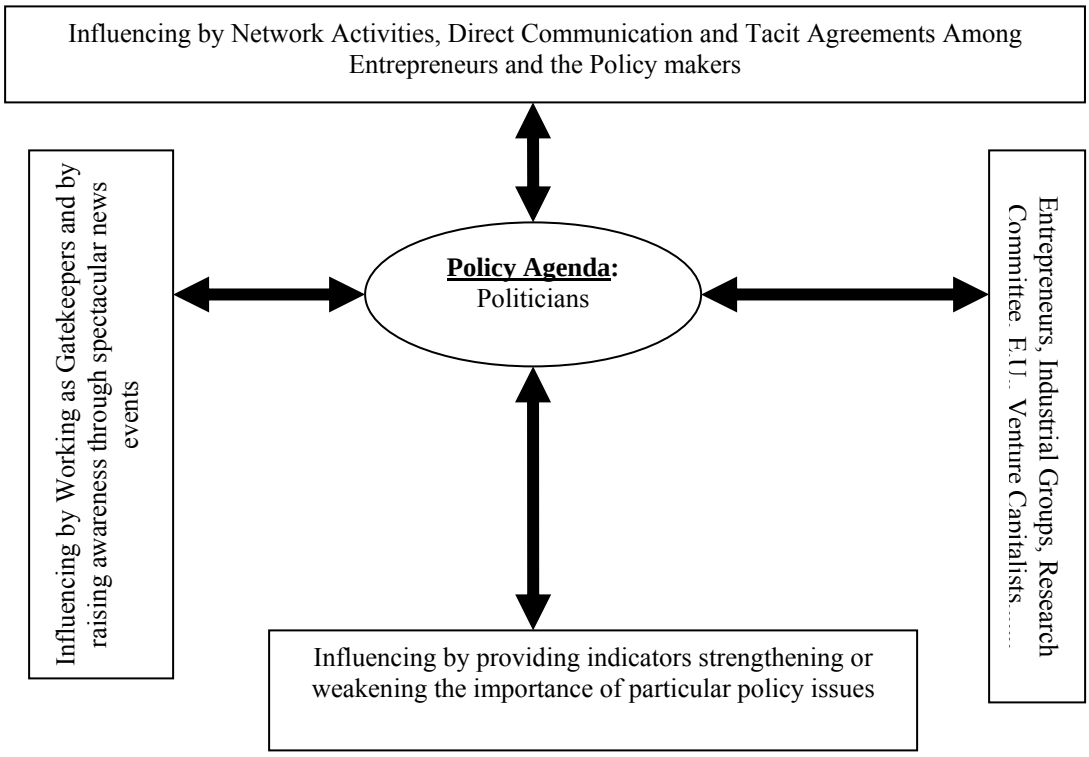
Table 3: Innovation in service enterprises with 10 or more employees: Greece

Indexes	1994-96		1997-98		1998-00	
	% share in population	% innovative enterprises	% share in population	% Innovative enterprises	% share in population	% Innovative enterprises
Enterprises with innovation activity	11,1	100	15,50	100%	31,9	100
• Intramural R&D	4,2	37,5	6,2	40,0	6,6	20,3
Research and experimental development - R&D	8,3	75,0	13,0	84,0	16,1	72,0
• Continuous R&D	5,6	50,0	5,6	36,0	10,5	32,0
• Occasional R&D	2,8	25,0	7,5	48,0	na	na
Enterprises with Cooperation arrangements on innovation activities	6,3	56,3	5,6	36,0	12,8	39,1
Enterprises receiving public funding	2,1	18,8	3,1	20,0	15,5*	15,1

Sources : GSRT (2001), European Commission, (2004). Note : *Central Government

Tables 1 and 2 illustrate the innovation in manufacturing enterprises, and also the innovation in service enterprises with ten or more employees in Greece. Whereas, Figure 4 illustrates the selected major factors and groups that affecting the innovation policy. In addition we have derived some relevant information and measures regarding the implications of innovation activities, in relation to both of the products and process. According to these results, the main implications for both small and medium firms for the products is related to increase the range of goods and services, and less to improve the quality of the products of goods and services. Looking at the main factors that determining the innovation policy and affecting the socio-economic growth, we can review the key-points of a SWOT analysis. Table 3 illustrates the strengthen, weakness, opportunities, and threats of innovation policy.

Figure 4: Selected Major Factors and Groups Affecting the Innovation Policy



The strengths in the Greek system lie in the policy tradition of seeing stakeholder involvement as a natural component. This creates trust and policy making procedures characterised by consensus. The organisation of the system has also proved to be robust, allowing it to withstand a changing environment. This robustness is partly built on the flexibility of civil servants. The civil servants are accustomed to take initiatives and to implement decisions using informal coordination (involving both members of their own organisation and external stakeholders). This facilitates taking opportunities, working efficiently and adapting to changes.

A weakness in the Greek system is the barriers between policy fields. These barriers prevent cooperation and hinder a clear-cut responsibility for and commitment to cross-sectoral issues. The weakness is reinforced by the absence of a clear leadership in

innovation related issues, a tendency to prioritise short term results and emergent policy matters at the expense of long term issues and lack of incentives for coordination. The desire to reach consensus among stakeholders is also time consuming and necessary compromises might lead to a loss in policy focus. The result is a fragmentation of actors and policy action. There is furthermore a need for better innovation measures (rankings, scoreboards, competitions etc) as those currently in place have lost their effect as triggers of policy development and do not fully take interaction and innovation into consideration. There is also a weak cooperation between the national level and municipalities at the local level, thus enabling the involved actors to implement a national policy on the local level.

Table 3: National Innovation System SWOT overview

Strengths	**Weakness**
• Good tradition of stakeholder involvement (unions and industrial groups) which creates trust and consensus • Robust organisational structure that can withstand different future scenarios • Flexibility through informal coordination at all policy levels making it possible to seize opportunities • Work processes involving all embracing long-term investigations and non-hierarchical decisions • Good tradition of stakeholder involvement (unions and industrial groups) which creates trust and consensus	• Lack of coordination between policy fields • Lack of responsibility for cross-sectoral issues • No clear national leadership for innovation policy • Lack of the time needed for policy coordination at both the ministry and agency level • Short sighted policy actions • Fragmentation of actions among policy actors • Lack of good innovation indicators on interaction and output • Consensus may be too time consuming and lead to a loss of focus. • Mutual cooperation between state and municipalities.
Opportunities	**Threats**
• The Regional Growth Programmes as a tool for the promotion of regional governance, experimentation and awareness of regional innovation systems. • Involvement in international cooperation (OECD, EU etc) which provides possibilities for systematic intelligence and policy benchmarking. • Policy learning and policy actions based on evaluations and experience. • «Innovative Systems» (the national innovation strategy) as a means to create a common vision of the future and a commitment to innovation policy.	• Blurred policy distinction between innovation policy and other policy fields • Weak structures for regional governance • Lack of a systems perspective and a tendency to believe in the linear model at the national level. • Policy actions based on short term special interests and sparse data. • Copycat syndrome among policy makers • Recurrence of past mistakes

The regions are given a more and more proactive role in the innovation system, which enables pooling diversified resources for more powerful joint actions. In addition, Greece involvement in international cooperation and networks (OECD, and EU) provides a good foundation for benchmarking Greek experiences and allows policy makers to be kept up to date about the development in the world outside the domestic borders. This type of cooperation increases the pressure for a good system of appraising performance. This, in turn, creates opportunities for policy learning and a higher demand for evaluation. Furthermore, as «Innovative Systems» is the forward-looking guideline for innovation policy in Greece, there are reasons to believe that different policy fields (which have traditionally been separated from each other) can be bridged in order to agree upon joint innovation policy actions in a near future.

In current policy documents, it is a real challenge to find the essential differences between innovation policy on the one hand and «active industrial policy», «technology policy» or simply «growth policy» on the other. Furthermore, the Greek governance structure can be characterised as a sand-glass as for instance, a structure composed of a broad national organisation, a small regional structure and a broad local base. The weak regional governance structure for innovation risks to become a threat since regions are becoming increasingly important for innovation. The general lack of a systems perspective in the governance of the Greek innovation policy combined with sparse data on innovation activities puts the system at risk of becoming vulnerable to the concerted influence of special interests. The consequence can be an increased tendency to favour simplified solutions, a recurrence of past mistakes and copying of foreign innovation measures not suited for Greek conditions.

To a large extent the problem goes well beyond innovation policy into the general climate of confidence and business expectations of the Greek economy. In summary, the main external obstacles that public policies may help reduce are:

- Limited access to finance;
- Lack of qualified human resources: the skills of the staff are fundamental to enterprises' capacity to obtain knowledge and to use it to innovate. Human capital and knowledge are key factors;
- Internal market: high level of regulation and red tape, bureaucracy, taxation and rigidities of the labour market;
- Lack of strong links between research (academic and public research bodies) and industry;
- Policy Makers at international and sub-national level should build and strengthen their innovation strategies, adopting an approach that is well coordinated across all government departments with areas of responsibility having a bearing on the conditions for innovation. Coordination should take place at a high political level. The public-private partnership approach is important;
- . Well-designed services (information, networking, partnership, benchmarking); operated in an efficient manner, contribute to a good climate for innovation.

While, the internal obstacles in the SME itself are:

- Cultural (resistance to structural change, worries about intellectual property protection) lack of qualified human resources;
- Low level of trust in public services and programmes for SMEs.

4. The Empirical Model and the Investigation

4.1. The Theoretical Background of Factor Analysis

It was Spearman (1904) in his pioneering paper who noticed that in a preparatory school the scores of students in various tests in the correlation matrix has an interesting and characteristic property: two rows were almost proportional if the diagonals were ignored. Therefore he came across the idea that each score X_i , say, with mean zero and variance 1, can be expressed by a *constant* a_i *and a "factor"* value , F say in the form :

$$X_i = a_i F + e_i. \qquad (2.1)$$

The (somehow acting like) "error" term e_i is that part of X_i that is specific to the i-th test, and only for that test. Moreover as :

$$1 = \mathrm{Var}(X_i) = \mathrm{Var}\,(a_i F + e_i) = a_i^2 + \mathrm{Var}\,(e_i) \qquad (2.2)$$

the constant term a_i, knowing **as factor loading,** is such that its square is the proportion of the variance X_i that is accounted for by the factor. The generalization is to consider more common factors plus a part , specific to the particular test under investigation :

$$X_i = a_{i1}F_1 + a_{i2}F_2 + \ldots + a_kF_k + e_i \qquad (2.3)$$

Then it can be evaluated that:

$$\mathrm{Var}(X_i) = \sum_{i=1}^{k} a_{ik}^2 \qquad (2.4)$$

which is known as the **communality of X_i** . This is the part of its variance that is related to the common factors , while $\mathrm{Var}(e_i)$ is known as the **specificity of X_i** and it is the variance that is unrelated to the common factors. The correlation between X_i and X_j is then :

$$\mathrm{cor}(X_i, X_j) = r_{ij} = \sum_{\nu=1}^{\kappa} \alpha_{\iota\nu}\alpha_{j\nu} \qquad (2.5)$$

There is an infinite number of alternative solutions for the factor analysis model and this leads to the second stage in the analysis, known as **factor rotation**: *the provisional factors are transformed so that the new factors are easier to be interpreted*. **Factor rotation** can be orthogonal or oblique. With the **orthogonal rotation** the new obtained factors have the beneficial property that are uncorrelated, as the "old" factors. One method of orthogonal factor rotation is often called **varimax rotation**: *is based on the assumption that the interpretability of factor j can be measured by the variance of the square of its factor loadings*.

So if this variance is large then the a_{ij}^2 values tend to be either 0 or 1.Two other more general methods are estimation by regression and Bartlett´s method. Factor analysis is related to **principal component analysis (PCA)**: the loadings a_{ij} are functions of the eigenvalues λ_ι of the correlations matrix, namely

$$a_{ij} = \sqrt{\lambda\iota}\, b_{ji} \qquad (2.6)$$

with b_{ji} being the coefficients of the PCA analysis. We comment here that the FA analysis as was introduced by Spearman is not fitting into the PCA framework, due to the strong structural assumption of common and specific factors. Certainly FA is a useful tool for data analysis, Frane and Hill (1976), especially when reduction of dimensionality to enhance further analysis is asked.

Graphical methods are also provide, the most common being the **Scree Plot**, which is the analogous to Mallow's C_p – statistic in Regression Analysis: With the Scree plot the number of components in the model is proposed graphically, at the "knee" of the

graph, were at the same time the eigenvalues greater than one are presented at the vertical axis.

The Kaiser-Meyer-Olkin (KMO) measure the sampling adequacy of the FA method we adopted to face the problem. We recall that when:

$0.1 < KMO < 0.3$ then we conclude that it is "worth it" to have a FA, while when

$0.3 < KMO < 0.5$ it is "regular" to have a FA and especially when

$0.5 < KMO < 0.8$ it is "good" to have this particular FA.

The determinant of the **correlation matrix** is also evaluated. All these calculations, involving matrix calculations, were rather difficult some years ago, for the investigator. Now, with the statistical packages this is not that difficult anymore. We have proceed a number of calculations of FA, for the data set we have collected, working on the project we mentioned at the Abstract. We only one present here, as an example how we proceed to analyze the case under consideration: the deterministic factors in Greek enterprises.

4.2. The Empirical Approach and the Estimated Results

We have derived the main data set from the research project entitled «Women and Innovation: Determinant factors and obstacles of innovative activity of Greek firms: 2000-2003» that was co-funded by 75% from the Greek Government under the framework of the «Education and Initial Vocational Training Program-Archimedes».

In order to collect some primary data, we have applied a questionnaire to several sectors in Greek enterprises. In particular, the data-set was collected from 210 Greek enterprises from various sectors and several areas-prefectures of the country.

There is a still widening gap for the existing qualifications and prospects on the employment-status, and also on research and development activities, between men and women. Using our sample from collected data of Greek enterprises, illustrates the following results for women participation:

According to our results of collected data, the number of employees have increased substantially for the period 2000-2003, and the corresponding figures for women' participation have also increased for the above period, however, the participation rate is still very low corresponding less to the half percentage.

Regarding the number of persons participating in the inter-firm research and development activities, for the period 2003, in both as full-time equivalent (FTE) and also as part-time equivalent (PTE), corresponding to small enterprises and accounts a small percentage of about 37,4 % for full-time equivalent (FTE) and 4 % for part-time equivalent (PTE), respectively.

Finally, the third group of data is looking for the balances attendance and the existing opportunities for both men and women, in a percentage rate. According to these data-set, the women participation, in relation to the prospects and the development in the work accounts only a small percentage corresponding to around 22 %. While the existing opportunities for women participation, in relation to the wages accounts a percentage of about 23 %. Finally, the rising opportunities for women participation in relation to the education and training and also in relation to «promotion» opportunities account a percentage rate about 18 % and 25 %, respectively.

Tables 4-8 illustrate the results from our questionnaires regarding the proportion of enterprises with innovation activity that received public financial support, the indication for selected sources of information, the main obstacles for innovation activities, the applications for patents during the period 2000-2003 and also other related methods to protect inventions or innovations, respectively. In the empirical part, we are using the factor analysis described in the above section. We can summarize, our empirical results from factor analysis for the main determinants of women entrepreneurship. In particular, we have analysed our primary collected from a sample of 129 enterprises and we are adopting the basic approach of factor analysis looking for the main two factors of women participation and innovation activities.

Table 4: Proportion of enterprises with innovation activity that received public financial support

Received financial support	Yes	No	Not answered
From local or regional authorities	8 3,8%	155 73,8%	**47** **22,4%**
From central government	13 6,2%	147 70,0%	**50** **23,8%**
From the European Union	**24** **11,4%**	**146** **69,5%**	**40** **19,0%**

Table 5: Proportion of enterprises with innovation activity indicating selected sources of information

Information source	Degree of importance				
	Not used	**Low**	**Medium**	**High**	**Total**
Within enterprise	30 14,3%	20 9,5%	27 12,9%	61 29,0%	**138** **65,7%**
Within enterprise group	69 32,9%	11 5,2%	41 19,5%	15 7,1%	**136** **64,8%**
Suppliers of equipment, materials, components, or software	35 16,7%	21 10,0%	53 25,2%	29 13,8%	**138** **65,7%**
Clients or customers	49 23,3%	13 6,2%	44 21,0%	28 13,3%	**134** **63,8%**
Competitors or other enterprises in your sector	56 26,7%	27 12,9%	32 15,2%	19 9,0%	**134** **63,8%**
Universities or other higher education institutions	94 44,8%	21 10,0%	10 4,8%	8 3,8%	**133** **63,3%**
Government or public research institutes	91 43,3%	16 7,6%	16 7,6%	5 2,4%	**128** **61,0%**
Professional conferences, meetings, journals	49 23,3%	23 11,0%	37 17,6%	37 17,6%	**146** **69,5%**
Trade fairs, exhibitions	43 20,5%	23 11,0%	35 16,7%	45 21,4%	**146** **69,5%**

Table 6: Proportion of enterprises with main obstacles for innovation activities

Hampering factors	Degree of importance				
	Factor not experienced	**Low**	**Medium**	**High**	**Total**

Excessive perceived economic risks	41 19,5%	21 10,0%	25 11,9%	36 17,1%	**123** **58,6%**
Innovation costs too high	27 12,9%	25 11,9%	37 17,6%	32 15,2%	**121** **57,6%**
Lack of appropriate sources of finance	42 20,0%	22 10,5%	24 11,4%	31 14,8%	**119** **56,7%**
Organisational rigidities within the enterprise	52 24,8%	33 15,7%	26 12,4%	8 3,8%	**119** **56,7%**
Lack of qualified personnel	50 23,8%	32 15,2%	30 14,3%	9 4,3%	**121** **57,6%**
Lack of information on technology	59 28,1%	38 18,1%	18 8,6%	5 2,4%	**120** **57,1%**
Lack of information on markets	66 31,4%	31 14,8%	18 8,6%	8 3,8%	**123** **58,6%**
Insufficient flexibility of regulations or standards	58 27,6%	30 14,3%	24 11,4%	12 5,7%	**124** **59,0%**
Lack of customer responsiveness to new goods or services	**59** **28,1%**	**29** **13,8%**	**26** **12,4%**	**9** **4,3%**	**123** **58,6%**

Table 7: Proportion of enterprises that applied for a patent during 2000-2003

Proportion of enterprises that applied for a patent during the period 2000-2003	Yes	No	Not answered
	10 **4,8%**	**162** **77,1%**	**38** **18,1%**

Table 8: Proportion of enterprises with innovation activity making use of methods (other than patents) to protect inventions or innovations

Protection methods			
	Yes	**No**	Total
Registration of design patterns	22 10,5%	103 49,0%	**125** **59,5%**
Trademarks	46 21,9%	88 41,9%	**134** **63,8%**
Copyright	29 13,8%	102 48,6%	**131** **62,4%**
Secrecy	24 11,4%	99 47,1%	**123** **58,6%**
Complexity of design	27 12,9%	100 47,6%	**127** **60,5%**
Lead-time advantage on competitors	**6** **2,9%**	**119** **56,7%**	**125** **59,5%**

Also using the following main six variables of exports, total number of employees, combined innovation, the expected change in 2004, the introduction of new results and the cooperation with other companies with data derived from application of our questionnaires. Tables 8 – 15 illustrate the estimation results from factor analysis using the above main explanation variables, the communalities, the rotated component matrix, etc so that the developed background in section 2 to be covered.

Table 9: KMO and Bartlett's Test, (Bartlett's Test of Sphericity)

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	**0,609**
Approx. Chi-Square	**35,500**
Df / Sig	**15/0,002**

Table 10: Total Variance Explained

Component	**Extraction Sums of Squared Loadings**			**Rotation Sums of Squared Loadings**		
	Total	% of Variance	Cumulative %	Total	% of Variance	**Cumulative %**
1	2,154	35,897	35,897	1,939	32,311	**32,311**
2	**1,225**	**20,419**	**56,317**	**1,440**	**24,006**	**56,317**

Extraction Method: Principal Component Analysis.

Table 11: Estimated Results of Factor Analysis

	Exports	**Total number of employees**	**Combined innovation**	**Expected change in 2004**	**Introduction of new products**	**Cooperation with other companies**
Exports	1,000	0,387	-0,463	0,048	0,137	**0,403**
Total number of employees	,387	1,000	-0,121	0,086	0,038	**0,321**
Combined innovation	-0,463	-0,121	1,000	-0,218	-0,227	**-0,294**
Expected change in 2004	,048	0,086	-0,218	1,000	0,291	**0,243**
Introduction of new products	0,137	0,038	-0,227	0,291	1,000	**-0,017**
Cooperation with other companies	**0,403**	**0,321**	**-0,294**	**0,243**	**-0,017**	**1,000**

a Determinant = ,404

Table 12: The Component Matrix

	Component	
	1	**2**
Exports	0,764	**-0,274**
Combined innovation	-0,690	**-0,170**
Cooperation with other companies	0,685	**-0,269**
Total number of employees	0,562	**-0,413**
Introduction of new products	0,344	**0,725**
Expected change in 2004	**0,435**	**0,595**

Extraction Method: Principal Component Analysis.
a 2 components extracted.

Table 13: The Communalities

	Extraction
Exports	**0,658**
Total number of employees	**0,487**
Combined innovation	**0,505**
Expected change in 2004	**0,543**
Introduction of new products	**0,643**
Cooperation with other companies	**0,542**

Extraction Method: Principal Component Analysis.

Table 14: The Component Transformation Matrix

Component	1	2
1	0,877	**0,481**
2	**-0,481**	**0,877**

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

Table 15: Rotated Component Matrix

	Component	
	1	**2**
Exports	0,801	**0,128**
Cooperation with other companies	0,730	**0,094**
Total number of employees	0,692	**-0,092**
Combined innovation	-0,523	**-0,481**
Introduction of new products	-0,047	**0,801**
Expected change in 2004	**0,095**	**0,731**

Principal Component Analysis. Rotation (converged in 3 iterations) Method: Varimax with Kaiser Normalization.

5. Policy Implications and Conclusions

In this paper it is proposed the specific pattern of entrepreneurship and innovative activities can be explained as the outcome of different technological regimes (learning and knowledge) that are implied by the nature of technology. The theoretical background is adopted from the multivariate statistics, to reduce dimensionality, and eventually concerns the form of the models related entrepreneurship and innovation activities. The model we propose is focused on the temporal aspects while the other concentrates on the phenomenon of the spatial aspects. We can considered that the two models are complementary in this respect

According to the collected data and the study we are performing still on it, there is a close-relationship between entrepreneurship and innovation activities. However, there are two conflicting forces: innovation, which tends to increase technological and economic differences between countries and imitation or diffusion, which tends to reduce them. The process may generate a pattern where countries follow diverging trends, as well as a pattern where countries converge towards a common mean.

While it may be obvious that increasing the entrepreneurial activity of women would boost the overall rate of entrepreneurial activity in a nation, it may be less obvious that this activity could have a significant impact on overall economic growth. There is a huge literature and evidence that there is indeed, a relationship between the level of female entrepreneurial activity and national economic growth. Further, this relationship is distinct from and stronger than the impact that either women's economic activity rates in general or their relative share of managerial or administrative positions appear to have on economic growth.

The fundamental policy problem regarding innovation is related to the presence of research externalities, i.e. the fact that the innovative knowledge created by an individual or a company can be learnt by other individuals or companies without paying for it. In economics terms, this implies that the private returns to innovation are lower than social returns.

Summarising the basic key policy recommendations, we can classify according to the following lines:

- Ensure stable macroeconomic and framework conditions to underpin the entrepreneurial business environment.
- Ensure the reduction and simplification of administrative regulations and costs which fall disproportionately on enterprises.
- Promote an entrepreneurial society and entrepreneurial culture, in particular through education and training.
- Integrate the local development dimension into the promotion of entrepreneurship.
- Ensure that programmes in support of entrepreneurship are realistic in terms of cost and are designed to deliver measurable results.
- Strengthen the factual and analytical basis for policymaking so that policy makers can take decisions in an informed manner based on empirical evidence.
- Increase the ability of women to participate in the labour force by ensuring the availability of affordable child care and equal treatment in the workplace.
- Listen to the voice of women entrepreneurs.
- Incorporate a women's entrepreneurial dimension in the formulation of all entrepreneurship related policies.
- Promote the development of women entrepreneur networks.
- Periodically evaluate the impact of any entrepreneurship -related policies on the success of women-owned businesses and the extent to which such businesses take advantage of them.
- Improve the factual and analytical underpinnings of our understanding of the role of women entrepreneurs in the economy.
- Concentrate policies for promoting availability of risk capital to innovative entrepreneurship mainly on early stages of the financing of the firm.
- Recognise the need for proximity between suppliers of funds and those who require finance, particularly for small-scale investment.
- Increase the managerial and technical expertise of intermediaries whose role is to evaluate and monitor companies.
- Facilitate international transfer of institutional infrastructure and expertise.
- Subject new regulations which could adversely affect the provision of risk finance to cost-benefit tests of their likely effect before implementation and monitor their subsequent impact.
- Encourage, in conjunction with business and accounting bodies, small business to recognise, measure, and report intangible assets.
- Improve entrepreneurship access to information about networking opportunities.
- Increase the participation of entrepreneurship in research networks and technology markets.
- Support the emergence and maintenance of innovative clusters.
- Identify and promote best practice policies which support company innovation through cluster development.
- Enhance entrepreneurship awareness and knowledge of all elements of the intellectual property system.

- Strengthen the integration of intellectual property issues in programmes and policy initiatives aimed at fostering innovation in entrepreneurship.
- Facilitate the use of the intellectual property system by promoting the development of cost-effective mechanisms for application and for the resolution of intellectual property disputes.
- Promote the role that foreign direct investment can play as a vehicle for entrepreneurship to access international markets.
- Encourage the smooth, cross-border growth of entrepreneurship by reducing the need for internationally active entrepreneurship to comply with multiple sets of rules or requirements.
- Facilitate access to the information entrepreneurship need to operate internationally.
- Enhance incentives for new public-private partnership initiatives that would help SMEs reach global markets for innovative products and access foreign sources of advanced technologies and knowledge.
- Move beyond policies for basic connectivity and ICT readiness to facilitate more widespread uptake and use of complex ICT applications and e-business uptake by small firms.
- Encourage rollout of affordable quality broadband networks to underpin the competitiveness and growth of entrepreneurship.
- Strengthen the infrastructure for trust, security (including spam and viruses), privacy and consumer protection.
- Expand, in conjunction with business and consumer groups, entrepreneurship' use of low-cost on-line dispute resolution mechanisms.
- Develop and distribute digital content, including by expanding the commercial use of information about the public sector, education and health care.
- Reduce ICT skill impediments to the growth of entrepreneurship.
- Embed strategies toward the private sector and entrepreneurship in countries' broader national development and poverty reduction programmes.
- Strengthen entrepreneurship capacities to improve their competitiveness in domestic, regional and global markets.
- Promote policy coherence at regional, national and international level.
- Maximise the spillover of management skills and knowledge from multi-national enterprises to local entrepreneurship.

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