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Regional Business Competitiveness: Medium and Low-Technology Production Systems in Northern Greece

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Abstract:
Successful regional integration in global competitive networks depends more than ever before on regional capacities for technological absorption and diffusion. Regional development inequalities are the outcome of different levels of technological adjustment and innovativeness in the regional business sector. This paper explores the technological adjustment capacity of the industrial regions of Northern Greece, which are characterised by traditional manufacturing specialisation – for long now declining due to global competition and currently, due to the recent crisis. The determinants of regional business competitiveness and economic performance are explored. The analysis substantiates that even in industrial agglomerations of traditional specialisation, competitiveness lies in technological advancement and not in labour cost compression.

Key Words:
Internet, valuation, Internet valuation, analysts
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1. Introduction

The following analysis focuses on the vulnerable region of Northern Greece, where the bulk of the country's traditional[4] manufacturing is concentrated in local production systems of small and medium-sized manufacturing enterprises. The paper attempts to estimate the impact of technological and innovation dynamism on regional business competitiveness under the current conditions of globalisation and crisis. To this purpose, technological and innovation capacity is explored across enterprises of different industries in the region concerned. Industrial/sectoral and territorial/localized factors are taken into account, as determinants of competitive business strategies. Such factors encompass the technological level of the regional production system, the pre-established industrial structures, the labour market, human capital and the institutional basis.

We assert that entrepreneurial technological capacities are the outcome of production, social and institutional structures of the regional context. The analysis focuses on manufacturing sectors of high labour intensity and low or medium technology intensity, operating in the regions of Western, Central and Eastern Macedonia and Thrace. Primary and secondary data are analysed on the business and sector level, in order to estimate the impact of sectoral and territorial factors on entrepreneurial technological capacity and consequently, regional competitiveness. The main objective of the analysis is to contest mainstream microeconomic approaches that advocate the dependence of competitiveness merely on production cost. The paper attempts to substantiate that the adoption of dynamic strategies improving productivity through technological advancement and innovation is the prerequisite for business and regional competitiveness.

A central hypothesis in the following analysis is that upgraded technological capacities have a positive contribution to firms' economic performance. Thus, business data on employment, labour skills, practices for technological improvement and innovation are associated to data on sales, in order to provide indication of entrepreneurial competitiveness. Results indicate that 'passive' business strategies compressing production cost, wages and investments, result into low value added production and weak competitiveness. While, higher competitiveness is achieved through 'reactive' strategies motivating business potential in the direction of technological upgrading and innovativeness. This of course requires skilled labour, high wages and substantial investments that allow for high value added production.

2. Regional development and inequalities in the New Economy of Knowledge

[4] Statistical data on the industrialisation of Greece indicate the concentration of the country's exports in traditional sectors only: 28 per cent in textile and leather products, 42 per cent related to agricultural products or primary raw materials. Even the specialisation index of textiles demonstrates a specialisation in the most traditional among textile products (Giannitsis, 1985).

According to the New Economy theory, firms, industries, regions and economies that learn faster become more competitive as the knowledge they develop – particularly the one embodied in labour and social capital – is hardly imitated or transferred to competitors (Storper, 1997). As knowledge has become increasingly traded, growth inequalities are the outcome of the uneven capacities of economic agents to absorb it and transform it to innovation (Hudson, 1999). Likewise, the successful integration of regional agglomerations in international networks is based on their capacity to accumulate knowledge and innovate.

In Romer's "endogenous growth theory" (Romer, 1986, 1990), knowledge spillovers and their externalities created within the spatial boundaries of agglomerations constitute important sources of innovation and lead to increasing development rates. The related discourse focuses on the connection of innovativeness to the industrial structure/composition of regional agglomerations and explores whether local externalities affect differently innovativeness in industrial sectors of different technological intensity (Glaeser *et al.*, 1992; Greunz, 2004; Thalassinos *et al.,* 2012). This connection will be explored in the following analysis as well.

Large-scale research across European regions and industries of different technological level (Greunz, 2004) has shown that knowledge spillovers are more dynamic in economically 'dense' agglomerations, such as metropolitan regions. In such environments, innovation is favoured by industrial differentiation rather than specialisation. Differentiation enhances innovation also in the case of high-tech industries. However, in the case of medium-high and medium-low technology industries, local/territorial externalities prove to be far more important for innovation. These findings are valuable for the targeted support of knowledge externalities required for the technological upgrading of regional production systems.

In the presented case, the regional production systems of Northern Greece (NG) characterised by low and medium technology manufacturing industries form the research context. The industrial competitiveness of the NG regions has been gravely challenged already since 1990, due to the opening of Eastern Europe to the West. While the recent recession since 2008 has further deteriorated manufacturing performance and threatened regional economic viability. The regional industrial basis of labour-intensive and medium-technology manufacturing has proved to be particularly vulnerable in terms of competitiveness and employment. Regional viability depends more than ever before on the industrial capacity for technological upgrading. Local externalities enhancing knowledge spillovers are therefore crucial for the adjustment of local industrial structures towards high value-added production.

3. The research framework – Research hypotheses

New Economic Geography has largely pointed out the interconnectedness of the local and the global in regional competitiveness and growth. In this theoretical framework, the paper explores the production systems of the regions of Northern Greece: East Macedonia and Thrace (EMT), Central Macedonia (CM, excluding the metropolitan area of Thessaloniki) and West Macedonia (WM). The technological level and innovation dynamism of the main manufacturing industries that constitute the regional production basis will be specifically researched as the prerequisite for competitiveness and viability of industrial agglomerations in the global economy of knowledge. Knowledge-enhancing externalities formed in these agglomerations will be sought at the level of local firms: their competitive strategy, technological adjustment practices, innovative and economic performance.

In related research (Kafkalas, 2006), the changing inter-regional inequalities in gross value-added of industrial production and industrial employment have been spatially depicted in Greece in the emergence of *neo-industrialisation* cores (Thessaloniki, Serres, Pella, etc.) and the *de-industrialisation and decline*, *stagnation* or *restructuring* of others. The innovation dynamic of Greek industries has been analysed in terms of: (i) R&D expenditures and (ii) purchase of patent licenses. The results form a new Greek industrial landscape of regional production systems characterized by:

- *High share of innovative industries* (Viotia, Magnesia, Attiki, Thessaloniki, etc.);
- *Medium share of innovative industries* (Achaia, Heraklio, Kavala, etc.);
- *Low share* (Serres, Larissa, etc.) or *absence* (Kozani, Pella, Kastoria etc.) of *innovative industries*.

As it is observed, areas/regions of *high share of innovative industries* present declining industrial employment and vice versa. In other words, regional development or decline does not appear to be related to the technological level of local industries. An explanation provided by Kafkalas (2006) is the random, non-systematic technological upgrading of the Greek industry. A different explanation sustained by the present paper and following analysis is the intra-industry adjustment, which allows only technologically dynamic firms to survive - leading the rest to downfall.

Our main hypothesis is that industrial/sectoral technological dynamism defines the technological adjustment capacity of firms. To explore the validity of this hypothesis, we examine the industrial/sectoral differentiation of firms' competitiveness and development strategy in terms of:

- size of sales and market reach;
- new technology adoption and capitalization of endogenous resources;

- change of employment and need for skilled labour;
- use of institutional structures for technological upgrading;
- cost of technology development and access to funding.

5. Methodological approach

The spatial production system of this analysis as already mentioned consists of the EMT, CM and WM regions, for which previous research (Kafkalas and Foutakis 1998; Kafkalas 2006) has provided the following results:

- In 1988 the EMT, CM and WM regions are identified as *neo-industrialisation* cores, despite the *low* or *non-existing share of innovative industries* in their production system;
- During 1988-1998 they deteriorated to *stagnation and restructuring regions* (EMT, CM) and even, *de-industrialisation regions* (WM);
- Until 2007 (last provided data), they face acute competition from neighbouring Balkan countries, as a result of the διάλυση of the East European block and EU enlargement.

Recent statistical data (ELSTAT: AIR, RLF) were analysed for our research purposes, concerning the share of manufacturing industries in the examined regions. The analysis evidenced the high concentration of firms' population, gross value added and sales in the manufacturing sectors of wearing apparel (18), footwear (19), electronics (31) and transport equipment (34). Those are the industries that characterise the production basis of the provincial regional economies concerned and thus, they are further analysed for the assessment of the impact of business technological dynamism on competitiveness.

In this analysis, regional industrial competitiveness is 'de-associated' from the regional industrial employment. The methodology adopted here applies a cluster analysis of production factor-intensity in order to investigate the technological/innovation dynamism of the industries in question. The latter is measured by:

- the share of wages in production value-added (labour intensity – SWVA),
- the share of investments in production value-added (capital intensity - SIVA),
- the average level of wages for employees (labour-cost intensity - WL), and
- the share of R&D employees in the total number of employees (human capital - SHW).

These variables are estimated in our model as: SWVA = 3/4, SIVA= 5/4, WL= 2/3, SHW= 6/2, where: (1) = number of highly paid employees, (2) = number of

employees, (3) = labour cost, (4) = gross value added of production, (5) = overall investments and (6) = number of employees in R&D. Applying as appropriate algorithm K-means clustering, the analysis classifies the examined industries in five clusters: (1) *technology-intensive*, (2) *human capital- and capital-intensive*, (3) *human capital-intensive*, (4) *labour- and capital-intensive*, and (5) *labour- intensive*.

Each one of these clusters presents the following attributes:

(1) *technology-intensive* industries are characterised by high share of R&D employees, high average wages, high share of wages and high share of investments in gross value added of production;

(2) *human capital- and capital-intensive* industries are characterised by high share of R&D employees, medium average wages, medium share of wages and high share of investments in gross value added of production;

(3) *human capital-intensive* industries are characterised by medium share of R&D employees, high average wages, high share of wages and low share of investments in gross value added of production;

(4) *labour- and capital-intensive* industries are characterised by low share of R&D employees, low average wages, medium share of wages and high share of investments in gross value added of production;

(5) *labour- intensive* industries are characterised by low share of R&D employees, low average wages, high share of wages and low share of investments in gross value added of production.

A fieldwork research was then carried out with the use of a questionnaire for sampled firms in the examined industries, in order to explore the relation between their competitiveness (growth of sales) and their technological predisposition (labour skills, R&D investments). The analysis of variance (ANOVA) applied to the empirical research findings allowed for the exploration of the hypothesis of firms' economic performance differentiation across industries of different level of technological dynamism.

6. Empirical results

The cluster analysis indicated the following:

- Sectors 31 and 34 are found to be human capital- and capital-intensive: characterized by a significant share or R&D employees in total employment, medium average wages, medium share of wages and high share of investments in total production value-added;
- Sector 19 is identified as human capital-intensive: characterized by skilled labour, medium share of R&D employees in total employment, high average wages, high share of wages and low share of investments in total production value-added;

- Sector 18 is labour- and capital-intensive: characterized by low-skill labour and thus, low share of R&D employees in total employment, low average wages, medium share of wages and high share of investments in total production value-added.

The empirical findings of the primary research were then organized in groups according to the identified clusters' characteristics, in order to complete the results with the use of elaborate statistical analysis. The applied ANOVA indicated the following for the examined firms:

- Change in sales varies statistically significantly: for firms in cluster 2 (more dynamic technologically) sales moderately increased, while remained stagnant for firms in clusters 3 and 4;
- The main sales destination for all firms is the national and the regional/local market; however, the degree of market penetration varies statistically significantly: for firms in cluster 2 and 3 is higher than for firms in cluster 4 – the latter is characterized by export orientation higher than the regional/local market orientation, due to subcontracting of firms in sector 18 to EU firms;
- Technology adopted by firms is of medium specialisation; but the degree of technology capitalization varies statistically significantly across clusters: it is higher for firms in cluster 2, firms in cluster 3 are following, while firms in cluster 4 are lagging;
- Main sources of technology and knowledge are firms' personnel and customers; while the degree of their capitalization varies statistically significantly: personnel is very important for firms in cluster 2, important for firms in cluster 3 and adequately important for firms in cluster 4. On the contrary, customers are important mostly for cluster 4, adequately for cluster 3 and less in cluster 2;
- Employment change varies statistically significantly across firms: in cluster 4 (of lower sales) employment decreases, in cluster 2 it marginally increases, and in cluster 3 it is stable;
- The need for specialized labour varies statistically significantly: in cluster 2 it moderately increases, while in cluster 4 it is stable, as well as in cluster 3;
- Firms' participation in development programs is low; only firms in cluster 4 take advantage from programs subsidizing labour cost;
- The access cost/hardship to funding is the main reason obstructing technological upgrade; however, it varies statistically significantly: it is more important for firms in cluster 3 (human capital-intensive), than in cluster 4 (labour- and capital-intensive);
- Firms' effort for technological upgrade through EU funding also varies statistically significantly: technological upgrading is a priority mainly for

cluster 3, less for cluster 2, and even less for cluster 4. On the contrary, personnel training is a priority for cluster 4, far more than the other clusters.

7. Conclusions

The results of the analysis verified the hypotheses for the positive relationship between the technological dynamism and the competitiveness of firms. Those firms that specialize in low-cost and low-tech production are unable to adjust to the changing conditions of international competition. On the other hand, firms that adopt strategies and practices for technological improvement –i.e. applying new technologies, upgrading human capital, and integrating funding– achieve higher competitive performance. The motivation of the endogenous potential and resources of firms is the main prerequisite for success.

The presented analysis further substantiates the positive impact of knowledge externalities, formed mainly by the industrial structures of the local/regional production system, on the technological dynamism of firms. The results show that firms of higher technological adjustment capacity operate in industries of higher technological dynamism/intensity. While on the other hand, firms of low-tech industries are unable to develop competitive technological and innovative orientation. This is the outcome of low labour-cost production, which consequently means low labour-skills.

Greek footwear manufacturing provides a good example of regional business with a steady performance in the national market, but with limited exports (of 2.5 million pairs of shoes in 2006). At the same time Italian and Spanish footwear manufacturing predominate in the global market holding the 1st and 2nd place respectively in exports, in 2006. For example, Spain exported 200 million pairs of shoes to the USA in 2006, running 2nd after Italy. As indicated by numbers, the Greek firms are lagging in competitiveness despite lower product prices, due to inadequate orientation towards design and quality.

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