ASSESSING THE DETERMINANTS OF FIRMS’ COMPETITIVENESS IN GREECE: A STRUCTURAL EQUATION MODELING ANALYSIS

Theodore METAXAS*, Athina ECONOMOU**

Abstract: The paper investigates the importance of territorial features/assets (i.e. agglomeration economies, urban infrastructure, factors of labour and cost, development policies, qualitative factors, inter alia) on small and medium-sized firms’ competitiveness. The analysis uses primary data from 204 small and medium-sized firms located in Thessaloniki (Greece). These firms operate in the industry, commerce and services sectors. Through the use of Structural Equation Modeling (SEM) analysis, the importance of particular factors for the competitiveness of firms has been analysed, reaching valuable conclusions not only for the firms and the city of Thessaloniki, but also for the firms and areas with similar characteristics in Greece and the wider area of the Balkans.

Keywords: firms’ competitiveness, territorial features/assets, Structural Equation Modeling (SEM) analysis, Greece

JEL Classification: O18, R5, R11

1. INTRODUCTION

There are two basic theories of strategic management, the Resource-Based View and the Industrial Organization Theory, which focus on the investigation of firms’ competitiveness. The first one refers to the internal environment of firms and their abilities and resources to be competitive (Barney, 1991, 2001; Wernerfelt, 1984; Snow and Hrebiniak, 1980)). Following Hart (1995), resource-based theory

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takes the perspective that valuable and costly to copy firm resources and capabilities provide the key sources of sustainable competitive advantage. The second one focuses on the external dynamics of the firms’ environment which affect (alternative: environment affecting) their competitiveness (Porter, 2000) and their ability to strategically design and to be effective (McLarney, 2001; Mukherji and Hurtado, 2001). Among the external environment’s forces, (the combination of) territorial features/assets (such as agglomeration economies, urban infrastructure, factors of labour and cost, development policies, qualitative factors etc.) is of extreme importance (i.e. Deas and Giordano, 2001; Maskell and Malmberg, 1999; Kresl and Singh, 1999; Keune, 2001; Christiaans, 2002; Fujita and Thisse, 2003). Several studies, using mostly statistical, econometric and correlation analysis, measure the firms’ competitiveness at the international level. For instance, Bargegil and Modrego (2011) using a sample of 2,357 firms in Spain, measure the impact of R & D organizations on the medium-sized firms, Bayyurt and Duzu (2008) present a comparison of the relative efficiencies of the manufacturing firms in China and Turkey, Kumar and Chadee (2002) evaluate the competitiveness of Asian manufacturing firms, while Parida (2008), using a sample of 1,471 information and communication technology firms (ICT), conceptualize the dynamic capabilities, studied the influence of ICT in related small Swedish firms. Finally, Henderson and Cockburn (1994), through econometric and structural interviews, measure firms’ productivity and the nature of competencies in pharmaceutical firms.

By taking into consideration that the supply of a favorable business environment is crucial for both the attraction of new investments and the development of the existing ones, the paper, using Structural Equation Modeling (SEM) Analysis, focuses on the evaluation of the impact of territorial characteristics/assets on 204 small- and medium-sized firms (SMEs), located in Thessaloniki (Greece), operating in the sectors of industry, commerce and services. The impact of the factors identified using the SEM application on the overall firms’ competitiveness is econometrically assessed. The present paper’s contribution is of twofold importance: a) the findings come from a primary research: the way the dataset is constructed allows us to capture the local firms’ perceptions and opinions regarding the factors affecting the competitiveness dynamics of the area under investigation and, b) the relationship between local business environment and
Assessing the Determinants of Firms’ Competitiveness in Greece: A Structural Equation Modeling Analysis

Competitiveness in Greece, particularly in Thessaloniki, has drawn a limited amount of research so far, thus the present analysis contributes to the literature regarding the competitiveness determinants in the area of interest.

Furthermore, as Liargovas and Skandalis (2007) underline, current increasing globalization conditions exert an increasing pressure upon local enterprises in terms of more intense international competition. In particular, Greece’s case constitutes an interesting one since most of the firms are small and medium-sized enterprises which need to address the limitations of the small local markets and expand their operation in order to ensure survival and international competitiveness. In addition, the economic and monetary integration of the European Union member states and the opening of markets in the Eastern European countries intensifies the competition faced by the local native firms since the barriers related to the free movement of production factors have been lifted (Floros et al., 2014). An understanding of the factors affecting firms’ competitiveness at the local level in Greece will shed light on the issues and problems that need to be addressed by local firms if they aim to improve their competitiveness and extend their operation in this increasingly globalizing environment. Furthermore, the firms’ competitiveness is a significant determinant of the whole economy’s competitiveness level and it also affects the local (native) citizens’ employment level and standard of living (Floros et al., 2014). While some studies addressed similar issues in Greece, to our knowledge, none uses local primary data in order to examine the factors affecting the local firms’ competitiveness with a wide range of indicators proposed by previous research.

The following section presents the literature review and, in particular, the variables (factors) under consideration, as well as the corresponding sources. The third section describes the research profile and the methodology. The fourth section presents the results of the SEM for the firms considered. The fifth section presents the results of the econometric analysis with regard to the determinants of the firms’ competitiveness. The last section of the paper offers the conclusions.
2. LITERATURE REVIEW

2.1 Development of the research and selection of variables

The main purpose of this study is to shed some light on the factors (criteria) that may affect the competitiveness of SMEs in the area of Thessaloniki in Greece. In doing so, the study utilizes primary level data and it empirically approximates the determinants of SMEs competitiveness at the firm level. In addition, the empirical investigation incorporates a wide variety of factors that have been identified to affect competitiveness by previous research. Therefore, it is of importance to understand the research conclusions drawn by previous similar studies.

In addition, the selection of the variables (factors), which constitute criteria for the firms’ location in specific areas, was mainly based on the report of CEC (1993), and, on the empirical studies of Herrin and Pernia (1987) and Trofimenko (2010). According to the CEC report (CEC, 1993), industrial firms pay more attention, comparing to the commercial/services ones, to the existence of agglomeration economies, the geographic location, the existence of supporting services, and to the area’s low taxes. In addition, factors associated to labour and to the existence of effective urban infrastructure (i.e. airports, ports, telecommunications) are considered important to their competitiveness. However, large commercial enterprises pay more attention to qualitative factors, workforce, and economic factors concerning the markets’ size and their accessibility to customers and suppliers.

Herrin and Pernia (1987), using 34 criteria, which form 6 groups, and primary data, on a 1 to 5 Likert scale, from 100 local and foreign firms in the Philippines, found that closeness to major customers, easy road access, reliable electrical power, adequate telephone/telex services, availability of a suitable plot of land, availability of a suitable building, and adequate space for expansion are, more or less, equally important location factors for local and foreign firms.

Trofimenko (2010), using data from the World Bank’s Study of Competitiveness, Technology and Firm Linkages, for 1,409 exporters and foreign-owned firms in China, examined 4 groups of location criteria. The empirical results indicated that exporters and foreign-owned firms are attracted by the size of the
local market, the quality of telecommunications, and the supply of skilled labour, while the quality of the transportation was not significant.

Besides traditional economic factors, such as the size of local market, the production structure, and the labor cost, the aforementioned studies attribute great importance to other non-conventional factors, such as the quality of cultural and social infrastructure, the existence of investment support agencies, as well as partnerships among local public authorities and private sector (Metaxas, 2011). This list of non-conventional factors can be enriched with input from other studies, such as D’Archy and Keogh (1999), Rogerson (1999), and Craglia et al., (1999), who use the variables of land use and values, quality of life, and international connections, respectively. These studies examine how firms belonging to different sectors, and located in particular areas, evaluate and exploit local/regional assets and policies in order to support their development and competitiveness.

On the basis of the discussion previously held, the literature identifies several groups of local/regional factors that affect the firms’ competitiveness. Agglomeration economies, including proximity to customers/suppliers – market size – supporting services – availability of natural resources - similar business existence (Crozet et al., 2004; Nachum and Keeble, 2003; Rocha and Stenberg, 2005; Graham, 2007; Doeringer et al., 2004; Combes et al., 2008). In this case, clusters enhance the firm access to specialized labour, materials, and equipment and enable lower operating costs. Easy access to markets is defined as the primary factor since the new markets, at regional and national level, are places where the new products have to be promoted to the new potential consumers, directly and effectively increasing the demand levels of these products (Doeringer, et.al, 2004; Trofimenko, 2010). In addition, highly concentrated markets attract skilled local workforce by offering job mobility and specialized suppliers and service providers by providing substantial business opportunities in close proximity (Austrian, 2000; Keune, 2001; Alonso-Villar, 2002; Trofimenko, 2010), while the creation and application of innovative and entrepreneurial local knowledge is deemed especially critical for securing regional economic advantage (i.e. Keeble and Wilkinson, 2000; Simmie, 2002; Karlsson et al 2008).

Furthermore, the management of labour relationships is directly linked to the existence of the employees’ satisfaction deriving from this work. There are a number of studies stressing the fact that the provision or absence of motives
influences the behaviour of employees and, consequently, the firms’ efficiency (Herzberg et al., 1959; Locke, 1976; Parsons and Broadbridge, 2006).

In addition, urban infrastructure, including road/highway, train, seaport and air connections, plays a crucial role on the firms’ competitiveness as well as on cities’ development since it is strongly related with the direct distribution of goods, the easy access to markets, the decrease of transportation (alternative: shipping) cost and, finally, the price of goods (Vickerman, 1996; Wheeler and Mody, 1992; Glaeser, 1999; EC 2003).

A number of studies support the importance of the shipping cost and land use cost on the firms’ decision making process for establishment (Harrington and Warf, 1995; Zhu 2000). In the new economic geography models, in particular, firms seek to create new establishments in areas with lower costs and market shares in the emergent states economically and geographically well-positioned (Disdier and Mayer, 2004; Vazquez-Rozas, 2009).

Finally, quality factors, including, urban aesthetic, attractiveness of physical environment and quality of education, research and training, contribute to business creativity, especially for SMEs, to the increase of their productivity and the development of innovative actions (Keune, 2001; Twomey, 2002). International practice mentions cases of cities that improved their images through the adaptation of regeneration and (possible alternative: reinvention) policies in order to attract investments and specialized human resources and to award their competitive advantages, based on their particularities as competitive destinations (Hall, 1998; Hope and Klemm, 2001). Table 1 presents an overview of the variables used in the particular studies.

<table>
<thead>
<tr>
<th>Sources (Studies and Reports)</th>
<th>Variables (factors)</th>
<th>Method and Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vernon Henderson (1986) Brazil</td>
<td>Labour quality and specialisation</td>
<td>Secondary data and econometric analysis</td>
</tr>
<tr>
<td>Herrin and Pernia (1987) Philippines (100 firms)</td>
<td>Proximity to customers/suppliers</td>
<td>Empirical research–Likert scale</td>
</tr>
<tr>
<td>Labour availability</td>
<td>Availability of support services</td>
<td></td>
</tr>
<tr>
<td>Sufficient connections by air</td>
<td>Labour availability</td>
<td></td>
</tr>
<tr>
<td>Sufficient road/highway connection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CEC (1993) Europe (Industrial, Commercial, Services and R&amp;D sectors)</td>
<td>Local market size</td>
<td>Empirical research–Likert scale</td>
</tr>
<tr>
<td>Proximity to customers/suppliers</td>
<td></td>
<td></td>
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<tr>
<td>Accessibility to other national markets</td>
<td></td>
<td></td>
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<tr>
<td>Presence of foreign business</td>
<td></td>
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</tr>
<tr>
<td>Sources (Studies and Reports)</td>
<td>Variables (factors)</td>
<td>Method and Analysis</td>
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<tr>
<td>-------------------------------</td>
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<tr>
<td>Availability of strong investment incentives</td>
<td></td>
<td>Econometric Analysis</td>
</tr>
<tr>
<td>Low local taxes</td>
<td></td>
<td>- equation partial adjustment model</td>
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<tr>
<td>Labour morality/ethics-</td>
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<td></td>
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<tr>
<td>Labour availability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Existence of similar business</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Luce (1994) (Philadelphia Metropolitan Area)</td>
<td>Local Taxes</td>
<td>Econometric analysis</td>
</tr>
<tr>
<td>Edward Glaeser, Jed Kolko and Albert Saiz (2001), USA cities</td>
<td>Urban aesthetic and culture / recreation</td>
<td>Econometric analysis</td>
</tr>
<tr>
<td>Stephen Redding and Antony Venables (2004), USA counties</td>
<td>Access to other national markets</td>
<td>Econometric analysis</td>
</tr>
<tr>
<td>Keith Head and Thierry Mayer (2004), Western Europe (Japanese firms)</td>
<td>Proximity to customers/suppliers</td>
<td>Empirical research, econometric analysis</td>
</tr>
<tr>
<td>Mihir Desai, Fritz Foley and James Hines, (2004) USA (multinational firms)</td>
<td>Local taxes</td>
<td>Secondary data and econometric analysis</td>
</tr>
<tr>
<td>Fernando Galindo-Rueda and Jinathan Haskel (2005), England (Annual Business Inquiry and Employer Skills Survey)</td>
<td>Labour quality and specialization</td>
<td>Descriptive statistics and econometric analysis</td>
</tr>
<tr>
<td>Gerard Marlet and Clernes van Woekerns (2005), Dutch cities</td>
<td>Urban aesthetic and culture / recreation</td>
<td>Statistics and factor analysis</td>
</tr>
<tr>
<td>Murillo-Luna and Ramón-Solans-Prat (2008) (98 Spanish industrial firms)</td>
<td>Natural resources</td>
<td>Empirical study (structured questionnaire and PCA Analysis)</td>
</tr>
<tr>
<td>Shangqin et al. (2009) New Zealand (75 local firms)</td>
<td>Local market size</td>
<td>Empirical research, descriptive and econometric analyses</td>
</tr>
<tr>
<td>Trofimenko (2010) China (1,409 export firms)</td>
<td>Local market</td>
<td>Econometric analysis</td>
</tr>
<tr>
<td>Availability of strong investment incentives</td>
<td></td>
<td></td>
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<tr>
<td>Sufficient railroad connections</td>
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<tr>
<td>Quality of local higher education</td>
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<td>Quality of local training/continuing education</td>
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<tr>
<td>Quality of research institutes</td>
<td></td>
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<tr>
<td>Rademaekers, et al., (2011)</td>
<td>Natural resources</td>
<td>Analytical report for EU, Comparative sector analysis</td>
</tr>
<tr>
<td>Hsiao-Chi and Chia-Han (2014) (Domestic firms from</td>
<td>Natural resources</td>
<td>Analytical Hierarchy Process (AHP) approach and TOPSIS</td>
</tr>
</tbody>
</table>
In the present analysis, a set of indicators grouped in three categories were chosen, namely: Agglomeration economies, Quality of life/labour, Urban infrastructure. The indicators were chosen based on their performance and significance in the estimated model, and a total of nine independent variables were finally included in the analysis.

2.2 The analysis’ importance for Thessaloniki and other similar cities

It is very important to underline that the above mentioned factors of competitiveness, which have been thoroughly studied using up-to-date empirical research, indicate that certain factors exert a strong and significant effect in the development and competitiveness of firms in specific regions. In the present paper, the competitiveness factors used are drawn from firms located in Thessaloniki and their investigation is considered to be very useful not only for Thessaloniki but also for other regions that share similar economic environment characteristics in the Balkans, namely Varna, Burgas or Constanta and the like.

Similar to the above-mentioned regions, Thessaloniki hosts a harbour with special development dynamics and characteristics. The competitiveness factors examined here are considered to be territorial assets of the region and are closely related to the development and the competitiveness of the firms located in Thessaloniki.

The same applies for the rest of the regions discussed above. A recent study of Varna (Metaxas, 2008) showed that several factors such as the agglomeration economies, urban infrastructure and the environment’s quality are positively related with the local firms development. Other factors such as the local taxes, land and labour costs, as well as the availability of strong investment incentives, were found to be negatively related with a firm’s competitiveness. All these factors are expected to be very important, despite the obstacles which rose in the last years and the slowdown in the industrial development of the region and the limitations of the harbor operation (van Winden, 2014).
In addition, following the Municipality Development Plan of Constanta (2006:43-44) we will sustain the idea that, according to the development objectives of the city, similar factors of interest are presented similar to the Varna’s case. The role of port and urban infrastructure is crucial, while the city lacks the existence of investment incentives and the capacity to manage European development projects.

In the case of Thessaloniki, agglomeration economies are considered to be extremely important since the city is located in a strategically significant location, with numerous SMEs operating in the broader area. The market size and the transportation system at the national, Balkan and European level might strongly affect the firms’ competitiveness levels and the city’s development, as well as the regional level. The local taxation system and the low costs of land use can encourage new firms in the area, as well as facilitate the development of the existing firms. At the same time, the city’s infrastructure, which is located in a focal point for the road, air and sea transport systems, can further affect the investment levels attracted in the area. The conclusions drawn by the present study can serve as an initial guide for the SMEs in Thessaloniki, as well as for other Balkan cities sharing similar characteristics. Therefore, the study’s findings are important not only for the city of Thessaloniki and Greece in general, but also for other similar regions and cities in the wider area of Balkans and South European regions.

2.3 Thessaloniki in brief

Thessaloniki is the second-largest city in Greece and the capital of the periphery of Central Macedonia, as well as the de facto administrative capital of the Greek regions of Macedonia and Thrace. According to the 2011 census, the municipality of Thessaloniki has a population of 322,240, while the Thessaloniki Urban Area (the contiguous built up area forming the “City of Thessaloniki”) has a population of 790,824; making it the fifth largest and most populated city in the Balkans and the second most populated city that is not a capital. Furthermore, the Thessaloniki metropolitan area extends over an area of 1,455.62 km² (562.02 sq mi) and its population reached a total of 1,006,730 inhabitants (National Statistical Service of Greece, 2011). With a history of over 2,300 years, it is one of Europe's oldest cities. Thessaloniki is Greece's second major economic, industrial, commercial and political centre, and a major transportation hub for the rest of
South-East Europe; its commercial port is also of great importance for Greece and the South-East European hinterland. The city itself has faced a rather severe “de-industrialization” over the period of the last two decades mainly due to the changes in the international industrial environment, the restructuring of the Greek economy, the new priorities of the European Union and the unstable environment in the Balkan States (RIMED Report No.9, 2005; Konsolas et al. 2002; Coccosis and Psycharis, 2008). The Port of Thessaloniki is one of the largest ports in the Aegean and as a free port, it functions as a major gateway to the Balkan hinterland. In the first six months of 2010, more that 7.2 million tons of products went through the city's port, making it one of the largest and most used ports in the Balkans. Thessaloniki has also been slowly turning into a major port for cruising in the Eastern Mediterranean (Thessaloniki Port Authority, 2010). The city is a major transportation hub for the whole of South-East Europe, carrying, among other things, trade to and from the neighbouring countries. Its economy is being transformed into a service economy with a rapidly grown logistic sector, whereas its economic hinterland shows industrial concentration. Its exports (20% of total national exports) are oriented towards the EU Member States such as Germany and the United Kingdom, while in the last 15 years exports towards Eastern Europe and Balkans have been growing rapidly. In 2009, the regional unit of Thessaloniki had a gross domestic product of € 21.321 billion (ranked 2nd amongst the country's regional units), comparable to Bahrain or Cyprus, and a per capita of € 18,400 (ranked 15th). In purchasing power parity, the same indicators are € 22.998 billion (2nd place,) and € 19,800 (15th place) respectively. In terms of comparison with the European Union average, Thessaloniki's GDP per capita indicator stands at 78 % of the EU’s average and 84 % in PPP. Overall, Thessaloniki accounts for 9.2 % of Greece’s total economy of Greece. In 2009 the economy contracted by –1.6% (Eurostat, 2010).

3. METHODOLOGY

3.1 Dataset

The dataset used in the study is drawn from a questionnaire survey applied to managers and business owners ] (123 business owners and 81 managers filled the questionnaire), as they are considered to be the most appropriate to answer
questions regarding specific firm characteristics related to their territorial environment, development policies, future prospects and competitiveness issues. The survey was conducted during the period April 2007-June 2008, and the survey’s target included firms located in the Thessaloniki region (Greece). In order to sustain the chance of clarifying ambiguous questions, and to avoid “quick” and “non-skeptical” answers the programming method was preferred instead of a random interview; A Likert scale from 1 to 10 (Stathakopoulos, 2005) was used.

The dataset contains detailed information regarding the characteristics that are addressed by the literature as the most important in assessing firms’ competitiveness. The response rate ranged to approximately 90 % (out of 227 questionnaires, 204 with complete information). The vast majority of the firms who answered was local (87,1 %), an element revealing the firm’s appreciation, as well as the fact that they are aware of the territorial environment (weaknesses and strengths) as well as of the development policies applied by the local authorities, for the benefit of the cities and the firms. The firms included in the sample were required to employ at least 20 employees. Interviews were made with high level managers and business-owners, and each interview lasted around 25-30 minutes. Interviews were certified with the signature of the responder who filled in the questionnaire and the business stamp. Finally, the selection of the firms was based on data provided by the Commercial and Industrial Chamber of Thessaloniki. Regarding the profile of the studied firms, 32,3 % of them belong to the industrial/manufacturing sector, 25,9 % to the commercial sector, 22 % to services and 19,6 % to the tourism sector. Furthermore, the average number of employees is 62 employees. Consequently, we reported only on small-medium firms.

3.2 Variables

A lot of information regarding the most important determinants of the firms’ competitiveness are included in the questionnaire. Based on the existing research, various questions are asked regarding the indicators found to have consistently affected the firms’ competitiveness, namely agglomeration economies, quality of life, labour features and urban infrastructure. In Table 2, the detailed definitions and the name of the variables, along with their descriptive statistics utilised in the study are presented.
Based on the mean values shown in Table 2, we observe that, in most of the cases, the mean values of the respondents’ answers are relatively low, barely above the cut-off value of six. The lowest mean value is observed for the question regarding the existence of “Natural resources availability”, indicating that in Greece the natural resources are not available in an efficient way. The highest respective mean value is observed for the “Size of local market”.

In addition, there might be a systematic bias in responses between business owners and managers, arising from the different status they hold within the firm. Such discrepancies in responses can significantly affect the findings of the present study. Therefore, the last two columns in Table 2 separately present the mean values in the responses of business owners and managers. As it can be seen, their responses are very close and the differences in the mean ratings are negligible. Perhaps this fact is also due to the nature of the questions asked, since they are related to the features of the local market and infrastructure, and not so much to the specific firm characteristics. This way, systematic differences in responses are not observed.

**Table 2: Definitions of the variables and descriptive statistics**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Variable Measurement</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Business Owners Mean Values</th>
<th>Managers Mean Values</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Agglomeration economies</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size of local market</td>
<td>1-10,</td>
<td>7.225</td>
<td>1.713</td>
<td>7.195</td>
<td>7.272</td>
</tr>
<tr>
<td>Natural resources availability</td>
<td>1-10,</td>
<td>5.794</td>
<td>2.011</td>
<td>5.878</td>
<td>5.667</td>
</tr>
<tr>
<td>Presence of similar business</td>
<td>1-10, 10: Highest degree</td>
<td>5.995</td>
<td>2.013</td>
<td>6.001</td>
<td>5.975</td>
</tr>
<tr>
<td><strong>Quality of life - labour</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labour availability</td>
<td>1-10,</td>
<td>6.230</td>
<td>2.136</td>
<td>6.341</td>
<td>6.062</td>
</tr>
<tr>
<td>Culture / Recreation</td>
<td>1-10,</td>
<td>6.686</td>
<td>1.705</td>
<td>6.756</td>
<td>6.889</td>
</tr>
<tr>
<td>Quality of local training / Continuing education</td>
<td>1-10,</td>
<td>6.515</td>
<td>1.757</td>
<td>6.390</td>
<td>6.580</td>
</tr>
<tr>
<td><strong>Urban infrastructure</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sufficient road / Highway connections</td>
<td>1-10,</td>
<td>6.809</td>
<td>1.713</td>
<td>6.041</td>
<td>7.086</td>
</tr>
<tr>
<td>Sufficient railroad connections</td>
<td>1-10,</td>
<td>6.466</td>
<td>1.732</td>
<td>6.756</td>
<td>6.580</td>
</tr>
<tr>
<td>Sufficient seaway connections</td>
<td>1-10,</td>
<td>6.456</td>
<td>2.504</td>
<td>6.659</td>
<td>6.296</td>
</tr>
<tr>
<td>Number of observations</td>
<td></td>
<td></td>
<td></td>
<td>204</td>
<td></td>
</tr>
</tbody>
</table>

*Source: Authors’ calculations*

*Note: 10 represents the highest value.*
3.3 The Model

Structural Equation Modeling (SEM) can be viewed as a combination of factor analysis and regression or path analysis (Hox and Bechger, 1998). The basic idea is that, following the defining of the indirect and direct pathways operating within the relationships of interest, the latent variables, though they cannot be observed by the researcher, can be estimated using their relation with the observed variables (multiple indicators) (Maruyama, 1997; Joreskog and Sorbom, 1998).

Regarding the firms’ competitiveness and performance studies, SEM has been used in a variety of scientific works. For instance, Ling et al. (2012) investigates in Porter’s ‘diamond’ environment the components of competitiveness, develops and validates mathematical models in order to predict the competitiveness levels of architectural, engineering and construction firms headquartered in mainland China. Momeni et al. (2011) investigate the relationship between knowledge management process capabilities and core competencies in Iranian companies using a questionannaire survey and the factor and SEM analysis. Furthermore, Tong et al. (2010) used the SEM analysis to evaluate the core competence of insurance companies. Based on empirical research of 108 Hong Kong-based China family owned manufacturing firms, Wu (2008) made use of regression and SEM analysis to examine the mediating role of information sharing in the relationships between dimensions of social capital and firm competitiveness. In addition, Graig et al. (2007) applied SEM in order to investigate how the promotion of family-based brand identity influences competitive orientation (customer versus product) and firm performance in family businesses. Finally, Chi et al. (2009) conducted SEM analysis by using collected industrial survey data, in order to provide a systemic understanding of the relationships between the individual business environment characteristics, the individual competitive priorities and supply chain structures, and the impact of alignment between these elements on firm business performance.

Generally, the SEM models are applied in order to simultaneously examine more complex relationships between observed and latent variables and to incorporate the latent variable of firm competitiveness in the analysis. Using the empirical literature quoted above, the present study goes one step ahead and, based on the SEM model, tries to examine the relationship between the firms’ competitiveness and the crucial indicators related to it.
We assume that the three latent (unobserved) variables, namely agglomeration economies, quality of life / labour and urban infrastructure are determined by three sets of ordinal, observed variables (namely, local market size, natural resources availability, and the like). These three latent factors are assumed to exert an impact on the firm competitiveness levels (another latent, unobserved variable). The scale of the latent factor firm competitiveness is fixed by assuming that it has a unit variance (Jöreskog and Sörbom, 2001). The hypothesized SEM model is estimated as described above and it is presented in the path diagram (Figure 1), being similar to the model provided by Strandskov (2006).

Figure 1. Path model on the determinants of firms’ competitiveness
The estimation method is the Weighted Least Squares (WLS), analysing the matrix of polychoric correlations. When the observed variables are ordinal with highly non-normal distribution, the WLS method is preferred in order to produce correct estimates, standard errors and goodness of fit statistics (Jöreskog and Sörbom, 2001). The estimated parameters presented in the study are standardized since they are considered more appropriate for a clearer interpretation and comparison of the estimated effects (Diamantopoulos and Siguaw, 2000; Moustaki and Knott, 2000). Furthermore, correlated error terms are introduced in the models (Figure 1). While correlated error terms are generally viewed with suspicion by researchers, however they can be justified in cases such as ours, where the observed indicators come from similar wording questions, reflecting very close meanings (Diamantopoulos and Siguaw, 2000) and have been introduced in the past in a similar manner (van de Ven and van der Gaag, 1982).

5. RESULTS

Table 3 presents the results of the SEM model. All estimated factor loadings are positive and statistically significant. Regarding the latent factor agglomeration economies we see that it is positively related to all outcomes. Specifically, agglomeration is higher among firms operating in a larger sized market, who have a better availability of natural resources and where there are similar firms. The estimated correlation for the outcome variable similar business existence seems to be the highest among the observed estimated correlations. In this regard, we would like to emphasize the fact that the variable similar business existence concerns the concentration of similar firms in a given geographic area, which could develop into partnerships, knowledge and knowhow exchange, shared infrastructure and networks, thus, through their connection, be able to increase their competitiveness. In other words, operating in the frame of a cluster.

Quality of life is also strongly related to its outcomes. In particular, firms enjoy quality of life with increasing levels of labour availability, quality of local training and cultural factors that can affect the firms’ performance and productivity. The strongest correlation is found for the outcome variable of quality of local training / Continuing education”.

Finally, urban infrastructure is, as expected, also strongly and positively related to its outcome indicators. Firms enjoy higher levels of urban infrastructure
with increasing sufficiency of road/highway, train and seaway connections. For this factor of infrastructure, the greater loading is observed for the outcome variable of train connections.

When the relationship of the latent factors is examined, it is evident that the firms’ competitiveness is strongly and positively related to all three elements (agglomeration economies, quality of life / labour and urban infrastructure, indicating that these factors are important indicators for competitiveness of firms. A very high loading is observed for the factor urban infrastructure in comparison to the remainder, revealing the very strong correlation this factor has with competitiveness of firms. As Joreskog (1999) argues, such a high standardized coefficient does not necessarily emphasize a modelling. Based on the fit indices (Table 2, last rows), it seems that the model adequately fits the data.

Table 3: SEM Results on the Effects of Firms’ competitiveness on Firms Characteristics(Completely Standardised Estimates), WLS

<table>
<thead>
<tr>
<th>Dep. Variables</th>
<th>Agglomeration Economies</th>
<th>Quality of Life – Labour</th>
<th>Urban Infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size of Local Market</td>
<td>0.701</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural Resources</td>
<td></td>
<td>0.688 ***</td>
<td></td>
</tr>
<tr>
<td>Accessibility</td>
<td></td>
<td></td>
<td>0.405</td>
</tr>
<tr>
<td>Similar Business Existence</td>
<td></td>
<td>0.719 ***</td>
<td></td>
</tr>
<tr>
<td>Labour Availability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Culture / Recreation</td>
<td></td>
<td>0.821 ***</td>
<td></td>
</tr>
<tr>
<td>Quality of Local Training / Continuing Education</td>
<td></td>
<td>0.859 ***</td>
<td></td>
</tr>
<tr>
<td>Sufficient Road / Highway Connections</td>
<td></td>
<td></td>
<td>0.593</td>
</tr>
<tr>
<td>Sufficient Train Connections</td>
<td></td>
<td></td>
<td>0.608 ***</td>
</tr>
<tr>
<td>Sufficient Seaway Connections</td>
<td></td>
<td></td>
<td>0.198 ***</td>
</tr>
</tbody>
</table>

Firm Competitiveness 0.550 *** 0.725 *** 1.043 ***

Chi square 21.032 (prob.) (0.335)
DoF 19
RMSEA 0.023
CFI 0.997
NNFI 0.994
GFI 0.992
Observations 204

\(^{a}\) The asterisks next to the coefficients indicate *** significance at 1%, ** significance at 5%, * significance at 10%.

\(^{b}\) Error terms are allowed to correlate as shown in Figure 1. All error term correlations are statistically significant.
6. CONCLUSIONS

The present study examines the external environment factors that affect firms’ competitiveness, in the Thessaloniki area (Greece). A series of factors, considered to mainly affect competitiveness, are used (namely agglomeration economies, quality of life/labour, urban infrastructure (Deas and Giordano, 2001). All estimated relationships are found to be statistically significant and in accordance to the findings of previous research. Agglomeration economies are significantly associated with local market size, availability of natural resources and similar business existence in line with previous empirical findings (Crozet et al., 2004; Duranton and Puga, 2004; Nachum and Keeble, 2003; Rocha and Stenberg, 2005; Graham, 2007; Doeringer et al., 2004; Combes et al., 2008). Similarly, high values of quality of life/labour are associated with higher values of labour availability, greater cultural and recreational environment and higher quality of local training. As the literature argues, these findings are expected since they are accompanied with higher productivity and innovation in the production process (Keune, 2001; Twomey, 2002). Finally, urban infrastructure is increased with higher availability of road/highway, train and seaport connections. Based on existing research, these factors are identified as major determinants of firms’ competitiveness since they facilitate firms’ ability to reach new markets for its products and, at the same time, decreases transportation costs and consequently prices, leading to higher competitiveness advantages (Vickerman, 1996; Wheeler and Mody, 1992).

As expected, the factors mentioned above are significant indicators of the firms’ competitiveness, with urban infrastructure exerting the higher effect among all. Once again, agglomeration economies”, quality of life/labour”, urban infrastructure”, are shown to be highly associated with firm competitiveness since regional market characteristics, greater availability and quality of labour force and availability of adequate connections will facilitate production process, productivity and opening to other markets.

All in all, this study presents evidence on the factors that are major determinants of firms’ competitiveness at the regional level. These findings may serve as guideline to policymakers and researchers on the challenges needed to tackle if the aim is to improve the competitiveness of our firms. Increasing their competitiveness is vital not only for the firms per se, but for the economy as a
whole, since increased competitiveness is an indicator of a healthy economy and of improved living conditions for its citizens. Still, further/additional research is needed with the use of large scale surveys that will facilitate to examine in more detail the main determinants of firm competitiveness.

Finally, we argue that the survey results contribute, to a degree, to the other studies and approaches so far, because they reveal the dynamics of the spatial environment connected to the development and competitiveness of the city of Thessaloniki and the study firms. In a geographical area where there is a lack of empirical researches production, the results of this study form at the same time the framework in the policies and activities planning towards the support of the medium firms’ development. Also, this contribution is enhanced even more by the fact that the estimations presented refer to existing firms, which play a really important role in the development of the city of the research as they experience the development conditions every day. At this point, however, we have to highlight a weakness of the present research. This weakness is connected to the generalization of the conclusions for other firms as well, situated in other cities of the South-East Europe. We mention the examples of Bari and Constanta, but of course, we cannot argue that the results express the attitude of all cities and firms in the wider area of South-East Europe. Clearly, if we have had studied more cities or we had presented a more representative sample of firms, the conclusions of the research would have had a greater generalization coefficient and the final estimations would have been more representative. Despite this weakness, the results of the study refer to a great number of firms, situated in very interesting and dynamic city, in key geographical location. Consequently, the estimations of the firms are very important and can contribute to the existence of similar estimations also by a wider number of firms situated in other cities of the Southeast Europe.

Regarding policy implications for Thessaloniki development, the findings of this study related to the following significant points. Firstly, the central geographical position of the city is the main advantage. Local decision makers and politicians should focus on the exploitation of these providing motives for supporting the existence firms and attracting new ones. Secondly, the strategic development of the city should be connected to the investigation and situation audit analysis of the current business environment. Many cities in Greece try to create, in a general way, an appropriate competitive and attractive entrepreneurial climate,
without any focus on the particularities and the needs of their business. This study presents and supports this necessity if we want to build an efficient spatial development strategy. Thirdly, this study aims to award the need of local authorities with organising and entrepreneurial capacity and knowledge to evaluate primary evidence and to plan development policies and actions by listening the market, the business but also the responses of the wider community.

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