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Manufacturing SMEs Competitiveness against the Crisis: Management Characteristics and New Perspectives

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Abstract- **The purpose of this paper is to study the drivers of competitiveness in sectors of the Greek Manufacturing Industry, both in the pro and post-economic crisis era, based on firm level financial/accounting and qualitative data attempting to identify critical issues about Greek SMEs. Although considerable empirical work has been done on this subject, research on the topic is limited and non-existent for Greece. A Competitiveness Index is developed in order to measure competitiveness of SMEs. The novelty of the study is to determine the competitiveness for the Greek manufacturing SMEs using factors associated with knowledge management, innovation, and personnel training in combination with financial/accounting data presenting current trends of competitiveness especially in crisis period.**

Keywords— *SMEs competitiveness, R&D, Knowledge Management, accounting data, Manufacturing Firms, Crisis periods*

1. Introduction

The Small and Medium Enterprises (SMEs) are quite different from large-scale firms as they have the ability to operate locally and regionally, offering unique services. Exploiting local assets and local characteristics, choosing local suppliers and employing human resources from the local community contribute to the development of remove areas by justifying and substantiating the irreplaceable role attributed to them in relation to large companies. Taking advantage of local human resources SMEs tend to prevent immigration and, in some ways, minimize employee's movement between the sectorial workplace [20]. They further develop forms of competition in places where large businesses would not risk their existence.

Another research [29] also concludes that farmers are major generators of employment and economic growth at an international level. The contribution of SMEs entrepreneurship to rural areas is vital for rural economic development. SMEs are a growth potential for isolated villages and disadvantaged areas due to geographic, morphological and population specificities.

SMEs in this way positively influence the structure of an economy as dynamic producers and services providers throughout a country. In short, the existence of SMEs discourages the concentration of national income and productive capacity on a small number of individuals or businesses.

On the other hand, SMEs contribute to strengthening the idea of a "knowledge society" as they are "training places" for young employees. Also, SMEs tend to become very innovative and adaptable to economic recession [15]-[38]. Furthermore, empirical studies have shown the role of SMEs in keeping with new technologies. According to [19] flexibility that is a significant asset for adapting to new technologies and creating innovative solutions.

The survival growth and success in periods of economic turbulence depend on competitiveness [1]. In recent days, competitiveness has become a key issue for researchers, receiving attention also from governments and business organizations because of its close association with the success of an entity [3]. Considering the fundamental role played by SMEs in the Greek economy, representing 99.9% of the total enterprises [27] and the considerable attention placed on issues related to firms' competitiveness, the purpose of this study is to investigate the performance level of manufacturing SMEs, creating a competitive index

model [39].

There are many studies on competitiveness and factors affecting it, calculation of competitiveness index, but mainly on regional, country or industry level, based on industry and macro sphere factors [18]-[35]-[23]- [40]. However, empirical research on determinants of firm level competitiveness, based on quantitative financial/accounting and qualitative data, is limited in the Greek context. This research attempts to cover this gap, providing evidence about factors impact competitive dynamic of Greek manufacturing SMEs taking into account aspects of IT, knowledge management, training, innovation and financial ratios of efficiency.

The study is structured as follows: Section 2 presents the literature review of the study, while in Section 3 European Union's definition of SMEs is discussed. In Section 4 the methodology as well as the model approach of the study are presented. In Section 5, the empirical results of the study are also given and finally, in Section 6, the main findings and future research are discussed.

2. Literature Review

In a quite challenging environment, the capacity of a firm to maintain reliable and continuously improved is crucial, while operational processes ensure its viability in the long run [9]. The SMEs structure can often leave employees frustrated because they are in some ways unable to realize their short and mid-term career goals, which describes the difficulty of SMEs to employ high-caliber staff and even harder to retain [11]. SMEs in most cases face restrictions and challenges in terms of competitiveness regarding, among others, inadequate technologies [12], excessive cost of products development [8], even lack of effective selling techniques [14].

Firms' competitive position depend also on their ability to produce products and/or services of superior quality and lower costs than its domestic and international rivals [6]. In today's rapidly changing economic environment, other qualities such as, flexibility in adjusting to changes, speed and adaptability to changes, are becoming increasingly important factors of competitiveness [34].

SMEs in economic crisis may suffer disproportionately from economic downturns, because of their limited financial resources and dependence on banks' lending, paying such high interest rates [5]. Survival and success is dependent on the strategic decision-making and positioning for competitiveness. Ref. [17] argues that competitiveness in manufacturing is the development of relative profitability combined with

viable growth of the firm. Other researchers [2] investigate factors used for measuring competitive position of Turkey against its rivals. They conclude that Turkey in order to become more competitive in international level should give special emphasis on several fiscal and monetary policies.

Emphasis for SMEs is focusing on the determinants of their survival and performance such as financing, innovation and ownership. Traditionally, the main measures of competitiveness are in financial or marketing terms [20]. Firm competitiveness can be measured by its market share, its relative value and its profitability over a time period [37]. Other researchers [26] examined the competitiveness of the food and beverages sector in the Greek environment, using profitability and growth as separate independent variables, to investigate the relative importance of firm and industry factors for the time span of 2003–2007. On firm level competitiveness [22] developed a competitiveness index based on survey data, R&D, market dynamics, attitudes toward changes, marketing expenditures, and participation in strategic alliances. Additionally, used the index in order to classify firms.

Firms' ability to respond to identified changes in market or customer behavior remains a key feature shown by competitive firms [7]. For innovative products and processes, management of employees' knowledge and skills is essential. Innovation for SMEs requires an ongoing effort [36]. Effective innovation process includes a continuous and a committed to excellence behavior in almost all areas of an SME (McAdam, 2000).

Factors that determine competitiveness at firm level can be internal and external ones. Dynamic capabilities of firms allow the accomplishment of new opportunities in an extremely competitive business environment and the conversion of organizational resources into both intangible and tangible assets and capabilities [10]-[43]. The knowledge-based economy offers unlimited resources. Strategies that seem to increase competitiveness are the development of cooperation, clustering of firms, R&D and application of new IT [32]. However, sources of firm-competitiveness are the assets and procedures that have the ability to provide competitive advantage to a firm against its competitors. Innovation and the development of internal technological capabilities (ICT) in SMEs, enhance the creation of sustainable competitive advantage that is translated to superior market position. Also [35] in their empirical study concluded that development of internal capabilities such as soft technology (methods and processes that

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support the firm) and hard technology (innovation in raw materials, in-house machinery development and externally acquired equipment) lead to the development of competitive advantages. R&D factor is an internal source of knowledge and innovation that has the ability to generate a competitive dynamic (higher growth and productivity) in firms [4]-[19]. Also [36] defined as main components of microeconomic competitiveness as company sophistication and strategy, the quality of national business environment and the state of cluster development.

According to the resource-based view, employee training is considered as an investment in human capital that provides employees with unique knowledge, skills and abilities that add value and result in positive organizational-level outcomes [28]. Taking care of employees can be defined as providing better pay, ongoing training, and making employees feel secure [13]. In addition, there is evidence of positive relationship between training activities and growth rate of profit [25]-[16]-[41]. Also [3] in a research for Greek firms they found that there is a significant relation between the employee perceived training effectiveness and their commitment, job satisfaction and motivation.

To address this lack of competitiveness, firms should give priority to the enhancing of their innovation, by increasing private R&D investments and by strengthening the linkages between businesses, research organizations, universities and government [24]-[33]-[42]. Similarly, [30] regard cooperation with other firms and development of links with knowledge centers as key factors for enhancing SME innovation.

3.   SMEs definition

The European Union (EU), in its effort to create and strengthen a single internal market without frontiers that is in a position to compete with the relevant competitive markets, has understood the need for a common definition of SMEs. The effort to strengthen and preferentially treat SMEs to continue to create new jobs has highlighted the issues created by the existence of different definitions and the risk of distortion of competition. Due to the great interaction between Community and national directives, any differentiation in the definition could lead to the EU being able to promote actions in support of a specific group of SMEs while Member States in another. Moreover, the lack of a precise definition would allow for the possible use of SMEs support mechanisms by firms with greater economic

power than SMEs. Thus, the EU has proceeded to Commission Recommendation 96/280 / EC of 3 April 1996 on the definition of small and Medium-Sized Enterprises so that the treatment accorded to SMEs is based on a set of common rules and principles. Recommendation 96/280 / EC is the first common EU-wide definition of SMEs, with clear measurable criteria for the classification of SMEs. As mentioned in Recommendation (2003/361 / EC), an update to 96/280/ EC, it was considered that the Commission, the Member States, the European Investment Bank (EIB) and the European Investment Fund definition would enhance the coherence and effectiveness of all policies in favor of SMEs and reduce risks of distortions of competition. The definition as formulated in 2003 takes into account the criteria of the number of employees and financial amounts and states that: small, micro and medium sized enterprises are defined based on the number of people employed and their turnover or total annual balance-sheet level. A medium-sized enterprise is defined as the one, which employs less than 250 employees, and whose turnover does not exceed EUR 50 million or its Total Assets do not exceed EUR 43 million. A small enterprise is defined as the one, which employs less than 50 employees and its turnover, or total Assets do not exceed EUR 10 million. Finally, a very small enterprise is defined as the one employing less than 10 employees whose turnover or Total Assets do not exceed EUR 2 million (see also Table 1 in Appendix sections).

4.   Methodology-Data

Traditionally, the main measures of competitiveness are in financial or marketing terms [26]-[36]-[20]. A competitive business might be expected to achieve one or more of the following:

• Higher growth rate than competitors

• Higher than average net profit margin

• Higher than average return on investment (ROA)

• High market share

• The strongest brand reputation in the market

• A clearly defined unique selling point

• Significant access to, or control of, distribution channels in the market.

Therefore, we could assume that a firm, which has an increase in market share as well as in ROA, suggest that it is competitive. Profit increase can be used to proximate a notion of sustainability of performance. Based on theory and literature [36] - [20], we choose the following financial factors, as the components of the index:

• CMS = Change in Firms' Market Share between every two consecutive years of the time frame examined

• CROA = Change in Firms' Return on Assets (ROA) Ratio between every two consecutive years of the time frame examined

Therefore, we can follow the formula:

Competitiveness index (CI) =CMS +CROA

The research is based on unbalanced financial/accounting data of 523 Greek manufacturing SMEs in 9 Sectors (Table 2), covering the time period of 2003-2011 (9 years), as well as on qualitative variables characterizing firms' operational activity.

The financial/accounting data were derived from the financial statements of the sample firms from the database of ICAP Hellas, a private Data base company and the qualitative data derived from a survey via questionnaire. The questionnaire (47 questions) investigates the integrated and individual effects of innovation, R&D and technology on firms' competitiveness, while other factors enhancing firm competitiveness are examined. Firm executives (owners, general managers or CEOs) were asked to rate the existence and the importance of each factor for their firm on a five-point Likert scale (1- Very low, 5- Very high).

Based on previous literature, this research attempts to provide new evidence on Training, R&D activities as well as technology relating with organizational practices and perceptions. In addition, it is attempted to identify the critical factors, which affect competitiveness of the firms for each industry sector. This is used to derive policy implications for Firms' managers and the State that could assist firms increase their competitiveness and growth.

In order to do that, we run a multivariate regression model (EGLS), on a panel data, using as dependent variable the calculated CI index of each firm in the sample and as independent variables the financial measurements and qualitative variables. This model takes into account financial data of Greek manufacturing firms as well as qualitative data derived from survey research (see Table 3 in the Appendix section).

The model used in our empirical work is the following:

$$CI = a_0 + a_1 \text{ WORCA} + a_2 \text{ RETEAR} + a_3 \text{ REBITTA} + a_4 \text{ R\&D} + a_5 \text{ PERTRA} + a_6 \text{ UKM} + \varepsilon_i$$

For a sample of 523 firms for nine (9) consecutive years.

The results of the regression (Table 4), showing that R&D investments, employees' training and efficiency and profitability affect firm-level competitiveness, while knowledge management does not.

5. Discussion of Results

According to the results, investments of R&D, proxy of innovation contribute to better competitiveness of Greek manufacturing. To the same extend Ratios of Working capital over Total Assets as well Earnings before Interest and Taxes over Total Assets show positive correlation to firms' competitiveness. This underscores that whenever profitability of firms' Assets increases their competitiveness also is reaching higher levels. In contrast, the Financial Ratio Retained Earnings over Total Assets shows negative relation to Firms' Competitiveness Index, indicating that Greek Manufacturing SMEs, financing their assets through retention of profits rather than debt, portraying overall lower competitiveness levels. Also, Personnel trainings tend to increase firms' competitiveness level while exploitation of knowledge management has also a positive effect on firms' competitiveness, indicating that capturing, developing, sharing, and effectively using organizational knowledge provides better firms' competitiveness level.

SMEs are mainly seen as powers of innovation and socio-economic development. In this scope, results show that innovation is not only a privilege and achievement for large enterprises but also for SMEs. R&D investments portray SMEs tendency to produce innovative products and services, which,

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nowadays, are considered an obvious prerequisite for every business to gain a competitive edge over others. It should be noted that today the concept of innovation is not limited to the introduction of new technology into production or its creation as a final product, but also includes any innovation that may concern the organizational scope of the enterprise.

6.   Discussion of Results

This study examines the drivers of Competitiveness measured by a Competitiveness index in a data set of 523 Greek Manufacturing firms during the time period of 2003-2011. Expect of financial ratios, qualitative factors included in the econometric analysis, in order to identify which of those factors are important for the competitiveness of SMEs. According to the results, the key characteristics of competitiveness in Greek manufacturing SMEs are R&D investments, employees' training as well as knowledge management. In contract, Greek Manufacturing SMEs, financing their assets through retention of profits rather than debt, face lower competitiveness levels. All results are in align with previous researches [36]-[20].

In future studies, proposed combined approach can be used to solve different problems through researches with more qualitative data in managerial planning, marketing strategies, technology application, ownership status, types of innovation, etc. and other important factors affecting firms' level competitiveness. Outcome of such researches enhance business perspectives and assist analysts, policy makers and academics to optimize their performance, especially during periods of economic turbulences.

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Appendix

Table 1: SMEs Thresholds

Firms' definitions	Number of employees	Financial/Accounting Data		
		Revenues (in €)	or	Total Assets (in €)
Micro-sized enterprises	< 10	≤ EUR 2 million	←or→	≤ EUR 2 million
Small-sized enterprises	< 50	≤ EUR 10 million	←or→	≤ EUR 10 million
Medium-sized enterprises	<250	≤ EUR 50 million	←or→	≤ EUR 43 million

Source

Article 2, of the *Commission Recommendation 2003/361/ EC, as published in the Official Journal of the European Union L 124, p. 36 of 20 May 2003*

Link:https://ec.europa.eu/regional_policy/sources/conferences/state-aid/sme/smedefinitionguide_en.pdf

Table 2: Sectoral sample analysis

Sector	Number of Firms	Percentage (%)
Agricultural Products	58	11,09%
Food & Beverages	104	19,89%
Furniture	18	3,44%
Machinery	85	16,25%
Metallic Products	42	8,03%
Non-Metallic Mineral Products	52	9,94%
Other Industries	114	21,80%
Paper products	25	4,78%
Wearing Apparel and Footwear	25	4,78%
Total	**523**	**100,00%**

Table 3: Variables selection

Meaning	Type of Data	Variables	Expected sign (relation)
Working capital/total assets	Financial Data	WORCA	(+)
Retained earnings/total assets		RETEAR	(+)/(-)
Ratio EBIT/total assets		REBITTA	(+)
R&D Investment (Likert scale)	Qualitative Data (From Questionnaire)	R&D	(+)
Personnel Training (Dummy, 0=No, 1=Yes)		PERTRA	(+)
Use of knowledge management (Likert scale)		UKM	(+)

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Table 4: Empirical Results

Variables	Coefficients
C	-0.3214** (0.0000)
WORCA	0.0213** (0.0016)
RETEAR	-0.0459** (0.0041)
REBITTA	0.0126** (0.0009)
R&D	0.0208** (0.00197)
PERTRA	0.0121* (0.0177)
UKM	0.563418 (0.4306)

Dependent Variable: Firm Competitiveness (CI),
Method:EGLS regression, Prob. is in parentheses. *:
statistical significant at 5% level of significance and **:
significant at 1% level of significance