

THE ROLE ENVIRONMENT AND BOARDS OF DIRECTORS' CHARACTERISTICS ON INNOVATION: AN EMPIRICAL EVIDENCE OF GREEK LISTED FIRMS

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Abstract

Research on the determinants of innovation practices and their effects on organisational performance have received an enormous attention among academics and business practitioners over the last few decades. Using evidence from a sample of 101 companies listed on the Athens Stock Exchange, the study examines the role of managerial and environmental characteristics on innovation strategies and how they contribute to Greek firms' performance. The findings from linear regression analysis reveal that the functional background of executives and the complexity of the external environment are the key determinants of the innovation practices and thus, on organisational performance. The implications of the findings from the perspective theory and managerial practice are discussed, along with possible directions for future research.

Keywords: Boards of Directors, Innovation Strategies, Performance, Greek Firms

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1. Introduction

In nowadays that organisations face global competition, technological change and fast-changing market situations, innovation is regarded as a life blood of change (Schumpeter, 1950) and as a source of sustainable competitive advantage (e.g. Ekvall and Arvonon, 1994; Howell and Higgins, 1990; Porter, 1985). Both practitioners and academics perceive innovation as the only way for the organisations to be effective or even survive in a world of rapid change. Over the last decades, research on innovation has engaged the attention of scholars in strategic management (Bantel and Jackson, 1989; Damanpour and Schneider, 2006).

The role that organizational leaders play in determining firm performance and in shaping organizational processes and outcomes is under debate among organizational theorists. Upper echelon theory (Hambrick and Mason, 1984) suggests that executives serve as an interface that helps an alignment between the organization and its environment, and thus their decisions and actions are likely to impact the organization (Hambrick, Finkelstein and Mooney, 2005).

According to the *Upper Echelon Theory* and the *strategic choice perspective* (Hambrick, 2007) organisational members take actions in order to adapt to an environment as an explanation to organisational

outcomes. Organisational theorists have examined the relationship between managers' characteristics and perceptions, objective decision criteria and strategic choices (Finkelstein, 1988; Hambrick and Mason, 1984; Nielsen and Nielsen, 2010). Previous studies have investigated the relationship between executives' characteristics and innovation strategies (Barker and Mueller, 2002; Hoskisson, Hitt, Johnson and Grossman, 2002; Zahra, 1996) however there is a gap in our understanding of the set of explanatory variables of innovation (Wolfe, 1994). Researchers agree that predictions about the impact of board demographic characteristics as well as environmental dimensions to organisational choices are not clear (Johnson, Daily and Ellstrand, 1996; Schwenk and Dalton, 1991; Zahra and Pearce, 1989). This study aims to fill this gap and to open the "black box" within Boards of Directors' dynamics and further investigate the impact of the external environment and the Boards of Directors' attributes on the strategic choice of innovation and consequently, on firm's performance. The study will provide access to the "black box" and it will further investigate the processes linking demographic characteristics and organisational outcomes.

The contribution of this paper is twofold: (1) to identify the demographic predictors and the environmental factors that encourage innovation strategies; and (2) to examine whether or not

innovation practices improve organisational performance. To examine these relationships, we adopt the Upper Echelon Theory and the environmental determinism perspective to explain the role of directors' attributes and environmental circumstances upon innovation strategies and thus, organisational performance of Greek listed companies as Greece is a recent industrialised country. By examining one distinctly different national setting, Greece, the study attempts to highlight the differences from more mainstream Western strategic decisions.

This paper is structured as follows. In section two we discuss the literature review behind strategic choice and organisational outcomes and we advance related research hypotheses. Section three explores methodological aspects of the study. In Section four we present and discuss the results of the statistical analysis. Section five elaborates on the key findings; explores the limitations of the study and suggests avenues for future research.

2 Theoretical Background

Academics and practitioners have highlighted the role of innovation for the organisation in order to maintain its competitive advantage and survive (Eisenhardt and Martin, 2000; Tushman and O'Reilly, 2002). The strategic choice perspective introduces the notion of equifinality into examinations of firm performance within similar environments which they might affect organizational strategies (Doty, Glick and Huber, 1993). Firms may thus establish competitive advantage on the basis of different sets of distinctive competencies, which aggregate specific activities that organisations perform especially well relative to other organisations within a similar environment (Snow and Hrebiniak, 1980). Empirical work has shown that competitive success is based on the organisation's management of innovation process and factors associated with successful management of the innovation process (e.g. Balachandra and Friar, 1997; Rothwell, 1992).

Innovation is defined as the creation or adoption of new ideas (Daft, 1978). At the organisational level, innovation is defined as the adoption of new product, production service, technology, policy, structure or administrative system (Damanpour, 1991). The adoption of innovation aims to contribute to the performance and effectiveness of the adopting organisation. Innovation is perceived as a way for an organisation to copy to various internal and external environmental circumstances (Damanpour, 1991) and being proactive (Toulouse, 1980).

According to the strategic choice perspective (Andrews, 1986; Child, 1972) organisational members take actions in order to adapt to changing environment and to provide direction for the future of the firm. Upper echelon theory articulated by Hambrick and Mason (1984) explains that organisational outcomes both strategy and

performance can be considered to reflect the values and cognitive characteristics of top managers (Finkelstein and Hambrick, 1996; Hambrick and Mason, 1984). The Upper Echelon Theory suggests that the observable characteristics of executives are linked to psychological and cognitive traits. It also states that there is a relationship between the executives' demographics and organisational outcomes (Cannella, Pettigrew and Hambrick, 2001; Hambrick and Mason, 1984; Smith et al., 1994). Previous studies have investigated the relationship between CEO characteristics and innovation strategies. Both Kimberly and Evanisko (1981) (studying hospitals) and Bantel and Jackson (1989) claim that the executives' educational background was associated with innovation. More specifically, empirical studies suggest that CEO tenure is positively related to R&D expenditure and/or innovation (Barker and Mueller, 2002), CEO age is negatively related to innovation (Child, 1974; Barker and Mueller, 2002) and inside directors encourage innovation (Baysigner, Kosnik and Turk, 1991; Hoskisson, Hitt, Johnson and Grossman, 2002; Zahra, 1996).

Scholars have examined the relationship between Boards of Directors (composition) and their demographic characteristics (age, gender, tenure, educational background) on firm's innovation by ending up to unclear and controversial results (Damanpour and Schneider, 2006; Eagly and Johnson, 1990; Hooijberg and DiTomaso, 1996; Kimberly and Evanisko, 1981; Zona et al., 2006). This can be explained by the fact that either those studies have not focused on actual leaders (Yulk, 1999) or they have failed to investigate the leadership behaviour and their effect on innovation process (Cannella and Monroe, 1997). Scholars (e.g. Elenkov, 2002; Papadakis, Lioukas and Chambers, 1998) argue that strategic decisions and consequently strategic choices are influenced by top managers and external environment.

Based on the environmental determinism approach, an organisation is regarded as an open system that seeks adaptation and matches the characteristics of the environment with those of the organisation in an attempt to survive and grow (Aldrich, 1979). According to this perspective, strategic decisions and processes show adaptation to opportunities, threats, constraints and other environmental characteristics. Several scholars have examined the influence of environmental and organisational factors on innovation (Damanpour, 1991; Kimberly and Evanisko, 1981; Papadakis and Bourantas, 1998). Based on the environmental determinism, executives play a limited role on innovation outcomes (Meyer and Goes, 1988; Tornatzky et al., 1983). Empirical studies have examined the adoption of various innovation strategies within certain environmental dimensions. In dynamic environments companies are becoming

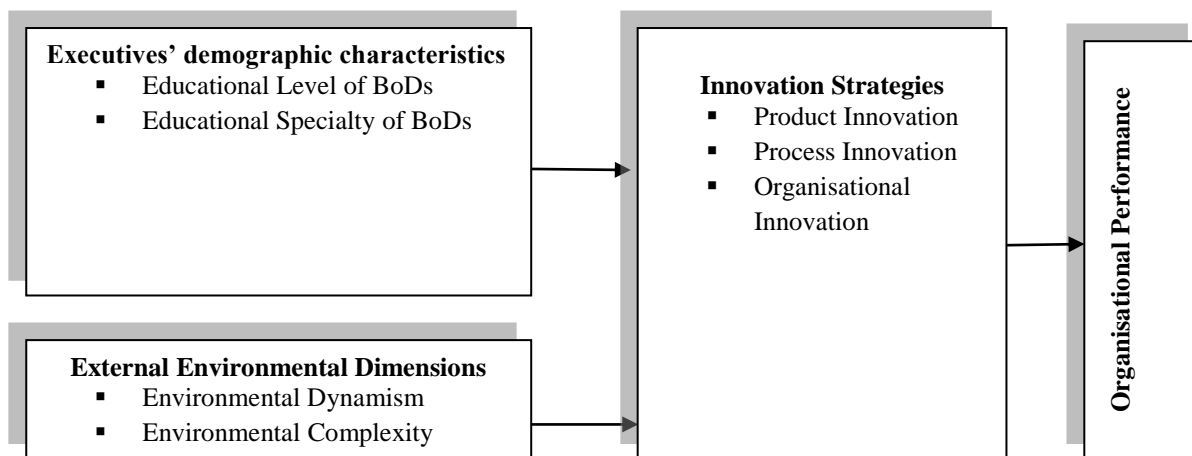
innovative and proactive in pursuing emerging market opportunities (Covin and Covin, 1990). On the other hand, companies operating in complex environments are more proactive in their operations and encourage entrepreneurial risk-taking (Morris and Jones, 1994; Zahra, 1991). Researchers agree that predictions about the impact of board demographic characteristics as well as environmental dimensions to organisational choices are not clear.

Whereas studies recognise that innovation contributes to sustainable competitive advantage (Ireland et al., 2001; Knott, 2003; Mone, McKinley and Barker, 1998; O'Brien, 2003), there is surprisingly little work that explores how firms with different innovation practices differ (Ettlie, Bridges

and O'Keefe, 1984). Our study will address this gap adopting a more process-oriented approach through the examination of specific innovation strategies in a holistic manner. For the purpose of our study, we adopt the Upper Echelon Theory and the environmental determinism approach in order to examine the executives' attributes and the environmental influences upon innovation practices and consequently, on firms' performance.

Figure 1 presents an integrative framework that examines the role of Boards of Directors' characteristics as well as the external environmental influences on innovation practices and how these practices improve the performance of Greek listed firms.

Figure 1. The Role of External Environment and Boards of Directors on Innovation Strategies and Organisational Performance



Hypotheses Development

Executives' demographic characteristics

Executives are regarded as the apex of the organisations and their demographic characteristics and experiences can determine the firm's orientation and strategic choices (Escribá-Esteve, Sánchez-Peinado and Sánchez-Peinado, 2009). Demography refers to the "composition, in terms of basic attributes such as age, sex, educational level, length of service or residence, race, and so forth of the social entity under study" (Pfeffer, 1983, p. 303). In this study, we will examine two demographic characteristics of the executives; educational level and functional background.

Educational Background

The formal educational background of executives is an indicator of the values and cognitive preferences and the cognitive preferences of the individual and his/her openness to change and innovation (Wally and Becerra, 2001). The level of innovation is positively related to receptivity to new ideas, which detects

innovation need and creates a favourable environment for its implementation (Damanpour and Schneider, 2006; Hambrick and Mason, 1984). Therefore, educated managers have the ability to generate solutions and have receptive attitudes toward innovation (Bantel and Jackson, 1989; Kimberly and Evanisko, 1981). Highly educated executives are more likely to use complex and diverse approaches to solve problems (Lee, Wong and Chong, 2005).

Therefore, we expect executives with higher educational level to encourage innovation practices. Thus, we hypothesize that:

Hypothesis 1: The level of formal education of directors will be positively related to firms' innovation.

Functional Background

The functional background of executives influences their strategic choices (Michael and Hambrick, 1992). Hayes and Abernathy (1980) point out that senior manager with backgrounds in finance and law are less committed to innovation. Whereas, executives with backgrounds in production, engineering or R&D are more likely to focus on, and comprehend, the

technical, operational and financial implications of innovation and to initiate *investments* in product innovation and process technologies. Managers with background in sciences and engineering have a clear understanding of the importance of technology and they tend to adopt innovation strategies (Tyler and Steensma, 1998) compared to those with emphasis on management who are risk-averse and reluctant to innovation (Finkelstein and Hambrick, 1996). Additionally, Hambrick and Mason (1984) stated that managers with marketing, sales and product R&D emphasize on growth and seek new domain opportunities. Those opportunities can derive from product extension as well as product innovation. Thus, following the reasoning set forth by Hambrick and Mason (1984) and Hayes and Abernathy (1980) we hypothesize that:

Hypothesis 2: The proportion of executives with functional background management will be positively related to the firm's innovativeness.

External Environmental and Innovation Strategies

Scholars have attempted to investigate the “*fit*” between strategy and external environment (e.g. Andrews, 1980; Bourgeois, 1980; Festing and Barzantny, 2008; Miller and Friesen, 1982; Venkatraman and Prescott, 1990; Wiersema and Bantel, 1993). More specifically, Romanelli and Tushman (1988, p. 130) claimed that: “...where environments are changing and/or performance outcomes are low or declining, leadership's primary task is to intervene in ongoing patterns of commitment and exchange to redirect the character of an organisation's relationship with its environment”. This indicates that leaders are required to examine the external environment conditions prior to any crucial decision. Firms operating in turbulent environments are likely to be more innovative, risk-taking and proactive (Naman and Slevin, 1993). In dynamic environmental circumstances, companies tend to be more innovative and proactive in pursuing emerging market opportunities (Covin and Covin, 1990; Miller and Friesen, 1982). Hostile environments as described by Khandwalla (1977, p. 335) are “*risky, stressful and dominating*”. Scholars (e.g. Pearce and Zahra, 1992; Zahra, Neubaum and Huse, 2000) argue that hostility leads to intense competition in the industry and destroys any previous structural and competitive equilibrium in the industry. Companies cope with competition by introducing global-scale efficiencies, worldwide learning and local responsiveness (Bartlett and Ghoshal, 1989). The previous section provides ground for the development of the following hypotheses:

Hypothesis 3: Environmental dynamism will be positively associated with innovation.

Hypothesis 4: Environmental complexity will be positively associated with innovation.

Innovation Strategies and Firm's Performance

Organisational performance is a complex and multidimensional phenomenon in strategic management literature (Venkatraman and Ramanujan, 1986). Hambrick and Mason (1984) posited that strategic choices contribute to positive organisational outcomes. They argue that a range of influential factors that might influence the impact of Boards of Directors on the firm's performance such the roles of the board, the impact of board demographic characteristics, the environmental conditions and the strategic decisions. Scholars (e.g. Finkelstein and Hambrick, 1990; Hambrick, Cho and Chen, 1996; Smith et al., 1994) have portrayed the upper echelons' characteristics as determinants of strategic choices and their outcome to organisational performance. Based on a longitudinal study, Bertrand and Schoar (2003) have concluded that the strategic choices of cash holdings, advertising investments, acquisitions, R&D have improved the financial position of the firm. Lawless and Anderson (1996) point out that innovation is related to firm performance in dynamic environments. Further, innovation speed improves organisational performance (Lawless and Anderson, 1996) and increases R&D spending which is positively related to firm performance (Chaney and Devinney, 1992). Based on the above arguments, the following hypothesis can be advanced:

Hypothesis 5: There will be a positive relationship between innovation strategies and firm's overall performance.

Cultural Context: Greece

Greece is a developed country, a member of the European Union since 1981 and a member of the Economic and Monetary Union (EMU) of the European Union (EU) since 2001. The majority of Greek firms are small and family owned with limited R&D and market spending. Greek companies lack of technological resources and infrastructure and modern management practices (Bourantas and Papadakis, 1996; Georgas, 1993. Makridakis et al., 1997). Hofstede (1980) describes Greece as a country of high degree of uncertainty and risk. High uncertainty avoidance might be an obstacle of technological innovation with high inherent financial risk that can lead to conservative strategy.

Government regulations, bureaucratic obstacles, and uncooperative labour prevent Greek companies from taking strategic actions and provide them with problems and challenges which are different to those of developed or under developed countries (Makridakis et al., 1997). The innovation practices in Greece are below the average ranking of the European Union (EU), particular in R&D expenditures, in firms' capacity to innovate, and in trademarks and patents is especially low. R&D and marketing

departments as well as public support are not regarded as key sources of innovative ideas in Greece (Giannitsis and Mavri, 1991). Although, Greece is particularly open to new ideas, it lacks a distinctive philosophy and innovation specific strategy. Greek companies in order to improve their innovation performance have to adopt a model that will focus on the adoption and adaptation of proven technologies and solutions through small – incremental innovations, applications in new context, adaptation to consumer needs, customer service and in internal organizational processes (Lioukas, 2009).

3 Methodology

Sample

Our sample frame consists of the Greek organizations listed on the Athens Stock Exchange operating in 12 different economic sectors as in December 2007. Companies that had been recently de-listed are excluded and so the remaining sample frame consists of 270 firms. A questionnaire to the CEO has been distributed as the CEO is the most knowledgeable respondent that can answer questions about the organisation's strategic choices (Escribá-Esteve, Sánchez-Peinado and Sánchez-Peinado, 2009; Tan and Tan, 2005). The questionnaire has been filled in by 101 CEOs of Greek listed firms. It should be noted that the responses to this questionnaire were collected prior to the current economic crisis. The questionnaire, designed in accordance with the 'Total Design Method' of Dillman (1978), was originally developed in English and, on the recommendation of Brislin (1980), was translated through a back translation process into Greek. The questionnaire was then reviewed by academics and board members in order to ensure question efficacy and format completeness while also confirming that its tools were appropriate, reliable and relevant in the Greek cultural context before the launch of the survey.

Measurements

Educational level of top management team is defined as the executives' fields in the highest level of education (Hitt and Tyler, 1991). The educational background of executives measured by using a two-level scale bachelor's degree (1 = for those who hold a BSc degree and 0= for those who have only higher educational degree) and for master's degree (1 = for those who hold a MSc degree and 0=for those who have a higher educational degree).

Executives' functional management background is defined as the area in which the executives had spent most years (Michael and Hambrick, 1992). Hambrick and Mason (1984) classified functional backgrounds into two categories: throughput functions (coded as '0') for marketing, sales, merchandising as well as product research and

development (R&D) and non-throughput functions (coded as '1') such as: productions/operations, engineering, finance and accounting. In this study, respondents were asked to specify their functional background within the following seven categories: finance treasurer, general management, information systems, marketing/sales/customer services, accounting/controller, manufacturing and sales and engineering. In this study, the majority of the respondents were from accounting (coded as '1') and general management (coded as '2').

Environmental dynamism refers to the continuity of changes in the firm's environment (Zahra, Neubaum and Huse, 2000). Three values are used in order to capture environmental dynamism/instability: 1. dynamism in marketing practices, 2. competitor dynamism and 3. customer dynamism. Each scale is measured in a 7-point Likert-scale ($\alpha = .912$) ranging from "1" (no change) to "7" (very frequent changes) (Achrol and Stern, 1988).

Environmental complexity was measured by the following statements developed by Miller, Burke and Glick (1998). Each statement is measured in a 7-point Likert-scale ($\alpha = .677$) ranging from "1" strongly disagree to "7" strongly agree. The following indicators are used to measure complexity: 1. products/services become obsolete very slowly in your firm's principal industry, 2. your firm seldom needs to change its marketing practices to keep up with competitors. 3. consumer demand and preferences are very easy to forecast in your firm's principal industry and 4. your firm must frequently change its production/service technology to keep up with competitors and/or consumer preferences.

Innovation is measured by using 12 items developed by Huse (1994) based on the methodology which has been initially developed by Zahra (1996). Innovation is divided into three categories: product innovation (4 items), process innovation (5 items) and organizational innovation (3 items). Using a 7-point Likert scale ($\alpha = .954$) (beginning from "1" no emphasis to "7" a lot of emphasis), respondents are asked to rate the firm's actual emphasis on each innovation item.

Organisational performance was captured by the following measurements developed by Khandwalla (1976) and Tan and Litschert (1994): after-tax return on total assets, after-tax return on total sales, total sales growth, overall performance and success and competitive positions. The response format was a 5-point Likert scale ($\alpha = .926$) (bottom 20 percent to top 20 percent).

Principal component factor analysis with varimax orthogonal rotation has been employed to produce factor solutions. The purpose of principal component analysis is to decompose the original data into a set of linear variates (Dunteman, 1989). The results of this analysis was the development of four factors; environmental dynamism, environmental complexity, innovation practices and organizational

performance with eigenvalue greater than one, details of which are summarized in Table 1 in the Appendix. All the measures 'loaded' cleanly on separate factors, with all the factors loadings from .614 to .929 a high threshold for acceptance. We also have tested the reliability and the internal consistency of the

constructs by using Cronbach's alpha. Nunnally's (1967) argues that an alpha coefficient of 0.50 or greater is adequate to conclude internal consistency. All scales are found to satisfy this reliability criterion with Cronbach's alpha coefficients ranging from 0.677 to 0.954 as illustrated in Table 1.

Table 1. Measurement Items, Standard Loadings and Reliabilities

| Measures | Std. loadings |
|---|---------------|
| Environmental Dynamism ($\alpha=.912$) | |
| Changes in the Competitor's Sales Strategies | .856 |
| Changes in the Competitor's Mix of Products/Brands | .853 |
| Changes in the sales strategies | .842 |
| Changes in the competitors sales promotion and advertising strategies | .824 |
| Change in the sales promotion/advertising strategies | .820 |
| Change in the mix of products/brands carried | .811 |
| Eigenvalue for ENV1 | 4.179 |
| % variance explained by ENV1 | 69.656 |
| Environmental Complexity ($\alpha=.677$) | |
| Hostility in the market activities of your key competitors | .813 |
| Influence of the market activities from your key competitors | .788 |
| Increase in the needed diversity in your production methods and marketing tactics to cater your different customers | .709 |
| Increase in the innovation rate of new operating processes and new products or services in your principal industry | .614 |
| Eigenvalue for ENV2 | 2.162 |
| % variance explained by ENV2 | 54.056 |
| Innovation ($\alpha=.954$) | |
| Being the First Company in the Industry to Introduce Technological Improvements | .902 |
| Creating Innovative Technologies | .886 |
| Being the first company in the industry to introduce new technology | .877 |
| Creating new products for fast market introduction | .834 |
| Being the first company in the industry to introduce new products/services | .805 |
| Developing radical new technology | .794 |
| Investing heavily in cutting edge process technology-oriented R&D | .779 |
| Creating new variations to existing product lines | .773 |
| Developing systems that encourage initiatives and creativity among employees | .759 |
| Increasing the revenue from less than 3 years old products | .757 |
| Supporting an organizational unit that drive innovation | .728 |
| Encouraging innovation in the organisation | .714 |
| Eigenvalue for INN | 7.733 |
| % variance explained | 64.438 |
| Organisational Performance ($\alpha=.926$) | |
| Overall Firm Performance and Success | .929 |
| After-Tax Return on Total Sales | .908 |
| Our competitive position | .907 |
| After-Tax Return on Total Assets | .896 |
| Firm's Total Sales Growth | .775 |
| Eigenvalue for ORGPER | 3.911 |
| % variance explained | 78.230 |

4 Results and Discussion

Table 2 shows the means, standard deviations and correlations between explanatory variables. As the phenomenon of multicollinearity can exist in multiple regression models when there is more than one

predictor (Hair et al., 1998), we have checked for multicollinearity among predictors by executing a correlation matrix of all predictors and we identify that they are not highly correlated (above .80 or .90) (Field, 2005). Thus, no serious multi-collinearity problems have been identified.

Table 2. Descriptive Statistics and Correlations between Variables

| Variables | Mean | SD | 1 | 2 | 3 | 4 | 5 | 6 |
|-----------------------------|-------|------|---------|-------|---------|--------|--------|--------|
| 1. Educational level (BSc) | .346 | .478 | | | | | | |
| 2. Educational level (MSc) | .455 | .500 | -.666** | | | | | |
| 3. Functional background | .353 | .481 | .036 | -.140 | | | | |
| 4. Environmental Dynamism | -.035 | 1.00 | -.146 | .185 | -.083 | | | |
| 5. Environmental Complexity | -.009 | 1.00 | .119 | -.026 | -.132 | .619** | | |
| 6. Innovation | -.018 | 1.00 | .068 | .144 | -.409** | .398** | .563** | |
| 7. Performance | .003 | 1.01 | .113 | -.099 | -.057 | .054 | .198 | .486** |

n=101. * $p < 0.05$ (two-tailed). ** $p < 0.01$ (two-tailed)

Correlation analysis, as shown in Table 2, gives us an insight into the relationships between constructs. Most of the correlations between demographic characteristics of board members, environmental dimensions, innovation and

organisational performance are statistical significant at $p < 0.05$ and $p < 0.01$ and in the expected directions. The results from the linear regression analysis are presented in Table 3.

Table 3. Results of regression analysis of innovation and organizational performance

| Variables | Innovation | | Performance |
|--------------------------|-------------------|-------------------|-------------------|
| | Model 1 | Model 2 | Model 3 |
| Educational level (BSc) | .246 (1.578) | | |
| Educational level (MSc) | .249 (1.604) | | |
| Functional Background | .380** (3.216) | | |
| Environmental Dynamism | | .078 (.643) | |
| Environmental Complexity | | .535** (4.422) | |
| Innovation | | | .486** (4.313) |
| R ² | .209 | .342 | .237 |
| Adjusted R ² | .168 | .323 | .224 |
| F | 5.101 | 18.198 | 18.603 |
| F Sig. | .003 | .000 | .000 |

n=101. Numbers are beta coefficients. Associated numbers in parentheses are t-ratios
⁺ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Model 1 in Table 3 shows that the educational level (BSc) ($\beta = .246$, $p < 0.05$) as well the educational level (MSc) ($\beta = .249$, $p < 0.05$) do not explain innovation practice. Therefore, Hypothesis 1 is not confirmed. Our findings are in line with previous

studies in the field (Damanpour and Schneider, 2006; Meyer and Goes, 1988). However, the executives' management functional background ($\beta = .380$, $p < 0.01$) exhibit significant relationships to innovation. Therefore, Hypothesis 2 is supported. Although the

effect of managerial characteristics on strategic choices has been supported by the strategic choice paradigm (Bantel and Jackson, 1989; Child, 1972; Finkelstein and Hambrick, 1990; Wiersema and Bantel, 1992), we have found the managerial characteristic of functional background to explain innovation practices. This can be explained by the fact that previous studies have taken place in different cultural contexts and that our sample consist of large Greek organizations where the decisions are not taken by a single individual but by a group of people.

Model 2 in Table 3 demonstrates the impact of environmental dimensions on innovation practices, our findings reveal that Greek companies pursue process innovation practices when they are operating in complex environments ($\beta = .535, p < 0.01$). The findings provide support to Hypothesis 4. Greek executives understand the different environmental dimensions in which their organisations operate and respond accordingly. In case of complex environmental circumstances, Greek executives invest in process innovation mainly in cutting edge process technology oriented R&D and in developing radical new technology. Also, they emphasise on the introduction of new products and services in the market. Other studies have shown that environmental complexity is associated with innovation and risk taking (Naman and Slevin, 1993; Zahra, 1991). Companies facing complex environmental conditions need to explore new business opportunities and to gain and sustain competitive advantage (Hitt et al., 2001). The empirical results from a sample of 101 Greek listed organisations are in accordance with previous studies indicating that companies operating in complex environments pursue product and process innovation practices. Greek executives tend to be proactive and innovative in circumstances of environmental uncertainty in order for their organisations survive and maintain their competitive position in the global market.

Model 3 in Table 3 contains results pertaining to the main effect of innovation practices on firm's performance. Our findings suggest that innovation is an important function of management because it is linked to business performance. The findings uniformly indicate a robust relationship between product, process and organisational innovation and performance in Greek companies ($\beta = .486, p < 0.01$). Thus, our results provided support to the hypothesis 5. Innovation for Greek listed organisations is becoming increasingly important as a means of survival not only growth in an era of intensive competition and environmental uncertainty. Our results are in line with previous studies that also found innovation practices to improve firm's performance (Chaney and Devinney, 1992; Damanpour and Evan, 1984; Lawless and Anderson, 1996). Several scholars (e.g. Bertrand and Schoar, 2003; Covin and Covin, 1990; Escribá-Esteve, Sánchez-Peinado and Sánchez-Peinado, 2008; Lumpkin and Dess, 1996; Morgan and

Strong, 2003) have concluded that certain strategic choices and firms' strategic orientations enhance organisational performance.

5 Conclusions

The study aims to contribute to the literature of strategic management revealing the influential factors of the innovation strategies and how they contribute to the Greek firms' performance. The alignment of managerial characteristics and environmental conditions to innovation practices are considered as key determinants of strategic choices and strategy formulation. However, it does not indicate that all factors have an equal contribution towards explaining innovation practices in Greek firms. The findings suggest that complex environments encourage innovation strategies in Greek companies. Also, innovation is a key determinant of organisational performance and growth of Greek listed organisations. The findings suggest that Greek companies are more responsive to external stimuli and introduce changes in their structures and policies in order to survive. However, when directors perceive the external environment to be complex, they develop a proactive environmental strategy by introducing long-terms guidelines in order to cope with various environmental dimensions. Public policy makers encourage greater proactivity in environmental practices by introducing clear regulations and long-term policies including innovation.

Regarding the effect of executives' characteristics on innovations, the findings indicate that Greek executives disregard the board composition as a significant factor of the strategic choices which can be justified by the fact that managerial characteristics might be heterogeneous and do not allow us to conclude that demographic or composition factors affect strategic decisions. Only the functional background of the executives is significant to innovation practices. Overall, Greek companies, in order to survive and achieve financial prosperity, are forced to adopt a more flexible management style (Bourantas and Papadakis, 1996) that is more like a team-based style of decision making which encourage innovation adoption of products and services.

The study contributes to the research in several ways. First, the paper provides empirical results on the effects of managerial and environmental characteristics on innovation practices and as a result to organisational performance of Greek listed companies on the Athens Stock Exchange. Furthermore, the accessibility to Boards of Directors allowed us to collect really rare and valuable data, since we are not able to attend board meetings and observe how in fact "boards work". The fact that this study was completed allowed us to draw some general overviews on how Greek Boards of Directors affect innovation strategies alongside with the influence of

external environment and the firms' performance is improved. A third contribution to knowledge is that it is the first study to be reported on the innovation practices in Greek listed organisations. The study combines a set of key factors- demographic characteristics and environmental dimensions and examines certain characteristics of innovation practices namely-product, process and organisational innovation and their effect on performance improvement and organisational effectiveness. Finally, the findings of this study contradict previous and recent empirical studies, which make a significant contribution to the existing literature.

The findings of the study have to be examined in the light of their limitations. First, the fact that literature on board of directors is not so extensive and most of the issues are comparatively new to the context, in which we applied our research, might cause inconsistencies or drawbacks in our assumptions and findings. The results that derived from our theoretical model explaining the key determinants of innovation might be different in a different model. Second, the questionnaire has been filled in by a single respondent of each listed in the ASE firms. It will be highly recommended in future research the use of multiple respondents per firm in order to minimize effects of systematic response bias. Third, the sample consists only of listed companies from various industries, a fact that implies that we are not be able to make generalisations at the industry level. Finally, the performance is measured by subjective measurements; future research could combine other objective measurements of performance from secondary data sources.

Based on the current findings, we would like to point out some avenues for future research. Our findings might encourage the continuation of theoretical and empirical research on strategic management. Future research might include different organisational, managerial and environmental contexts that have effect on innovation strategies. Also, we could investigate how other strategic choices such as diversification, mergers and acquisitions contribute to firm's growth and effectiveness. The findings of our study are based on cross-sectional data; a next logical step in this line of research would be to investigate the relationship between innovation strategies and performance outcomes over a period of time, treating contextual variables as potential moderators. A more accurate approach to understand the causal relationships between decision antecedents and process requires the adoption of a longitudinal research design. Studies on boards of directors so far, have been taken place in developed western countries, so future research could have some useful insights if it is implemented in cultural context where board of directors and innovation strategies and other corporate governance practices are in infancy.

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