THE MODERATING EFFECT OF GOVERNANCE MECHANISMS ON THE RELATIONSHIP BETWEEN INNOVATION STRATEGY AND THE PERFORMANCE

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ABSTRACT

The aim of this research is to examine the effect of innovation strategy on firm's performance and investigate the moderating effect of ownership structure and board of directors' characteristics, as governance attributes, on this relationship. Based on a sample of 29 Tunisian companies over a period from 2008 to 2013, we show that innovation strategy has no effect on firm's performance. However, some corporate governance attributes are likely to affect this relationship which turns significant. Overall, the independence of board members, CEO duality, audit quality and the independence of audit committee members have moderating effects on the relationship between the innovation strategy and performance. These results illustrate the crucial role played by the board of directors in determining the relationship between the innovation strategy and firm performance.

Contribution/Originality: This study contributes in the existing literature both theoretical and empirical reconciliations between these two corpuses: source of performance and value creation. This study is one of very few studies which have investigated the effect of internal mechanisms of governance (ownership structure and board of directors) on the relationship between the innovation strategy and the firm performance.

1. INTRODUCTION

Nowadays, companies are faced with the obligation to improve their activities and monitor the economic developments. Indeed, investment in research and development seems to be the most effective strategy for dealing with these developments. As a consequence of these developments, we are witnessing the emergence of an abundant literature on this particular type of intangible assets including its valuation, and particularly, its effects on the performance of the company. Previous research confirms the positive effect of R&D investment on firm performance and market value (Griliches, 1981; Cockburn and Griliches, 1988; Lev and Sougiannis, 1996; Blundell et al., 1999; Cañibano et al., 2000; Chan et al., 2001; Toivanen et al., 2002; Hall and Oriani, 2006). On the other hand, even if R&D spending decreases cash flow and current profits, they have a positive effect on firms' prospects of higher future profits. R&D investment, especially for firms specializing in high-tech sectors, is guaranteeing firms' innovative potential to ensure their competitiveness in the market and guarantee their viability. However, since company policies are mainly determined by their managers, are the latter encouraged to invest in such activities in order to improve their firm performance?
Researches in this direction remain very limited. Indeed, governance theories do not systematically integrate the analysis of innovation strategies in firms. Similarly, the extant literature on innovation has long ignored the study of systems and structures of governance. The contribution of this paper is therefore making both theoretical and empirical reconciliations between source of performance and value creation.

Today, Tunisia has initiated various reforms of the financial, tax and accounting system and law. The importance of these reforms stems mainly from the changes that Tunisia has experienced both technologically and economically with an increasing opening of its borders. Given the importance of the role played by companies in this context, as an engine of wealth creation, it is interesting to study the organization of formal power between the manager, the board of directors and shareholders. These power relationships will be referred to as corporate governance. Indeed, corporate governance system often strives to create added value for the various stakeholders by making strategic decisions on R&D investments. However, this effort is often tied to economic, technical and institutional problems. More specifically, these investments generate enormous costs for the company. As a result, conflicts of interest and information asymmetry arise. Hence, some shareholders refuse to commit themselves to finance new projects. Moreover, the disruption of the environment can negatively influence any kind of investment. Therefore, any disturbance can have a negative effect on firm performance.

Our research work integrates the Tunisian context and tries to answer this question: to what extent do internal mechanisms of governance (ownership structure and board of directors) have affected the relationship between the innovation strategy and firm performance?

Thus, the purpose of this study is to illustrate the impact of ownership structure and the board of directors' characteristics on the relationship between innovation strategy and firm performance.

The remaining of the paper is structured around three parts. In a first step, we present a review of the literature. Then, we explain the research methodology, and finally, we carry out the statistical analyses to extract the different results.

2. LITERATURE REVIEW AND RESEARCH HYPOTHESES

A review of the literature in terms of corporate governance reveals that most of the work examines the direct association between governance mechanisms and firm performance by ignoring the indirect relationship between these two variables, with the exception of the studies by Hutchinson and Gul (2004); Gani and Jermias (2006) and Le et al. (2006). These authors show the moderating role of governance mechanisms on the relationship between investment in R&D and performance. According to them, the firm performance could improve in well-governed structures and that corporate governance moderates the relationship between R&D expenditure and performance.

Firm performance is one of the priorities for the company's managers and partners and is of great importance to the company's various partners, managers, investors and employees. This is an objective to be achieved. Several authors have treated the performance of the company and the best ways to achieve good profitability and improve it.

Moreover, the characteristics of investment in R&D (high level of risk, long time horizon and high asset specificity) represent sources of conflicts of interest between the various stakeholders. Governance mechanisms are therefore necessary to converge these interests and consequently to favor investment in R&D, which creates value. Therefore, the concept of corporate governance refers directly to the influence of strategic decisions on value creation.

In fact, a firm's ability to invest in R&D is considered one of the determinants of its performance (Hall, 1998; Aboody and Lev, 2000). However, studies carried out in terms of corporate governance argue that without an appropriate control system that is able to reduce managerial latitude and information asymmetry problems, the effectiveness of R&D investments may not contribute to the improvement of company value. These phenomena are particularly highlighted by the specific characteristics of R&D: the long time horizon (Xu and Zhang, 2004) a high
risk rate (Nekhili and Poincelot, 2000) and the specific nature of this investment (Williamson, 1988; Shleifer and Vishny, 1992).

Moreover, several empirical studies have shown that managerial opportunism influences the relationship between R&D expenditures and firm performance (Zahra, 1996; Sanders and Carpenter, 2003; Tihanyi et al., 2003). To deal with this opportunism and to diminish its impact on executive decisions, the theory of corporate governance offers several control mechanisms to ensure the managers monitoring and allow them to make strategic decisions such as R & D investment in order to improve the wealth of shareholders (Fama and Jensen, 1983; Walsh and Seward, 1990; Shleifer and Vishny, 1997).

In what follows, we present a review of previous research dealing with the effect of the two governance mechanisms namely ownership structure and board of directors on the relationship between the innovation strategy and the company's performance. This review of the literature will allow us to formulate our different hypotheses of research.

2.1. The Innovation Strategy and Firm Performance

The relationship between innovation strategies and firm performance is particularly interesting, especially in the last few years. Intangible assets are an increasingly important part of the balance sheets of companies and yet they remain difficult to evaluate. The previous literature has confirmed that investing in R&D activities improves the future performance of companies and ensures their sustainability. In fact, even if R&D expenditures negatively affect cash flow and current profits, they stimulate firms' growth opportunities. According to Del Monte and Papagni (2003) firms that invest in R&D activities have a significantly higher growth rate than firms in the same sector that did not invest. Similarly, Lev (1999) points out that R&D is the main asset of high-tech and biotechnology firms.

Empirical studies have confirmed the positive contribution of R&D activities to the improvement of performance and productivity (Sougiannis, 1994; Aboody and Lev, 2000; Ding et al., 2003; Lööf and Heshmati, 2005) and the market value of firms (Ben-Zion, 1978; Griliches, 1981; Bosworth and Rogers, 1998; Blundell et al., 1999; Toivanen et al., 2002). Moreover, Cañibano et al. (2000) found a significant positive relationship between R&D spending and stock market returns. The preceding discussion leads to the following hypothesis:

**H1: The innovation strategy has a positive effect on firm performance.**

2.2. The Innovation Strategy and Firm Performance: The Structure Effect of Ownership

2.2.1. Concentration of Ownership

The presence of majority shareholders may require managers to act to maximize the value of the company (Shleifer and Vishny, 1997). These shareholders can influence votes at general meetings and more easily mobilize more important means for the control of managers and the protection of their investments. Several agency theorists (Demsetz, 1983; Agrawal and Mandelker, 1990; Jensen, 1990; Bethel and Liebeskind, 1993; Agrawel and Knoeber, 1996) suggest that concentration of capital is a guarantee of minority interest's protection (Alexandre and Paquerot, 2000). Indeed, the more the ownership is concentrated, the better the managers are controlled. In addition, Shome and Singh (1995) and Allen and Phillips (2000) show that there is a positive relationship between block holder ownership and performance. This relationship implies that shareholders with a significant share of the capital all have the power to compel managers to act in their interests and to oppose decisions that run against the objective of maximization of their wealth. In the same vein, and by introducing the R&D investment decision, it seems that the presence of majority shareholders is a factor that stimulates investment in the R&D activities that create value and increase future performance. Based on a sample of 81 firms, Hill and Snell (1989) showed that the concentration of ownership positively affects the intensity of R&D spending, which in turn positively influences the productivity of...
the firm. As a result, we assume that the effect of R&D spending on performance will be more favorable in concentrated ownership firms.

**H2: The concentration of ownership has a positive effect on the relationship between the innovation strategy and firm performance.**

### 2.2.2. Institutional Ownership

Over the past two decades, institutional investors have become major players in the global economy, particularly because of the weight of their operations in the financial market. Indeed, institutional investors have an active role in controlling the management of the company (Agrawal and Mandelker, 1992). These shareholders have the ability to influence the decisions of managers in order to maximize the return on their investments. According to Bathala et al. (1994) the participation of institutional investors in the capital of an enterprise has a beneficial effect on its performance. Similarly, institutional investors have the right to access specific information to evaluate investment projects accurately. As informed investors, institutional investors can make decisions about the execution of long-term investment projects such as R&D projects in order to improve the company's future performance.

Early research has highlighted the "short-sightedness" of institutional investors in R&D (Loescher, 1984; Graves, 1988). These authors found a negative relationship between the intensity of R&D investment and institutional investor's ownership. Similarly, Kor and Mahoney (2005) found that the proportion of shares held by institutional investors has a negative but not significant moderating effect on the relationship between R&D expenditure and performance. Also, Berrone et al. (2005) showed that the effect of a significant level of R&D investment on company performance is negative but not significant if the owners of control blocks are banks.

Indeed, the presence of these investors as shareholders is a factor that may affect the quality of selected R&D projects and therefore the performance of the company. Nevertheless, Chung et al. (2003) argue that institutional ownership has no significant impact on the relationship between investment in R&D and the market value of the firm. The preceding discussion leads to the following hypothesis:

**H3: Institutional ownership has a mixed effect on the relationship between innovation strategy and company performance. This effect would be negative or positive.**

### 2.2.3. The Managerial Ownership

According to Jensen and Meckling (1976) the intensity of conflicts between shareholders and managers depends on the ownership structure of the firm and in particular on managerial ownership. Moreover, a share of high capital that is held by the leaders generates fewer conflicts and therefore a successful company. These authors show that managerial ownership can reduce the willingness of managers to take advantage of their position, expropriate the wealth of shareholders and engage in decisions that do not maximize the value of the firm. This results from the thesis of convergence of interests. Contrarily, this thesis was challenged on the one hand by Demsetz (1983) who affirms the neutrality thesis according to which the property structure has no effect on the value of a firm. Shleifer and Vishny (1989) from their part support the thesis of entrenchment, which stipulates that the ownership of a large part of the capital allows managers to escape control and thus results in a decrease in the performance of the firm.

For companies engaged in R&D activities, we propose that managerial ownership encourages them to choose R&D projects that have a positive effect on the company's long-term performance term. Also, the bad behavior of managers in the decision-making process can harm the performance of the company and jeopardize the value of the company. Several empirical studies have asserted this idea. Chang et al. (2006) find that the ownership of the internal market positively influences the effect of an increase in R&D expenditure on the financial market. As a consequence, we hypothesize that:
H4: The managerial property has a positive effect on the relationship between the innovation strategy and firm performance.

2.3. The Strategy of Innovation and Performance of the Company: Effect of the Board of Directors

2.3.1. The Size of the Board of Directors

The agency theory (Jensen, 1986) supports the idea that when the board is small, the control of the manager's behavior is effective. Large boards are considered unreactive and relatively ineffective in their operation. Indeed, John and Senbet (1998) gave an explanation that there is an additional cost related to the communication and decision-making problems associated with more administrators. Thus, a large board causes the dominance and expansion of the discretionary behavior of managers.

Yermack (1996) and Eisenberg et al. (1998) showed that the size of the board of directors is negatively correlated with firm performance. Therefore, a limited board size is desirable to control the behavior of executives and ensure the effectiveness of strategic decision making such as investment decision in gender R&D activities to improve company performance. Moreover, we propose that the effect of the innovation strategy on performance be more favorable in companies with small boards of directors. Our hypothesis is then as follows:

H5: The size of the board has a negative effect on the relationship between the innovation strategy and firm performance.

2.3.2. The Independence of Board Members

The external directors are considered to be independent of the executives and the company. Their control is supposed to be more effective (Hanson and Song, 2000). Indeed, according to Fama and Jensen (1983) the presence of independent directors in the board increases the effectiveness of the board in controlling and limiting the opportunism of executives since the goal of directors is the protection of Interests and maximizing the value of the company. The effectiveness of the Board relies primarily on the presence of external, experienced and independent directors and on the existence of a market of external directors guaranteeing the absence of collusion between directors and Independent directors.

For companies that invest in R&D activities, independent board encourages executives to engage in R&D activities that allow long-term wealth creation for shareholders. These arguments support the idea that the effect of R&D expenditure on performance will be more favorable in companies with boards of directors predominated by external directors. This has been well validated by previous studies.

In fact, Kroll et al. (2006) examined the effect of R&D expenditures on firm performance on a sample of US firms and found that this effect was positive and significant only for firms with independent boards. Moreover, the direct effect is reflected in the active participation of these directors in the decision-making process, in the control and ratification of the decisions taken by the directors in terms of investment in R&D in such a way those only projects that create value for shareholders (Fama and Jensen, 1983; Zahra, 1996).

Similarly, Chung et al. (2003) demonstrated that capital and R&D expenditures have a positive impact on the market value of a firm. This result holds true for firms with a board of directors dominated by external directors suggesting that these directors better control managerial actions.

These arguments lead to the following hypothesis from these reflections we envisage that:

H6: Board independence has a positive effect on the relationship between the innovation strategy and firm performance.

2.3.3. CEO Duality

Another characteristic is supposed to influence the relationship between the innovation strategy and the firm’s performance, CEO duality. This is the case when the CEO is also the chairman of the board. This characteristic is considered a source of conflicts according to the theory of agency. Thus, according to Brickley et al. (1997) duality means the assignment of the same person as general manager and chairman of the board of directors for the same period.
Moreover, insofar as the function of the board of directors is to appoint, remunerate and dismiss the CEO, when the latter is also the Chairman of the Board, this will confer an influential role and power to the manager (Mizruchi, 1983) and to hinder the proper functioning of the board and to influence its independence (Fama and Jensen, 1983; Jensen, 1993). Similarly, this high concentration of power in the hands of the same person is a source of opportunistic and inefficient behavior, which negatively affects the wealth of shareholders. Accordingly, we assume that the effect of R&D expenditure on performance will be less favorable in companies that have CEO duality characteristic. This has been well confirmed by Chang et al. (2006) who find that the combination of management and chairmanship functions affects negatively the effect of the announcement of increased R&D spending.

Thus, we formulate the following hypothesis:

\[ H_7: \] CEO duality has a negative effect on the relationship between the innovation strategy and firm performance.

### 2.3.4. Gender Diversity of the Board

The presence of women on the board has been the subject of several theoretical and empirical reflections, especially in developed countries, such as the Singh (2008) study of British companies and Adams and Ferreira (2007;2009) in the American context and Rose (2007) for the case of Danish firms.

The question that now arises is whether the presence of the women in the board has an impact on the board. The answer to this question is mixed between defenders and opponents of gender diversity in boards. Indeed, according to the advocates of this diversity, women bring new ideas; have a very important communication capacity in relation to men (Ehrhardt and Nowake, 2002; Adams and Ferreira, 2003; Carter et al., 2003). In the same vein, Omri et al. (2011) provide that joint boards improve the image of the company through disclosure of their openness, tolerance and fairness. This result was corroborated by the study of Kang et al. (2009) which provide that the announcement of the addition of a woman to the board has an effect on improving performance.

Women directors make specific contributions in terms of experiences, perspectives and management styles compared to male administrators (Hillman et al., 2002; Daily and Dalton, 2003; Huse, 2007). Thus, the presence of women allows the Board of Directors to approach a wider range of ideas, helping to identify new opportunities for innovation (Miller and Triana, 2009). We can therefore expect the presence of women on the boards of directors contribute positively and significantly on the innovation strategy within the company. Our hypothesis is then as follows:

\[ H_8: \] The presence of women on the board of directors affects positively the relationship between the strategy of innovation and the performance of Tunisian companies.

### 2.3.5. Audit Quality

Several studies have suggested that independent audit can reduce information asymmetry existed between the management and firm stakeholders by allowing outsiders to verify the validity of financial reports (DeAngelo, 1981). The related audit credibility model also suggests that the management select external auditors with a view to signaling their honesty and quality to accounting users. Therefore, the effectiveness of auditing and its ability to constrain the earnings management is expected to vary with the quality of the auditor (DeAngelo, 1981). In addition, DeAngelo (1981); Watts and Zimmerman (1986) and Becker et al. (1998) suggest that big auditing firms are usually identified as high quality auditors in the literature. Based on these studies, we use Big 4 auditing firms as the surrogate of audit quality.

On the other hand, Moore and Ronen (1990) show that audit can give an idea about the quality of the management in company. It therefore enables the company to improve its performance by infusing a new life, through the arrival of new capital invested by reassured shareholders. In terms of investment in research and development, we expect firms with the highest quality auditors to have the highest levels of intangible expenditure.
Previous studies have shown the positive impact of audit quality on the level of capitalization of R&D expenditure (Krishnan et al., 2002). The related hypothesis is then formulated as follows:

**H9**: The audit quality has a positive effect on the relation between the innovation strategy and firm performance.

### 2.3.6. Independence of Audit Committee Members

The role of the Audit Committee is to oversee the audit process and to resolve any disagreements that may arise between the auditors and management. Indeed, Abbott et al. (2000) suggest that firms whose audit committees are composed of independent members have been less sanctioned by the SEC because of fraudulent or erroneous financial statements. The composition of the audit committee is the subject of several recommendations, which state that the audit committee should be composed of a majority of independent external directors in order to guarantee their independence and efficiency of their monitoring (Beasley and Salterio, 2001). In the same vein, Klein (1998) shows that the effectiveness of the board depends on its own structure as well as on the structure of its committees. Indeed, he maintains that the assignment of independent external directors to the audit committee is likely to improve the performance of the company. This shows the importance of the role of independent members in the audit committee in the process of allocating resources in R&D activities and to contribute the innovation and better performance. Hence, our hypothesis is as follows:

**H10**: The presence of a large percentage of independent members on the audit committee positively affects the relationship between the innovation strategy and the performance of Tunisian companies.

### 3. RESEARCH DESIGN

To study the relationship between innovation strategy and firm performance and the moderating effect of governance mechanisms (effect of ownership structure and board effect), we use a sample of Tunisian non-financial companies listed in a period from 2008 to 2013, namely 29 companies. Companies belonging to the financial sector (banks, financial services, insurance companies, etc.) have been excluded because they have an atypical financial structure.

#### 3.1. Definitions and Measures of Variables

In order to operationalize the hypotheses to be tested, we define the denomination of the selected variables and their measurements as well as their references (table1).

#### 3.2. Dependant Variables

- **ROA (Return on assets)**: Over the last twenty years, empirical studies have attempted to show that intangible investments generate a significant increase in the future performance of companies. The study by Casta et al. (2007) was interested in demonstrating the associations between investments in intangible capital on the one hand and the financial, economic and competitive performance of companies on the other. In this research, the performance of the companies studied will be measured, in an economic approach, by the Return on Assets (ROA) ratio, which is the return on assets, which corresponds to the ratio between the operating income and the total assets (Eisenberg et al., 1998). This ratio is then as follows:

  \[ \text{ROA} = \frac{\text{Operating Income}}{\text{Total assets}} \]

- **Tobin’s Q ratio**: Tobin’s Q refers to a traditional measure of expected long-run firm performance (Bozec et al., 2010). The employment of market value of equity may present the firm’s future growth opportunities which could stem from factors exogenous to managerial decisions and this is indicated by the company’s level (Demsetz and Villalonga, 2001; Shan and McIver, 2011). In addition, a high Q ratio shows success in
the a way that the firm has leveraged its investment to develop the company that is valued more in terms of its market-value compared to its book-value (Kapopoulos and Lazaretou, 2007).

*Tobin's Q ratio = (Market capitalization + Total debt) / Total asset*

### 3.3. Independent Variables

- **The importance of innovation strategy**: In general, when addressing the question of measurement of intangible capital, previous studies often mention the problem of the availability of information. While the information published by US companies provides data on intangible expenditures (either capitalized or funded), which makes it easier for researchers working on this context and leads to more relevant results, most other contexts (France, Spain, Germany, Tunisia ...) suffer from a lack of information on intangible values. The only data available are those provided in companies' accounting statements and are often limited to amounts capitalized (Thibierge, 1997; Thibierge, 2001; Bouden, 2006; Charfi-Laadhar, 2006; Turki et al., 2006; Casta et al., 2007) or information published voluntarily by companies (Bourmont, 2006) or in their management reports. As part of our research, our aim is to study the importance of the innovation strategy in the Tunisian company. We therefore refer to the amounts of intangible assets that appear on the assets of the individual accounts of Tunisian firms. In addition, in order to limit the effect of large variations in the intangible assets of different companies, intangible capital will be measured in proportion to the total assets. This measure, which relates intangible assets to total assets, has been used by many previous studies including those by Thibierge (2001); Thibierge (1997). It is defined by the following ratio:

\[
INNOV = \frac{\text{Net intangible assets}}{\text{Total assets}}
\]

- **Concentration of ownership**: The capital concentration is defined as the percentage of capital, at least 20% (according to La Porta et al. (1999)) held by the largest shareholder.

\[
CONC_K = \frac{\text{Percentage of capital held by the largest shareholder}}{\text{Total asset}}
\]

- **Institutional ownership**: This variable corresponds to the proportion of capital held by institutional investors. It is calculated by the number of securities held by institutional investors divided by the total number of securities. Although the results are still mixed, there is a strong trend that institutional investors with a high proportion of the company's capital are actively involved in the control and management of the company and tend to improve its performance (Omri, 2002).

\[
INST_K = \frac{\text{Percentage of capital held by institutional investors}}{\text{Total asset}}
\]

- **The managerial ownership**: This variable is measured by the percentage of capital held by management. This measure has been used in many research including those by Rediker and Seth (1995) and Fernández and Arrondo (2005).

\[
DIR_K = \frac{\text{Percentage of capital held by management}}{\text{Total asset}}
\]

- **The size of boards of directors**: The size of the board of directors is measured by the total number of directors sitting there. This measure has been adopted by several researchers including Petra (2007) and Siala et al. (2009).

\[
TCA = \text{Total number of directors who sit on the board}
\]

- **The independence of boards members**: The Independence of Board Members is measured by the ratio of the number of independent directors to the total number of directors serving on the Board of Directors. This measure was also used by Ahmed et al. (2006) and Siala et al. (2009).

\[
ADM_IND = \frac{\text{Number of independent directors}}{\text{The total number of directors}}
\]

- **CEO Duality**: The CEO Duality is a binomial variable taking the value 1 if the positions of Director General and Chairman of the Board are held by one person and 0 if not. This measure been used by several previous studies like Kang et al. (2009); Brickley et al. (1997) and Godard and Shatt (2004).
Gender diversity of the boards: Board diversity is measured in terms of the percentages of women on the board. Gender diversity reinforces the control mission assigned to the board and reduces control costs (Walsh and Seward, 1990) because the female directors are in most cases independent (Dalton et al., 1999) and thus improves performance of the company.

\[ \text{DIV}_\text{CA} = \text{Percentage of women in the board} \]

Audit quality: The previous literature uses a variety of audit quality measures. Nevertheless, the most observable and widely used measure in the literature is to refer to the reputation of the audit firm (Johnson and Lys, 1990; Craswell et al., 1995; Francis and Krishnan, 1999; Piot, 2001; Krishnan et al., 2002; Hiraki et al., 2003; Bourmont, 2006). According to this approach, the most important international auditors in the global market (generally the "Big"), as well as their representatives in the world, are seen as those offering the best quality audit service. A lower quality is attributed to the other auditors. Based on these reflections, the audit quality "QUAL" will be measured by a binomial variable taking the value 1 if the company is audited by at least one Big and taking the value 0 otherwise.

Independence of audit committee members: The independence of the members of the Audit Committee is measured by the percentage of independent directors sit on the Audit Committee. This measure has been used in previous work, including those by Wright (1996); Carcello and Neal (2000) and Zarai and Bettabai (2007).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Measures</th>
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</thead>
<tbody>
<tr>
<td>The dependent variable (to be explained)</td>
<td></td>
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<tr>
<td>ROA (Return on assets)</td>
<td>Ratio of operating income to total assets.</td>
</tr>
<tr>
<td>Tobin’s Q ratio</td>
<td>Ratio of the market Capitalization plus total debt divided by total asset of the company.</td>
</tr>
<tr>
<td>The independent variables (explanatory)</td>
<td></td>
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<tr>
<td>INNOV</td>
<td>The measure of the importance of the innovation strategy is the ratio of net intangible assets to total assets.</td>
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<td>Variables related to the ownership structure</td>
<td></td>
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<tr>
<td>CONC_K</td>
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<td>TCA</td>
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<tr>
<td>ADM_IND</td>
<td>Number of independent directors on the total number of directors.</td>
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<tr>
<td>DUAL</td>
<td>1 if the positions of Director General and Chairman of the Board are held by one person and 0 if not.</td>
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<tr>
<td>DIV_CA</td>
<td>Percentage of women in the board.</td>
</tr>
<tr>
<td>QUAL</td>
<td>1 if the company is audited by at least one Big and taking the value 0 otherwise.</td>
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<tr>
<td>IND_AUD</td>
<td>The proportion of independent directors who sit on the Audit Committee.</td>
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<tr>
<td>The control variables</td>
<td></td>
</tr>
<tr>
<td>SIZE</td>
<td>Company size: the natural logarithm of the total assets.</td>
</tr>
<tr>
<td>DEBT</td>
<td>Debt ratio: total debt / total assets.</td>
</tr>
<tr>
<td>SEC</td>
<td>1 if the firm belongs to high-tech sectors and 0 if not.</td>
</tr>
</tbody>
</table>

\[ \text{IND\_AUD} = \text{the proportion of independent directors who sit on the Audit Committee} \]

Control variables

Company size: The company size is measured by the natural logarithm of the total assets (Godard, 2002). It’s a control variable, but it can also have an impact on the performance.

\[ \text{SIZE} = \text{Log (Total assets)} \]

Debt ratio: The debt ratio determined by the percentage of total debt over the total assets. The impact of this ratio on performance shows results equivocal. Indeed, Weir et al. (2002) associate a negative
relationship between performance and the debt ratio, while other authors believe that debt affects positively the profitability of the company.

\[ DEBT = \frac{Total\ debt}{Total\ assets} \]

- **Sector:** To account for the sector effect and to obtain more reliable results, we introduced a control variable (binary variable). In this respect, this variable takes 1 if the firm belongs to high-tech sectors and 0 if not.

### 3.4. Research Model

In order to test our hypotheses and based on the characteristics of the various variables, our general model is a multiple linear regression on panel data (Sevestre, 2002) presented as follows:

\[ \text{Variable to explain} = c + \alpha \text{Explanatory variables} + \beta \text{Control variables} + \varepsilon \]

Among the assumptions we have made, some support a moderating role in the main relationship studied. In other words, we consider if the effect of innovation strategy on firm performance is affected by the characteristics related to ownership structure and the board of directors.

A moderator variable is defined as a variable that essentially influences the relationship between two other variables. It systematically modifies the magnitude, intensity, meaning and / or form of the effect of the independent variable on the dependent variable (Sharma et al., 1981).

According to Baron and Kenny (1986) the moderating effect is observed when a moderator variable \( Z \) modifies the intensity of the relationship between the independent variable \( X \) and the dependent variable \( Y \). The authors thus specify that there exist three relations which Release: The influence of \( X \) on \( Y \): \( (\beta_1) \), the influence of \( Z \) on \( Y \): \( (\beta_2) \) and the influence of \( X \) and \( Z \) on \( Y \): \( (\beta_3) \). The equation of the regression is of this form:

The moderating effect of \( Z \) is detected when the link \( (\beta_3) \) is significant (see FIG. 1). The links \( (\beta_1) \) and \( (\beta_2) \) are not necessarily significant. If, on the other hand, the link \( (\beta_2) \) is significant, \( Z \) is a quasi-moderator.

![Figure-1. Representation of a moderating effect](Source: Saunders (1956); Zedeck (1971)).

To identify factors related to ownership structure to the board of directors that can influence the relationship between innovation strategy and firm performance, we used two regression models.

The first regression model is as follows:

**Performance (ROA, Tobin’s Q) = \( \beta_k + \beta \cdot \text{INNOV} + \beta \cdot \text{DEBT} + \beta \cdot \text{SIZE} + \beta \cdot \text{SEC} + \varepsilon \)**

The second regression model is as follows:

**Performance (ROA, Tobin’s Q) = \( \beta_k + \beta \cdot \text{INNOV} + \beta \cdot X + \beta \cdot \text{INNOV} \cdot X + \beta \cdot \text{DEBT} + \beta \cdot \text{SIZE} + \beta \cdot \text{SEC} + \varepsilon \)**

With \( X \): variable related to the ownership structure or the board of directors. In other words, we will test the effects of different combinations of characteristics related to ownership structure and the board of directors on the relationship between the performance of the company and the innovation strategy.

The regression models with moderating variables are presented in the table below:

---

1 According to the list of high-tech activities in NAF nomenclature set by INSEE (2002).
Table 2. The different models and regressions to be tested

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Regress to test</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>H₁</td>
<td>ROAᵢt = β₀ + β₁INNOVᵢt + β₂DEBTᵢt + β₃SIZEᵢt + β₄SECᵢt + εᵢt</td>
<td>M1.1</td>
</tr>
<tr>
<td></td>
<td>Tobin’s Qᵢt = β₀ + β₁INNOVᵢt + β₂DEBTᵢt + β₃SIZEᵢt + β₄SECᵢt + εᵢt</td>
<td>M1.2</td>
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<tr>
<td>H₂</td>
<td>Tobin’s Qᵢt = β₀ + β₁INNOVᵢt + β₂CONC_Kᵢt + β₃(INNOV * CONC_Kᵢt) + β₄DEBT + β₅SIZE + θ₆SEC + εᵢt</td>
<td>M2.1</td>
</tr>
<tr>
<td></td>
<td>ROAᵢt = β₀ + β₁INNOVᵢt + β₂CONC_Kᵢt + β₃(INNOV * CONC_Kᵢt) + β₄DEBT + β₅SIZE + θ₆SEC + εᵢt</td>
<td>M2.2</td>
</tr>
<tr>
<td>H₃</td>
<td>Tobin’s Qᵢt = β₀ + β₁INNOVᵢt + β₂(INNOV * INST_Kᵢt) + β₃(INNOV * INST_Kᵢt) + β₄DEBT + β₅SIZE + θ₆SEC + εᵢt</td>
<td>M3.1</td>
</tr>
<tr>
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<td>ROAᵢt = β₀ + β₁INNOVᵢt + β₂(INNOV * INST_Kᵢt) + β₃(INNOV * INST_Kᵢt) + β₄DEBT + β₅SIZE + θ₆SEC + εᵢt</td>
<td>M3.2</td>
</tr>
<tr>
<td>H₄</td>
<td>ROAᵢt = β₀ + β₁INNOVᵢt + β₂DIR_Kᵢt + β₃(INNOV * DIR_Kᵢt) + β₄DEBT + β₅SIZE + θ₆SEC + εᵢt</td>
<td>M4.1</td>
</tr>
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<td>Tobin’s Qᵢt = β₀ + β₁INNOVᵢt + β₂DIR_Kᵢt + β₃(INNOV * DIR_Kᵢt) + β₄DEBT + β₅SIZE + θ₆SEC + εᵢt</td>
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</tr>
<tr>
<td>H₅</td>
<td>ROAᵢt = β₀ + β₁INNOVᵢt + β₂(TCAᵢt + β₃(INNOV * TCAᵢt) + β₄DEBT + β₅SIZE + θ₆SEC + εᵢt</td>
<td>M5.1</td>
</tr>
<tr>
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<td>Tobin’s Qᵢt = β₀ + β₁INNOVᵢt + β₂(TCAᵢt + β₃(INNOV * TCAᵢt) + β₄DEBT + β₅SIZE + θ₆SEC + εᵢt</td>
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</tr>
<tr>
<td>H₆</td>
<td>ROAᵢt = β₀ + β₁INNOVᵢt + β₂ADM_INSTᵢt + β₃(INNO * ADM_INSTᵢt) + β₄DEBT + β₅SIZE + θ₆SEC + εᵢt</td>
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<td>Tobin’s Qᵢt = β₀ + β₁INNOVᵢt + β₂ADM_INSTᵢt + β₃(INNO * ADM_INSTᵢt) + β₄DEBT + β₅SIZE + θ₆SEC + εᵢt</td>
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</tr>
<tr>
<td>H₇</td>
<td>ROAᵢt = β₀ + β₁INNOVᵢt + β₂DUAL_Iᵢt + β₃(INNO * DUALᵢt) + β₄DEBT + β₅SIZE + θ₆SEC + εᵢt</td>
<td>M7.1</td>
</tr>
<tr>
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<td>Tobin’s Qᵢt = β₀ + β₁INNOVᵢt + β₂DUAL_Iᵢt + β₃(INNO * DUALᵢt) + β₄DEBT + β₅SIZE + θ₆SEC + εᵢt</td>
<td>M7.2</td>
</tr>
<tr>
<td>H₈</td>
<td>ROAᵢt = β₀ + β₁INNOVᵢt + β₂DIV_CAᵢt + β₃(INNO * DIV_CAᵢt) + β₄DEBT + β₅SIZE + θ₆SEC + εᵢt</td>
<td>M8.1</td>
</tr>
<tr>
<td></td>
<td>Tobin’s Qᵢt = β₀ + β₁INNOVᵢt + β₂DIV_CAᵢt + β₃(INNO * DIV_CAᵢt) + β₄DEBT + β₅SIZE + θ₆SEC + εᵢt</td>
<td>M8.2</td>
</tr>
<tr>
<td>H₉</td>
<td>ROAᵢt = β₀ + β₁INNOVᵢt + β₂QUALᵢt + β₃(INNO * QUALᵢt) + β₄DEBT + β₅SIZE + θ₆SEC + εᵢt</td>
<td>M9.1</td>
</tr>
<tr>
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<td>Tobin’s Qᵢt = β₀ + β₁INNOVᵢt + β₂QUALᵢt + β₃(INNO * QUALᵢt) + β₄DEBT + β₅SIZE + θ₆SEC + εᵢt</td>
<td>M9.2</td>
</tr>
<tr>
<td>H₁₀</td>
<td>ROAᵢt = β₀ + β₁INNOVᵢt + β₂IND_AUDᵢt + β₃(INNO * IND_AUDᵢt) + β₄DEBT + β₅SIZE + θ₆SEC + εᵢt</td>
<td>M10.1</td>
</tr>
<tr>
<td></td>
<td>Tobin’s Qᵢt = β₀ + β₁INNOVᵢt + β₂IND_AUDᵢt + β₃(INNO * IND_AUDᵢt) + β₄DEBT + β₅SIZE + θ₆SEC + εᵢt</td>
<td>M10.2</td>
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</table>

4. STATISTICAL ANALYSES

4.1. Descriptive Analysis

Table 3 shows a disparity in the innovation variable manifested by a low standard deviation and the existence of a non-remarkable difference between the minimum (0) and the maximum (0.2586776). This may be due to industrial effects. In general, it is recognized that firms operating in high-tech sectors invest more in R & D activities than firms in traditional sectors. It should be noted that 24.13% of the companies in the sample belong to high-tech sectors. The average value of the ROA is 0.2586776.

Among ownership and board characteristics, Table 3 shows that the average participation of shareholders, institutional investors and managers in the capital is respectively 35.36574%, 12.94247% and 11.34568%. The board of directors of the companies in the sample is on average of 8 members, this figure is close to the recommendations of Lipton and Lorsch (1992). These latter estimates that the optimal size of the board is between 8 and 12 people. The Board of Directors is composed of 16.49114% of independent directors. Gender diversity shows that, on the whole, women are relatively unrepresented on the boards of our sample (4%). Nevertheless, 68.39% of the companies confuse the functions of general manager and chairman of the board of directors.

Companies in our sample audited by a Big 4 audit are 33.91%. While, the average independence of audit committee members does not exceed 7% with a minimum of (0) and this is justified by the existence of family businesses in our sample.
Table 3. Descriptive statistics of variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>Median</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROA</td>
<td>174</td>
<td>0.0613872</td>
<td>0.0520378</td>
<td>0.0900411</td>
<td>-0.2516123</td>
<td>0.3054475</td>
</tr>
<tr>
<td>Tobin’s Q</td>
<td>174</td>
<td>2.60</td>
<td>1.75</td>
<td>2.72</td>
<td>-0.21</td>
<td>26.04</td>
</tr>
<tr>
<td>INNOV</td>
<td>174</td>
<td>0.0092958</td>
<td>0.0026695</td>
<td>0.0265312</td>
<td>0</td>
<td>0.2586776</td>
</tr>
<tr>
<td>DEBT</td>
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<td>0.0627601</td>
<td>0.0965712</td>
<td>0</td>
<td>0.4040222</td>
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<tr>
<td>SIZE</td>
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<td>18.21317</td>
<td>18.07981</td>
<td>0.9083798</td>
<td>16.66747</td>
<td>21.0697</td>
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<tr>
<td>TCA</td>
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<td>8.404684</td>
<td>12</td>
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<td></td>
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<tr>
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<td>0.1649114</td>
<td>0.166685</td>
<td>0.1667795</td>
<td>0</td>
<td>0.6667</td>
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<tr>
<td>CONC_K</td>
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<td>0.3547</td>
<td>0.3328253</td>
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<tr>
<td>INST_K</td>
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<td>0.144303</td>
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<tr>
<td>IND_AUD</td>
<td>174</td>
<td>0.07</td>
<td>0.15</td>
<td>0.50</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ROA is the ratio of operating income to total assets; Tobin’s Q ratio is the ratio of the market Capitalization plus total debt divided by total asset of the company; INNOV is the measure of the importance of the innovation strategy is the ratio of net intangible assets to total assets; DEBT ratio is total debt / total assets; SIZE is the natural logarithm of the active total. TCA is Total number of directors who sit on the board; ADM_IND is the number of independent directors on the total number of directors; CONC_K is the percentage of capital held by the largest shareholder; INST_K is the percentage of capital held by institutional investors; DIR_K is the percentage of capital held by management; DIV_CA is the percentage of women in the board; IND_AUD is The proportion of independent directors who sit on the Audit Committee.

Part B: Dichotomes variables

<table>
<thead>
<tr>
<th></th>
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<td>174</td>
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<td></td>
<td>174</td>
<td>100.00</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SEC equal to 1 if the firm belongs to high-tech sectors and 0 if not; DUAL equal to 1 if the positions of Director General and Chairman of the Board are held by one person and 0 if not; QUAL equal to 1 if the company is audited by at least one Big and taking the value 0 otherwise.

4.2. Correlation Matrix

Multiple linear regression estimation requires the absence of multicollinearity between the different independent variables. An examination of the correlation matrix (Table 4) shows that all correlation coefficients are less than 0.8, which corresponds to the limit set by Kennedy (1985) and from which we start to have serious problems of multicollinearity. This leads us to conclude that there is no serious problem of multicollinearity.
Table 4. Pearson Correlation Matrix

<table>
<thead>
<tr>
<th></th>
<th>ROA</th>
<th>Tobin’ s Q</th>
<th>INNOV</th>
<th>DEBT</th>
<th>SIZE</th>
<th>CONC_K</th>
<th>INST_K</th>
<th>DIR_K</th>
<th>TCA</th>
<th>ADM_IND</th>
<th>DIV_CA</th>
<th>IND_AUD</th>
<th>DUAL</th>
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<td>Tobin’ s Q</td>
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<tr>
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<tr>
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<td>-0.03</td>
<td>0.09</td>
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</tbody>
</table>
ROA is the ratio of operating income to total assets; Tobin’s Q ratio is the ratio of the market Capitalization plus total debt divided by total asset of the company; INNOV is the measure of the importance of the innovation strategy is the ratio of net intangible assets to total assets; DEBT ratio is total debt / total assets; SIZE is the natural logarithm of the active total. TCA is Total number of directors who sit on the board; ADM_IND is the number of independent directors on the total number of directors; CONC_K is the percentage of capital held by the largest shareholder; INST_K is the percentage of capital held by institutional investors; DIR_K is the percentage of capital held by management; DIV_CA is the percentage of women in the board; IND_AUD is The proportion of independent directors who sit on the Audit Committee. DUAL equal to 1 if the positions of Director General and Chairman of the Board are held by one person and 0 if not; QUAL equal to 1 if the company is audited by at least one Big and taking the value 0 otherwise; SEC equal to 1 if the firm belongs to high-tech sectors and 0 if not. Asterisks indicate significance at 10% (*), 5% (**), and 1% (***)

5. RESULTS

In the following, we present the results obtained from the tests of the different regression models.

5.1. Analysis of the Effect of the Innovation Strategy on Company Performance

Table 5 below shows that the coefficient of correlation between the variable INNOV and the variable ROA is not significant. Innovation strategy has no significant influence on the performance of Tunisian firms. This result rejects our first hypothesis. This finding can be explained by the characteristics of the firms in our sample since these firms do not possess a sufficiently large intangible asset or rather because the innovation strategy in these firms is not important.

Similarly, when measuring firm performance by the Tobin’s Q ratio, the relationship remains insignificant. This finding does not confirm the preceding findings by Baklouti et al. (2007) on intangible assets and their influence on performance in the case of the Tunisian markets. These authors find that investment in research and development capital has a negative impact on performance of Tunisian companies.

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>M 1.1</th>
<th>M 1.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROA</td>
<td>-0.040</td>
<td>-7.141</td>
</tr>
<tr>
<td>INNOV</td>
<td>(-0.31)</td>
<td>(-1.00)</td>
</tr>
<tr>
<td>DEBT</td>
<td>-0.036</td>
<td>-3.899</td>
</tr>
<tr>
<td>SIZE</td>
<td>-0.011</td>
<td>-2.611</td>
</tr>
<tr>
<td>Constant</td>
<td>0.265</td>
<td>50.573</td>
</tr>
<tr>
<td>Observations</td>
<td>174</td>
<td>174</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.95</td>
<td>1.26</td>
</tr>
<tr>
<td>Number of id</td>
<td>0.005</td>
<td>0.154</td>
</tr>
<tr>
<td>Firm FE</td>
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<td>YES</td>
</tr>
</tbody>
</table>

ROA is the ratio of operating income to total assets; Tobin’s Q ratio is the ratio of the market Capitalization plus total debt divided by total asset of the company; INNOV is the measure of the importance of the innovation strategy is the ratio of net intangible assets to total assets; DEBT ratio is total debt / total assets; SIZE is the natural logarithm of the active total.

T student in parentheses, *** p<0.01, ** p<0.05, * p<0.1
Table 6 shows the results on the moderating effect of the different characteristics related to the ownership structure on the relationship between the innovation strategy and firm performance. In other words, the question is whether this relationship varies with the concentration of ownership and the participation of institutional investors and managers in the capital.

ROA is the ratio of operating income to total assets; Tobin’s Q ratio is the ratio of the market Capitalization plus total debt divided by total asset of the company; INNOV is the measure of the importance of the innovation strategy is the ratio of net intangible assets to total assets; CONC_K is the percentage of capital held by the largest shareholder; INST_K is the percentage of capital held by institutional investors; DIR_K is the percentage of capital held by management; DEBT ratio is total debt / total assets; SIZE is the natural logarithm of the active total. T student in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Concentration of Ownership

Table 6 shows that the effect of the innovation strategy on the performance of the firm measured by the ROA is significant and positive at the 1% threshold, taking into account the concentration of the property. Thus, by introducing the strategy of innovation, a concentrated property constitutes a factor that stimulates the performance of the company. This idea is not confirmed by studying the interaction effect CONC_K*INNOV on the firm’s performance since this effect is negative and significant at the 1% threshold. This result rejects hypothesis H2, so, the concentration of ownership has a negative moderating effect on the relationship between the innovation strategy and the performance of Tunisian firms. This finding suggests that the ownership of a capital share by the shareholders is not a means of giving the power to compel the leaders to act in their favor and to oppose decisions that run counter to the objective of maximization of the wealth of shareholders. The results are not significant when we took the Tobin’s Q as a performance measure.
The Institutional Property

Table 6 shows that the relationship between the innovation strategy and the firm’s performance of the firm, measured by the ROA and Tobin’s Q, is not significant with the presence of institutional investors in the capital. Also, by testing the interaction effect between R & D investment and institutional ownership on performance since the INST_K*INNOV interaction is not significant (with the two measures). Taken together, these results reject the hypothesis H3 and not attest the negative effect of institutional ownership on the relationship between the innovation strategy and the firm’s performance.

The Managerial Property

Table 6 shows that the effect of the innovation strategy on firm performance measured by the ROA and Tobin’s Q, is not significant in the presence of the managerial property. However, by studying the effect of interaction DIR_K*INNOV on the firm’s performance, also this effect is not significant (with the two measures). Taken together, these results reject the hypothesis H4. In this case, we can’t assume that according to what has been planned (H4) the managerial property has a positive moderating effect on the relationship between innovation strategy and firm’s performance.

5.3. Analysis of the Effect of the Board of Directors on the Relationship between the Innovation Strategy and the Performance of the Company

Table 7 presents the results of the effect of different characteristics related to the board of directors on the relationship between the innovation strategy and firm performance.
Table 7: Regression results for models 5, 6, 7, 8, 9, and 10

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>M5.1 ROA</th>
<th>M5.2 Tobin’s Q</th>
<th>M6.1 ROA</th>
<th>M6.2 Tobin’s Q</th>
<th>M7.1 ROA</th>
<th>M7.2 Tobin’s Q</th>
<th>M8.1 ROA</th>
<th>M8.2 Tobin’s Q</th>
<th>M9.1 ROA</th>
<th>M9.2 Tobin’s Q</th>
<th>M10.1 ROA</th>
<th>M10.2 Tobin’s Q</th>
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</thead>
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<td>INNOV</td>
<td>4.987***</td>
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<td>-1.058***</td>
<td>-29.871**</td>
<td>0.063**</td>
<td>-3.103</td>
<td>-6.724</td>
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<td>-0.89**</td>
<td>-51.45**</td>
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</tr>
<tr>
<td>TCA</td>
<td>-3.55</td>
<td>(0.34)</td>
<td>-3.14</td>
<td>(1.77)</td>
<td>(1.73)</td>
<td>(0.87)</td>
<td>(0.99)</td>
<td>(0.56)</td>
<td>(0.92)</td>
<td>(1.73)</td>
<td>(1.71)</td>
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</tr>
<tr>
<td>INNOV*TCA</td>
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<td></td>
<td></td>
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<tr>
<td>ADM_IND</td>
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<td>-0.018</td>
<td>(0.92)</td>
<td>4.276***</td>
<td>101.518</td>
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<tr>
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<td>(1.59)</td>
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<tr>
<td>DUAL</td>
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<td>(0.27)</td>
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<tr>
<td>INNOV*DUAL</td>
<td></td>
<td>(-2.93)</td>
<td>-0.907**</td>
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<tr>
<td>DIV_CA</td>
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<tr>
<td>INNOV*DIV_CA</td>
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<td>(1.41)</td>
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<tr>
<td>QUAL</td>
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<td>25.821</td>
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<td>(-2.45)</td>
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<td>DEBT</td>
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<td>-0.052</td>
<td>-4.695</td>
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<td>Constant</td>
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<td>0.169</td>
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<td>0.168</td>
<td>0.041</td>
<td>0.168</td>
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<td>0.179</td>
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</table>
ROA is the ratio of operating income to total assets; Tobin’s Q ratio is the ratio of the market Capitalization plus total debt divided by total asset of the company; INNOV is the measure of the importance of the innovation strategy is the ratio of net intangible assets to total assets; TCA is Total number of directors who sit on the board; ADM_IND is the number of independent directors on the total number of directors; DUAL equal to 1 if the positions of Director General and Chairman of the Board are held by one person and 0 if not; DIV_CA is the percentage of women in the board; QUAL equal to 1 if the company is audited by at least one Big and taking the value 0 otherwise; IND_AUD is The proportion of independent directors who sit on the Audit Committee; DEBT ratio is total debt / total assets; SIZE is the natural logarithm of the active total.

\[ T \text{ student in parentheses, } ** p<0.01, * p<0.05, * p<0.1 \]

- **The Size of the Board of Directors**
  
  Table 7 shows that the effect of the innovation strategy on the firm’s performance measured by the ROA is significantly negative (at the 1% threshold), taking into account the size of the board of directors. The results of model 5.1 show that the interaction effect TCA*INNOV on the ROA is significant and positive. The hypothesis H5 is therefore rejected. As a result, the size of the board has a positive moderating effect on the innovation strategy and consequently on the performance of the company.

- **The Independence of the Members of the Board Of Directors**
  
  Table 7 shows that the effect of innovation strategy on firm performance measured by ROA is negative and significant at the 1% threshold and at the 5% threshold when performance is measured by Tobin’s Q. The study of the effect of interaction ADM_IND*INNOV on the variable ROA shows that this effect is positive and significant also at the threshold of 1%. The hypothesis H6 is therefore accepted. This result suggests that independent directors are effective monitors who are able to control decision-makers, in particular in terms of investment in R&D, enhancing firm performance. We then conclude that independent directors have a positive moderating effect on the relationship between the innovation strategy and firm’s performance.

- **CEO Duality**
  
  Table 7 shows that the effect of the innovation strategy on the firm’s performance measured by the ROA is significantly negative (at the 5% threshold), taking into account CEO duality on the board. But, the results are not significant when we took the Tobin’s Q as a performance measure. The results of models 7.1 and 7.2 show that the interaction effect DUAL*INNOV on the ROA and Tobin’s Q is significant and negative. The hypothesis H7 is therefore accepted. As a result, CEO duality has a negative moderating effect on the innovation strategy and consequently on the performance of the company. Such a result may be motivated by the fact that the combination of the two functions by the same person does not constitute a factor facilitating access to information and communication between the board of directors and the management team, and don’t offers the flexibility to promote growth opportunities and to make better investment decisions especially in R & D in order to improve the performance of the company.

- **Gender Diversity of the Board**
  
  Table 7 shows that the effect of the innovation strategy on the performance of the company, measured by the ROA and Tobin’s Q, is not significant in the presence of women on the board. However, by studying the effect of interaction DIV_CA*INNOV on the firm’s performance, also this effect is not significant in model 8.1, but significant and negative in model 8.2.

  Taken together, these results reject the hypothesis H8. This finding is confirmed by the study of Bouaziz and Triki (2012) in Tunisian context, which found a negative and significant result. Indeed, this result corroborates the
study by Farrell and Hersch (2005) which predicted a negative impact of gender diversity on firm’s performance, due to the small number of women on the councils, which can skew the scope of their presence. Also, Huse (2007) explained that diversity on the board also has its disadvantages: it can create coordination difficulties, require more time in discussions, and lose cohesion within the board. Potential conflicts and misunderstandings can be at the expense of effective decision-making on the board of directors (Goodstein et al., 1994).

- **Audit Quality**

  Table 7 shows that the effect of the innovation strategy on the firm’s performance measured by the ROA and Tobin’s Q is not significant taking into account the audit quality. But, the results of the interaction effect QUAL*INNOV on the ROA is positive and significant at the 1% threshold. In this case, the hypothesis H9 is therefore accepted. Audit quality improves the performance of the firm, which is consistent with the results of Lennox (1999). But, when performance is measured by Tobin’s Q the interaction effect QUAL*INNOV is negative and significant at the 5% threshold.

  This finding concord with Zare et al. (2013) who’s found a negative and significant relation between audit firm size and company’s profitability. This result may refer to the low quality of audit firms. The audit profession is dominated by big audit firms and a few smaller national audit firms. Hence, we concluded that audit firms in Tunisia are of low quality.

- **Independence of Audit Committee Members**

  Table 7 shows that the effect of innovation strategy on firm performance measured by the ROA and Tobin’s Q is negative and significant at the 5% threshold into account of independence of audit committee members. The study of the effect of interaction IND_AUD*INNOV on the variable ROA and Tobin’s Q shows that this effect is positive and significant also at the threshold of 5%.

  The hypothesis H10 is therefore accepted. This result corroborates the results of several studies including Klein (1998) which shows that the assignment of external directors (Independent) audit committee is likely to improve the performance of the company.

6. **CONCLUSION**

   The purpose of this paper is to examine the relationship between innovation strategy and firm performance and the moderating the effect of ownership structure and the board of directors on this relationship. The study carried out on a sample of 29 Tunisian companies listed on the Tunis stock exchange over a period from 2008 to 2013 shows that the innovation strategy has no effect on the performance of the company. These results suggest that the lack of relationship between the strategy of innovation and the performance of the firm in the Tunisian context can be justified by the small number of firms investing in R&D activities.

   However, this effect exists if the characteristics related to the board of directors are introduced. In general, the results show that the concentration of ownership, institutional ownership, the managerial property, the size of the board of directors and gender diversity of the board do not have a moderating effect on the relationship between the innovation strategy and the firm’s performance.

   On the other hand, the independence of board members, the CEO duality, audit quality and independence of audit committee members have a moderating effect on the relationship between the innovation strategy and the performance of the firm.

   Taken together, these results illustrate the crucial role played by the board of directors in determining the relationship between the innovation strategy and firm performance. This is useful for companies in the high-tech sector who are forced to allocate huge resources in R&D to preserve their sustainability. These companies should
thus establish an adequate system of corporate governance to limit the opportunistic behavior of managers and ensure that efficient R&D investment decisions are engaged to maximize the wealth of shareholders.

The contribution of this study is twofold. The first is to include an innovative aspect in the literature on the governance of the corporate by integrating the notion of moderating governance variables, rarely explored, in the study of the relationship between innovation strategy and firm performance.

The second contribution highlights the importance of the role played by governance mechanisms, particularly the board of directors, in ensuring the effectiveness of the deployment of resources in R&D activities closely linked to the improvement of firm performance.

To sum up, we consider that the present research could be extended by examining the effect of corporate governance on the relationship between innovation strategy and the performance of the firm in different institutional contexts, since differences in governance systems across countries (Europe, USA, Japan, etc.) in several aspects (concentration of ownership, shareholder identity, etc.), as demonstrated by La Porta et al. (1999) and Faccio and Lang (2002) on such a relationship.

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**REFERENCES**


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