APPLIED FINANCE LETTERS

VOLUME 5, ISSUE 1, 2016

DOES CEO EMOTIONAL INTELLIGENCE AFFECT THE PERFORMANCE OF THE COMPANY'S RESEARCH AND DEVELOPMENT?

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Abstract: This paper, using qualitative and quantitative data, investigates how behavioral aspects of managers (measured by emotional intelligence) impact performance of innovative companies (measured by high investment in research and development). The results obtained clearly show, for these companies, there is a significant and positive relationship between CEO emotional intelligent and their financial, social and environmental performance.

Keywords: R&D, Emotional Intelligence, Social performance, Financial performance, Environmental performance

1. Introduction

Companies that have a commercial goal should be eager to adopt innovation strategies to maximize their value. Nevertheless, some companies are effective while others are not. Among the managerial decisions, investment in research and development could potentially lead to conflicts of interest among managers, shareholders and other stakeholders.

Indeed, the executive decision to adopt innovation strategy as a source of value may affect corporate performance. According to cognitive theory, the CEO should use his emotions appropriately to achieve better performance because the business decision-making may be affected by the CEO's emotions. This recent concept in the field of management has become a research topic of growing importance. Emotions, such as fear, happiness and surprise, play a vital role in our decision making processes. The effect of such emotions may be either positive, "emotional intelligence", or negative, "behavioral biases". Performance is not only related to the competence and the team working skills but also to the internal competence being part of "emotional intelligence". In this context, we can see a new trend in research combining psychology, behavioral finance and management sciences.

When the CEO decides to invest in research and development (R&D), his decision is based on the financial capacity of the company which depends on the CEO's specific skills. To achieve good results, he must manage risk and uncertainty. Accordingly, an emotionally intelligent CEO can direct his emotions appropriately so that he can decide to invest in research and development and to create the opportunity: "research intends to produce a new knowledge, applied to the production activity, which will give rise to

goods or new manufacturing processes that will increase the usefulness of the consumers in the case of consumer goods, or make the increase in productivity possible if there are intermediate goods "(Barré et al., 1997)

Our objective is to study the effect of CEO emotional intelligence on the financial, social and environmental performance using a sample of Tunisian companies which have a high level of research and development. The main contribution of this work is to explain how behavioral finance (in our case emotional intelligence) allows to present answers regarding performance of companies. We study this effect on three forms of performance: financial, social and environmental. The results, obtained from the application of linear regressions on a sample of firms with a strategy to invest in research and development, show a significant and positive effect of CEO emotional intelligent on the financial, social and environmental performance.
This article is structured as follows. Section 2 presents the related literature and the theories which motivate the empirical work. Section 3 discusses the empirical strategies that were adopted. Section 4 presents the main results and discussion.

2. Theoretical literature review

Various studies have attempted to answer the question of the impact of emotion on decision making and, especially, on the performance of organizations (Damasio, 1994; Forgas and George, 2001; Degeorge and Fayolle, 2009). In the words of Goleman (1995): "The market forces reshape the business world in such a way emotional intelligence is an unprecedented key factor for success in the workplace". Emotional Intelligence, for that reason, promotes productivity and creativity. In this paper, we particularly interested in investigating the effect of emotional intelligence on the performance of innovative companies (research and development). We review the relevant theories that have addressed this issue.

2. 1. Emotional Intelligence Concept

The last decade witnessed an increase in the volume of empirical research and theories in the field of emotional intelligence. Therefore, its definition and the methods of its measurement has expanded and sometimes differ from one researcher to another.

2.1.1. Definition

According to Bar-On (1997), emotional intelligence is a "set of abilities and non-cognitive skills that influence the ability to successfully adapt to environmental pressures." Bar-On (2002) argues that there are four dimensions of emotional intelligence. The first is Intrapersonal (the awareness of one's emotions, the ability to express one's feelings and to communicate one's needs). The second is Interpersonal affecting the extent to which one is able to establish cooperative, constructive and satisfactory Interpersonal relationships taking into account the feelings of others. The third one is related to stress management (how to manage and control emotions). Finally, adaptability is the fourth dimension. It is, actually, about how to implement effective problem-solving strategies based on emotions.

Salovey and Mayer (1990) also state that the skills are expanded by incorporating interpersonal intelligence, intrapersonal intelligence and that, ultimately, emotional

intelligence “is a form of intelligence that involves the ability to control one's feelings and emotions and those of others, to distinguish between them and to use this information to guide one's thoughts and actions”. These researchers redefined the concept by "the ability to perceive emotion, integrate it so as to facilitate thought, to understand emotions and to master them in order to enhance personal development". (Mayer and Salovey, 1997).

Goleman (1995) believes that emotional intelligence involves 5 dimensions: emotion knowledge, emotion management, and self-motivation, the knowledge of others' emotions and the management of interpersonal relationships. George (2000) asserts that emotional intelligence consists of 4 dimensions: evaluating and expressing emotions, using emotions to enhance cognitive processes and decision making, understanding emotions and managing emotions.

2.1.2. Emotional Intelligence Model: mixed model of emotional intelligence

The emotional intelligence model of Goleman is a mixed model of emotional intelligence proposed by Goleman (2002). Such a model is presented in four forms: self-awareness (accurate self-assessment, self-confidence), self-mastery (self-control, reliability, motivation, etc.), social awareness (service-concern and organizational understanding) and relationship management (helping others to improve, conflict management, communication, etc.). He affirms that any individual is born with an emotional intelligence and his competences can develop (personal or social).

2.1.3. Hypotheses

According to Mairesse and Mohnem (2005), investment in R&D plays a key role in any innovative company since it affects the capabilities and strategies of the PME (Schroll and Mild, 2011; Van de Vrande et al., 2009; Börjesson and Löfsten, 2012; Colombo et al., 2012; Parida et al., 2012 and Huizingh, 2011). As a matter of fact, an emotionally intelligent leader must perform well to improve the financial performance of the company in an attempt to build up a good reputation vis-à-vis the shareholders as well as the investors. He always tries to meet the needs of the different stakeholders due to the fact that this demand motivates the companies to be engaged in innovation. According to Gallaud et al. (2012), demand allows integrating the incentive role of the group of shareholders, suppliers or even the employees.

A leader who has a strong emotional intelligence must try to foster a positive work environment for employees, workers, staff.... Actually, a good environment pushes them to increase their productivity. Consequently, this has a positive impact on the performance of the group. The leader, in this case, seeks to immerse in activities that positively mirror his business. These activities may be research and development which has a significantly higher growth rate compared to companies which are not engaged (Del Monte and Papigni, 2003).

An emotionally intelligent leader seeks to achieve greater competitiveness based on innovative strategies such as R&D (O'Brien, 2003) owing to the fact that this competitiveness has a tight relationship with innovation (Geroski et al., 1997). Additionally, an emotionally intelligent leader seeks to increase his business-market value which is positively related to the investment in R&D (Bae and Kim, 2003). The CEO must also be keen to increase his company's growth opportunities based on research

and development since this has a positive effect on these opportunities (Yew et al. 2006). Accordingly, one may say that there is a positive relationship between the emotionally intelligent CEO and the financial performance of innovative companies.

Through these theories, we can propose the following hypothesis:

H1: CEO emotional intelligence allocates positively the financial performance of companies to high level of investment in R&D.

Huang (2013) shows that the business social performance is related to the leader's socio-demographic characteristics such as the specialization of his higher qualifications, seniority, sex, the level of emotional intelligence and cognitive skills. Gendron (2007) thinks that emotional intelligence allows individuals to effectively participate in different social fields that adhere to the success of their lives, the proper functioning of society and the country in general. Goleman et al. (2002) also believe that the leader's emotional intelligence enables him to foster the creative innovation for the sake of the total performance so as to motivate the employees and to build friendly relationships with them.

When critically reading the work of Goleman et al. (2002), Thalmann (2004) shows that "social skills are not enough; they must be accompanied by essential elements such as general knowledge of the organization and its goals as well as how to run meetings, the ability to delegate to the right people, the right sense, communication, planning, supervision, risk taking, innovation, etc. There is, therefore, an essential prerequisite to leadership: emotional intelligence that cannot be replaced. "

Fiori and Antonakis (2011) ascertain that emotional intelligence reflects the ability of an individual to manage his own emotions and those of others; it allows him to acknowledge the strengths, the problems and the weaknesses of the business and how to manage them. Actually, it helps him to make a wise decision to invest in the appropriate projects and to decide to innovate. In fact, they believe that this decision improves the leader-employee and the leader-customer relations; hence, emotional intelligence has a positive impact on the social performance of innovative companies.

So an emotionally intelligent leader will try to invest in innovative projects in order that he can meet the customer's needs (Oltra and St. John, 2011) showed that the integration of innovations intervenes just after the clients' request).

Hence, we can now present the following hypothesis:

H2: CEO emotional intelligence has a positive impact on the social performance of companies at high level of investment in research and development.

George (2000) indicates that an emotionally intelligent leader must have a high cognitive flexibility to get adapted to the changes in the environment. For this reason, he must choose innovative and non-specific investment projects. This implies the existence of a positive correlation between emotional intelligence and the environmental performance of innovative companies.

According to Delmas et al. (2011), the apprenticeship ability of a company can not only improve the environmental performance, but also can gain a competitive advantage (cost control, reputation, innovation-differentiation) to increase the profit of

the company by gaining a competitive advantage from its environmental programs throughout the relations with the stakeholders (shareholders, the local community, government, customers and suppliers) and throughout the environmental impacts on its global reputation.

An emotionally intelligent leader seeks to stabilize the situation of the company after the turbulence of the environment, he innovates to cope with the environmental changes (Baker and Sinkula (2002), Balkin et al. (2000); Darroch and McNaughton (2002); Lyon and Ferrier (2002), Scherer (1992), Utterback (1994) Vrakking (1990) and Wolfe (1994) show that innovation allows the company to cope with environmental changes. Moreover, with emotional intelligence, the leader can choose the innovation strategy which aims to achieve environmental performance as research and development enables him to cope with environmental problems (Brown and Eisenhard, 1995 and Miles and Snow, 1978)

H3: CEO emotional intelligence influences (positively or negatively) the environmental performance of companies at high level of investment in R&D.

3. Methodology

Our study is aimed at investigating the effect of the CEO's emotional intelligence on the performance of innovation companies. Thus, this research attempts to answer our central question: How can emotional intelligence affect the performance of Tunisian enterprises (innovation companies)? Our methodology consists of two parts. The first is used to identify the data sample selection and the second is devoted to the results interpretation.

3.1 Data Sample Selection

Our empirical study is based on quantitative research. We use a questionnaire as a method of data collection:

Our questionnaire consisted of three main parts, based on treated areas in theory:

- The first part aims to collect some company information from the firm's statute and financial annual statement, total assets, R&D expense, etc.
- The second part focuses on determination of the social and environmental performance.
- The third part focuses on determination of the CEO's emotional intelligence.

Our sample involves 96 Tunisian companies with high level on research and development divided into 10 industries which are: chemistry, distribution, food processing, transportation, industries, computer, other consumer goods, consumer services, buildings, and services. Companies belonging to the financial sector are excluded (banks, insurance companies, etc.) because they have a unique financial structure.

The data collection was carried out in 2013. We used several methods to gather information: personal investigation (by appointment: direct interview with the company leader of a duration of 45 minutes), telephone survey, fax inquiry and internet survey.

The Ministry of Tunisian industry as well as several business centres, namely the business centre of Sfax, helped us.

Table 1: Visited companies

The questionnaire was sent to:	
Listed Tunisian companies	28
Non-listed Tunisian companies	228
TOTAL	**256**
Number of respondents	153
Innovation companies *(investment in research and development is the main strategy)*	96
Non-innovation companies	57
Final Sample	**96**

Table 2: Sample distribution by industry

Industry	**Number of businesses**	**Percentage**
Chemistry	5	5.2%
Distribution	2	2.083%
Food processing	15	15.625%
Transportation	2	2.083%
Industries	15	15.625%
Computer	9	9.375%
Consumer services	31	32.291%
Other consumer goods	3	3.125%
Buildings	2	2.083%
Services	12	12.5%
Total	**96**	**100%**

Variables

In this context, it is appropriate to separate the dependent variables from independent ones:

Measurement of the dependent variables

The dependent variables are the three forms of performance: financial performance, social performance and, finally, environmental performance.

Financial performance (FP)

To measure financial performance, we used Return on Equity (ROE) which is used by many authors such as Bouri and Bouaziz (2007) and Brown and Caylor (2004). The "return

on equity" measures the ability of a business to generate profits from its net equity .The data is extracted from the income statements of the sample firms for the years from 2009 to 2013.

Social and environmental performance

In the previous paragraph, we have shown that we have adopted a questionnaire to calculate the social and environmental performance. We have adopted the methodology of the KLD[1] (Kinder, Lydenberg, Domini) rating agency to measure the dependent variables which are the social and environmental performance.

For social performance, the following measures are employed:

- Customer relationship: we used 8 items to measure the firms' social involvement regarding their relationships with their customers in terms of loyalty, satisfaction and encouragement. For each firm, we assigned a score ranging from 0 (no item is taken into account) to a maximum of 8 (all elements are taken into account). Then, we brought back the number to a value ranging from 0 to 1 by dividing the total by 8.
- Employee relationship: as we used 8 items for customers, we measured this variable in the same way; a score ranging from 0 (no item is taken into account) to a maximum of 8 (all elements are taken into account). Then, we brought back the number to a value ranging from 0 to 1 by dividing the total by 8.
- Country and community relationship: each axis took 3 items to check the social responsibility relationship, community and territory (with the same method of calculation).

Finally, to calculate social performance, the sum of the four axes is divided by four:

$$\textit{Social Performance (SP)} = (\textit{clients' aggregate score} + \textit{employees' aggregate score} + \textit{community aggregate score} + \textit{territory aggregate score}) / 4 \quad (1)$$

Environmental performance is calculated on the basis of 6 items which are defined to measure the firms' environmental performance. For each firm, a score ranging from 0 (no item is taken into account) to a maximum of 6 (all items are considered). Then, we brought back the number to a value ranging from 0 to 1 by dividing the total by 6.

$$\textit{Environmental Performance (EP)} = (\sum \textit{items}) / 6 \quad (2)$$

Measurement of independent variable

Here, we discuss the measurement of innovation strategy and emotional intelligence.

Investment in research and development (R&D)

[1] *Rating agency which estimates large companies quoted Americans (together of the indication (index) Russel 3000) according to a series of criteria of exclusion (example: alcohol, tobaccos...) and of criteria of evaluation (Human resources, environment, sponsorship, customers...)*

This measurement is used by many authors including Francis and Smith (1995), Cho (1998), Abdullah, Weiyu, and Vivek (2002), Azouzi and Jarboui (2012), and Hamza and Jarboui (2012). It is standardized by taking the ratio of R&D expense to total sales.

Emotional intelligence

There are many approaches to measure emotional intelligence; e.g., Mayer et al. 2000; Zeidner et al. (2004), measurements based on skills (e.g. Mayer-Salovey-Caruso Emotional; Intelligence Test, MSCEIT, Mayer et al., 2003). The mixed measurements (e.g. Emotional Competence Inventory, ECI, Boyatzis, Goleman 2002). In the second part of our questionnaire, we generated a group of 17 items (the most representative concept of emotional intelligence obtained from Schutte et al., 1998, SSREI test) based on the theoretical model of emotional intelligence developed by Golemen (2002) .The responding leaders used a 5-point scale, from "no agreement" to "total agreement"

$$\textit{Emotional Intelligence} = \Sigma \textit{ points collected in the questions} \quad (5)$$

In our model, we included four control variables which have shown to affect firms' performance. These variables are proxies of the firm size, debt, age and industry.

3.2 Questionnaire Validation

Our objective is to test the validity of 22 items about social performance, 6 items about environmental performance and 17 items about emotional intelligence. The internal consistency validity test of our questionnaire is achieved with Cronbach alpha (a measurement of the internal consistency between the different items of measurement) equals ($\alpha = 0.831$).

The internal consistency between the 22 items of social performance is very important, it equals 0781. For the 17 items of emotional intelligence, it is important as it equals 0.562. This means that each item is the equivalent measurement of emotional intelligence and that they are consistent. For the 6 items of environmental performance, it is less important as it equals 0.350. Thus, one can say that the scale generated for the measurement of the various items is reliable and includes the aspects of the theory. The Principal Component Analysis suggests a structure of 4 factors representing 95.14% of the total variance for the factors of social performance. For environmental performance, we have three factors representing 73.84% of the total variance. But for the 17 items of emotional intelligence, the components' rotated matrix represents 7 factors with a percentage equal to 68.41% of the total variance. The first factor is personal consciousness which represents 15.45% of the explained variance. Thus, the index of Kaieser-Mayer-Olkin (KMO), which reflects the adequacy of the factor solution, is very important for the 3 variables. The factor solution of social performance, environmental performance, and leaders' emotional intelligence are summarized in Table 3-5, respectively.

Table 3: Social Performance Factors: 22 items

Items	Factor 1: motivation of employees (35.67% VE)	Factor 2: loyalty, encouragement and satisfaction of clients : (35. 38% VE)	Factor 3: relation with community (13.16% VE)	Factor 4: relation with the country (10.93% VE)
We put child-care centres	0.986			
A 3-month-high-production bonus for most employees	0.986			
Ensure transport for employees	0.937			
Ensure training for my employees	0.919			
Ensure the medical coverage for all my employees	0.905			
A canteen is set up in my business	0.847			
The provision of an infirmary with a doctor available on-site during all work-hours	0.964			
They have the right to strike	0.945			
Providing quality service		0.929		
Ensure that the product sold is in line with what has been previously negotiated		0.914		
Free delivery		0.876		
Ensure a high quality of commercial relations between the customer and the company's interlocutors		0.982		
Ensure that the sales process is optimal and effective		0.940		
Offer additional products		0.939		
Minimizing waiting time		0.934		
Proliferation of the products offered		0.985		
I contribute to the financing of the infrastructure in my area			0.985	
I participate in the cultural activities within my business			0.907	
I assure the funding of schools and mosques in my city			0.862	
I participate in local associations				0.789
I suggest trainings for employees of companies in difficulty				0.703
I help small and new businesses to get them on their feet in the Tunisian market				0.804

Table 4: Environmental Performance Factors: 6 items

Items	Factor 1: Environment Protection (28.82%VE)	Factor 2: energy saving (28.15%VE)	Factor 3: Recycling (16.87%VE)
I choose energy sources that protect the environment	0.929		
I choose low-cost means of transport	0.928		
I apply the highest standards of environmental standards		0.919	
I make an energy saving plan		0.916	
I recycle my products			0.899

The raw materials chosen by our company limit the depletion of natural resources	0.446

Table 5: The leader's emotional intelligence factors: 17 items

Items	Factor 1: Personal awareness (15.45% VE)	Factor 2: Empathy (12.79%VE)	Factor 3: Personal management (10.88%VE)	Factor 4: Report management (8.28% VE)	Factor 5: Emotional awareness (7.42% VE)	Factor 6: Motivation (7.17% VE)	Factor 7: Relation management (6.41% VE)
My colleagues are not communicative	0.914						
I do things that I regret	0.853						
I communicate well with each of my co-workers	-0.841						
It is unpredictable how my colleagues feel in any given situation		-0.931					
I can interpret nonverbal messages		0.906					
I can describe exactly what I feel		0.575					
I can stay calm even in difficult circumstances			0.786				
The things that happen in my life are meaningful for me			0.774				
I appreciate other people's feedback			0.532				
I feel excited when I think of my goals				-0.683			
I get impatient with incompetent people				0.678			
I'm influenced by other people's opinions				0.561			
I can explain my action					0.777		
I comfortably talk to anyone					0.687		
I imagine that the corporate performance will be good						0.870	
Others do not see me as I see myself							0.764
I am aware enough to achieve my future goals						0.4	

4. Empirical Findings

We will try to verify the effect of emotional intelligence on the performance of the firms with a high-level of investment in R&D. The models to be tested for each hypotheses are:

Model 1: $FP = \beta 0 + \beta 1 * R\&D + \beta 2 * EI + \beta 3 * SIZE + \beta 4 * AGE + \beta 5 * DEBT + \varepsilon \rightarrow H1$

Model 2: $SP = \beta 0 + \beta 1 * R\&D + \beta 2 * EI + \beta 3 * SIZE + \beta 4 * AGE + \beta 5 * DEBT + \varepsilon \rightarrow H2$

Model 3: $EP = \beta 0 + \beta 1 * R\&D + \beta 2 * EI + \beta 3 * SIZE + \beta 4 * AGE + \beta 5 * DEBT + \varepsilon \rightarrow H3$

The results of the linear regression are presented in Table 6. On the whole, we observe that the coefficient of IE in all three specifications are highly statistically significant.

Table 6: Results

	Model 1		Model 2		Model 3	
Variables	Beta	Significance	Beta	Significance	Beta	Significance
Constant		0.284		0.833		0.993
R&D	0.150	0.045**	0.055	0.012**	0.065	0.029**
IE	0.210	0.048**	0.105	0.029**	0.115	0.033**
Size	0.046	0.028**	0.180	0.031**	-0.086	0.411
AGE	0.046	0.666	0.033	0.858	-0.037	0.730
DEBT	-0.081	0.035**	-0.132	0.100*	-0.156	0.040**
R-Squared		0.345		0.456		0.368

*, **, ***, Respective significance at 10%, 5% and 1%.

The result reported model 1 shows a positive and significant relationship between emotional intelligence and financial, social and environment performance. This is supportive of our hypotheses that the emotionally intelligent leaders tend to invest in R & D projects which, in turn, allows creating some opportunity for firm's performance (Barré et al. 1997). A leader with a high level of emotional intelligence chooses the strategies that are to solve the most complex tasks based on his inter-interpersonal confidence .The leader here is interested in developing new ideas and in R & D which affects the overall business performance (Yew et al. 2006).

The validation of our first hypothesis confirms the results found by Colombo et al. (2012), Parida et al. (2012), the investment in R & D has a positive impact on any innovative company that is used to establish a good reputation vis-à-vis the shareholders and investors; it is the aim of any emotionally intelligent leader.

According to these results, we notice that there is a negative relationship between debt and financial performance (in which the leader is emotionally intelligent). So, one may conclude that, despite highly emotional intelligent managers in a company, high level of debt has negative impact on performance.

The results indicate that the emotional intelligence variable has a positive and significant effect on social performance (high-level R & D), (β = 0.105, p =0.029). This result confirms the idea of Huang (2013) who asserts that the business social performance is related to the socio-demographic characteristics of the leader; for instance, the specialization of his higher qualifications, seniority, sex, level of emotional intelligence and cognitive skills.

The result confirms the studies of Fiori and Antonakis (2011) who argue that emotional intelligence reflects the ability of an individual to manage his own emotions as this allows him to make decision to invest in good projects and to innovate because they believe that this decision improves the leader-employee and the leader-customer relations.

In fact, a positive and significant relationship between emotional intelligence and environmental performance is perceived throughout these regression results ($\beta = 0.115$ $p = 0.033$). Such a variable allows minimizing the negative impact of R & D on social performance (previously found result) which confirms the idea of George (2000) who declares that the emotionally intelligent leader must have a high cognitive flexibility to adapt to the environmental changes; therefore, he must choose innovative and non-specific investment projects.

5. Conclusion

In recent years, the study of the effect of the leader's emotional intelligence on his strategic choice affecting a firm's performance has gaining some attention. In this paper, we show the existence of a positive significance between the emotional intelligence and the financial/social/environmental performance of the companies with a high-level of research and development. Mangers with a high level of emotional intelligence appear to choose t strategies that are more likely to solve the most complex tasks facing companies leading to better overall business performance.

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