



## The Contribution of Intangibles to the Value Creation

**Maha BEN TANFOUS**

Faculty of Economic Sciences and Management  
University of Tunis El Manar  
Adresse: B.P 248 El Manar II, 2092, TUNIS, TUNISIA  
E-mail: maha\_bentanfous@yahoo.fr

### **Abstract**

*This research aims to demonstrate that the combination of intangible assets leads to more value creation than the partial contribution of each of them. Our study observed a sample of 252 non-financial French companies listed on the Paris Stock Exchange over the period 1999-2007. This sample is subdivided into three groups: industrial, service and technology sector. The results indicate firstly that the manufacturing companies are more involved in intangible activities followed by the service companies. Secondly, the relationship between intangible expenses and value creation (market capitalization) is non-linear (**U inverted**). Finally, the integration of the different immaterial assets contributes more to the value creation.*

**Keywords:** intangible assets, research and development, advertising, incentive schemes, employee training, market capitalization, curvilinear link, optimal value of immaterial expense.

### **1- Introduction**

With the globalization, the emergence of new information technologies and the intensification of competition, the economic value of a company reflect to a large part its intangible assets. This phenomenon has led to a radical change of the corporate strategies by neglecting the traditional manufacturing for the benefit of new activities based largely on research and development, patents, software, human resources, as well as new organizational structures.

Taking into account the increased importance of intangible investments in recent years, more and more companies resort to the publication of the components of their intangible capital. Indeed investors react positively to the announcement of this type of investment. For example, Chan.H (1990) demonstrated that the announcement of R&D investment leads to a significant increase in the stock return, Frieder and Subrahmanyam (2005) found that investors favor the shares of known firms, finally Hanssen and Joshi (2009) point out that the advertising of a new

product led to the increase in the stock price. These different researches confirm that the reaction of investors is not neutral towards the intangible investments.

In this context, our study question is the following: *At what level the intangibles are a source of value creation?* To answer this question, we have set two objectives: The first consists in determining the critical threshold beyond which the intangible capital, namely, research and development, advertising, incentive schemes and training employees does not create value. The second focuses on showing that the combination of these four elements together led to the improvement of their contribution in the value creation.

For the purpose to achieve our goal, this paper is organized as follows. First we look at the studies that will be the basis for the formulation of our research hypotheses. Second, we describe the methodology of our work by providing the database, the definition and the variables measurement. Next we expose the results and the interpretation of the models estimation. Finally we conclude with some suggestions for future research.

## **2 - Background and hypothesis formulation**

Before starting the study of previous research on the contribution of the intangibles, we give an overview of the definition and the evaluation of this concept. For a long time economists and managers are attempting to identify the various aspects of the concept of intangible investment.

Lacroix.M (1997, p.63) considers the intangible investment as « *a virtual stream, generating complex effects ranging from the power of knowledge to the birth of practical achievement*». By this definition, the author points out its dynamic nature, its cumulative and virtual character. To clarify the outlines of this concept, Epingard.P (1998) defines it as « *a detour by which the knowledge production is permanently incorporated into objects, men and organization* ».

At this level, the question that arises is what it refers to intangible investment or rather expenditure intangible? By focusing on a point of view manager, Martory.B and Pierrat.C (1996) describe investment as « *a current commitment of the company's resources which is done with the aim of a greater future profit* ». Therefore, the implementation of the material equipments and/or the material production justify the qualification of tangible investment. On the other hand, in the immaterial domain, if the spending is marginal in the productive process (complementary way to the realization of a project of investment) it cannot be qualified as intangible investment. It is rather about immaterial expenses with which the leading part is to accompany tangible investments. It is from the effects of the immaterial spending that these authors envisage their qualification of intangible investment.

This analysis of the definition of the intangible investment is shared by other authors. Ochs P (1995) considers intangible investment as a « *dynamic intangible investment which incorporates a share of dominant knowledge that contributes in a specific or in a process way to the competitiveness and to the company value*». It seems to be interesting; to enumerate the characteristics of intangible investment, particularly at the level of its effects. These last can be isolated or considered in a process chain. In the first case, it is the specific contribution but in the

second case, it is the interrelationship with other investments (or means implemented in the productive process).

Previous definitions allow us to understand the different reflections conducted by researchers. However, the presentation of typologies of the intangibles is an important step to the realizing of the contours of these assets. In the literature, there are several typologies of the immaterial: Classification by type of activity [OECD: Organisation for Economic Co-operation and Development], Classification by function [Bounfour.A (1998)], Classification by the degree of measurement [Martory.B et Pierrat.Ch (1996)] and Theories based on resources [Grant (1991), Tézéna.S et Montcel.H (1993), Thévenard C. (1997), etc.].

During the rest of this section, we examine the empirical research reviewing the contribution of the immaterial to the value creation. We are particularly interested in research and development, advertising, incentive schemes and training employee. Our motivation for the choice of these assets is driven by the following factors. First, research and development are considered as an indicator of innovation, then advertising allows the company to create its brand image and therefore guarantee its reputation and finally the participation and training are approached as an indicator of favorable social environment within the company (motivation and good integration of employees in their workplaces).

To study the contribution of the immaterial to the value creation, the majority of studies use the market capitalization, market-to-book ratio or the price-to-book ratio as indicators of wealth creation.

### **2.1- Contribution of research and development to the value creation**

Green, Stark and Thomas (1996) have adopted the following assessment approach: the market value of the company is expressed as the sum of the book value plus the sum of the discounted residual benefits [Kay (1967), Peasne (1981), Stark (1986) and Ohlson (1989)]. The fundamental model expresses the market-to-book ratio based on residual income and R&D expenditures. These authors introduce other control variables for better explain the connection between the value of the firm and the R&D investments. Among these variables, there are market share, concentration index (industrial concentration), the debt ratio (debt/equity) and the risk factor.

Using the ordinary least square method, the estimation indicates that the coefficients of variables residual outcome ( $RI_{it}$ ) and R&D expenditures ( $RD_{it}$ ) are positive and statistically significant over the study period. In effect, the introduction of control variables (for example the market share of the undertaking, the debt ratio...) does not alter the previous findings since they contribute less to the explanation of the market value of the company. Another result involves the life expectancy of the R&D (The period between the year of establishment of the R&D and the year where they start to generate revenue) which varies from three to five years. This result affirms that the durability of the R&D is usually long but it depends on the nature of the firm activity and the market structure. In the English market it varies from three to five years [Green, Stark and Thomas (1996)] while in the American marketplace, it varies from five to nine years [Lev and Sougiannis (1996)].

Stern and Stewart (1999) conducted a study on 300 companies listed in the stock exchange of Great Britain. The objective of this study is to explore the correlation between the increase of R&D expenditures and the market value added (MVA). The results vary from one sector to another. Indeed, for the pharmaceutical, electronic and mechanical industry, the R&D contributes favorably to the value creation (correlation coefficient is positive and significant) but in other sectors such as textile and construction materials sector, the correlation is negative.

At this level, the question that arises is: why R&D creates value for some sectors but it destroys value for other sectors? To study the contribution of R&D to the value creation, Stern and Stewart (1999) analyze the rapport between R&D spending; market value added (MVA) and economic value added (EVA). They have divided the sample of companies into two groups. The first one is more implicated in technology than the second group.

For companies highly involved in technologies, the results obtained accord that more the added economic value is high, most the influence of R&D expenditures will be important on market value added and vice versa. The second group of companies are less concerned in technology but they have high value-added economic. In fact, any increase in the R&D is associated with a decrease in the price of securities and the market value added. One explanation for this result is as follows: It will be better for this segment of companies to focus on the current performance before thinking about future investments.

This deduction is consistent with the Burgman.R (2002) argument. According to this author « *Manage the market value is other than the management of the current value of the activities and the future growth value* ». The value management requires that the company grows profitably, this imperative requests in turn a good understanding of the cycle of value creation. This sequence begins with an efficient allocation of capital which leading to the constitution of strategic assets (resources and potentials) which consequently will influence the distinctive competence that result in a competitive advantage. This advantage plays a strategic role in the constitution of the economic profitability of the company and subsequently to the value creation for the shareholders. In conclusion, create the value requires good management of strategic assets that are other than intangible assets.

The survey of the theoretical literature above clarifies that the investment in research and development create value over a long-term horizon and this link depends on certain factors such as a sectoral belonging. However, none of these studies introduced the notion of «the threshold effect », in other words, the spending of R&D contributes to the increase of the firm value but beyond a certain level there is not a value creation anymore.

Ike.C.E and Kingsley.O (2010) have studied simultaneously the contribution of R&D expenditures and the presence of a curvilinear liaison between the market capitalization and the intensity of R&D. The presentation of the model to estimate as well as the definition of variables will be discussed in details in the next section.

The dependent variable is the market capitalization divided by the total sales. It is obtained by multiplying the share price at the end of years by the number of outstanding securities.

The explanatory variable is the research and development rate, which is measured by the total expenditures divided by the turnover. Beside to this variable, the authors have introduced its square in order to test the presence of the non-linear liaison between the market capitalization and the intensity of R&D. Among the control variables used in the explanation of the variation of the market capitalization of the company, Ike.C.E and Kingsley.O have chosen the debt ratio (the total ratio of debts on total assets), the company size (logarithm of the turnover), and the market concentration (Herfihndhal index).

The sample is composed of 6422 American firms shared between industrial and service companies. The observation period extends from the year 1990 to 2007 and the estimation method is the least square ordinary. The results obtained reveal the presence of a strong correlation, on one hand, between the market capitalization and the R&D ratio and on the other hand between the square of the R&D ratio and the market capitalization. This proves the existence of a non-linear liaison between the market capitalization and the research and development expenses. The results of estimation of the model display a positive and significant contribution of research and development expenditure for the whole of the sample. Nevertheless, the contribution of R&D is more important for the industrial companies than the services firm.

The second result point outs that the estimated coefficient of the square of the R&D rate is significant for the total sample; therefore there is a non-linear link between the market value of the company and research and development spending.

This literature review allows us to assume that:

***H<sub>1</sub>: The contribution of the R&D to the value creation is positive but beyond a certain threshold it becomes negative.***

***H<sub>11</sub>: The degree of contribution of R&D depends on the corporate sector.***

## **2.2- Contribution of advertising to the value creation**

Two sources may explain the impact of advertising on the firm value such as the externality effect (Spillover) and the signal effect.

Indeed, advertising allows the company to differentiate itself from its competitors by the creation of the brand for its products [Aaker (1991)]. This asset (brand), which is the result of marketing activities, can influence the behavior of current and potential customers. For example, Frieder and Subrahmanyam (2005) found that investors prefer invest in shares with a big brand name, even if they do not offer immediate returns. This behavior is explained by the fact that investors forecast a greater increase in the stock prices of these firms. Also, the customers prefer to bet on something of which they trust and they have the knowledge on the inherent uncertainty with regard to some things ambiguous which they possess no information. Such a preference can lead to investment decisions for which investors prefer to hold mark securities that they have access to the necessary information [Heath and Tversky (1990)].

Overall, these results prove that brand awareness and the perceived quality of consumed products can have a favorable impact on the price securities of these companies.

Another feature of the publicity lies in its role of signal sent on the market. Several signaling mechanisms may influence the behavior of the investors, Mathur.L.K and Mathur.I and Rangan.N (1997) analyzed the impact of the use of celebrity endorsement technique (It is a technique which involves a famous personality) on the share price of the firm. This study found that when Michael Jordan made advertising for the association of basketball, the market value increase on average of 2 %. It follows that the advertisings before the launch of the product led to the rise in the share price and may create forecasts that will be corrected after the putting to the market of the new product [Hanssens and Joshi (2009)].

It is clear that advertising has an effect on the firm value, the question that arises how this influence can occur? Various studies have examined the effects of advertising on sales [Hanssens, Parsons and Schultz (2001)]; hence, the direct impact of these expenditures on market value is less studied. Hanssens D.M, Pauwels. J.S.R and Srinivasan.S (2004) demonstrate that the launch of a new product on the market contains information that takes time to be fully incorporated in the share price.

Hanssens and Joshi (2010) examine the contribution of advertising to the value creation. According to these authors, the advertising can simultaneously have an indirect impact on the firm value through an increase in the level of sales and profits and direct impact through the constitution of the brand. It is worth noting that the first effect will be detected on a short-term horizon although the second one will be more important on a long-term horizon. Considerable research provide an empirical generalization that the short-term elasticity between sales and advertising expenses is positive but low and advertising shall not take effect in the long term when the effect of short term is significant [Abraham M.M et al (1995)]. Therefore advertising will indirectly affect the firm value through an increase of the turnover.

Whatever the nature of the effect of advertising, Hanssens D.M and Joshi.A (2010) studied the contribution of this type of spending in the value creation by highlighting the direct and indirect effect of advertising on the company value. To do this, these authors used two indicators of value creation namely the matched firm returns (MFR) and the market-to-book ratio (MBR).

We are only interested in the analysis of the rapport between advertising expenditures and the market-to-book ratio. Hanssens D.M and Joshi.A (2010) divided the total sample into two groups. The first group contains five high-tech firms and the second one consists of four companies appertaining to the sector of sports clothing. These authors chose two companies from the group of high-tech firms. The first one is in a leader position but the second is newly introduced in the market. Hanssens D.M and Joshi.A (2010) proceed then to the increase of advertising expenses and they observe its impact on the market capitalization. The study period extends from 1997 to 2000.

For the leader company any increase in advertising expenses of 10 % has a positive effect on the market capitalization. This increase is displayed only for the year 1999, for the remainder of the period advertising affect negatively value creation. For the second firm the increase of 10% of advertising expenses led to an increase of the ratio market-to-book respectively to 1.4 million \$, 2.28 million \$, 1.44 million \$ and 0.78 million \$ on the four years 1997, 1998, 1999 and 2000. This growth is explained by the direct effect of the advertising expenses.

Regards the indirect effect, it is rated simultaneously to the increase of the sales volumes (23.52 million \$, 38.18 million \$, 24.18 million \$ and 13.08 million of \$ respectively to the four years 1997, 1998, 1999 and 2000) and the reduction of the benefit due to the advertising cost (4.15 million \$, 5.42 million \$, 6.04 million \$ and 5.23 million\$ of over the four years).

The last step of their study resides to measure the optimum of the advertising expenses. Hanssens D.M and Joshi.A (2010) use the conditions of Dorfman and Steiner (1954) which consists in determining the value of these expenses that maximize the market capitalization [For more details on the method of determination of the critical value of advertising expenses, see Hanssens D.M and Joshi.A (2010), page 30]. The results obtained by these authors assert that the value creation will take place when the optimal budget allocated to advertising is greater than the actual value. This is translated by a negative gap between the optimal and the real value.

The first firm displays a negative gap only on the 1999 year and the second firm presents a negative gap over the years 1998 and 2000. Hanssens D.M and Joshi.A (2010) found that the increase in these expenses led to a gain in terms of market capitalization increase only if the existent expenses are between 94% and 117%, which correspond to the Dorfman-Steiner optimal thresholds.

It appears from the study that any deviation of the advertising expenses from the critical level leads to the decline of the market value of the firm. This conclusion affirms the existence of a non-linear relationship between advertising and the market capitalization. It follows that:

*H<sub>2</sub>: The contribution of the advertising to the value creation is positive but above a certain level it becomes negative.*

*H<sub>21</sub>: The degree of contribution of advertising depends on the business sector.*

### **2.3- Contribution of incentive and participation to the value creation**

As reported by Buchko (1993) the employee shareholding has implications on the individual behavior. Among these compartments, there are the motivation, the personal involvement and cooperation between employees:

- Motivation: This attitude is one of the most studied in the literature showing that the financial participation of employees increases their motivations [Webb (1912), Ben - Ner and Jones (1995), Long (1978a) and (1978b), Pierce and al. (1991), Pierce and Rodgers (2004)].

- Involvement: The employee shareholding favors the implication of the latter [Fröhlich et al. (1998), Pendleton (2001)]. In addition, a satisfied employee will be even more involved [Hallock et al. (2003)].

Beyond these advantages, the participation and the profit sharing mechanisms generate changes at the level of the firm. In fact, the introduction of this type of instrument offers several advantages such as:

- Reduction of agency costs: The financial participation allows reducing conflicts between employees and managers and contributing to the sustainability of companies [Desbrieres.P (1997)].

- Turnover: The companies that have adopted employee shareholding plans have significantly lower turnover rates [Buchko (1993)].

- Absenteeism: Brown and Fairbanks (1999) demonstrate that companies that choose incentive schemes have absenteeism rates significantly lower than other companies.

- Performance of work: Given that the financial participation of employee increases the involvement at work [Buchko (1992, 1993), Pendleton (2001)] and the involvement in turn favors the performance of the work, subsequently the employee participation has an effect on the work performance which can be measured by productivity [Riketta (2002)].

However, the employee shareholding has disadvantages such as the rising costs linked to their participation in the decision-making process [D'Arcimoles.C.H and Brillet.F (2002)] and the risk of the capital dilution of the company.

Many studies have examined the impact of the employee participation in the capital on the performance firm. This criterion is apprehended by different indicators such as turnover per employee, growth rate of sales, value added, the return on assets, financial profitability, stock price, etc.). The researches investigating the association between these two indicators are not numerous. We review the studies conducted by Hollandts.X (2007) and Donald.L and Bachelard.A (2009). The first used the price-to-book ratio (PBR) and the second utilized the market value added (MVA).

Hollandts.X (2007) has employed two groups of firms. The first is composed of 189 companies from the SBF 250 whose 104 companies practice incentive schemes and 85 companies do not exercise this mechanism. The second group consists of 152 companies including 62 companies with shareholding employee that responded to the questionnaire. The observation period elongates from the year 2001 to 2004. Hollandts.X (2007) estimated seven regressions where the dependent variable is the price-to-book ratio and the independent variables are divided into two classes.

The first group of variables reflects the employee ownership which contains three dichotomous variables, such as, the presence of shareholding employee, the mode of holding of securities (directly or indirectly) and the existence of an association of employees in the company. The other variables that reflect the financial participation of employees are the percentage of capital and of the voting rights held by the employees and the percentage of employee shareholdings.

The second group of variables describes the corporate governance. To These explicative variables, Hollandts.X (2007) integrates control variables, for example the number of employees, the turnover, the industrial sector, the concentration of ownership and the structure of government. Beside these variables, the author adds the square of the percentage of shares and voting rights held by all the employees. The incorporation of the square of these variables permits to see if there is or not a curvilinear relationship between the price-to-book ratio and the variables measuring the employee participation.

A first result confers that the presence of employee ownership has a positive and significant impact on the ratio of Price-to-book but this relation is not linear (in reverse-U).



Hollandts.X (2007) found that the optimum depends on the nature of the stocks held by the employees. In effect, the optimal percentage of common shares is 28.6 % and the optimal percentage of shares with right to vote is 28 %. This means that the percentage of employee shareholding is positively associated with the value creation for average levels and negatively related to the price-to-book ratio for high level. Consistent with to the author, these various rates are empirical values. They depend on the legal form of the firm, its capital distribution and the concentration of employee ownership.

A last result demonstrates that the presence of a non-internal Director Officer reduces the magnitude of the relation between employee ownership and the price-to-book ratio, consequently the threshold drops to 22%. This result emphasizes that the concrete integration of employee shareholding in decision-making within the Board of Directors has a negative effect of moderation.

Audard.L and Bachelard.A (2009) argue that the presence of a curvilinear relationship (U-reverse: ascending and descending phase) between the participation rate and the value creation is the result of several determinants. Among the factors that explain the increase of the employee participation drives to the growth of the price-to-book ratio (ascending phase), we distinguish:

- The conflict of interest between employee shareholding and managers is low;

- The investments on corporate savings plan (CSP) are often matched without right of entry and management fees. Accordingly, they appear much more attractive than the market such as banks and insurers;

During the descending phase, the authors suggest the following arguments:

- Employee shareholding is better informed through its participation in the general assemblies of the company. Therefore, they may act opportunistically at the expense of others and eventually of the firm sustainability because they tend to prefer quick benefits.

- The employee shareholding decisions in a short-term perspective can destabilize the direction of companies.

Audard.L and Bachelard.A (2009) presented graphically the liaison between market value added (MVA) and the financial participation of employees. The sample is composed of 13 companies which belong to the CAC 40 observed in the period 2000-2005. At first stage, these authors have determined the correlation for the total sample without taking into account the corporate sector, the correlation coefficient is in the order of 0.516.

At the second stage, the authors take into account the sectorial appertaining factor. The correlation analysis indicates that communication, media and multimedia sector (2 companies) presents negative correlation. Hence, the general public distribution sector (2 companies), the energy and basic products sector (4 companies) and telecommunication sector (2 companies) present all of them a positive and high correlation and finally automotive sector (3 companies) shows no correlation between value creation and financial participation of employees.

Audard.L and Bachelard.A (2009) sum up that the analysis on a small sample does not allow drawing from consistent conclusions on the relationship between the employee shareholding and the value creation. It is for that reason; they added other indicators like revenue, operating income, cash flow, financial autonomy, the productivity of the production potential, the economic profitability and the part of the employees in the added value

The correlation between these indicators and the participation of the employees is low with the exception of the correlation between the productivity and the percentage of the capital held by the latter. According to these authors, the employee shareholding is other than a means of remuneration. Audard.L and Bachelard.A argue that interactions between the incentive and participation schemes and performance indicators remain complex and non-automatic.

In summary, these researches confirm the existence of a non-linear association between the participation of employees and the value creation. This conclusion seems to be obvious, because if the participation rate exceeds the critical threshold it will lead to conflicts between shareholding employees and other partners, such as employees, internal and external shareholders and managers. The examinations of these last two works permit us to formulate the following hypothesis.

***H<sub>3</sub>: The contribution of the profit sharing and participation of the employees to the value creation is positive but away from a certain threshold, it becomes negative.***

***H<sub>31</sub>: The degree of contribution of the incentive schemes depends on the corporate sector.***

The empirical results from the studies reviewed throughout this section affirm the positive contribution of intangible investments in the value creation despite this liaison can be non-linear and it depends of several determinants mainly sectoral belonging factor.

It should be noted that we have not considered the theoretical studies related to the contribution of personnel training to the value creation. As stated by Ballot.G (2001) there is a strong interaction between research and development and staff training that is materialized by this sequence: innovation is stimulated by the personnel qualification and training of the R&D department. In effect, the majority of R&D spending is intended to pay for a highly skilled workforce and has an impact in terms of training and the aptitude improvement [Organization for Economic Cooperation and Development «OECD», 2006].

In our empirical analysis, we test the contribution of the training expenses to the value creation. To verify the connection between these two indicators we formulate following both hypotheses.

***H<sub>4</sub>: The contribution of the employees training to the value creation is positive but above a certain level, it becomes negative.***

***H<sub>41</sub>: The degree of contribution of the training rate depends on the business sector.***

## **2.4- Interrelationship of the intangible assets**

In accordance with Jacobson and Mizik (2003), the research and development alone does not improve the value of the firm, so it is necessary that it have a value of appropriation through advertising. It follows that research and development can create value via innovation on condition that it is marketed.

This point of view of the complementarity of intangible assets between them is supported by Kaplan and Norton (2004). This interrelation will make the foundation of the balanced scorecard and the strategy map. These two tools describe the process of value creation, starting from the learning and growth perspective and leading to the financial perspective.

The learning and growth perspective determines the critical intangible assets for the strategy. The purposes of this perspective identifies what tasks (human capital), what systems (informational capital) and what type of climate (organizational capital) required to support the process of the value creation. These assets should be grouped together and aligned to the internal process.

The internal perspective illustrates (operational management, customer management and innovation management) processes which transform the intangible assets into customer value and shareholder wealth.

The perspective of clients defines the value creation to the target clients. This proposal of value is the perception of products quality and a good condition delivery. These different dimensions of value creation depend enormously on the skills of the employees and the internal process. Accordingly, a coherent alignment of actions and capabilities is essential for the creation of value to customers and for the implementation of the strategy.

The financial perspective expresses the results of the strategy in financial terms. Among the indicators that explain whether or not the company's strategy has been successful, Kaplan and Norton (2004) cite the return on investment, value shareholder, profitability and growth revenues, etc.

The objectives of the four perspectives are interlinked through cause-effect relationships.

This theoretical overview allows us to formulate the last hypothesis which states that:

***H<sub>5</sub>: The contribution of the combination of intangible assets to the value creation is higher than the individual contribution of each of them.***

Motivated by the recent work of Hollandts.X (2007), Audard.L and Bachelard.A (2009), Hanssens.D.M and Joshi.A (2010) and Ike.C.E and Kingsley.O (2010). Our contribution in this research is to extend the last study to other components of intangible capital such as advertising, incentive schemes and employee training and analyze the effect of their combination to the value creation.

### **3- Methodology of research**

#### **3.1- Data collection and sample**

To test empirically our hypotheses we are resorted to accounting and stock-exchange data of non-financial French companies listed on Paris Stock Exchange. The database used for the analysis of our research is obtained through the following web sites. The sample of listed firms is gathered by Next News Information (Financial Information Provider) and Yahoo Finance. The annual reports are collected from the web site of the « Financial Markets Authority » and the sectoral classification from the website of Euronext.

Our selected sample is composed of 252 companies that are divided into three sectors: 100 industrial firms, 71 service companies and 81 technology enterprises.

A detailed description of the characteristics of our sample in terms of intangibles intensity [*research and development* « **RD.I** », *advertising* « **Adv.I** », *incentive (profit-sharing) and participation* « **IP.I** » and *training*« **Tra.I** »] is represented in the following table. The values that appear in the table represent the ratio of the expenses divided by the turnover.

INDUSTRIAL SECTOR						
Code ICB <sup>1</sup>	Activity sector <sup>2</sup>	Companies number	RD.I	Adv.I	IP.I	Tra.I
0500	Business oil and gas	5	1.09	2.58	0.36	2.43
1300	chemistry materials	5	2.28	1.97	0.34	1.78
1700	Raw materials	7	3.03	9.34	1.34	0.98
2350	Building and construction materials	11	0.95	4.58	0.35	1.32
2700	Goods and services industrial <sup>3</sup>	30	3.67	3.11	0.98	1.62
3300	Automobiles and equipment manufacturers	6	6.95	7.64	0.33	5.82
3500	Agri-food and beverages	14	1.93	8.67	0.22	4.72
3700	Household products and personal care <sup>4</sup>	22	4.21	12.09	0.18	1.51
	<b>TOTAL</b>	100	3.01	6.25	0.51	2.52
SERVICE SECTOR						
Code ICB	Activity sector	Companies number	RD.I	Adv.I	IP.I	Tra.I

<sup>1</sup> ICB: Industry Classification Benchmark

<sup>2</sup> Source: <http://www.euronext.com/trader/summerizedmarket>

<sup>3</sup> Industrial goods and services : aerospace and defense (2710), electronic and electric equipment, (2730), industrial engineering (2750), industrial transport (2770) and Support Services (2790).

<sup>4</sup> Household products and of personal care: household products and individual construction ( 3720 ), equipments of leisure ( 3740 ) and personal articles ( 3760 ).

<b>4500</b>	<b>Health</b> <sup>5</sup>	18	68.35	13.57	1.41	1.73
<b>5300</b>	<b>Distribution</b>	8	0.21	2.03	0.73	6.31
<b>5500</b>	<b>Media</b>	24	1.72	3.80	0.36	2.17
<b>5700</b>	<b>Travel and leisure</b>	12	1.62	3.76	0.43	3.47
<b>6500</b>	<b>telecommunications wireline</b>	3	0.96	1.05	0.33	1.24
<b>7500</b>	<b>Services to communities</b> <sup>6</sup>	6	1.78	0.25	0.22	2.56
	<b>TOTAL</b>	71	12.44	4.08	0.58	2.91
<b>TECHNOLOGY SECTOR</b>						
<b>Code ICB</b>	<b>Activity sector</b>	<b>Companies number</b>	<b>RD.I</b>	<b>Adv.I</b>	<b>IP.I</b>	<b>Tra.I</b>
<b>9530</b>	<b>software and services</b>	66	9.00	6.62	1.42	2.87
<b>9570</b>	<b>Equipment for information technology</b>	15	15.20	16.90	4.39	2.14
	<b>TOTAL</b>	81	12.10	11.76	2.90	2.51

**Table n°1: Sample description**

It is clear from the table that the service sector is highly involved in R&D activities; the major part is associated to the health branch that equals to 68.35%. At the same time, the service sector has the largest training expenditures (2.91%). As regards the advertising expenses and motivation of personnel, the technology sector displays the highest values to other sectors. Finally, the examination of the industrial sector reveals that automobiles and equipment manufacturer branches has simultaneously a high rate of R&D expenditures and staff training. They are respectively equal to 6.95% and 5.82%. Another feature of industrial firms is related to the marketing activities. The branch of household products and personal care represents the higher rate of advertising expenses of 12.09%, followed by the sector of raw materials (9.34%), the agri-food and beverages sector (8.67%) and the sector of automobiles manufacturer (7.64%).

In summary, the description of the sample allows us to conclude a priori that the degree of investment in intangible varies from one sector to another.

### **3.2- Variables and measures**

The definition and measurement of the different variables will be examined during the following subsection.

#### **3.2.1- Dependent Variable**

The explained variable is the market capitalization divided by turnover. According to Ike.C.E and Kingsley.O (2010), the capitalization reflects best the opinion of investors on net wealth and the value of the enterprise. It is calculated by multiplying the securities price at the

<sup>5</sup> Health : equipment and health services, pharmacy and biotechnology.

<sup>6</sup> Services in communities: electricity, Gas, water and multiple services.

end of year by the number of outstanding shares. Several authors use performance measures based on the assessment by the market in order to understand the return on investment of R&D [Chauvin and Hirshey (1993), Bae (2008)].

To avoid the problems related to the effects of the gap between the values and to facilitate the interpretations, we used the logarithmic variable **MV.I**. The transformed dependant variable that we will use in the estimation of the contribution of intangible capital is « **Ln (MV.I)** ».

### **3.2.2- Independent Variables**

We distinguish two parts of variables for the explanation of the variation of the market capitalization. The first group relates to indicators of intangible capital and we called them variables of interest. The second group is composed of the control variables namely the debt ratio, the size of the firm and the competitive structure of the market.

#### **A. Variables of interest**

Among the elements of intangible capital, we cite:

##### ✓ **Research and development**

The problem that arises for the measurement of this variable is related to the accounting method. In accordance with accounting standards such as **IFRS** « International Financial Reporting Standards » and **IAS 38** « International Accounting Standards », the research and development costs are activated when they meet the criteria of activation (generation of future economic benefits and assessment of costs in a reliable way).

For most French companies that constitute our sample, the research and development expenses are recognized as an expense in the period in which they are incurred. As a result, the ratio of R&D investment is equal to:

$$\mathbf{RD.I = RD/Sales}$$

Next to this variable in the model, the authors have introduced the square of RD.I. The addition of this variable allows capturing the existence of a non-linear relationship between value creation and research and development.

##### ✓ **Advertising**

The evaluation of this variable poses no problem because different firms in our sample record the cost of advertising in the income statement. The advertising rate is calculated as follows:

$$\mathbf{Adv.I = Adv/Sales}$$

##### ✓ **Incentive and participation**

In order to improve social policy, French companies launch a staff incentive scheme. It is manifested either by participation in the results, incentive schemes, the corporate savings plan, purchase options and "stock option".

The value of profit sharing and the participation of staff are represented in the account «personnel expenses ». This rate is measured by the following ratio:

$$\mathbf{IP.I = IP/Sales}$$

✓ **Training rate**

The amount of expenditures for training of the personnel is contained in notes out of the financial statements (social information). The rate of training is obtained by the division of expenditure on the training of staff on the payroll.

$$\mathbf{Tra.I = Training costs / Payroll}$$

**B. Control Variables**

✓ **Debt**

The leverage is assessed by the total debt divided by total assets. It is an indicator of risk supported by the company. According to Pantzalis (2001), the debt ratio controls the change of the firm value due to the difference in the structures of capital.

$$\mathbf{LEV = Total debt / Total assets}$$

✓ **Size**

The size is evaluated by the logarithm of the total turnover (sales) of the firm. In compliance with Ike.C.E and Kingsley.O, this transformation offers a close data distribution to the normal distribution.

$$\mathbf{SIZE = LOG (Sales)}$$

✓ **Market Concentration**

Previous studies have shown that the concentration has an impact on the variation of firm performance [Hsu and Boggs (2003)]. The assessment of the market structure is determined by the Herfindhal index. It is equal to the sum to the square of the ratio of the total turnover of the firms with regard to the total turnover of the sector. It is other than the sum of the square of the market share.

This index is calculated as follows:

$$\mathbf{CONC = \sum_{i=1}^N \left(\frac{S_i}{S}\right)^2}$$

Where :

$S_i$ : The annual sale of the company belonging to the nth segment,

S: The total sales of the sector,

N: The number of activity branches.

#### 4- Econometric models

We recall that our research is inspired from the work of Ike.C.E and Kingsley.O (2010). Our empirical analysis purposes to investigate firstly, the link between value creation and each component of the intangible capital (research and development, advertising, incentive and participation and staff training) and secondly, the impact of the combination of the different intangible elements on the value creation.

##### 4.1 - Univariate models

The study of the contribution of each intangible asset is done through the following regressions:

$$\text{Regression n } ^\circ 1: \ln (MV.I)_{it} = \beta_0 + \beta_1 RD.I_{it} + \beta_2 RD.I_{it}^2 + \beta_3 SIZE_{it} + \beta_4 LEV_{it} + \beta_5 CONC_{it} + \sum \beta_j (YEAR)_j$$

This regression highlights simultaneously on the study of the linear and non-linear relationship between the market capitalization of the company and the rate of research and development expenditure.

$$\text{Regression n } ^\circ 2: \ln (MV.I)_{it} = \beta_0 + \beta_1 Adv.I_{it} + \beta_2 Adv.I_{it}^2 + \beta_3 SIZE_{it} + \beta_4 LEV_{it} + \beta_5 CONC_{it} + \sum \beta_j (YEAR)_j$$

The second regression accentuates at the same time on the review of the linear and non-linear link between the market capitalization and the rate of advertising expenses.

$$\text{Regression n } ^\circ 3: \ln (MV.I)_{it} = \beta_0 + \beta_1 IP.I_{it} + \beta_2 IP.I_{it}^2 + \beta_3 SIZE_{it} + \beta_4 LEV_{it} + \beta_5 CONC_{it} + \sum \beta_j (YEAR)_j$$

The third regression focuses on the analysis of linear and non-linear relationship between the market capitalization and the rate of incentive and participation of staff.

$$\text{Regression n } ^\circ 4: \ln (MV.I)_{it} = \beta_0 + \beta_1 Tra.I_{it} + \beta_2 Tra.I_{it}^2 + \beta_3 SIZE_{it} + \beta_4 LEV_{it} + \beta_5 CONC_{it} + \sum \beta_j (YEAR)_j$$

The last regression emphasizes on the examination of the linear and non-linear liaison between the market capitalization of the company and the rate of training of personnel.

Where:

The index « i » and « t » denote respectively the company and the year.



**Ln (MV.I):** The logarithm of market capitalization divided by the sales

**RD.I:** The R&D expenses ratio (RD.I = RD/Sales)

**RD.I<sup>2</sup>:** The square of the R&D expenses ratio

**Adv.I:** The advertising rate (Adv.I = Adv /Sales)

**Adv.I<sup>2</sup>:** The square of the advertising rate

**IP.I:** The percentage of incentive and participation of employees (IP.I = IP /Sales)

**IP.I<sup>2</sup>:** The square of the percentage of incentive and participation

**Tra.I:** The proportion of training expenses (Tra.I = Training costs / Payroll)

**Tra.I<sup>2</sup>:** The square of the proportion of training expenses

**SIZE:** Logarithm of the total turnover (sales) of the firm (SIZE = LOG (Sales))

**LEV:** Leverage rate (LEV = Total debt / Total assets)

**CONC:** The market concentration ()

The next point of our empirical analysis is dedicated to the investigation of the contribution of the connection between different elements of intangible capital.

## 4.2 - Multivariate model

In order to study the impact of the association between the four intangible expenses, we use the following regression:

$$\text{Ln (MV.I)}_{it} = \beta_0 + \beta_1 \text{RD.I}_{it} + \beta_2 \text{RD.I}_{it}^2 + \beta_3 \text{Adv.I}_{it} + \beta_4 \text{Adv.I}_{it}^2 + \beta_5 \text{IP.I}_{it} + \beta_6 \text{IP.I}_{it}^2 + \beta_7 \text{Tra.I}_{it} + \beta_8 \text{Tra.I}_{it}^2 + \beta_9 \text{SIZE}_{it} + \beta_{10} \text{LEV}_{it} + \beta_{11} \text{CONC}_{it} + \sum \beta_j (\text{YEAR})_j$$

The intention behind the estimation of this model resides in the analysis whether the simultaneous integration of the four intangible elements allows improving their contributions to the value creation.

The econometric software « *SATAT 10* » provides the results of estimation of the different regressions.

## 5 - Results and discussion

This sub-section will be organized into three points. The first will treat the descriptive statistics. As for the second point will be dedicated to the study of the individual contribution of intangible assets in the explanation of the value creation and the third point will treat the impact of the association of the four components of intangible capital.

### 5.1 - Descriptive analysis

The following table mentions the mean, the minimum value, maximum value, and standard deviation related to the variables used for the estimation of the models below.

TOTAL SAMPLE								
	Ln (MV.I)	RD.I	Adv.I	IP.I	Tra.I	LEV	SIZE	CONC
<b>Mean</b>	4.331	11.165	13.729	1.039	2.595	22.274	5.680	0.511
<b>Minimum</b>	-2.255	0	0	0	0	0	-2.764	0.169
<b>Maximum</b>	9.852	1654.1	311.111	149.33	86.699	228.125	12.564	1
<b>Standard deviation</b>	1.320	66.400	22.731	5.669	6.240	17.351	2.434	0.245
INDUSTRIAL SECTOR								
	Ln (MV.I)	RD.I	Adv.I	IP.I	Tra.I	LEV	SIZE	CONC
<b>Mean</b>	4.057	3.820	13.471	0.550	2.294	26.761	6.393	0.561
<b>Minimum</b>	-0.113	0	0	0	0	0	-2.764	0.239
<b>Maximum</b>	9.852	60.835	88.728	26.976	63.157	94.097	11.975	0.999
<b>Standard deviation</b>	1.288	8.038	14.518	1.878	5.112	15.765	2.312	0.186
SERVICE SECTOR								
	Ln (MV.I)	RD.I	Adv.I	IP.I	Tra.I	LEV	SIZE	CONC
<b>Mean</b>	4.456	22.000	10.230	0.666	2.860	23.831	6.178	0.680
<b>Minimum</b>	-2.255	0	0	0	0	0	0.244	0.401
<b>Maximum</b>	9.030	1654.111	311.111	41.309	86.699	228.125	12.564	1
<b>Standard deviation</b>	1.376	125.110	24.155	2.742	8.769	19.513	2.727	0.192
TECHNOLOGY SECTOR								
	Ln (MV.I)	RD.I	Adv.I	IP.I	Tra.I	LEV	SIZE	CONC
<b>Mean</b>	4.559	10.960	17.541	1.969	2.737	15.369	4.363	0.301
<b>Minimum</b>	-1.308	0	0	0	0	0	-0.576	0.169
<b>Maximum</b>	9.303	166.28	233.052	149.333	52.194	77.172	10.114	0.920
<b>Standard deviation</b>	1.249	18.036	28.467	9.374	4.746	14.907	1.657	0.197

**Table n°2: Descriptive statistics**

The observation of this table demonstrates that the highest rate for research and development and advertising expenditures characterizes respectively the service and technology sector.

The fifth column of the table n° 2 outlines that the percentage of incentive and participation is low for the whole sample; it varies from 0.55 to 2%. Identically to the training rate which fluctuates between 2.3% and 2.9%.

Another characteristic that typifies the sample is related to a low disparity of the explanatory variables with the exception of (**RD.I**), (**PUB.I**) and (**LEV**). These three variables displayed the highest standard deviation. This result is valid for the total sample and the various sectors. A high standard deviation for variables (**RD.I**) and (**PUB.I**) can be explained by the fact that some companies spend more in research and development and marketing activities than others do. At the level of sectors, the high-tech business is identified by a high deviation of

advertising expenses relatively to the others sectors however the service sector presents the highest standard deviation for variables (**RD.I**) and (**LEV**).

## 5.2 - Study of the correlations

The second step of the descriptive analysis is to verify the presence or not of the problem of multicollinearity. The examination of these matrixes (see appendix) allows us to identify the following interpretations:

- The presence of a positive correlation between the market capitalization, the research and development expenditures (**RD.I**), advertising expenses (**Adv.I**), the incentive and participation of the staff (**IP.I**) and their squares. Nevertheless, the correlation coefficient is negative and not significant between the market capitalization and the training rate (**Tra.I**). This result is checked for the total sample and three business groups.

-The existence of a strong correlation between the variable **RD.I** and **RD.I<sup>2</sup>**. The correlation coefficient equals respectively 0.9102, 0.9010, 0.9230, and 0.8665 (significant at the 1% level of confidence) for the total sample and different sectors.

Conforming to Ike C.Ehie and Kingsley Obi (2010), the presence of multicollinearity between these two explanatory (**RD.I** and **RD.I<sup>2</sup>**) variables poses no problem. In effect, the objective of the study regards firstly to analyze the contribution of the research and development rate to the market capitalization and secondly to test the presence of a curvilinear relationship between these two indicators. In the highlight of this deduction, these authors conclude that the omission of the variable **RD.I<sup>2</sup>** may bias the results. The presence of a strong correlation is checked for the other explanatory variables and their squares (see appendix).

- The review of the correlation matrix indicates that the correlation coefficient is positive and very strong only for the total sample ( $\rho_{RD.I, PUB.I} = 0.6118$ ) and service sectors ( $\rho_{RD.I, PUB.I} = 0.9347$ ). Thus, there is a problem of multicollinearity. To correct the problem we estimate the contribution of each variable separately (see sub-section 5.4: Regression 1' Regression 2', Regression 4' and Regression 5'). An explanation of this result testifies the interrelation between R&D and advertising. In fact, RD disconnected from marketing activities does not improve the value of the firm, as well as it is combined with it.

## 5.3 - Contribution of the immaterial to value creation: simple regression

Before giving the results of estimation, we must specify the econometric characteristics of our sample. The specification test indicates that the whole sample is not homogeneous (hypothesis null is rejected at the threshold of 1%). This translates into the presence of effects associated with individuals (firms).

These effects may be fixed or random. The choice between these two specifications is made through the Hausman test. The application of this test shows that the method of estimation with fixed effect is opted for the various groups of companies excepting the technology firms (random effect). The results of the estimation of the univariate regressions will be detailed in the next sub-section.

### 5.3.1 - Relationship between research and development expenses and market capitalization

Dependant Variable : Market capitalization				
	TOTAL SAMPLE	INDUSTRIAL SECTOR	SERVICE SECTOR	TECHNOLOGY SECTOR
Constant	6.414188 (18.61)*	6.891988 (10.67)*	5.681457 (6.91)*	5.311913 (18.49)*
RD.I	0.001640 (1.03)	0.123432* (5.79)	0.000802 (0.39)	0.012866*** (1.94)
RD.I <sup>2</sup>	-0.000009 (-0.99)	-0.002223* (-5.36)	-0.000000 (-0.23)	-0.000030 (-0.59)
LEV	-0.004602** (-2.56)	-0.017218* (-5.43)	0.005605** (1.97)	-0.014914* (-4.59)
SIZE	-0.258033* (-5.67)	-0.290860* (-4.71)	0.005215 (0.05)	-0.272929* (-5.15)
CONC	-1.06043** (-2.53)	-1.484161** (-2.15)	-1.909856* (-2.62)	1.748199* (3.91)
N	221	86	60	75
R <sup>2</sup>	3.04	13.97	3	18.34
Fisher	9.61	19.26	2.53	82.18
Prob> F	0.000	0.000	0.0284	0.000
Test de Breusch- Pagen	1793.16	908.77	231.13	558.60
Prob > Chi2	0.000	0.000	0.000	0.000
Test d'Hausman	36.56	45.60	44.85	6.49
Prob > Chi2	0.000	0.000	0.000	0.1654 <sup>1</sup>

Table n °3: Impact of research and development expenditures on market capitalization

Values in parentheses represent the t-student,

<sup>1</sup> Wald Chi (2): statistics of global significance used in the case of the random effect regression  
\*significant at the level 1%, \*\*significant at the level 5%, \*\*\*significant at the level 10%.

The interpretation of this table demonstrates that the model is globally significant at the threshold of 1%. Research and development contributes positively to the market capitalization. Nonetheless, we observe some differences between the three sectors, the most significant contribution of R&D expenditures appears for industrial enterprises (estimated coefficient equal to 12.34% significant at the 1% threshold) and then technology companies (1.28% significant at the 5% threshold).

Although, the descriptive analysis exhibits that the service sector registers a high value of the rate of R&D expenditures, the results of estimation shows that the contribution of the R&D is not significant. This result can be explained by the fact that these companies, resort to other organisms of research such as universities (for example pharmacy and biotechnology sector, etc).

The last point of the estimation of the first regression resides in the test of the presence of the non-linear relation between the intensity of research and development and the market capitalization. Table n°3 mentions that the estimated coefficient of the variable **RD.I<sup>2</sup>** is

significant at the level 1% only for the group of industrial enterprises. At this stage, we can determine the optimal value for the ratio of research and development for which the market capitalization is maximum. To do this, we simply compute the first derivative of the equation:

$$\text{Ln (MVI)}_{it} = \beta_0 + \beta_1 \text{RD.I}_{it} + \beta_2 \text{RD.I}_{it}^2 + \beta_3 \text{LEV}_{it} + \beta_4 \text{SIZE}_{it} + \beta_5 \text{CONC}_{it} + \Sigma \beta_j$$

$$(\text{YEAR})_j$$

This threshold is calculated as follows:

$$\frac{\partial(\text{Ln (MV.I)})}{\partial(\text{RD.I})} = 0 \rightarrow \beta_1 + 2\beta_2 \text{RD.I}^* = 0 \rightarrow \text{RD.I}^* = -\frac{\beta_1}{2\beta_2}$$

The optimum is equal to **27.76%**, for a rate lower than the critical threshold, any increase in R&D spending creates value, but above this value, the effect becomes negative. Our results are conform to those of Ike C.Ehie and KingsleyOlibe (2010) who found at the same time, that the contribution of research and development to market capitalization is significantly positive and the relationship between these two measure are curvilinear. Nonetheless, the industrial firms are more involved research and development activities than the service companies are.

In summary, the results of the estimation of the first regression, we conclude that the hypotheses **H<sub>1</sub>** (the relationship between the **R&D** rate and the value creation is non-linear) and **H<sub>11</sub>** (the business sector influences the importance of the contribution of **R&D** expenditures) are confirmed.

Now in regards to the influence of the control variables on the market capitalization we found that size and indebtedness act negatively and significantly for industrial and technology firms, (this result is valid for regressions are below). On the contrary, the service sector displays different results. Indeed, debt favorably affects the enterprise value the coefficient estimated for the debt ratio equal to 0.56% (significant at the 5% threshold). The positive impact of the debt on the market capitalization is checked for other regressions. For the variable size, its impact is positive but not significant. Finally, the market concentration index affects negatively the market capitalization for industrial and services companies but it has a positive effect on the market value of technology companies. It should be noted that this last result is valid for other regressions (with the exception of regression n °2).

Comparison of the results that we have found and those obtained by Ike.C.E and Kingsley.O reveals some differences. These authors have shown that the size and concentration act unfavorably on the market capitalization and this regardless the sector of activity. The last variable concerns the debt ratio; this indicator influences favorably the value creation of industrial firms while it has a negative effect for the service ones.

### 5.3.2 - Relationship between advertising spending and market capitalization

Dependant Variable : Market capitalization				
	TOTAL SAMPLE	INDUSTRIAL SECTOR	SERVICE SECTOR	TECHNOLOGY SECTOR
<b>Constant</b>	6.290374* (11.72)	5.970963* (10.71)	6.23144* (5.53)	5.172488* (11.98)
<b>Adv.I</b>	0.000977 (0.20)	0.024522*** (1.78)	0.001021 (0.08)	0.007755 (1.14)
<b>Adv.I<sup>2</sup></b>	0.000004 (0.23)	-0.000282*** (-1.70)	-0.000005 (-0.14)	0.000000 (0.03)
<b>LEV</b>	0.001251 (0.58)	-0.016222* (-3.93)	0.009195* (3.04)	-0.015701* (-3.02)
<b>SIZE</b>	-0.300431* (-4.25)	-0.227059* (-4.37)	-0.227130 (-1.39)	-0.208922* (-2.78)
<b>CONC</b>	-0.026501 (-0.05)	0.055860** (0.09)	-0.592228 (-0.61)	1.709052* (2.78)
<b>N</b>	132	51	40	41
<b>R<sup>2</sup></b>	2.82	18.19	4.59	21.10
<b>Fisher Prob&gt; F</b>	5.11 0.000	42.78 0.000	2.54 0.029	42.88 0.000
<b>Test de Breusch- Pagen Prob &gt; Chi2</b>	1050.61 0.0000	636.61 0.000	175.10 0.000	337.68 0.000
<b>Test d'Hausman Prob &gt; Chi2</b>	27.07 0.000	7.63 0.1061 <sup>1</sup>	351.63 0.000	6.17 0.1868 <sup>2</sup>

Table n °4: Impact of advertising spending on market capitalization

Values in parentheses represent the t-student,

<sup>1-2</sup> Wald Chi (2): statistics of global significance used in the case of the random effect regression

\*significant at the level 1%, \*\*significant at the level 5%, \*\*\*significant at the level 10%.

It appears from the table n°4 that advertising spending has a positive impact on the market capitalization, however, this contribution it is significant only for the industrial company (2.452%). Once again the results prove that the sectoral membership factor plays an important role in the explanation of the extent of the influence of intangibles on the creation value.

The non-significance of this variable does not imply that the service and technology sector are not involved in marketing activities. Several factors, such as the position of the companies on the market (leaders or young companies), the advertising strategies (aggressive or defensive) and the reactions of investors-clients to any increase in these expenditures can explain the results. All these factors lead that these expenditures are not immediately incorporated into the stock price [Hanssens.D.M and Joshi.A (2010)].

Another point to analyze is related to the presence or not of curvilinear relationship between the advertising expenditures and market capitalization. In effect, the square of the explanatory variable (**Adv.I<sup>2</sup>**) is significant at the threshold 10% for industrial companies. At this step, we determine the critical level of advertising expenditures that maximize the market capitalization. The first derivative of the second regression shows that the optimum value equals to **43.37%**.

In summing up the results of the estimation of the second regression, we deduce that the hypotheses  $H_2$  (the link between the advertising intensity and the value creation is non-linear) and  $H_{21}$  (the appertaining sectoral factor influences the degree of the contribution of advertising expenditures) are verified.

### 5.3.3 - Relationship between incentives and participation application and market capitalization

Dependant Variable : Market capitalization				
	TOTAL SAMPLE	INDUSTRIAL SECTOR	SERVICE SECTOR	TECHNOLOGY SECTOR
<b>Constante</b>	6.433914* (20.83)	7.871703* (14.04)	6.009694 (8.63)	5.426588* (20.15)
<b>IP.I</b>	0.023657** (2.48)	0.163608** (2.29)	0.132569** (2.32)	0.017545*** (1.65)
<b>IP.I<sup>2</sup></b>	-0.000087 (-1.19)	-0.003292 (-1.34)	-0.003434** (-2.20)	-0.000044 (-0.56)
<b>LEV</b>	-0.004164** (-2.53)	-0.011112* (-4.01)	0.005752** (2.19)	-0.014741* (-4.68)
<b>SIZE</b>	-0.261899* (-6.45)	-0.308804* (-5.58)	-0.134885 (-1.44)	-0.254541* (-5.13)
<b>CONC</b>	-1.06372* (-2.90)	-2.884524* (-4.80)	-1.348915** (-2.16)	1.458064* (3.39)
<b>N</b>	252	100	71	81
<b>R<sup>2</sup></b>	3.86	9.35	3.26	14.25
<b>Fisher Prob&gt; F</b>	14.13 0.000	14.35 0.000	3.32 0.005	76.80 0.000
<b>Test de Breusch-Pagen Prob &gt; Chi2</b>	2333.23 0.0000	1054.86 0.000	450.35 0.000	659.69 0.000
<b>Test d'Hausman Prob &gt; Chi2</b>	35.26 0.000	42.23 0.000	45.44 0.000	5.38 0.250 <sup>1</sup>

Table n °5: Impact of incentive and participation on market capitalization

Values in parentheses represent the t-student,

<sup>1-2</sup> Wald Chi (2): statistics of global significance used in the case of the random effect regression  
\*significant at the level 1%, \*\*significant at the level 5%, \*\*\*significant at the level 10%.

The observation of this table shows that the motivation of staff (measured by the rate of profit sharing and participation) influences favorably the market capitalization. The estimated coefficient for the **IP.I** variable is positive and statistically significant for the total sample and different sectors. The most important contribution is registered for industrial then the service firms. It is clear that the corporate sector affects the liaison between intangible expense and the value creation.

The second step of the estimation of the regression n°3 concerns the non-linearity relation between the market value of the company and the intensity of employee's participation. Indeed, the estimated coefficient of the variable **IP.I<sup>2</sup>** is significant only for the service sector. The optimal value of profit sharing and participation ratio equals to **19.30%**, any increase of this ratio above the critical threshold causes a decrease in market capitalization.

For more details on the factors that drive to the wealth creation or on the contrary to the destruction value, see the sub-section 2.3 of this paper.

By recapitulating the results of the estimation of the third regression, we conclude that the hypotheses  $H_3$  (the association between profit sharing and participation rate and the value creation is non-linear) and  $H_{31}$  (the business sector affects the magnitude of the contribution of shareholding employees) are approved.

### 5.3.4 - Relationship between training cost and market capitalization

Dependant Variable : Market capitalization				
	TOTAL SAMPLE	INDUSTRIAL SECTOR	SERVICE SECTOR	TECHNOLOGY SECTOR
Constant	6.519715* (21.13)	7.911768* (14.02)	6.475251* (9.49)	5.460121* (20.11)
Tra.I	0.026738*** (1.83)	0.091940* (2.73)	-0.007092 (-0.34)	0.014215 (0.59)
Tra.I <sup>2</sup>	-0.000472** (-2.49)	-0.001085** (-2.33)	-0.000138 (-0.54)	0.000439 (0.79)
LEV	-0.003998** (-2.48)	-0.010498* (-3.73)	0.005949** (2.48)	-0.014537* (-4.61)
SIZE	-0.312458* (-7.80)	-0.328908* (-5.94)	-0.304185* (-3.28)	-0.273803* (-5.71)
CONC	-0.704974*** (-1.93)	-2.89652* (-4.76)	-0.311984 (-0.52)	1.543694* (3.60)
N	247	98	68	81
R <sup>2</sup>	4.38	6.69	5.51	14.25
Fisher Prob> F	15.81 0.000	13.42 0.000	5.49 0.000	76.69 0.000
Test de Breusch- Pagen Prob > Chi2	2437.87 0.000	1158.24 0.000	538.30 0.000	657.43 0.000
Test d'Hausman Prob > Chi2	31.45 0.000	38.36 0.000	50.78 0.000	5.72 0.3349 <sup>1</sup>

Table n °6: Impact of training rate on market capitalization

Values in parentheses represent the t-student,

<sup>1</sup> Wald Chi (2): statistics of global significance used in the case of the random effect regression

\*significant at the level 1%, \*\*significant at the level 5%, \*\*\*significant at the level 10%.

The table n °6 indicates that the contribution of training is significantly positive only for the manufacturing companies at the level 1%. Now it remains to know if there is a non-linear relationship between market capitalization and the training rate. This last regression shows that the coefficient of the explanatory variable ( $Tra^2$ ) is significant at the level 5% for industrial firms. The critical threshold that corresponds a maximum value of market capitalization equals to **42.33%**. This result implies that the company has to dedicate 42.33% of the payroll to optimize the value creation.



Summarizing these issues, we deduce that the hypotheses **H<sub>4</sub>** (the link between training rate and the value creation is non-linear) and **H<sub>41</sub>** (the business sector influences the degree of the contribution of the training) are validated.

In brief, the results of the estimation of these four regressions shows that the industrial sector is increasingly involved in intangible investments since we found that the estimated coefficients of these variables **RD.I**, **Adv.I**, **Tra.I** and there square are significant. However, the service sector displays simultaneously a significant estimated coefficient for the variable (I.PI) and its square (I.PI<sup>2</sup>).

#### 5.4 - Contribution of the immaterial to value creation: multivariate regression

During this sub-section, we study the contribution of the various immaterial elements that we examined previously. Our objective consists in analyzing if the integration at the same time of these four immaterial components (**RD.I**, **Adv.I**, **IP.I** and **Tra.I**) improve their contribution to the explanation of the value creation?

We will proceed by the heteroscedasticity test then the homogeneity test and finally the test of the individual effects (Hausman test). The first two tests are remained valuable (the samples are not homogeneous and there is not a problem of heteroscedasticity), nevertheless, the Hausman test shows some differences from the simple regressions. The results indicate that for the total sample and service firms, we will apply the fixed effect method but for the manufacturing and technology companies we will use the random effects model.

In advance of analyzing the results of the last regression, it is worth noting that we have found a strong correlation between the variable (**RD.I**) and the variable (**Adv.I**) for the whole sample and service firms. To correct the problem of multicolinearity, we estimate the contribution of each variable separately. Hence, we will have six regressions to estimate. The results are summarized in the following table:

$\text{Ln(MVD)}_{it} = \beta_0 + \beta_1 \text{RD.I}_{it} + \beta_2 \text{RD.I}_{it}^2 + \beta_3 \text{Adv.I}_{it} + \beta_4 \text{Adv.I}_{it}^2 + \beta_5 \text{IP.I}_{it} + \beta_6 \text{IP.I}_{it}^2 + \beta_7 \text{Tra.I}_{it} + \beta_8 \text{Tra.I}_{it}^2 + \beta_9 \text{SIZE}_{it} + \beta_{10} \text{LEV}_{it} + \beta_{11} \text{CONC}_{it} + \sum \beta_j (\text{YEAR})_j$						
	TOTAL SAMPLE		INDUSTRIAL SECTOR	SERVICE SECTOR		TECHNOLOGY SECTOR
	Regression 1'	Regression 2'	Regression 3'	Regression 4'	Regression 5'	Regression 6'
<b>Constant</b>	6.144699* (17.36)	6.221099 (11.39)	5.336096* (9.13)	6.039159* (7.04)	5.54175* (4.68)	5.256034* (11.36)
<b>RD.I</b>	0.001229 (0.79)		0.067111* (2.91)	0.000001 (0.00)		0.002368 (0.24)
<b>RD.I<sup>2</sup></b>	-0.000000 (-0.66)		-0.001207* (-2.81)	0.000000 (0.21)		-0.000005 (-0.08)
<b>Adv.I</b>		-0.000139 (-0.03)	0.027217*** (1.85)		-0.000994 (-0.08)	0.004930 (0.61)
<b>Adv.I<sup>2</sup></b>		0.000008 (0.44)	-0.000453* (-2.59)		0.000005 (0.15)	0.000014 (0.41)
<b>IP.I</b>	0.020109** (0.040)	0.011679 (0.77)	0.443382* (3.64)	0.112075*** (1.79)	0.196134** (2.29)	-0.009128 (-0.46)
<b>IP.I<sup>2</sup></b>	-0.000070 (-0.93)	-0.000047 (-0.47)	-0.023505* (-2.59)	-0.002864*** (-1.73)	-0.005009** (-2.23)	0.000011 (0.09)

<b>Tra.I</b>	0.050045** (0.011)	0.003639 (0.16)	-0.00359 (-0.11)	0.019755 (0.51)	-0.025852 (-0.81)	-0.010490 (-0.12)
<b>Tra.I<sup>2</sup></b>	-0.000779* (-3.07)	-0.000098 (-0.33)	-0.000154 (-0.32)	-0.000514 (-1.10)	0.000200 (0.49)	0.003636 (0.84)
<b>LEV</b>	-0.004092** (-2.34)	0.001451 (0.66)	-0.015928* (-3.63)	0.007701* (2.90)	0.010588* (3.42)	-0.014079* (-2.59)
<b>SIZE</b>	-0.275593* (-5.99)	-0.287436* (-3.98)	-0.211925* (-3.99)	-0.203653*** (-1.74)	-0.142011 (-0.83)	-0.261006* (-3.01)
<b>CONC</b>	-0.552583 (-1.32)	-0.059378 (0.10)	0.304985 (0.46)	-0.729713 (-1.02)	-0.563545 (-0.57)	2.049765* (2.93)
<b>N</b>	216	130	45	57	39	38
<b>R<sup>2</sup></b>	4.74	2.83	18.41	6.14	7.41	20.93
<b>Fisher Prob&gt; F</b>	8.25* 0.0000	2.80* 0.0031	69.19* 0.0000	2.80* 0.0034	2.25* 0.0196	44.88* 0.0000
<b>Test de Breusch- Pagen Prob&gt; Chi2</b>	1811.48 0.0000	990.22 0.0000	409.07 0.0000	237.70 0.0000	146.55 0.0000	294.41 0.0000
<b>Test d'Hausman Prob&gt; Chi2</b>	32.72 0.0000	30.91 0.0000	4.58 0.8011 <sup>1</sup>	48.70 0.0000	222.83 0.0000	10.37 0.2399 <sup>2</sup>

**Table n °7: simultaneous contribution of the intangible elements to the market capitalization**

Values in parentheses represent the t-student,

<sup>1-2</sup> Wald Chi (2): statistics of global significance used in the case of the random effect regression  
\*significant at the level 1%, \*\*significant at the level 5%, \*\*\*significant at the level 10%.

The *regression 1'* indicates that the combination of all intangible elements leads to the improvement of the contribution of training expenditures. It becomes equal to **5%** significant at the 5% confidence level, while it was **2.673%** (significant at the 10% threshold). This result proves that the fruits of training are most important when they are associated with motivated and well-integrated employees.

The results of the estimation of the *regression 3'* (industrial sector) demonstrate the existence of a significant increase in the contribution of the **Adv.I** and **IP.I**. The first variable grows from **2.452%** (see table n °4) to **2.721 %** but the second variable increases from **16.360%** (see table n °5) to **44.338%**.

For the service companies, the impact of training expenditures becomes more important on the market capitalization, but it remains non-significant (*regression 4'*). The estimated coefficient becomes equal to **1.975%** instead of **-0.709%** (see table n °6). For the same group we obtain a different result regarding the contribution of the staff incentive to the variation of the market capitalization. Indeed, when it is combined to other intangible elements its contribution increased from **13.256 %** to **19.613 %** (see *regression 5'*).

Finally, for the technology companies, we notice no improvement of the contribution of the different variables. On the contrary, the estimation of simple regression gives better and more significant results than the multivariate regression.

Now as regards the control variables, the results show that they practically did not change sign. In effect, the size and debt affect negatively the market capitalization of the industrial and technology firms. For service companies the market value increases with the leverage. Finally, the impact of competition, it keeps its positive sign for technology companies but for the other two sectors, the competition has no significant effect.

The last point of the multivariate analysis focuses on the verification of the curvilinear link between intangible expenditures and value creation.

The observation of the table n °7 allows us to calculate the optimum values of the intangible expenses. The following table provides these values (the empty boxes reflect non-significant contribution of the explanatory variable):

	TOTAL SAMPLE		INDUSTRIAL SECTOR		SERVICE SECTOR		
	Univariate regression	Multivariate regression (regression 1')	Univariate regression	Multivariate regression (regression 3')	Univariate regression	Multivariate regression (regression 4')	Multivariate regression (regression 5')
<b>RD.I</b>			27.76	27.79			
<b>Adv.I</b>			43.37	30.03			
<b>IP.I</b>			24.84	9.43	19.30	19.56	19.57
<b>Tra.I</b>	28.29	32.09	42.33				

**Table n °8: Comparison of the optima of the explanatory variables  
(Univariate and multivariate regression)**

The main results are:

- A first result is relative to the total sample. Indeed, the optimum of the training rate increased only by **3.8%** following the integration of three other explanatory variables.
- The second issue concerns the critical rate of R&D, which remained unchanged. Hence, the optimum rates of advertising and participation employees decreased respectively by **13.28%** and **15.41%**. Concretely, the reduction of these two rates implies that industrial companies can reach a maximum value of market capitalization for weaker intangible expenses. This is an advantage for the firm, since she spends less and in return, its market value increases. This decrease is due to the association of intangible assets together.
- A third result corresponds to service firms. They displayed an optimum value of the ratio of profit sharing and participation that remains practically constant. The contribution of other variables appears to be not significant in explaining the market capitalization (*regression 4', regression 5'*).

In summary, it emerges from the last analysis that industrial companies are more involved in intangible investments because they register the largest improvement at the level of advertising spending and of participation of staff. Secondly are the service companies, which

show a significant amelioration at the level of the profit sharing and the participation of the employees. Finally, we found that the combination of different intangibles leads to the decrease of the optimal value of immaterial expenses and simultaneously to the growth of the market capitalization. At this level, we conclude that the fifth hypothesis is confirmed.

### ***Conclusion***

Our research brings an analysis of the impact of the combination of the intangible assets together on the value creation. It emerges from our empirical analysis that research and development expenditures advertising expenses, the participation of the staff and the training of employees influence favorably the value creation of the firm (measured by market capitalization). The degree of influence varies from one sector to another, indeed the results obtained previously show that the industrial sector is the most involved in intangible investments (coefficients estimated explanatory variables RD.I, Adv.I, IP.I and Tra.I are significant), then the service sector and finally the technology sector.

The second conclusion concerns the presence of a non-linear relationship between the market capitalization and the determinants of intangible capital. We calculated the optimum of the explanatory variables beyond which the market capitalization decreases.

The last finding shows that the integration of the different intangible assets causes the betterment of the individual contribution of each of them by the decrease of the optimal value of immaterial expenses and in the same time the rise of the market capitalization.

The limits of our search are related at first to the low number of companies by branch what prevented us from leading a more meticulous study. To our knowledge this allows to seize better the degree of contribution of the immaterial for every sub-sector that presents the same characteristics. The second limit concerns the absence of the data on certain indicators that seems to be important in the study of the role of the immaterial in value creation. Among these indicators, we cite as an example patents, share of customer's wallet, etc.

Indeed, new avenues of research can be envisaged to pursue this work. First, it would be interesting to consider the human resources as the key source of value creation. Then when we speak about the immaterial, we have to consider it as an inseparable group. The good association between the various immaterial components guarantees not only the value creation for the shareholders but for all the partners and consequently the survival and the reputation of the company.

Certainly, our research does not allow the generalization of the results achieved for all the firms of various sizes or various sectors. However, it participates on the debate on the immaterial and on its crucial role at the level of the company and at the level of the economy.

## Appendix: Correlation Matrix

TOTAL SAMPLE												
	Ln (MV.I)	RD.I	RD.I <sup>2</sup>	Adv.I	Adv.I <sup>2</sup>	IP.I	IP.I <sup>2</sup>	Tra.I	Tra.I <sup>2</sup>	LEV	SIZE	CONC
Ln (MV.I)	1											
RD.I	0.2670*	1										
RD.I <sup>2</sup>	0.1620	0.9102*	1									
Adv.I	0.3541*	0.6118*	0.5014*	1								
Adv.I <sup>2</sup>	0.2405**	0.7667*	0.7706*	0.8244*	1							
IP.I	0.1632	0.1036	0.0135	0.3256*	0.2817*	1						
IP.I <sup>2</sup>	0.0874	0.0636	0.0051	0.3038*	0.3350*	0.8589*	1					
Tra	-0.0269	0.0155	0.0086	-0.0148	-0.0227	0.0120	-0.0078	1				
Tra <sup>2</sup>	-0.0567	-0.0035	-0.0042	-0.0232	-0.0162	0.0045	-0.0051	0.8871*	1			
LEV	-	-0.1046	-0.0603	-0.0879	-0.0755	-0.0069	0.0168	0.0174	0.0112	1		
SIZE	-0.2734*	-	-0.1123	-0.2487	-0.1983**	-0.1600	-0.0959	0.0273	-0.0015	0.176***	1	
CONC	0.1016	0.0913	0.0730	0.0469	0.0374	0.0440	0.0366	-0.0190	0.0329	0.1459	0.1442	1
INDUSTRIAL SECTOR												
	Ln (MV.I)	RD.I	RD.I <sup>2</sup>	Adv.I	Adv.I <sup>2</sup>	IP.I	IP.I <sup>2</sup>	Tra.I	Tra.I <sup>2</sup>	LEV	SIZE	CONC
Ln (MV.I)	1											
RD.I	0.1982	1										
RD.I <sup>2</sup>	0.2214	0.9010*	1									
Adv.I	0.3286**	0.1544	0.0838	1								
Adv.I <sup>2</sup>	0.2872***	0.1427	0.0529	0.9017*	1							
IP.I	0.2315	0.0806	0.0256	0.5425*	0.6808*	1						
IP.I <sup>2</sup>	0.1519	0.0212	0.0011	0.5044*	0.6614*	0.9021*	1					
Tra	0.1519	0.2258	0.1138	0.0398	-0.0026	0.0321	0.0012	1				
Tra <sup>2</sup>	0.0053	0.1997	0.1176	0.0218	-0.0203	0.0060	-0.0098	0.8908*	1			
LEV	-0.0798	-0.0235	-0.0372	0.0161	-0.0192	-0.0790	-0.0122	-0.0387	-0.0311	1		
SIZE	-0.2297	-0.1171	-0.1500	-0.1946	-0.2268	-0.0674	-0.0656	0.1154	0.0232	-0.0607	1	
CONC	0.2349	-0.0956	-0.0708	0.1692	0.0789	-0.1079	-0.0575	-0.1384	-0.0764	0.0302	-0.1114	1
SERVICE SECTOR												
	Ln (MV.I)	RD.I	RD.I <sup>2</sup>	Adv.I	Adv.I <sup>2</sup>	IP.I	IP.I <sup>2</sup>	Tra.I	Tra.I <sup>2</sup>	LEV	SIZE	CONC
Ln (MV.I)	1											
RD.I	0.4092*	1										
RD.I <sup>2</sup>	0.2830**	0.9230*	1									
Adv.I	0.3707*	0.9347*	0.8520*	1								
Adv.I <sup>2</sup>	0.2576***	0.9464*	0.9845*	0.8980*	1							
IP.I	0.2310	0.2061	0.0518	0.2273	0.0514	1						
IP.I <sup>2</sup>	0.2037	0.1574	0.0329	0.2211	0.0605	0.9412*	1					
Tra	-0.1146	0.0196	0.0204	-0.0347	-0.0164	0.0644	-0.0017	1				
Tra <sup>2</sup>	-0.1486	-0.0122	-0.0070	-0.0342	-0.0151	0.0466	-0.0044	0.9460*	1			
LEV	-0.1969	-0.1606	-0.1066	-0.1537	-0.1018	-0.0998	-0.0909	0.0475	0.0158	1		
SIZE	-0.2572**	-0.2747**	-0.2033	-	-0.2646***	-0.2083	-0.1047	-0.1013	0.0178	-0.0211	0.2116	1

<b>CONC</b>	0.1091	0.1387	0.0792	0.2165	0.0990	0.1547	0.1026	0.0777	0.0593	-0.1060	-0.1792	<b>1</b>
<b>TECHNOLOGY SECTOR</b>												
	<b>Ln (MV.I)</b>	<b>RD.I</b>	<b>RD.I<sup>2</sup></b>	<b>Adv.I</b>	<b>Adv.I<sup>2</sup></b>	<b>IP.I</b>	<b>IP.I<sup>2</sup></b>	<b>Tra.I</b>	<b>Tra.I<sup>2</sup></b>	<b>LEV</b>	<b>SIZE</b>	<b>CONC</b>
<b>Ln (MV.I)</b>	<b>1</b>											
<b>RD.I</b>	0.2811	<b>1</b>										
<b>RD.I<sup>2</sup></b>	0.1794	0.8665*	<b>1</b>									
<b>Adv.I</b>	0.3674**	0.4524*	0.3512**	<b>1</b>								
<b>Adv.I<sup>2</sup></b>	0.2719	0.3566**	0.3405**	0.8561*	<b>1</b>							
<b>IP.I</b>	0.1718	0.3415**	0.3408**	0.3749**	0.4369*	<b>1</b>						
<b>IP.I<sup>2</sup></b>	0.1206	0.3119***	0.3714**	0.4075**	0.5356*	0.8826*	<b>1</b>					
<b>Tra</b>	0.0693	-0.0590	-0.0365	-0.0252	-0.0637	-0.0140	-0.0207	<b>1</b>				
<b>Tra<sup>2</sup></b>	0.0736	-0.0647	-0.0355	-0.0372	-0.0406	-0.0176	-0.0117	0.8522*	<b>1</b>			
<b>LEV</b>	-0.1311	-0.0087	0.0388	0.0084	-0.0057	0.1080	0.0872	0.0690	0.0508	<b>1</b>		
<b>SIZE</b>	-	-	-0.1928	-0.2467	-0.2538	-0.2580	-0.1610	-0.0519	-0.0675	0.0917	<b>1</b>	
<b>CONC</b>	0.2170	0.1801	0.1287	0.0911	0.0843	0.2410	0.1672	-0.0298	-0.0313	0.0710	0.0445	<b>1</b>

\*significatif au seuil de 1%, \*\*significatif au seuil de 5%, \*\*\*significatif au seuil de 10%

## References

Aaker.D.A. (1991) « Managing Brand Equity », New York, The Free Press.

Abraham M.M, Bruce.R, Livelsberger.J, Lodish.L.M, Lubetkin.B and Stevens M.E (1995) « A Summary of Fifty-Five In-Market Experimental Estimates of the Long-Term Effects of TV Advertising », Marketing Science, 14 (3), G133-40.

Audard.L and Bachelard.A (2009) « L'actionnariat salarié dans les sociétés françaises: Une solution d'avenir? », projet d'étude

Bae.S.C, Park.B.J and Wang.X. (2008) « Multinationality, R&D intensity, and firm performance: evidence from U.S. manufacturing firms », Multinational Business Review 16, 53-77

Ballot.G, Fakhakh.F and Taymaz.E (2001) « Firms' human capital, R&D and performance: a study on French and Swedish firms », labor economics, vol 8, pp 443-462.

Ben-Ner.A and Jones.D (1995) « Employee Participation, Ownership, and Productivity: A Theoretical Framework », Industrial Relations, Vol. 34, n°4, pp.532-554.

Bounfour.A(1998) « Le management des ressources immatérielles. Maîtriser les nouveaux leviers de l'avantage compétitif », Dunod, Paris.

Brown.S and Fakhfakh.F (1999) « Absenteeism and Employee Sharing: an Empirical Analysis based on French panel data, 1981-1991 », Industrial and Labor Relations Review, Vol. 52, Issue 2, pp 234-251.

- Burgman.R (2002) « Shareowner value creation and the management of intangible assets », working paper.
- Buchko A (1992) « Employee Ownership, Attitudes and Turnover: an Empirical Assessment», *Human Relations*, Vol.45, N°7, pp 711-733.
- Buchko.A.A (1993) «The effects of employee ownership on employee attitudes: an integrated causal model and path analysis», *Journal of Management Studies*.
- Chan.S.H, Martin.J.D and kensinger.JW (1990) « Corporate research and development expenditures and share value », *Journal of financial economics* (august), pp 255-276.
- Chauvin.K.W and Hirschey M ( 1993) « Advertising, R&D expenditures and market value of the firm», *Financial Management* 22, 128–140.
- D’Arcimoles.C.H and Brillet.F (2000) « Règles de droit et nouvelles régulations dans l’entreprise: l’exemple de la participation financière des salariés, XV<sup>o</sup> journées nationales des IAE, Pau, Septembre
- Desbrieres.P (1997) «Le rôle de l'actionnariat des salariés non-dirigeants dans le système de gouvernement de l'entreprise, dans *Le gouvernement des entreprises* », *Economica*.
- Dorfman.R and Steiner.P.O. (1954) « Optimal Advertising and Optimal Quality», *American Economic Review*, 44 (5), 826–36.
- Epingard P (1998) « Étude d’un objet conceptuel déstabilisant; L’investissement immatériel», *Revue Économique*, vol. 49, novembre, pp.1151-1538.
- Frieder.L and Subrahmanyam.A (2005) « Brand Perceptions and Market for Common Stock », *Journal of Financial and Quantitative Analysis*, 40 (1), 57–86.
- Frohlich.N, Godard.J, Oppenheimer.J and Starker.F (1998) « Employee versus Conventionally-Owned and Controlled Firms: An Experimental Analysis», *Managerial and Decision Economics*, vol.19, n°4-5, pp 311-326.
- Grant.R.M. (1991) «The Resources-Based Theory of Competitive Advantage : Implications for Strategy Formulation », *California Management Review*, printemps, pp. 114-135.
- Green.J.P, Stark A.W and Thomas H.M (1996) «UK evidence on the market valuation of research and development expenditures », *Journal of business finance & accounting*, vol.23, pp. 191-216.
- Hallock.D, Salazar.R and Venneman.S (2003) « A Research Model to Investigate the Organisational Impact of an ESOP», *International Journal of Sociology and Social Policy*, vol.23, n°12, pp 47-63.

Hanssens D.M and Joshi.A.M (2009) «Movie Advertising and the Stock Market Valuation of Studios: A Case of ‘Great Expectations’? », *Marketing Science*, 28 (2), 239–50.

Hanssens D.M and Joshi.A (2010) « The Direct and Indirect Effects of Advertising Spending on Firm Value », *Journal of marketing* , vol 74, pp 20-33.

Hanssens.D.M, Pauwels.J.S.R and Srinivasan.S (2004) « New Products, Sales Promotion, and Firm Value: The Case of the Automobile Industry», *Journal of Marketing*, 68 (October), 142–56.

Hanssens.D.M, Parsons.L.J and Schultz R.L (2001) «Market Response Models», 2nd ed. Boston, Mass: Kluwer Academic Publishers.

Heath.C and Tversky.A (1990) « Presence and Belief: Ambiguity and Competence in Choice Under Uncertainty » in *Contemporary Issues in Decision Making*, K. Borcherding and O. Larichev, eds. Amsterdam: North Holland, 93–123.

Hollandts.X (2007) «Les effets de la participation des salariés sur la performance des entreprises - Tests empiriques et proposition de modèle théorique», EM LYON, thèse soutenue le 4 Septembre 2007, sous la direction scientifique du Professeur Pierre-Yves GOMEZ, Université Jean Moulin Lyon3

Hsu.C.C and Boggs.D.J (2003) «Internationalization and performance: traditional measures and their decomposition», *Multinational Business Review* 11, 23–49.

Ike.C.E and Kingsley.O (2010) «The effect of R&D investment on firm value: An examination of US manufacturing and service industries», *International Journal of Production Economics*, n°128, p 127-135.

Kaplan R. S and Norton.D.P (2004) «Strategy map converting intangible assets into tangible outcomes», Harvard Business School Press,.

Kay.J.A (1976) «Accountants Too, Could be Happy in a Golden Age: the Accountants’ Rate of Profit and the Internal Rate of Return», *Oxford Economic papers* (november), pp 447-460.

Lacroix.M (1997) « La reconnaissance des actifs immatériels et le reporting financier », Thèse pour le doctorat en Sciences de Gestion, Bordeaux IV.

Lev.B and Sougiannis.T (1996) « The capitalization, amortization and value-relevance of R & D», *Journal of accounting and economics* 21, 107-138.

Long R. (1978b) «The Relative Effects of Share Ownership versus Control on Job Attitudes in an Employee-Owned Company», *Human Relations*, No.31, pp.753-763.

Long R.(1978a) «The Effects of Employee Ownership on Organizational Identification, Job Attitudes and Organizational Performance: a Tentative Framework and Empirical Findings», *Human Relations*, No.31, pp.29-48.

Martory.B and Pierrat.C (1996) «La gestion de l’immatériel» , édition Nathan, Paris.



- Mathur.L.K, Mathur.I and Rangan.N (1997) « The Wealth Effects Associated with a Celebrity Endorser: The Michael Jordan Phenomenon », *Journal of Advertising Research*, 37 (May), 67–73.
- Ochs.P (1995) « L’investissement immatériel et la commercialisation : Analyse du cas français », Thèse pour le doctorat en Sciences de Gestion, Université Paris II - Panthéon-Assas, février.
- Ohlson.J.A (1989) «Accounting earnings, book value, and dividends: the theory of the clean surplus equation (part 1)», working paper (columbia university).
- OECD (2006) « Actifs immatériels et création de valeur », Réunion du Conseil de l’OCDE au niveau ministériel.
- Pantzalis, C (2001) «Does location matter? An empirical analysis of geographical scope and MNC market valuation». *Journal of International Business Studies* 32, 133–155
- Peasnel.K (1981) « On Capital Budgeting and Income Measurement», *Abacus* (spring),pp.52-67.
- Pendleton.A (2001) «Employee Ownership, Participation and Governance. A study of ESOPs in the UK», Routledge, London and New York.
- Pierce J, Rubenfeld S. A and Morgan S (1991) «Employee ownership: a conceptual model of process and effects», *Academy of Management Review*, vol.16, pp 121-144.
- Pierce J and Rodgers L (2004) «The Psychology of Ownership and Worker-Owner Productivity», *Group and Organization Management*, vol.29, n°5, pp 588-613.
- Riketta.M (2002) «Attitudinal Organizational Commitment and Job Performance: a Meta-Analysis », *Journal of Organizational Behavior*, No.23, pp.257-266.
- Stark.A.W (1986) « More on the Discounting of Residual Income Streams»,*Abacus* (march), pp.20-28.
- Stewart.J.M and Stewart.G.B (1999) « The value of R&D: Creating value through research &development », volume 1,mai 1999.
- Tézéna.S and Montcel.H (1993) « Le capital immatériel de l’entreprise - Repères», Document de recherche, Les entretiens de Porquerolles, Centre d’ingénierie des savoirs
- Thévenard.C.(1997) « Le management stratégique des marques obtenues par croissance externe », Thèse de Doctorat en Sciences de Gestion, École Supérieure des Affaires, Université Pierre Mendès, Grenoble.
- Webb.C (1912) «Industrial cooperation: the story of a peaceful revolution», Manchester,Cooperative Union.