Intellectual Capital and Firm Performance

Mu Shun Wang

Wang Mu Shun is a Assistant Professor of Department of Money and Banking, Kainan University, No.1 Kainan Road, Luzhu Shiang, Taoyuan 33857, Taiwan, Tel:(03)2705689 est 6123，Email:sunrise034@yahoo.com.tw ，The author would like to thank two anonymous reviewers for their helpful comments on earlier drafts of this manuscript.

Abstract

The paper use the method of pooling data OLS, Panel data regression to test the relationship between intellectual capital and firm performance from 2001 to 2007. The variables included of customer capital, human resource capital, structure capital from independent and return on asset, market price to book value and total productivity from firm performance. As the relationship between structure capital and firm performance is insignificant. The paper separated two group depended by the R & D expenditures. Continue to investigate the influence of intellectual capital on firm performance.

The effect of company management has ever become deteriorated with larger the scale of company and it has exposed the rather unfavorable defect of management for internal workflow. Of such defect, it is the sign often seen in practice as many institutes are run by one single individual. However, if the enhancement of transparency for financial information remains insufficient, it can, if through the empirically works of this study, help suggest to increase the transparency of

management process, or if many of the authorities in-charge-of or expert institutes should concurrently be led or duality by one single individual? They are the important suggestions put forth by this study, and we do expect that enterprise should, in times of economic recession, not lay off staff or streamline personnel training expense merely with consideration of profit-making, which can greatly jeopardize the enhancement of intellectual capital.

Keyword: intellectual capital, human resource capital, structural capital, customer related capital, panel data regression

1. Introduction

Recent studies of intellectual capital can be divided into two trends, one is the overall surface, such as integration with the national innovation system, or create various types of capital indicators (Pomeda et al., 2002; Lin and Lin, 2008, Lin and Edvinsson, 2008); the other is a decent look into the relationship between corporate performance (Kamath, 2008). Choong (2008) try to sum scholars from various countries on the construction and classification of intellectual capital, so that the content of intellectual capital accounting information can be translated into measurable by the subject to explore with the relationship between corporate performance, he uses a meta-analysis Methods appropriate classification of intellectual capital, of the academic general acceptance. Kamath (2006) that a company's intellectual capital is the potential that can be observed in strategic asset, and this strategic asset, tangible and intangible assets between inclusive. Because intellectual capital is, in essence, no specific shape is real assets, Kamath (2008) is divided into customer relationship capital, human resources, capital and structural

capital, the three indicators of return on investment, market value - book value ratio correlation between productivity levels. As Kamath (2008) study looked only at the Indian biotech industry, and a statement of intellectual capital in India is just a fledgling country, this paper studies continuation Kamath, into Taiwan from 2001 to 2007 data of all listed companies, in addition to Index of use of the same impact on performance, but also increase R & D spending to discuss this variable impact on business performance, the use of mixed data ordinary least regression analysis found that all five indicators of business performance correlation. Then, according to industry characteristics, and to avoid sampling selection bias, I use of Logistic regression model to investigate whether the R & D expenditures under the conditions of the four indicators of intellectual capital on business performance.

From the resource base that (resource-based theory) point of view, core competencies can be constructed from the organizational point of view, many ideas that intellectual capital is a core competence or power. How do we use the simplest method from the internal resources or external search to form a reliable measure of further discussion and the relationship between corporate performances, intellectual capital is often used to demonstrate its value in the company to replace the implementation of force measurement. Academic definition of intellectual capital, and its characteristics are (1) intellectual capital is intangible assets, representing a potential value creation (Mavridis, 2005); (2) from the Board of Directors of the organization point of view, it is specific to the company and can often adapt changes in conditions; (3) the composition of many intangible assets can improve business functions (Brooking, 1996). Pulic (2000) proposed the added value of intellectual capital model (VAIC), to compare with the measure of corporate cross-sectional data,

Deol (2009) in the same way with the concept of strategic environmental impact on Indian banks and state bank of wisdom capital on the local economy development.

The main purpose of this paper is to understand the intellectual capital of the proxy variables on firm performance and the related expenses of the company's contribution to value creation. It also represents the conclusions of this paper is not only to individual companies for researchers, industry, decision makers and investors have a great influence on the community. From the point of view of the resource base, intangible assets is a valuable but scarce and can not be transferred, competitive advantage has helped the company's assets (Barney, 1991; Wernerfelt, 1984). In the past, the company's managers emphasize the interests of shareholders or corporate profit maximization as the goal, this view is often short-sighted and short term profits, and many scholars agree with this argument based on the decisions made would be damaging to the company accumulation of knowledge (Edvinsson, 1997; Bontis, 2001; Ordonez de Pablos, 2002), such as the poor performance of the employees were laid off or fired, but their management may be important is the company's intangible assets. In fact the company's stakeholders, including employees, investors, shareholders, creditors, suppliers and government departments, so too much emphasis on the interests of shareholders, indeed undermine the balance of interested parties, and the allocation of resources will inevitably be wrong (Kamath, 2008).

From the view of deciding to made of Intellectual capital, the added value of many enterprises is closely related with intellectual capital, and these benefits are not easily recognized at the financial statement of the fiscal year each firms. but he probably will increase the value of the company competitiveness, business

performance and the satisfaction of all stakeholders. Such as Itami (1991) that intellectual capital is the company's technology, customer trust, brand image, company culture and management knowledge, Smith (1994) said that intellectual capital is not as easy working capital or physical assets to evaluate the contribution to the company, However, the value of the company is also very far-reaching. This organizational structure is divided into the following sections: In addition to Section I Introduction, that the motives and purposes, Section II for the literature review, Section III for the study design, Section IV the empirical results indicate that the considered regression analysis model and research programs, and describes the method for obtaining the information, and section V is conclusion.

2. Literature Review

2.1 intellectual capitals

Royal and O'Donnell (2008) that human resource capital is a very important element of value creation. Wiig (2004) pointed out that the human resource capital may include knowledge, understanding, skills, experience and the relationship between employees, so the human resource capital is a property leased to the company staff. Barth et al. (2001), Roos (2005) hope to establish a human resources indicators for investors to judge the value of the company, they believe that corporate managers may be more focus on short-term performance of the financial statements, but many market investors think the company is long-term, especially with technical or specialized knowledge of the business. This means that many companies in a highly competitive environment to grow, of course, in the short term profitability will

be under the business cycle and the effects of fluctuations in systemic risk, but the most stable companies in the knowledge and human resource capital. Royal and O'Donnell (2008) set the clamp of human resources capital in the community between the capital and knowledge management, reflecting the human resource capital is the backbone of intellectual capital.

Intellectual capital with human capital, innovation capital, process capital, and structural capital, and other different elements, to be through the various elements of the tie in order to create business value and improve performance (Edvinsson and Malone, 1997; Stewart, 1997; Bontis, 1998; Ross et al., 1998). However, the current structure of the innovation capital on a capital, or independent dimensions, Choong (2008) did not provide an answer, this reference to the existing literature to include the proportion of R & D expenditures to total assets as part of innovation capital, and innovation are included in the capital of capital structure, unlike Kamath (2008) design. In fact, R & D may have a very important part of the composition of capital and human resources related, Kamath (2008) in order to avoid double counting, is based on enterprise value less the capital structure of human resource capital as a representative of the discovery of this structural capital of the company's performance is not entirely obvious, is to add a variable. Structural capital can be defined as "companies solve problems and create value for the overall systems and procedures," Chen Mei Pure (2001) analysis is a can be copied and shared knowledge and skills, such as corporate strategy and culture, structure and system, the organization's daily business and procedures part. Structural capital represents the operation of the mechanism and structure of organizations, to assist and support staff, the intelligent pursuit of personal best performance and reach enterprise-wide performance.

Kamath (2008) defines customer relationship capital is a value-added capital, Edvinsson and Malone (1997) pointed out that the business relationship with the outside world more closely, the more blurred boundaries, internal and external difference gradually disappears, but also to the management of virtualization stressed the relationship between contact. Stewart (1997) put forward some guiding principles, including corporate alliances with customers should be to maintain long-term customer loyalty, Johnson (1999) that the relationship between social capital should include stakeholders, customer relations, supplier relations, the company and these external institutions interaction between the long-term profitability for the company and the key to business success. Mei pure definition of customer relationship capital is defined as "organized foreign relations establishment, maintenance and development, including customers, suppliers and strategic partners." In the measure of skills, Bannany (2008), Kamath (2008, 2006) recommended the use of value-added customer relations intellectual capital as a measure of capital, after all, customer loyalty, customer satisfaction and contribution are of value-added enterprises.

Second, the intellectual capital on corporate performance to help

Recently, scholars are looking for a variety of measurement methods to measure the intellectual capital on firm performance, Nielson et al. (2006) proposed human resource capital is the core of intellectual capital components, these components include skilled staff, knowledge and management philosophy the company's performance has been affected. Human resources can play to improve the efficiency of capital value innovation, because it can create the market competition capability,

Bannany (2008) that the relatively good performance of the company, it may be better because the strategies used, such as use of relatively good ways to attract customers, so that rank in the industry than before. So the intellectual capital of the company's value creation and operating performance are positively related. Goh (2005) of agricultural and industrial sectors of the intellectual capital on firm performance, Mavrids (2004), Bannany (2008) intellectual capital of the bank the impact on corporate performance, Kamath (2008) of the Indian biotech industry, Kamath (2006) of the Indian information technology industry, the intellectual capital of the impact on business performance, Miao-Lin Xinxin finches and (2005) discuss the financial holding of the intellectual capital and marketing and the relationship between risk and other documents to the Taiwan local Bo, MA paper-based, it was the capital of innovation, some of R & D capability, or intangible assets, and Kamath (2008) and Choong (2008) defined a slightly different (Mei Chun, 2001; Liu Zhengtian, 2002; Kuo Chui Ling, 2008).

2.2 Intellectual capital and firm performance

Intellectual capital has been formalized, captured and leveraged to produce a higher valued asset. Thus a set of elements is to drive the firm performance and value creation. Chen et al. (2005) found that intellectual capital and physical capital have a positive impact on market return, as well as on current and future financial performance in the database of Taiwanese firm, Tan et al. (2007) confirmed these results to use the publicity trades companies in Singapore. Otherwise, Fire and Williams in South Africa, Zeghal and Maaloul (2010) study in U.K. to get similar conclusion above discussed. Kamath (2008) acclaimed that intellectual capital is in

the stage of infancy in India. And their study only research for the domestic pharmaceutical industry. And to find the relationship is positive between firm performances with intellectual capital. Bannany (2008) indicate that the investment in intellectual capital variables have a significant impact on intellectual capital performance of banking industry from UK case.

The research framework of Moeller (2009) contains two groups of independent variables (trust, participate and strategic relevance) and network performance. Ghosh and Mondal (2009) seek to estimate and analyze the relationship between intellectual capital and pharmaceutical companies for a period of five years from 2002 to 2006. Ting and Lean (2009) examined the association between intellectual capital and the financial performance. Follow these papers, this study uses VAIC and VAIN as an aggregate measure of corporate intellectual ability.

3. Research Design

3.1 Research methods and sampling procedure

We had collected the samples from Taiwan Economic Journal database during 2001 to 2007 year, this paper found serious scarcely in intellectual capital such as labor costs, investment income and corporation tax from their annual reports, in order to solve these difficulties; we use many methods to test.

First, the use of ordinary least squares to test the intellectual capital and the relationship between corporate performance, as each year data have missing values within, so that each year data is not so long, so I had to be independent of each sample as sample, missing values delete the sample values obtained after 4,404 pen, not to

delete the case of missing values the total sample was 4,714 point. Second is the worry that repeated sampling tests of the sample bias is too high, so the only choice in 2001, while financial information has been listed company, using regression analysis, tracking data from 2001 to 2007, to discuss the many phenomena, simply in terms of s, the number of samples for each year are the same and equal. Here I established hypothesis is:

Hypothesis 1: The Intellectual Capital of the impact of operating performance is positive.

Third, this measure there is a very important variable is the ratio of R & D expenditures to total assets, but the sample was found to have many companies have never invested in R & D expenditures above, I then consider the basis of sample characteristics and selection bias, the use of Logistic regression to explore the intellectual capital management performance, so by hypothesis the second and third hypothesis is:

Hypothesis 2: Intellectual capital in companies with R & D expenditures on company performance is very significant.

Hypothesis 3: The intellectual capital of companies in the absence of R & D expenditures on company performance is very significant.

Fourth, the net cost to the company size and debt control variable discussion, the company should be larger and intellectual capital, value of innovation are positively correlated, and the company's debt ratio should be optimal capital structure of the relevant circumstances, namely, the lower the debt ratio The company's operating

performance as possible.

Hypothesis 4: Under the conditions of intellectual capital, firm size and firm performance is positive, debt ratio, the impact on corporate performance is negative.

3.2 variables and measurement

3.2.1 R % D expenditure

Kamath (2008) explore the relationship between corporate performance and intellectual capital in using ordinary least squares regression. He believes that intellectual capital is bound to by virtue of technical manpower, research and development expenditures and equipment provided to R & D and patents, intellectual capital be possible to perform its functions,

In reviewing the financial statements of all information, design appropriate proxy variable is the annual R & D expenditure to the proportion of total assets, as the activities of R & D expenditure indicators, this formula is designed as follows:

R & D expenditures ÷ total assets ... ... [1]

R & D expenditures are often designed as part of innovation capital, and innovative capital structure has been classified as part of capital as distinguished from human resource capital, the paper the exception of SCVA, but also to measure R & D expenditures to total assets ratio as a measurement variable.

3.2.2 Human resource capital

Human resource capital is often defined as organizational capital or parts of intangible assets. Royal and O'Donnell (2008) that the leader is very important to the company's core management systems, and their goal is given from the power companies who compete with the commercial activities pursued by the promotion of the company to enhance market performance. The company offers internal personnel expenditures, such as salary or wages are clearly documented in their annual report, of course, some scholars believe that members of the company's reputation is very important to the company's goodwill and intangible assets have a certain degree of role However, from the TEJ database and can not find the relevant annual accounts, so the only cost to the employer share of total assets as proxy variables.

3.2.3 Customer Related Capital

Reference Kamath (2008) design, first calculate the added value of organization, $VA_i = I_i + DP_i + D_i + T_i + M_i + R_i$ added value for the i's interest expense (I), depreciation (DP), cash dividends (D), corporate tax (T), investment income (M) And the cumulative number of retained earnings (R). By the following formula:

....[2]

When the calculated value added (VA) and then divided by the net is obtained, such as customer relationship capital coefficient formula 3, in which the calculation of the net book value of owner's equity is calculated on the basis:

$$VACA_i = \frac{VA_i}{CA_i} \quad \text{... ... ... [3]}$$

3.2.4 structural capital

Structural capital seeking to add value and be the difference as the structure of the personnel costs of capital, Kamath (2008) Design of structural capital ideas come from Ante (2001), focusing on investment in human resources, it might have an effect in the structures of these Effect is present but remain within the organization in the structure, so he will be less value-added human resource capital as a proxy for capital structure. The formula listed as 4 and 5:

$$SC_i = VA_i - HC_i \quad \text{……..……..[4]}$$

$$SCVA_i = \frac{SC_i}{VA_i} \quad \text{……..……..[5]}$$

3.2.5 intellectual capital

Kamath (2008) to customer relationship capital, human capital and structural capital, intellectual capital is derived by adding (VAIC), as VAIC is VACA, VAHU

(human resource capital) and the SCVA's addition.

3.2.6 Control variables

Another article by adding debt ratio and firm size as control variables, is generally believed that the larger the company the higher the intellectual capital; if companies greater the degree of leverage, operating performance because of interest costs increased. Company size is the natural logarithm of total assets as proxy variable direct cost of debt to total debt to total assets ratio for the proxy variables.

3.3 The subjects variable

This article is based on the data of the long-term study, so only use return on assets (ROA), market value and book value ratio (PBR) and productivity (ATO) as measured by the variable ratio of book value, market growth opportunities for the company, ROA as the profitability, productivity on behalf of operating results, as we measure the three indicators of corporate performance. The formula of Productivity formula is the net total income divided by the company. This paper presented a simple linear regression models such as the formula [6]:

$$Y_{i,k} = \beta_0 + \beta_1 * VACA_{i,k} + \beta_2 * VAHU_{i,k} + \beta_3 * SCVA_{i,k} + \beta_4 * R\&D\%_{i,k} + \beta_5 * SCALE_{i,k} + \beta_6 * Debt\%_{i,k} + \varepsilon \quad [6]$$

Y=PBR, ROA, ATO

4. Results and implication

4.1 descriptive statistics

This article from the Taiwan Economic Journal Database (TEJ) in the 4,714 document terms to find information on the length of time for the 2001 to 2007, during the mixed regression model for multi-year study, by deleting 310 document information is not complete, nor from the annual report found in the data sample was 4,404 pen. After finishing these samples, we found that the sample properties, such as described in Table 1.

Table 1 shows samples of all listed companies, no longer individual industries were introduced, from Table 1 to see, PBR has 15 times as large, with prices close to book value, return on total assets ranging from negative to positive between , the total productivity but also negative to 1, showing the sample distribution was very broad, all listed companies comply with the performance of the whole market rule of thumb. Structure coefficient tends to negative, an average of -2.628, which shows the capital structure of most companies in the negative bias, indicating that human capital expenditures during the study period than added value, may be due to the value of intangible assets of listed companies in Taiwan less relevant; minimum number of added value is negative, but most companies tend to be positive; the intellectual capital value (VAIC) is a customer relationship capital, human resources, capital and structural capital sum, so the intellectual capital of all listed companies seeking yearly checking, found in Taiwan since 2001, the intellectual capital of listed companies have a stable growth state, so further discussion of these measurement variables on the subjects variables. R & D expenditures to total assets ratio of 0.3% maximum,

indicating that most of Taiwan companies to invest in R & D expenditures amount to be raised.

Between the variables selected for further examination whether there is the phenomenon of multicollinearity using the Pearson correlation test, found between the dependent and the dependent variable is highly correlated between the dependent variable to VACA with SCVA and VAIC have significant, This represents VACA, SCVA and VAIC have additiveness.

Table 1: descript statistic

Samples	minimum	maximum	mean	median	Std.deviaiton
PBR	0	15	1.64	1.28	1.291
ROA Return on Asset	-100.72	52.34	5.924	5.42	9.835
ATO Total production	0.0007	255.61	1.6113	1.136	4.164
VACA Value added coefficient	-143.72	1	-0.731	0.151	3.434
VA Value added	-29,656,852	241,339,738	2,126,863.91	402,021	10,430,614.9
VAHU Value of human coefficient	-1038.4	3383.66	11.96	1.34	109.95
SCVA Structural value coefficient	-6583.25	1950.65	-2.628	0.677	144.92
VAIC	-98.52	970.4	10.63	2.277	57.898
HC Human capital	250	87,806,508	808,836.27	251324	2,315,427.118
SC Structure capital	-89,065,213	238,030,383	1,304,538.05	72516	10,232,936.8
R & D%	0	0.3	0.1451	0.01	0.332

PBR=market to book value ratio；ROA=Return on asset；MC=Market capitalization；VAIC=Value Added Intellectual Coefficient；VAIN=Value added intangible coefficient；R_D%=R & D percent; BATE=barriers to entry。These variables were necessary for collecting from Taiwan Economic Data base (TEJ). To delete the missing data are 310, altogether the final testable data are 4,625. Because of the balanced panel data regression to examine their relationship, my longitude has eight years from 2001 to 2008 at the listed companies of the Taiwan. The samples have a item of 578 once year to operate

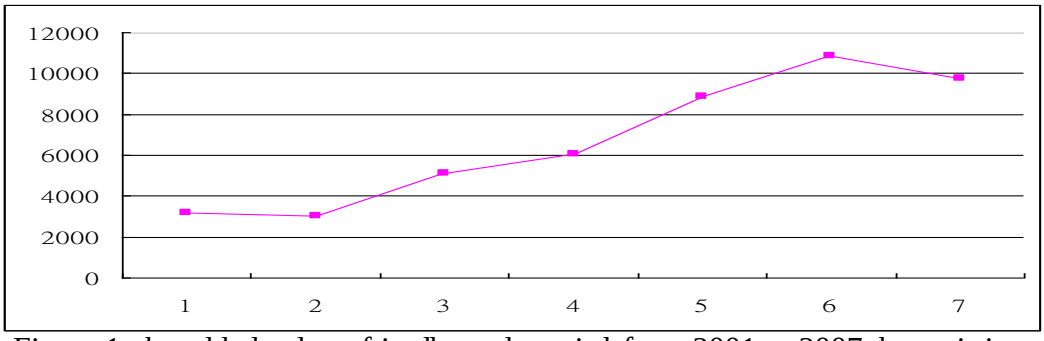

Figure 1, the added value of intellectual capital from 2001 to 2007 the variations

Table 2:Pearson correlation test

變數	ROA	ATO	VACA	VAHU	SCVA	VAIC	R&D%
PBR	0.53**	0.04*	-0.01	0.157***	0.006	0.17**	0.11***
ROA		-0.026	0.25***	0.22***	0.11**	0.185***	0
ATO			-0.62***	0.005	0.003	0.025	0.03
VACA				0.13	0.043***	0.059***	-0.008
VAHU					0.1	0.05	-0.03
SCVA						0.05	0.006
VAIC							-0.04*

*Two-tail normal contribution test, α>0.01,marked **, >0.025, marked *; altogether samples are 4, 404* ◦ PBR=market to book value ratio ; ROA=Return on asset ; MC=Market capitalization ; VAIC=Value Added Intellectual Coefficient ; VAIN=Value added intangible coefficient ; R_D%=R & D percent; These variables were necessary for collecting from Taiwan Economic Data base (TEJ). To delete the missing data are 310, altogether the final testable data are 4,625. Because of the balanced panel data regression to examine their relationship, my longitude has eight years from 2001 to 2008 at the listed companies of the Taiwan. The samples have a item of 578 once year to operate.

4.2 pooling data and ordinary least squares regression

Pooling data using ordinary least squares regression analysis, as much as possible to avoid the survival bias and small sample bias, from Table 3 that, VACA and VAHU the company does have a very significant performance impact, R & D impact on growth opportunities, can drive the growth momentum, which specializes in line with the general theory of innovation on firm performance, firm size and debt ratio on firm performance has a significant impact, where arguments and Kamath

(2008,2007,2006) and the Deol (2009), Mavridis (2004), Bannany (2008) the same argument.

In Liu Zhengtian (2002) study, investigate the relationship between intangible assets and growth opportunities, with the effect of lagged effects, this conjecture in a few years VAHU have no effect on the ATO, is also possible that with this phenomenon, Han and Lin (2008) designed three indicators of intellectual capital to discuss the analysis of human resource capital, the proposed method to further combine these with time series of lagged phenomenon. Another phenomenon is worth discussing the performance of structural capital of the company response is not significant, and only slightly better situation in 2003, as structural capital, the minimum and average are all negative, on behalf of Taiwan many companies do not focus on the structure of capital investment and application, but because the structure of capital on corporate performance is not significant, so the intellectual capital and then to run into the regression equation and found that after 2004 the VAIC started the company a significant performance impact of, SCVA study in the mixed data, to distinguish R & D expenditures R & D spending firms and enterprises of non-performance of the company are not significant, the authors recommend should be amended Kamath (2008) the measure of SC because of his method is to calculate directly from the added value (VA) less human resource cost (HC), may be the best measure is a direct discussions on the sum of accounts is appropriate.

Third, according to whether the condition of R & D expenditures on firm performance To understand the structure of capital on corporate performance is not a significant cause, then the sample group, depending on whether there is clustering R & D expenditure to obtain a sample group of non-R & D expenditures total 1,348 pen;

a sample group of total R & D expenditures 3,029 pen, after grouping the samples descriptive statistics, are summarized in Table 4.

Table 3: intellectual capital and performance (wholly period from 2001 to 2007)

Variable	PBR	ROA	ATO
Constant	1.898***	7.904***	1.585***
	8.056	4.623	5.897
VACA	-0.066***	0.228***	-0.12***
	-4.097	15.454	-8.091
VAHU	0.166***	0.155***	0.033***
	10.72	10.868	2.332
SCVA	-0.011	0.002	-0.014
	-0.71	0.143	-1.021
R & D%	0.127***	-0.007	-0.006
	8.28	-0.486	-0.426
SCALE	-0.003	0.032**	-0.077***
	-0.162	2.222	-5.261
Debt%	-0.139***	-0.285***	0.392***
	-8.648	-19.249	26.362
R-coefficient	0.25	0.322	0.689
R square	0.062	0.103	0.475
Adj-R square	0.061	0.102	0.474
Std. error of the estimate	1.15	9.3183	3.01841

PBR=market price to book value , symbol of growth opportunity, ROA=return on asset, symbol; of probability, ATO=total production, means of economic effectiveness, VACA=VA/CA、VAHU=staff fee/total asset、SCVA=SC/VA、R & D% is research to total asset ratio, means of structure capital, VA is added value, HC is human resource capital, SC is structure capital , VAIC is added value of intellectual capital, altogether samples are 4,404point. First column is beta, second column is T value，significance is ***(under and equal to1%)、**(under and equal to5%)、*(under and equal to 10%)。

Table 4 shows the availability of R & D expenditures as a benchmark to distinguish between the samples and found a variety of different groups are different indicators of intellectual capital, R & D expenditure as a sample group of non-number, though small, but the ROA, ATO's standard deviation is relatively large, But research VACA, VAHU, VAIC with SCVA performance in the two groups are quite, t test value is 0.846, not significant, can not reject the null hypothesis between the average of the same. A sample group of R & D expenditures VAIC, the larger its standard

deviation, minimum, no R & D expenditure is less than the sample group, but no R & D expenditure is less than the maximum sample group, showing a sample group of R & D expenditure, in addition to some of the samples deviate from is large, its VAIC values than those without cluster sample of R & D expenditures; Table 4 standard deviation of coefficient of Human Resources, on behalf of human resources at different times have different coefficients of performance, the worst group to have R & D expenditures -1,038.4 The best time to have R & D expenditure groups 3383.66. After the clustering may cause sample selection bias (sample selection bias), Chien-Hung Chen, who practices in this reference, the use of Logistic regression, R & D spending will set a dummy variable to 1, no R & D dummy variable set to 0, further ordinary least squares regression testing, in a sample of R & D spending is no R & D expenditure is three times the sample under the conditions, VACA of PBR and A significant impact on ROA, Table 5 shows, but the effect is not consistent with the direction, of the PBR for the negative effect of the impact, the impact on ROA is positive effect, indicating that value-added factor in the absence of this group of major R & D spending accounts for City significant than the impact, but there are a bunch of R & D expenditure rate of return on assets is more significant. This guess many listed companies either to R & D expertise, may be engaged in process improvement, branding and customer relations, and therefore the effect in the city than on the account to a significant negative phenomenon, and research and development expertise to the company, its added value when With the increase of intangible assets, so the rate of return on assets is positive significant effect. VAHU, VAIC the impact of PBR and ROA for the positive effect, but SCVA impact on corporate performance is not significant. In addition, VAHU does not have an effect on overall productivity.

Table 4:the descriptive statistics for R & D % or not

	A sample group of R & D expenditures =3,029 item				The sample group of non-R & D expenditure =1,348item			
	Maxmium	Minimum	average	Standard error	Maxmium	Minimum	average	Standard error
ROA Return on Asset	49.34	-60	3.57	8.35	52.34	-100.77		10.07
ATO Total production	24.45	0.001	1.38	1.54	255.61	0.0323	1.71	4.89
VACA Added value coefficient	1.01	-45.66	-0.2	2.1	0.91	-143.72	0.026	2.88
VAHU Human resource coefficient	2,621.5	-1,038.4	13.85	137.31	3383.66	-480	11.46	93.43
SCVA Structural coefficient	1950.65	-663.2	1.06	57.93	799.95	-6583	-2.11	120.93
VAIC Value intellectual capital	934.41	-97	12.44	67.62	970.4	-98.5	9.86	52.98

Table 5: R & D% to discriminate between intellectual capital and performance by logistics regression

variables	PBR Price-to-book ratio	ROA Return on asset	ATO Total production
Constant	1.265***	-5.38*	2.82***
	3.91	-1.894	4.91
VACA	-0.06***	1.68***	0.007
	-3.34	10.68	0.224
VAHU	0.13***	0.007***	-0.032
	4.25	4.75	-1.067
SCVA	-0.001	-0.003	0.01
	-1.37	-0.926	0.354
VAIC	0.05*	0.006*	0.033
	1.67	1.71	1.12
Debt%	-0.2	-10.3***	0.305***
	-1.57	-9.38	10.632
SCALE	-0.002	0.87***	-0.123***
	-0.077	4.786	-4.4
R Square	0.03	0.243	0.1
Adjust R Square	0.026	0.239	0.098

4. Conclusion and suggestion

The main contribution of this paper is first discussing the relationship between intellectual capital and firm performance involves operating cash flow, ROA and market capitalization during eight years from 2001 to 2008 on Taiwan. The study of intellectual capital has been developing and the measurement always been submitted in the recent years. This paper finds the create capital is more influence on firm performance than customer related capital. It is a interesting special feature at the listed companies on Taiwan. I guess these companies have ability to produce however lack of the marketing to their customer. Otherwise, these firms are inclined to research and development expenditure from the subsidy of government but they are less than dig out internal know-how to construct perfect knowledge storehouse.

In brief, I have three suggestions from my finding:

1. the policy of corporate governance ought to focus on the management effectiveness of the company to take for main goal of planning:

   The paper find human resource capital is insignificant related with management effectiveness but has high significant on ROA and PBR. The mean what is the managers is very concern the market performance and accounting performance such that neglect on the human management and staff feee and lack of working hard.. they reduce the human resource expenditure for raise the profit. Sometimes they over dependent on the turnkey and transfer the technology to regardless of human resource capital. Their advantage is the OEM on the Taiwanese firms. Naturally, they ofter deprive of the trainning and education to their employee. Somhow, managers consider the performance of them own evaluated, as far as possible they reduce the cost of human and rise up the profit. These motivation

cause the relationship is insignificant between total production and human resource capital. In addtion to push the corporate governance, design the employee option and bonus to promote the interest are consistent between managers and stockholders, I suggested ought to design a mechanism for manager to perfer invest on the human resource capital and long planning for their company.

2. the internal delivery of information about the intellectual capital ought to declare among the related companies.

There are many papers often regard as the firm as a entity but the fact is any firms with complexity owner structure. It is needless to say that the intellectual capital often was share, common occupy and rotate to use one another. From the angle of management, you can say that is synergy, however, they oftern waster resource, and to exist in name only

3. lay off employee to face the regression is poor, these activity ease give serious damage for accumulating of intellectual capital.

The paper conclude that firm ought to emphasis on the human trainning customer related management and research and development input to cope with the regression period. If the company would layed off for regression, they had been adviced to face the warnig inner the organization, but the consequence is hurt for knowledge management.

Reference

Alwert, K., M. Will (2009), "Does intellectual capital reporting matter to financial analysts?" Journal of intellectual capital, 10(3), pp.354-368.

Ante, P.(2001), "Value Creation Efficiency Analysis of Creation Banks 1996-2000,"

International Consulting LLC, Zagreb, available at: www.vaic-on.net.
Bannany, Magdi(2008), "A Study of Determinants of Intellectual Capital Performance in Banks: the UK case," Journal of Intellectual Capital, Vol.9, N0.3, pp.487-498.
Barney, J.(1991), "Firm resources and sustained competitive advantages, " Journal of Management, Vol.17, No.1, pp.99-120.
Barth, M.,E.,Kasznik, R., McNichols, M.,F.(2001), "Analyst coverage and intangible assets," Journal of Accounting Research, Vol.39, No.1, pp.1-34.
Bontis, N.(1998), "Intellectual capital: an exploratory study that develops measures and models," Management Decision, Vol.36, No.2, pp.63-76.
Bounfour, A., and Edvinsson, L.(2004), "IC for Communities, Nations, Regions, Cities, and Other Communities," Boston, M.A: Butterworth-Heinemann.
Brooking, A.(1996), "Intellectual Capital: Core Assets for the Third Millennium Enterprise, Thomson Business Press, London.
Chen ,Mei-Chun(2001), "The effect of information technology investment and intellectual capital on business performance," Doctoral Dissertation , National Central University.(in Chinese)
Chen, M. C., Cheng, S.J., Hwang, Y.(2005), "An Empirical investigation of the relationship between intellectual capital and firms' market value and financial performance," Journal of Intellectual capital, 6(2), pp.159-176.
Choong, Kwee, Keong(2008), "Intellectual Capital : Definitions, Categorization and Reporting Models," Journal of Intellectual Capital, Vol.9, No.4, pp.609-638.
Deol, Harjinder, Singh(2009), "Strategic environment and intellectual capital of Indian banks," Journal of Intellectual Capital, Vol.10, No.1, pp.109-120.
Edvinsson, L.(1997), "Developing intellectual capital at Skandia," Long Rang Planning, Vol.30, No.3, pp.266-373.
Edvinsson, L., M., S., Malone(1997), "Intellectual Capital Realizing Your Company's True Value by Finding its Hidden Brainpower," New York: Harper Business.
Ghosh, S., and A. Mondal(2009), "Indian sofeware and pharmaceutical sector IC and financial performance," Journal of intellectual capital, 10(3), pp.369-388.
Goh, P.(2005), "Intellectual capital performance of commercial banks in Malaysia," Journal of Intellectual Capital, Vol.6, No.3, pp.385-396.
Han, Tzu, Shian, Carol, Yeh-Yun, Lin(2008), "Developing human capital indicators: a three-way approach," Int. J. Learning and Intellectual Capital, Vol.5, Nos.3/4, pp.387-403.
Itami, H.(1991), "Mobilizing Invisible Assets," Harvard University Press, Cambridge, MA.
Jacobsen, K., Hofman-Bang, P. and Nordby, R. Jr (2005), "IC Rating," Journal of Intellectual Capital," 6(4), pp.570-587.
Jhunjhunwala, S. (2009), "Monitoring and measuring intangibles using value maps: some examples," Journal of intellectual capital, 10(2), pp.211-223.
Joia, L. A., R. Malheiros (2009), "Strategic alliances and the intellectual capital of firms," Journal of intellectual capital, 10(4), pp.539-558.
Kasztler, A., and K. H., Leitner (2009), "An SNA-based approach for management control of intellectual capital," Journal of intellectual capital, 10(5), pp.329-340.
Kamath (2006), "Understanding the intellectual capital statements: a case study of Infosys Technologies Ltd." Int. J, Learning and Intellectual Capital," Vol.3, No.3, pp.268-292.
Kamath, Bharathi, G.(2008), "Intellectual Captial and Corporate Performance in Indian Pharmaceutical Industry," Journal of Intellectual Capital, Vol.9, No.4, pp.684-704.

Kim, D.ong-Young, Vinod, Kumar (2008), "A framework for prioritization of intellectual capital indicators in R & D," Journal of Intellectual Capital 10(2), pp.277-293.

Kong, Eric (2010), "Innovation processes in social enterprises : an IC perspective," Journal of intellectual capital. 11(2), pp.158-178.

Kuo,Tsuilin (2007), "The Impacts of Transfer Intellectual Capital from Parent on Performance of Subsidiary: An Examination of Taiwanese Enterprises in China," Doctoral Dissertation , National Chang-Chi University.(in Chinese)

Lin, Carol, Yeh-Yun, Te, Yi, Lin(2008), "National Intellectual Capital: Exploring Taiwan's Standing," International Journal of Learning and Intellectual Capital, Vol.5, Nos. 3/4.

Lin, Miao-Que, Xin-Xin, Lin(2005), "A Study on the Influence of Intellectual Capital, Marketing Strategy, and Risk Management Strategy on Business Performance: The Case of Financial Holding Companies in Taiwan," Review of Economic, Sociology and Law , Vol.36, pp.79-110.(in Chinese)

Liu , Jenten(2002), "The Study for the Relationship among Intangible Assets, Growth Opportunity and Stock Returns," The International Journal of Accounting Studies, Vol.35, pp.1-26.(in Chinese)

Malhotra, Y.(2003), "Managing and measuring knowledge assets in the public sector," working paper, Syracuse University, Syracuse, New York, NY.

Marr, B., and Schiuma, G.(2004), "Intellectual Capital at the Crossroads: Manageing, Measuring, and Reporting of IC," Journal of Intellectual Capital, Vol.5, No.2, pp.224-229.

Mavridis,D.(2004), "Intellectual capital performance of the Japanese banking sector," Journal of Intellectual Capital, Vol.5, No.1, pp.389-413.

Mavridis,D.(2005), "intellectual capital performance drivers in the Greek banking sector," Management Research News, Vol.28, No.5, pp.43-62.

Moeller, K. (2009), "Intangible and financial performance: causes and effects," Journal of intellectual capital, 10(2), pp.224-245.

Mouritsen, J., Larsen, H. T., and Balch, P. N. P. (2001), "Intellectual Capital and the 'Capable firm' : narrating, visualizing, and namkering for managing knowledge," Accounting, Organization, and Society, Vol.26, Nos 6/7, pp.738-762.

Nielsen, C., Bukh, P., Mouritsen, J., Johansen, M., and Gormsen, P.(2006), "Intellectual capital statements on their way to the stock exchange," Journal of Intellectual Capital, Vol.7, No.2, pp.221-240.

Ordonez de Pablos, P.(2002), "Evidence of intellectual capital measurement from Asia, Europe and Middle East," Journal of Intellectual Capital, Vol.3, No.3, pp.287-302.

Ortiz, M. A. A. (2009), "Analysis and valuation of intellectual capital according to its context," Journal of intellectual capital, 10(3), pp.451-482.

Pomeda, J. R., Moreno, C.M., Rivera, C.M. and Martil, L.V.(2002), "Towards an Intellectual Capital Report of Madrid: new insights and developments, presented at "The transparent enterprise. The value of intangibles," Madrid, Spain, 25-26 November.

Public, A.(1998), "Measuring the performance of intellectual potential in a knowledge

economy," paper presented at 2nd McMaster World Congress, available at www. Vaic-on.net.

Pulic, A.(2000), "VAIC—an accounting tool for IC management," International Journal of Technology Management, Vol.20, Nos.5-8, pp.702-714.

Public, A.(2004), "Intellectual capital-does it create or destroy value?" Measuring Business Excellence, Vol.8, No.1, pp.62-68.

Roos, J., G., Roos, L., Edvinsson, and N. C. Dragonetti(1998), "Intellectual Capital: Navigating in the New Business Landscape, New York: NewYork University Press.

Roos, G.(2005), "Disclosure of intangibles: problems and opportunities," address to the Australian Human Resources Institute(AHRI), Sydney, October, 16.

Royal, Carol, Loretta, O'Donnell(2008), "Differentiation in Financial Markets: the Human Capital Approach," Journal of Intellectual Capital, Vol.9, No.4, pp.668-683.

Secundo, G., Margherita, A., Elia, G. and G. Passiante (2010), "Intangible assets in higher education and research : mission, performance or both?" Journal of intellectual capital, 11(2), pp.140-157.

Smith, G. V.(1994), "The New Role of Intellectual Property in Commercial Transations," Wiley New York, NY.

Stewart, T. A.(1997), "Intellectual Capital : The New Wealth of Organizations, New York, Doubleday.

Sveiby, K. E.(1997), "The New Organizational Wealth: Managing and Measuring Knowledge-based Assets," Barret-Kohler, San Franciso, CA.

Sveiby, K. E.(2002), "Methods for measuring intangible assets," available at www.sveiby.com/articles/IntangibleMethods.htm.

Tan, H. P., Plowman, D. and Hancock, P.(2007), "Intellectual capital and financial returns of companies," Journal of Intellectual Capital, 8(1), pp.76-95.

Tan, H. P., Plowman, D. and Hancock, P.(2008), "The evolving research on intellectual capital," Journal of intellectual capital, 9(4), pp.585-608.

Ting, W. K., H. H., Lean (2009), "Intellectual capital performance of financial institutions in Malaysia," Journal of intellectual capital, 10(4), pp.588-599.

Wernerfelt, B.(1984), "A resource-based view of the firm," Strategic Management Journal, Vol.5, No.2, pp.171-180.

Wiig, K.(2004), "People Focused Knowledge Management: How Effective Decision Making Leads to Corporate Success," Butterworth-Heinemann, Oxford.

Zeghal, D., A., Maaloul (2010), "Analyzing Value Added as an Indicator of Intellectual Capital and its Consequences on Company Performance," Journal of Intellectual Capital, 11(1), pp.39-60.