The Impact of Accumulation of Intellectual Capital and Productivity on Financial Performance: Using Corporate Value as the Dual Mediator

Chia-Hui Chao[1], Yu-Je Lee[2]

1Ph. D. Candidate, College of Business, Chung Yuan Christian University, & Assistant Professor, Department of Information Management, Hsing Wu University, New Taipei City, Taiwan.
2College of Management, Takming University of Science and Technology, Taipei City.
pyj@takming.edu.tw

Abstract: *The purpose of this study is to verify, using corporate value as the Dual Mediator, the impact of intellectual capital accumulation and productivity on the financial performance of the Taiwan-listed IC design industry. Research subjects and the primary interviewees are the section chiefs and managers of Taiwan-listed IC design industry. The sampling method adopted in this study is the Simple Random Sampling method; while Structural Equation Modeling (SEM) is used to verify the overall research model and the fitting effect of its Structural Model and Measurement Model, followed by the use of Sobel Test, Boostrapping, and Mackinnon PRODCLIN2 methods to verify the Dual Mediating effects. The study results show that, to the Taiwan-listed IC design industry: (1) the accumulation of intellectual capital has a significant positive effect on corporate value; (2) corporate value also has a direct significant positive effect on financial performance; (3) the accumulation of intellectual capital has a significant effect on financial performance; (4) productivity has a significant positive effect on corporate value; and (5) productivity has a significant effect on financial performance. The above results show that "corporate value" has a "dual" mediating effect, which also implies that promoting corporate value plays an important role in improving financial performance. But, improving financial performance does not solely rely on promoting corporate value; a number of other channels may also contribute to it. Additionally, the study results may also serve to help the decision makers of Taiwan-listed IC design industry with their strategic thinking when considering improving the accumulation of intellectual capital, productivity, and corporate value, and hopefully improve their financial performance as a result.*

Keywords: *accumulation of intellectual capital, productivity, corporate value, financial performance, dual-mediating effect*

1. RESEARCH BACKGROUND (MOTIVATION AND OBJECTIVES)

Corporate value has long been a hot topic. It is particularly important to managers and investors. Especially after the Enron scandal, market participants,one after the other, cast doubts on performance evaluation and corporate management models. This is the time for a more comprehensive new management tool (Chen, Z. R., 2004).

Capital market participants, such as business owners, accountants, financial analysts, investors and financial service providers, have long been concerned about core issues relating to the measurement and assessment of corporate value and performance. Additionally, the relationship between corporate value and the information provided by financial indicators is an important research topic and direction for studying securities investment.However, it is easy for businesses to get creative in accounting practices in order to curry favor with the market. The Enron scandal in the U. S. shows that despite that itsafter tax net profit between 1998 and 2000 increased annually, its EVA decreased each year; however, investors only looked at accounting earnings and ignored economic profits, resulting in their suffering of heavy losses.In general accounting principles, business R& D expenses, employee training expenses, and advertising expensesare recognized as costs. Ehrbar (1998) proposed that such recognition in accounting, which derives from an extremely conservative bias in the field of the accounting profession, is creating an ever-increasing gap between the reported data and reality.To put it in simple terms, Economic Value Added is the so-called residual income (RI). Classical Economist, Alfred Marshall (1890)

proposed the concept of residual income while discussing capital budget, "the surplus of a business should be: profits that belong to the manager or owner after deducting interest expense of the capital under the current interest rate." Marshall pointed out that the created value (i.e. economic profit) of a company in any period must also include expenses recorded in the accounting statement, and the opportunity costs of the funds employed by the company; i.e. economic value added = accounting profits earned by the company (adjusted) - cost of funds (Cao, 2013).

Furthermore,while the semiconductor industry is important to the economic development of a country; it is highly capital-and-technology intensive. Among the countries with leading positions in semiconductors, Taiwan is the only country with a vertically integrated supply chain. The government seeks to boost the productivity of the industry by establishing science parks and creating cluster effects. In fact, Taiwan is the role model for the countries who seek to develop their semiconductor industries.Because the semiconductor industry in Taiwan has the unparalleled competitiveness in efficiency and cost, due to a comprehensive supply chain, it also provides an ideal backdrop for the booming development of IC design houses (Peng, T. F., 2009). While IC design is in the forefront of the supply chain, including IC manufacturing, packaging, testing, and support, of the IC industry, its technology and output dominate the development of the IC industry in Taiwan. Therefore, improving the productivity factor of technical efficiency is relevant to the operating performance of the industry.

As mentioned above, since the semiconductor industry is a highly capital-intensive industry, if an enterprise wants to control the advantages presented in the rapidly changing era of a knowledge-based economy, it must improve its organizational performance through the accumulation of intellectual capital. Intellectual capital can create high enterprise value, bring forth the competitive advantages, and become itscore competitiveness required for a company's survival (Chiang, 2006).For more than a decade, a great deal of academic research was conducted on intellectual capital, which in itself proposes that intellectual capital may bring sustainable competitive advantages for businesses (Kaplan and Norton, 2004).In a broad sense, intellectual capital comprises human capital, social capital, and structural capital, and is considered a new mediating variable for interpreting a high performance work system and organizational performance (Becker and Huselid, 1998). With the use of high performance work systemsinpromoting and elevating human, structural, and social capitals of an organization, operational efficiency may be enhanced, thereby affecting the financial performance of an organization, and ultimately bringing forth improvedbusiness performance for the organization (Chang, 2010).

Summarizing the above, this study targeted the Taiwan-listed IC design industry as the research subject; focused the research on four dimensions: intellectual capital, productivity, corporate value, and financial performance; constructed research models, and performed analyses and validations, so as to understand the fitting effect of the goodness-of-fit of the model. Specifically, this study attempts to verify and to understand the impact of intellectual capital accumulation and productivity on financial performance of the Taiwan-listed IC design industry, while using corporate value as the dual mediator. The primary objectives of this study can be summarized into the following items:

- To verify whether the accumulation of intellectual capital has positive and significant influence on corporate value in the Taiwan-listed IC design industry;

- To verify whether corporate value has significant influence on financial performance in the Taiwan-listed IC design industry;

- To verify whether the accumulation of intellectual capital has positive and significant influence on financial performance in the Taiwan-listed IC design industry;

- To verify whether the productivity has positive and significant influence on corporate value in the Taiwan-listed IC design industry;

To verify whether the productivity has significant influence on financial performance in the Taiwan-listed IC design industry.

2. LITERATURE REVIEW

The main constructs of this study include intellectual capital, productivity, corporate value and financial performance. Below is a review of relevant literature.

The Definition and the Measurement Dimensions of Intellectual Capital

The conceptual definition and dimensions of this study concerning "Intellectual Capital" is drawn from M. C. Chen's (2001) definition: "That which encompasses the entire company and is expressed through skills, knowledge, information, experience, problem-solving capability and wisdom, and which is integrated in human capital, structural capital and relationship capital." The operational definition of its sub-dimensions is briefly described as follows:(1) Human Capital: knowledge, skills and experiences of a company's entire staff and management; (2) Structural Capital: a company's overall system/procedures concerning problem-solving and value creation; (3) Relationship Capital: the initiation, maintenance and development of an organization's external relationships with customers, suppliers, and business partners. Other relevant literature concerning the definition of this study is described below:

Edvinsson& Malone (1997) considered intellectual capitalas the sum of human capital (i.e., knowledge created and stored by employees) and structural capital (i.e., knowledge taking the form of documents, authorization, and the infrastructure that supports human capital). They went on to divide structural capital into organizational capital (i.e., a company's IT systems/processes of creating and storing knowledge for accelerated internal circulation/utilization) and customer capital, or the company-customer relationships. Stewart (1997) agreed with Edvinsson and Malone (1997) and identified IC as a combination of human and structural capitals, but he separated customer capital from the structural one and gave them equal importance, instead of listing the former under the latter as a sub-category. Stewart also included organizational capital into the structural one. Bontis (1996) regarded relationship capital a broader concept that includes customer capital and involves all the valuable relationships, such as company-customer relationships, company-supplier relationships, interdepartmental relationships, employee-supervisor relationships, inter-employee relationships, among other internal social capital-based relationships (Leana and Van Buren, 1999; Nahapiet and Ghoshal, 1998).Bontis' argument about relationship capital shares the same components with what the advocates of organization theory refer to as "social capital" (Adler and Kwon, 2002; Chang, 2010).

Intellectual capital, according to Sveiby(1998), is made up of individual competencies and the internal/external structure of a company, where "individual competencies" is defined as the employees' capabilities of taking actions under varied circumstances with explicit knowledge, skills, experiences, value judgments, social networks, among others; the "internal structure" is defined as the sum of patents, concepts, patterns/models, computer and management systems; the "external structure", the sum of company-customer or company-supplier relationships such as brands, goodwill, and trademarks.

While Knight (1999) tackled the issue of intellectual capitalin four dimensions, namely human, structural and external capitals besides financial performance, he said human capital comprises the employee turnover rate, employee satisfaction, the number of new products/ideas conceived and recommended to be proposed/received; the structural capital comprises the operating-capital turnover rate, ratio of salespersons to general/administrative staff, and the length of time required to launch a new product; the external capital comprises customerpersistency/satisfactions, the list of customers for maximum profitability, indicators of suppliers' product quality/reliability; the financial performance comprises the Economic Value Added (EVA), the 90-day accounts receivable, and the value added per employee.

Johnson (1999) argued that intellect consists of human, structural and relationship capitals. He defined human capital as the idea capital (i.e., the manpower for knowledge-based duties and employee aptitudes/attitudes) and leadership capital (i.e., the qualities of an expert/manager); the structural capital as the innovation capital (i.e., patents, trademarks, copyright and knowledge archives) and process capital (i.e., work procedures and trade secrets); the relationship capital as a corporate organization's relationships with customers, suppliers and online-community members.

The intangible intellectual capital is a major referential indicator ofcorporate value, as contended by Chen, M. C. (2001), who said IC consists of human, structural and relationship capitals while defining it as "something that integrates into such capitals all the skills, knowledge, information, experiences, problem-solving abilities and wisdom of a company."She went on to define human capital as"the knowledge, skills andexperiences of a company's employees and management"; structural capital, "a company's overall system/procedures concerning problem-solving and value creation"; relationship capital,"the initiation, maintenance and development of an organization's external relationships with customers, suppliers, and business partners, among others."

Tsen and Hu (2010) believed that intellectual capital is something all businesses will rely on for future growth, as well as being an indicator of efficiency in business operations. It is impossible to implement any corporate reform without first investing in intangible assets (Edvinsson, 2003).

Kung (2014) proposed that intellectual capital comprises human capital, customer capital, process capital, and innovation capital; in addition, she added family enterprise as the mediating variable to examine the mediating effect of family enterprise on intellectual capital and corporate value. The research results show that the more intellectual capital invested, the higher the corporate value.

The above literature is the research basis of this dimension for this study.

3. THE DEFINITION AND THE MEASUREMENT DIMENSIONS OF CORPORATE VALUE

The conceptual definition and dimensions of this study concerning "corporate value" aredrawn fromthe definition from MBAlib.com (2015), "corporate value is a scientific standard for evaluating corporate performance; using listed companies as an example, the market value of a business is the market capitalization of the business in the stock market." This study divides the measurement dimension of corporate value of a business into (1) book value: the net value of each item on a balance sheet; (2) market value: refers to the sale price a business can obtain; and (3) fair value: refers to the current value of the expected future cash flow return of a business, after it has been discounted with an appropriate discount rate. Other relevant literature concerning the definition and measurement dimensions of corporate value of this study is described below:

Corporate value may be defined as the ability of a corporation, which follows the law of value and through the use of value-cored management, to enable all stakeholders of the corporation (including shareholders, creditors, managers, general staff, government, etc.) to obtain satisfactory returns. Obviously, a corporation with a higher corporate value has the ability to give higher returns to stakeholders. This value can be measured through its economic definition. The definition of corporate value reveals that corporate value is positively correlated with a corporation's free cash flow; in other words, under the same conditions, the larger a corporation's free cash flow is, then the larger its value. Additionally, the type of management that sets the goal of promoting corporate value is defined as corporate value management, while corporate value indicator is the performance evaluation indicator generally adopted by leading enterprises of every global industry, and free cash flow (FCF) is the most important variable of corporate value. Furthermore, corporate value and free cash flow, owing to their objective attributes, are replacing the conventional evaluation indicators, such as profit and income, in a broader and broader field of enterprises. They are becoming the essential research topics for modern enterprises (MBAlib.com, 2015).

In terms of corporate value's primary representations or dimensions, there are a variety of representations or dimensions deemed from the financial management perspective, i.e.: (1) book value; (2) market value; (3) fair value; (4) liquidation value; and (5) replacement value. Objectively speaking, each value representation or dimension has its own rationality and applicability (MBAlib.com, 2015).

Furthermore, Li, Hong, and Zheng (2008) also suggested 7 major dimensions of corporate value indicators for evaluating enterprises in the communications category of Taiwan Excellence Awards: (1) finance/accounting dimension; (2) R&D/innovation dimension; (3) customer dimension; (4) business dimension; (5) quality dimension; (6) human resource dimension; and (7) materials dimension.

Through the use of this measurement model, Ming (2001) found that corporate value is positively correlated with investment inclination, after measuring various enterprises. Other than the size and internationalization dimensions, out of the six enterprise characteristics, each of the remaining four dimensions: computerization, customer services, competition, and innovation, has a positive correlation effect ofvarying degree with the measurement items of CRM customer value and corporate value.

The above literature is the research basis of this dimension for this study.

4. THE DEFINITION AND THE MEASUREMENT DIMENSIONS OF PRODUCTIVITY

The "conceptual definition" of "Productivity" of this study refers to the ratio between product output and input. While the dimensions of productivity of this study are drawn fromthe categorization of productivity factors proposed by Lin, Xu and Chen (2004): (1) pure technical efficiency; (2)scale efficiency; (3) technical changes. Other relevant literature concerning the definition and measurement dimensions of productivity of this study is described below:

It is understood that the term *productivity* was first proposed by the founder of Physiocracy, F. Quesnay, in 1776. The hypothesis base, on which this term was raised, was that the resources were finite, while human desires are infinite, which is also the problem of productivity. Productivity has becomequite a popular concept in recent years; however, it is also the most confusing term. The main reasons for this are that different identifications are given to its inputs and outputs, and that productivity has different representations when used in different fields (Wu, and He, 2008).

Lin et al (2004) studied the total factor productivity (TFP), and the changes and trends of its comprised factors (including: pure technical efficiency, scale efficiency, and technical changes) of 20 manufacturers of Taiwan's IC industry from 1996 through 2002 in their article, titled "The Effects of Taiwan's IT Industry's Internationalization on Technical Efficiency and Marginal Productivity", to verify,whether or not,investing in China poses any impact on the productivity, five major capabilities on profitability, and credit risk variables of Taiwan's IC industry.

Hou (2004) proposed that productivity refers to the ratio between output and input. If the input in question is a single-factor input, such a ratio is termed Partial Factor Productivity (PFP), and if all factor inputs are considered, such a ratio is termed Total Factor Productivity (TFP). When there are multiple factors of output and input, weights need to be weighted in a manner that allows for single statistical output index, and total input factor index; while various methods can be used to measure weights. Productivity can be used to compare the productivity performance between different manufacturers, or between different time frames of the same manufacturer. One of the objectives in measuring productivity is to understand the efficiency of company operation. Apart from the direct contribution of factor input, factors that cause changes in productivity also include: the advancement of knowledge (includes technical and management aspects), the scale of economy, changes in market structures, external economy, input quality, or changes in composition.

The above literature is the research basis of this dimension for this study.

5. THE DEFINITION AND DIMENSIONS OF FINANCIAL PERFORMANCE

The conceptual definition concerning "financial performance" in this studyis drawn fromthe definition proposed by Lin[a] (2013), "Financial performance, which is the narrowest sense of business performance, is generally expressed with simple financial indicators to reflect on whether or not the business has reached economic goals. Common profitability indicators include measurement standards such as: ROI, ROS, ROE, and EPS." While the dimensions used to measure financial performance as proposed by Huang (2008); Ling, and Hong (2010); and Lin[a] (2013) are referenced concerning the measurement dimensions for financial performance in this study. Thus, EPS and ROE are used in this study as the indicators for measuring financial performance. Relevant literature concerning dimensions for financial performance is briefly described below:

Performance is a concept significant in the two different layers of *efficiency* and *effectiveness*.

While efficiency is the output-to-input ratio, effectiveness is the degree of goal achievement *for* an organization. Organizational operations are pursuits of results that are both efficient and effective. According to the motivation theory of management sciences, performance is interpreted as"a piece of work completed by an employee"(Wang, 1997). The science of organizational behavior, nevertheless, refers to performance as "an integrated success consisting of efficiency, effectiveness and efficacy"(Hsieh, 2006).

Lin[a] (2013) proposed that financial performance, which is the narrowest sense of business performance, is generally expressed with simple financial indicators to reflect whether or not the business has reached economic goals. Common profitability indicators include: sales growth, profitability (e.g. ROI, ROS, and ROE), EPS and other enterprise market values as the measured indicators.

Additionally, Ling and Hong (2010) pointed out that, to take into consideration the financial aspect of organizational performance measurement, they applied the indicators for "growth" and "profitability". For example, a company's Earning per Share (EPS) is above the average of other businesses in the same sector, or is used along with Return on Equity (ROE) or Return on Assets (ROA) as measurement indices for financial performance (Huang, 2008).

The above literature is the research basis of this dimension for this study.

6. RELEVANT LITERATURE ON INTELLECTUAL CAPITAL AND CORPORATE VALUE

Chen, L. H. (2004) reconstructed Tobin's Q, and EPS regression models that affect company value by using variables, such as intellectual capital, R&D and innovation activities, company scale, capital structures, dividend policy, and shareholding structures. The empirical results show that the impact of each explanatory variable on company value differs from industry to industry.

The empirical results of the research by Chiou and Hung (2008) show that, without considering corporate life cycle, innovation capital, customer capital, and process capital have a significant positive correlation with corporate value.

Yen and Han (2012) argued that intellectual capital creates value for the company, and continue to help it maintain a competitive advantage. But when business credit risk rises, it may interfere with intellectual capital's value-creation effects.

Kung (2014) proposed that the more a business invests in the four dimensions of intellectual capital, i.e. (1) human capital; (2) customer capital; (3) process capital; and (4) innovation capital, the higher the corporate value.

Summarizing the above, although the subjects of discussion belong to various industries or scales, there are sufficient similarities that allow this study to derive thefollowing hypotheses:

H_1: The accumulation of intellectual capital has a significant positive effect on the corporate value of Taiwan-listed IC design industry.

7. RELEVANT LITERATURE ON CORPORATE VALUE AND FINANCIAL PERFORMANCE

To date, relevant literature concerning corporate value and financial performance is scarce. Literature that is relevant to this study is described below:

Guan (2001) argued that the ultimate goal of a business operation is to create company value and shareholder value; thus it is necessary to construct value-based performance evaluation indicators. EVA is an integrated single indicator for evaluating organization performance that can meet the demands of all stakeholders of a business, including customers, employees, suppliers, and stockholders. In addition to increasing a company's economic value, it is also reflected in the capital market, thereby increasing market value added (MVA). Furthermore, EVA establishes the partnership between professional managers and the business's stockholders (make managers into owners), it also establishes a more efficient interconnected mechanism for evaluating the internal business performance of an organization and external investment returns.

Lu (2009) argued that the EVA indicator can significantly interpret stock-based returns, and that it should be treated as an important indicator for evaluating a corporation's business performance. Clearly, EVA and a corporation's business performance are positively correlated; in addition,

corporate value is the Present Value of the corporation, i.e. the value after discounting the Weighted Average Cost of Capital (WACC) of the expected free cash flow with an appropriate discount rate. It is highly related to the financial decision making of a business.

Chao, Lee, and Pan (2011) studied on the impact of the cross-multiplication between a company's product diversification and internationalization on its performance, and the findings show that it is positively correlated with ROA, ROE, and ROS, within 1%, and 5% of significant levels. The cross-multiplication between product diversification and internationalization has increased benefits and positive significant effects on financial performance; its impact on the company value is also positive. Overall, the level of product diversification, and company value are positively correlated. Therefore, corporate value and financial performance are correlated.

In analyzing the above literature, although the subjects of discussion belong to various industries or scales, there are sufficient similarities that allow this study to derive the following hypotheses:

H_2: Corporate value has a significant positive effect on the financial performance of Taiwan-listed IC design industry.

8. RELEVANT LITERATURE ON INTELLECTUAL CAPITAL AND FINANCIAL PERFORMANCE

Chen, M. C. (2001) argued that apart from affecting the output of intellectual capital through the intermediate variables, the input of intellectual capital can also directly impact the quality of its output. Therefore, if a business can provide proper control between intellectual capital input and the intermediate variables, intellectual capital input will provide a positive effect on the efficacy of intellectual capital output.

Wang and Chang (2004) pointed out that intellectual capital affects a corporation's business performance; in addition, each factor of intellectual capital, apart from directly affecting business performance, can indirectly affect business performance through the causal effect between factors. Human capital, the most fundamental factor of the indirect effect, will positively affect innovation capital and process capital; while innovation capital will also affect process capital. Process capital will, thereby, affect customer capital, and through customer capital, affect positively the overall business performance. Therefore, if the semi-conductor enterprises can manage the leading factor - intellectual capital, it is then helpful to accumulate and improve other factors that are lagging behind.

Lin and Lin (2005) adopted the analytic hierarchy process (AHP), and constructed a research model using intellectual capital, marketing strategies, and risk management strategies as independent variables, and financial holding business performance as the dependent variable. It can also be extrapolated from their research findings that the accumulation of intellectual capital has a significant positive effect on financial performance.

Using the approach of case study, Peng (2009) delved into the relation between knowledge management-stimulating factors and knowledge management to examine how an organization accumulates intellectual capitalthroughknowledge management, and how it improves performances by accumulating intellectual capital.

According to Chang (2010), intellectual capital affects organizational performance in a significantly positive way. That is, a larger intellectual capital leads to improvements in organizational performance.

Tsen et al (2010) argued that, since intellectual capital consists of human, structural and social capitals, it is important that an organization develops"human capital" hardly replicable by competitors, transforms the accumulated wisdom/abilities into its core capability, creates distinctive organizational qualities using functions of "structural capital", and establishesirreplaceable external relationships to bolster social capital. They also consider the synergy resulted from interactions among "human, structural and social capitals"a crucial factor of organizational competitiveness.

In analyzing the above literature, although the subjects of discussion belong to various industries or scales, there are sufficient similarities that allow this study to derive the following hypotheses:

H_3: Intellectual capital has a significant positive effect on the financial performance of Taiwan-listed IC design industry.

9. RELEVANT LITERATURE ON PRODUCTIVITY AND CORPORATE VALUE

To date, relevant literature concerning productivity and financial performance is scarce. Literature that is relevant to this study is described below:

Cohe (2003) suggested that most companies depend on various power structures for organization efficacy, where employees, managers, executives and chairman of the board of directors are clearly defined, in order to demonstrate corporate value of the productivity. In other words, a business with positive productivity can create corporate value.

In addition, employee productivity is the direct source for the competitiveness factor of corporate value. It is also the major factor in creating customer satisfaction and enterprise profitability (Baidu, 2015).

Lin[b] (2013) pointed out that white collar and knowledge workers are the main characters in a thriving business. Their productivity and performance value determine the profit/loss and rise/fall of a business; moreover, they are the driving force of a business's innovation value.

Whilst the abovementioned literature examines different industries, scales or scopes, there is a degree of consensus. Therefore, this study develops the following hypothesis:

H_4: The productivity has a significant positive effect on the corporate value of Taiwan-listed IC design industry.

10. RELEVANT LITERATURE ON PRODUCTIVITY AND FINANCIAL PERFORMANCE

Chen, K. T. (2004) re-examined the relationship between the shareholding ratio of institutional investors and business performance by using productivity as the indicator for business performance, and also explained that productivity is a better tool than Tobin's Q for measuring business performance. The findings show that the shareholding ratio of institutional investors, and business performance, have significant positive correlations.

Linet al (2007) argued that the enhancement of technological efficiency can significantly improve ROA, ROE and earning-price ratio (E/P).

Lin (2009) suggested in the article, "Market orientation, marketing knowledge, marketing productivity and performance", that marketing productivity is positively correlated with performance.

Lin[b] (2013) pointed out that the basic concept of productivity refers to the ratio relationship between an organization's input and output; where "input" refers to the input and the amount of resources consumed to produce merchandize or services; where "output" refers to the amount of merchandize or services produced to satisfy customer demands; and the ratio between such input and output is the intrinsic meaning of productivity. Undoubtedly, productivity has a deep impact on an organization's operational performance.

Whilst the abovementioned literature examines different industries, scales or scopes, there is a degree of consensus. Therefore, this study develops the following hypothesis:

H_5: The productivity has a significant positive effect on the financial performance of Taiwan-listed IC design industry.

11. RESEARCH METHODS

Based on the above research purposes, hypotheses and literature review, this study comes up with the following research structure (Figure1):
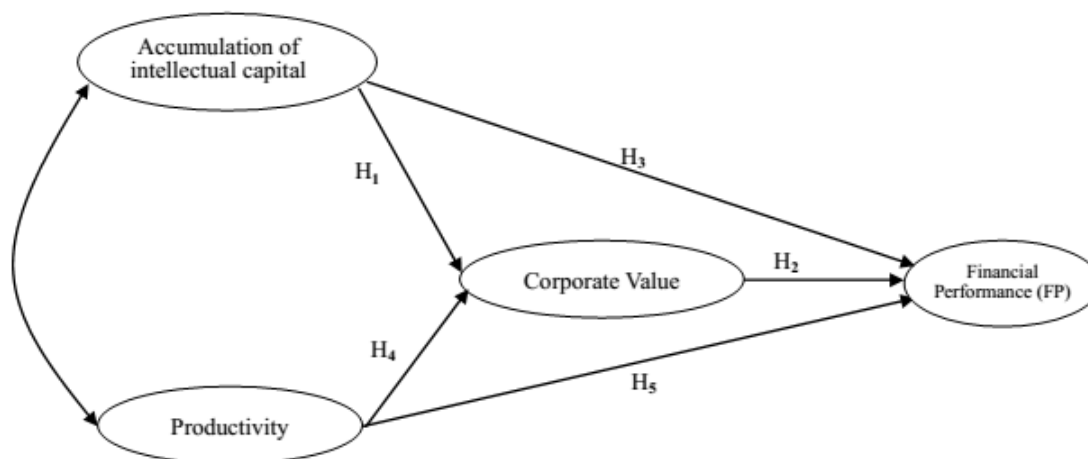
Research Framework

Fig1. *Research Framework*

12. QUESTIONNAIRE DESIGN AND CMV TEST

12.1. Questionnaire Design

This study uses simple random sampling for the questionnaire survey. To enhance the content validity and reliability of the questionnaire, this study conducts an expert questionnaire based on the initial questionnaire design for a pilot test. Inappropriate questions are either modified or deleted before the post test. The questionnaires are issued to the section chiefs and managers working in Taiwan-listed IC design industry. A total of 530 questionnaires are posted, and 205 effective questionnaires, or at 38.68% effective recovery rate, are collected after the elimination of incomplete and invalid questionnaires. The questionnaire in this study was compiled on the basis of Itemization Survey method and the afore-mentioned observable dimensions. On a 7-point Likert Scale, the answers were measured with7 denoting Strongly Agree and 1 denoting Strongly Disagree. A higher score represents a greater level of agreement, and vice versa (Fritz and Mackinnon, 2007).

The questionnaire design concerning "intellectual capital" is drawn from the three sub-dimensions of intellectual capital proposed by Chen, M. C. (2001) that includes human capital, structure capital, and relation capital. The dimensional scales were used as the design base to come up with a total of 9 questions.

This study referenced the dimension classification of MBAlib.com (2015), and drew on information from TEJ's (Taiwan Economic Journal) databank to design the questionnaire concerning "corporate value", which includes three sub-dimensions: (1) book value; (2) market value; and (3) fair value; with the resulting 9 questions in total.

This study referenced sub-dimensions proposed by Lin et al (2004), namely: (1) pure technical efficiency; (2) scale efficiency; and (3) technical changes; to design the questionnaire concerning "productivity". The dimensional scales were used as the design base to come up with a total of 9 questions.

Concerning the measurement indicators for "financial performance", this study referenced the perspectives on financial dimensions held by Huang (2008), Ling et al (2010), and Lin[b] (2013), and adopted "EPS" and "ROE" as the dimensional indicators for measuring financial performance. With some adaptation, and drawing information from TEJ's databank, this study designed the questionnaire with a total of 6 questions.

13. SEM AND MEASUREMENT SYSTEM

To validate the research structure, this study adopts Structure Equation Modeling (SEM) for Confirmatory Factor Analysis (CFA). The questionnaire measures four latent variables, i.e. employees' service quality, organizational commitment, customer satisfaction and financial performance. Each latent variable can be divided into secondary variables, for which multiple

questions are developed. The collated survey data is processed and the data file for the questionnaire responses is established. Whilst the questionnaire is designed into individual sections for the measurement system of the research model, this study performs dual measurements in order to facilitate software processing. Table 1 summarizes the number of questions and reference sources of individual implicit variables and explicit variables (Lee[a], 2011).

Table1. *Questionnaire structure*

Implicit dimension	Explicit dimension	No. of questions	References
Intellectual Capital (IC)	Human Capital	3	Chen, M. C. (2001)
	Structure Capital	3	
	Relation Capital	3	
Corporate Value (CV)	Book Value	3	MBAlib (2015) and TEJ
	Market Value	3	
	Fair Value	3	
Productivity (PR)	Pure Technical Efficiency	3	Lin et al (2004)
	Scale Efficiency	3	
	Technical Changes	3	
Financial Performance (FP)	EPS	3	Huang(2008), Ling et al (2010), Lin (2013), and TEJ
	ROE	3	

14. LINEAR STRUCTURAL MODEL

Confirmatory Factor Analysis (CFA) is a type of analysis in contrast with Exploratory Factor Analysis (EFA). This study conducts pairwise CFA on the four dimensions, i.e. intellectual capital, corporate value, productivity and financial performance. Structural equation modeling (SEM) consists of structural modeling and measurement modeling. It can effectively solve the causal relationship between implicit variables. Hence, this study sets out to examine three elements of the model: (1) the compliance of the fit measurement for the overall model with the requirement; (2) the fit of the measurement model and (3) the fit of the structural model (Lee[a], 2011).

15. RESEARCH ANALYSIS & FINDINGS

15.1. Overall Fit Tests

After the literature review and the factor analysis on sampled data, this study constructs the overall model and, as suggested by Hair, Anderson, Tatham, and Black (1998), classified the measurement of the overall model fit into three categories, i.e. measures of absolute fit, increment fit and parsimonious fit. Table 2 shows the results of the overall fit tests (Chen, Fang, Chen &Chien, 2008).

Table2. *Overall fit tests*

Fit measures		Criteria	Research results
Absolute fit	GFI	>0.9	0.904
	AGFI	>0.8	0.901
	RMR	<0.05	0.024
Increment fit	NFI	>0.9	0.903
	CFI	>0.9	0.901
Parsimonious fit	PNFI	>0.5	0.614
	PGFI	>0.5	0.612

16. CMV TEST RESULTS & ANALYSIS

Using CFA to test and compare, common method variance does not exist in the questionnaire designed by this study. Results are shown in Table 3.

Table3. *CMV Test Results*

Model	χ^2	DF	$\Delta\chi^2$	ΔDF	P
Single-Factor	1326.2	97	884.8	99	0.000
Multiple-Factor	441.4	196			

17. MEASUREMENT SYSTEM WITHIN MODEL

The factor loading of latent (implicit) variables (i.e. main dimensions) and manifest (explicit) variables (i.e. sub-dimensions) measures the strength of linear correlation between individual latent variables and manifest variables. The closer the factor loading is to 1, the better the measurement variable (or sub-dimension variable) can evaluate the main dimension. All the factor loading values of individual dimensions in this study are greater than 0.7, indicating strong reliability. Therefore, all the sub-dimensio.ns (manifest variables) in the measurement system can appropriately evaluate the main dimensions (latent variables). Meanwhile, Average Variance Extracted (AVE) expresses the explanatory power of latent variables on measured items. The higher the AVE, the better reliability and convergent validity the latent variables have. Usually, the AVE value must be greater than 0.5, indicating the explained variance of the dimension concerned is greater than measurement error (Fornell and Larcker, 1981). All the factor loading values in this study are higher than 0.7, Composite Reliability (C.R.) and Cronbach's α also greater than 0.7. All the AVE values exceed 0.5, suggesting the latent/implicit variables carry high reliability and convergent validity (Tables2 and 4).

Table4. *Criteria for Measurement System in Model.*

Main dimension	Sub-dimension (or measurement)	Factor loading	Composite Reliability, C. R.	Cronbach's α	Average Variance Extracted
Intellectual Capital(IC)	Human Capital	.854	.833	.822	.670
	Structure Capital	.821			
	Relation Capital	.824			
Corporate Value (CV)	Book Value	.813	.814	.811	.664
	Market Value	.811			
	Fair Value	.812			
Productivity (PR)	Pure Technical Efficiency	.814	.823	.814	.664
	Scale Efficiency	.812			
	Technical Changes	.823			
Financial Performance (FP)	EPS	.853	.853	.851	.674
	ROE	.864			

In addition, this study refers to AVE to determine discriminant validity of individual dimensions. Fornell and Larcker (1981) believed that the AVE of each dimension should be greater than the squared value of the correlation coefficient of the dimension in question in order to validate the discriminant validity between the dimensions. Table 5 indicates the presence of discriminant validity between the dimensions such as intellectual capital, corporate value, productivity, and financial performance. In other words, this study has passed discriminative, and convergent validity tests. As mentioned above, the questionnaires of this study do not contain the issue of common method variance.

Table5. *Estimates of confidence interval for discriminant validity*

Parameter	Estimate	$\Psi \pm 2\sigma$		Bias-corrected		Percentile method	
		Lower	Upper	Lower	Upper	Lower	Upper
IC ⟷ CV	.542	.421	.663	.420	.673	.416	.682
CV ⟷ FP	.681	.371	.991	.368	.992	.363	.993
IC ⟷ FP	.532	.382	.682	.373	.683	.367	.684
PR ⟷ CV	.521	.423	.619	.421	.621	.416	.623
PR ⟷ FP	.513	.431	.631	.426	.636	.413	.638

18. COEFFICIENT OF DETERMINATION

Coefficient of determination, also known as Squared Multiple Correlation (SMC), represents the explanatory power of independent variables to dependent variables of individual latent variables. Table 6 shows that the independent variables in this study exhibit medium levels of explanatory power on dependent variables of individual latent variables.

Table6. *Coefficient of determination*

Coefficients of Determination	R^2
Intellectual Capital (IC)→Corporate Value (CV)	.243
Corporate Value (CV)→Financial Performance (FP)	.331
Intellectual Capital (IC)→Financial Performance (FP)	.242
Productivity (PR) →Corporate Value (CV)	.363
Productivity (PR) →Financial Performance (FP)	.281

19. PATH COEFFICIENTS OF LATENT VARIABLES IN THE MODEL

After the validation of the model with internal fit tests, this study summarizes the standardizedcoefficients and C.R. values of individual latent (implicit) variables in Table 7 and Table 8 according the path analysis results.

**Table7.** *Results of path analysis on structural model (un-standardized).*

	Estimate	S.E.	C.R.	P
Intellectual Capital (IC)→Corporate Value (CV)	.782	.131	5.969	***
Corporate Value (CV) → Financial Performance (FP)	.883	.112	7.884	***
Intellectual Capital (IC)→Financial Performance (FP)	.784	.133	5.895	***
Productivity (PR) → Corporate Value (CV)	.881	.141	6.248	***
Productivity (PR) → Financial Performance (FP)	.841	.132	6.371	***

*Note: *denotes P<0.05; **denotes P<0.01; ***denotes P<0.001*

Table8. *Standardized Regression Weights: (Group number 1–Default model)*

			Estimate
Intellectual Capital (IC)	→	Corporate Value (CV)	.541
Corporate Value (CV)	→	Financial Performance (FP)	.682
Intellectual Capital (IC)	→	Financial Performance (FP)	.531
Productivity (PR)	→	Corporate Value (CV)	.523
Productivity (PR)	→	Financial Performance (FP)	.512

*Note: *denotes P<0.05; ** denotes P<0.01; ***denotes P<0.001*
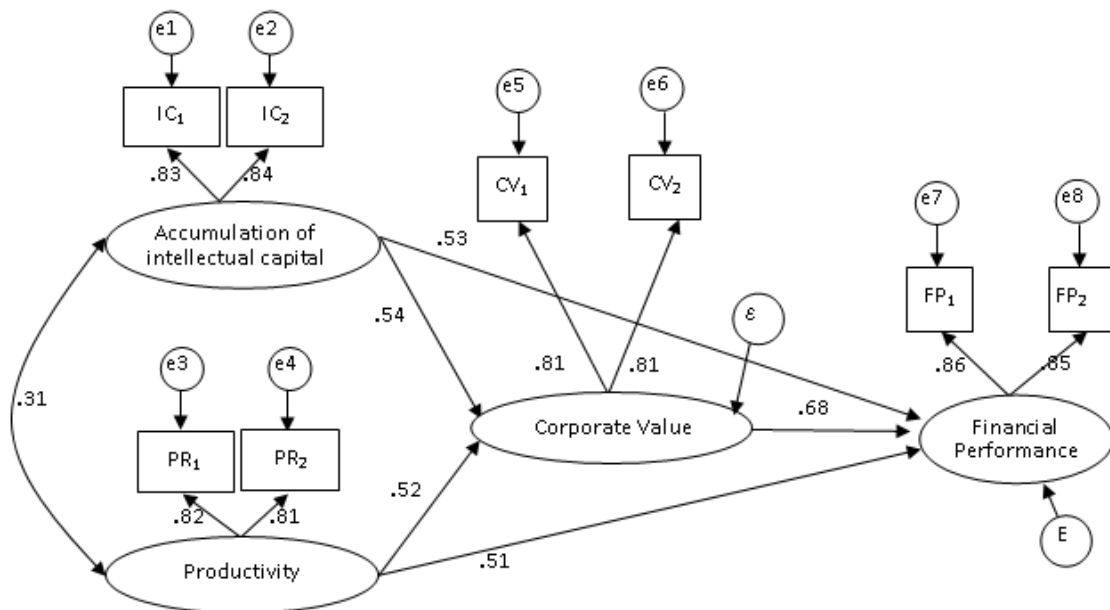
20. PATH EFFECT ANALYSIS & TESTS ON STRUCTURAL MODEL

This study performs Sobel tests, Bootstrapping and Mackinnon PRODCLIN2 on the path coefficients of latent variables (or non-observable variables) as the path effect analysis on the path effects in the structural model. The corporate value serves as a dual mediator. Test results are shown in Tables 9 and 10 (Sobel, 1982; MacKinnon, Friitz, Willians and Lockwood, 2007)

Table9. *Intervening variables (un-standardized)*

Variable	Point of Estimates	Product of Coefficients		Bootstrapping				MacKinnon PRODCLIN2 95%CI	
				Bias-Corrected 95% CI		Percentile 95% C			
	(Est.)	SE	Z	Lower	Upper	Lower	Upper	Lower	Upper
				Total Effects					
IC→CV	.782	.131	5.969	.71	.85	.63	.86		
				Indirect Effects					
CV→FP	.883	.112	7.884	.39	.46	.35	.44	. 31	.49
				Direct Effects					
IC→FP	.784	.133	5.895	.32	.39	.28	.42		

Table10. *Intervening variable (un-standardized)*

Variable	Point of Estimates	Product of Coefficients		Bootstrapping				MacKinnon PRODCLIN2 95%CI	
				Bias-Corrected 95% CI		Percentile 95% C			
	(Est.)	SE	Z	Lower	Upper	Lower	Upper	Lower	Upper
				Total Effects					
PR→CV	.881	.141	6.248	.72	.86	.63	.87		
				Indirect Effects					
CV→FP	.883	.112	7.884	.42	**.51**	.34	.45	.31	.52
				Direct Effects					
PR→FP	.841	.132	6.371	.33	.35	.29	.42		

The conclusion of this study is obtained from Tables 9&10 and Figure 2 as below：

* The accumulation of intellectual capital has positive and significant influence on corporate value in Taiwan-listed IC design industry. Standardized coefficient is estimated to be 0.54. Therefore, H_1 is substantiated.

* Corporate value has direct, positive and significant influence on the financial performance in Taiwan-listed IC design industry. Standardized coefficient is estimated to be 0.68. Therefore, H_2 is substantiated.

* The accumulation of intellectual capital has significant influence on the financial performance in Taiwan-listed IC design industry. Standardized coefficient is estimated to be 0.53. Therefore, H_3 is substantiated.

* The productivity has positive and significant influence on corporate value in Taiwan-listed IC design industry. Standardized coefficient is estimated to be 0.52. Therefore, H_4 is substantiated.

* The productivity has significant influence on the financial performance in Taiwan-listed IC design industry. Standardized coefficient is estimated to be 0.51. Therefore, H_5 is substantiated.

These above results suggest that corporate value serves partly as a dual mediator. This also implies that corporate value plays a pivotal role in the promotion of organizational performance. However, the improvement of organizational performance takes more than just corporate value. It is necessary to push for performance improvements via other means.

21. CONCLUSIONS AND SUGGESTIONS

This section reaches conclusions on the basis of the above analysis and findings, and elaborates on the contribution of this study. Finally, the research limitations are summarized and the suggestions to follow-up studies are made.

21.1. Conclusions

In sum, this study interviews the section chiefs and managers working in Taiwan-listed IC design industry in order to develop an SEM model to validate the research hypotheses. The following is the research conclusions:

The effects of the accumulation of intellectual capital on corporate value of Taiwan-listed IC

design industry

The findings of this study show that the hypothesis 1 is supported, i.e. Taiwan-listed IC design industry's accumulation of "intellectual capital" has a significant positive effect on "corporate value". This result is similar to the research findings of Chen, Z. R. (2004), Chiou, Hung (2008), Yen&Han (2012), and Kung (2014).

The effects of corporate value on financial performance of Taiwan-listed IC design industry

The findings of this study show that hypothesis 2 is supported, i.e. Taiwan-listed IC design industry's "corporate value" has a significant positive effect on "financial performance". This result is consistent with the research findings of Guan (2001); Lu (2009); and, Chao, Lee, and Pan (2011).

The effects of the accumulation of intellectual capital on financial performance of Taiwan-listed IC design industry

The findings of this study show that hypothesis 3 is supported, i.e. Taiwan-listed IC design industry's accumulation of "intellectual capital" has a significant positive effect on "financial performance". This result is consistent with the research findings of Chen, M. C. (2001), Wang and Chang (2004), Lin and Lin (2005), Peng (2009), Chang (2010), and Tsen et al (2010).

The effects of productivity on corporate value of Taiwan-listed IC design industry

The findings of this study show that hypothesis 4 is supported, i.e. Taiwan-listed IC design industry's "productivity" has a significant positive effect on "corporate value". This result is consistent with the research findings of Cohe (2003), and Lin[a&b] (2013).

The effects of productivity on financial performance of Taiwan-listed IC design industry

The findings of this study show that hypothesis 5 is supported, i.e. Taiwan-listed IC design industry's "productivity" has a significant positive effect on "financial performance". This result is consistent with the research findings of Chen, Z. R. (2004),Lin et al (2007), Lin (2009), and Lin (2013).

22. RESEARCH CONTRIBUTIONS

- This study constructs a model with two causes, one effect and one mediator. The model is based on relevant studies and validated for the goodness-of-fit effects. Hence, it adopts a CFA (Confirmatory Factor Analysis) approach on an important real-life issue with an innovative approach. It is suggested that follow-up studies continue to explore relevant topics and further examinations.

- This study completes a series of tests on the reliability and the validity on the model dimensions for the questionnaire and conducts CMV analysis and tests. The statistical approach and the research methodology are pragmatic and creative.

The results of this study may serve to help the decision makers of the Taiwan-listed IC design industry with their strategic thinking when considering improving the accumulation of intellectual capital, productivity, and corporate value, and hopefully improving their financial performance as a result.

23. RESEARCH LIMITATIONS

This study suffers from limited resources, although it seeks to complete all the stages of research tasks in a manner as robust as possible. Below is a list of research limitations:

- There are limited studies in Taiwan and overseas on the research dimensions developed in this study and very few papers address the pairwise dimensions as in this study. This is why the supporting data seems inadequate for hypothesis development.

- This study uses simple random sampling and issues the questionnaires via post. As a result, the effective recovery rate is low and the sample may not be representative of the population.

Due to research resource limitations, this study only samples the Taiwan-listed IC design industry. The research scope does not cover all the small-and-medium sized IC design industries in Taiwan.

24. SUGGESTIONS TO FOLLOW-UP STUDIES

This study only interviews the section chiefs and managers working in Taiwan-listed IC design industry. To broaden the scope of data or seek innovative approaches, follow-up studies may examine the players of smaller sizes in the same IC design industry or investigate other industries for comparisons and analyses.

REFERENCES

Adler, P and Kwon, S (2002). Social Capital: Prospects for a New Concept. *Academy of Management Review*, 27(1), 17-40.

Baidu (2015).http://baike.baidu.com/view/1282060.htm

Becker, BE and Huselid, MA (1998). High-performance work system and firm performance: a synthesis of research and managerial implications. *Research in Personnel and Human Resource Management*, 16, 53-101.

Bontis, N (1996). There is Price on Your Head: Managing Intellectual Capital Strategically.*Business Quarterly*, 40-47.

Cao, YJ (2013). Examining Business Performance of Taiwan Financial Holdings Company: EVA Perspective. Taiwan: *Bank of Taiwan Quartly*, 62 (2), 1-24.

Chang, CF (2010). A study of the relationship among HPWS, intellectual capital and organizational performance. Taiwan: Master's degree thesis, Graduate Institute of Human Resource, National Central University.

Chao, YS, Lee, ZQ and Pan, CH (2011). A Study on the Influences of *Internationalization* Depth on Financial Performance and Corporate Value. Taiwan: East-Asia Review, Ta Hwa University of Science and Technology.

Chen, FC, Fang, HK and Chung, YH (2008). A Study on the Evaluation of Service Quality and Operation Performance of Government Financial Organizations. Taiwan: *Journal of Chinese Economic Research*, 5(2), 82-104.

Chen, KT (2004). Institutional Investors and Firm Performance: A Re-examination Using Productivity Measurement. Taiwan: Master's degree thesis, Graduate School of Business Administration, Kun Shan University.

Chen, LH (2004). Intellectual Capital, Research and Development Expenses, and the Valuation of Firms. Taiwan: Master's degree thesis, Department of Finance, Chao Yang University of Technology.

Chen, MC (2001). The Effect of Information Technology Investment and Intellectual Capital on Business. Taiwan: Doctoral Dissertation, Department of Information Management, National Central University.

Chen, ZR (2004). A Study of The Association Between Economic Value Added, Traditional Measure of Financial Performance and Market Value Added. Taiwan: Master's degree thesis, Department of Accounting Information, Da-Yeh University.

Chiang, HY (2006). The Study of Performance Evaluation in Liner Shipping Industry by Linking Intellectual Capital and Balanced Scorecard. MA, Taiwan: Department of Shipping and Transportation Management, National Taiwan Ocean University.

Chiou, CC and Hung, F. T. (November 2008). On the Association of Intellectual Capital and Firm Value: Considering Different Phases of Business Life Cycle. Taiwan: *Journal of Contemporary Accounting*, 9 (2), 201-236.

Cohe,C (2003). Corporate Uices. Taiwan: Sunbright Publishing, 108.

Edvinsson, L (2003). Corporate Longitude: What You Need To Know To Navigate The Knowledge Economy, Financial Times Prentice Hall. Pearson Education, Inc., Upper.

Edvinsson, L, and Malone, MS (1997). Intellectual Capital: Realizing Your Company's True Value by Finding Its Hidden Brainpowe. New York, NY: Harper Business.

Ehrbar,A, (1998). EVA: The Real Key to Creating Wealth, New York: Wiley.

Fornell, C, and Larcker, DF (1981). Evaluating structural equation models with un-observables

and measurement error. *Journal of Marketing Research*, 18: 39-50.

Fritz, MS and Mackinnon, DP (2007). Required sample size to detect the mediate effect. *Psychological Science*, 18, 233-239.

Guan, CQ (2001). Measuring Organizational Performance using EVA. Taiwan: CECI Technical Journal, http:// www.ceci.org.tw.

Hair, JF Jr., Anderson, R, Tatham, R, and Black, WC (1998). Multivariate Data Analysis (5th ed.). Upper Saddle River, NJ: Prentice Hall.

Hou, I (2004). A Study about the Efficiency Analysis of Insurance Industry between Taiwan and China: Application of CCD Model and application of Data Envelopment Analysis. Taiwan: Master's degree thesis, Department of Finance, Shu-Te University.

Hsieh, HC (2006). A Research on the Relations among Organizational Change Recognition, Organizational Commitment and Work Performance: Take Hsing Chung Paper Company as an Example. Taiwan: Master's degree thesis, Graduate Institute of Management, Fo Guang University.

Huang, HC (2008). Moderating and contextual effects of trust mechanisms on interorganizational co-opetition strategy: Using CPA partnership firms as examples. Taiwan: doctoral dissertation, College of Management, National Taiwan University.

Johnson, K (1999). Making loyalty program more rewarding. Direct Mark, 61 (11), 24-27.

Kaplan, RS, & Norton, DP (2004). Measuring the strategic Readiness of intangible Assets. *Harvard Business Review,* 82(2), 52-63.

Knight, GA (1999). Consumer preferences for foreign and domestic products.*Journal of Consumer Marketing*, 16 (2), 151-162.

Kung, HN (2014). The Association between Intellectual Capital and Firm Value- The Moderating Effect on Family Firms. Taiwan: Master's degree thesis, Accounting Department, Ming Chuan University

Leana, CR and Van Buren, HJ (1999). Organizational social capital and employment practices. *Academy of Management Review,* 24(3), 538-555.

Lee[a], YJ (June 2011). A case study on the effect of Teaching Innovation on Learning Effectiveness: Using a Moderator of 'Integrating Information Technology into Teaching. *The Journal of Human Resource and Adult Learning*, 7(1).

Li, YZ, Hong, PP and Zheng, GX (2008). The Measurement Indicators of Corporate Value: Using Taiwan's Award Winning Enterprises in Communication Category of Taiwan Excellence Awards as Examples. *Web Journal of Chinese Management Review,* 11(4), 1-24.

Lin, MQ and Lin, XX (2005). The Research of the Influence of Intellectual Capital/ Marketing Strategy/ Risk Management Strategy on Business Performance: The Case of Financial Holding Group in Taiwan. Taiwan: *Socioeconomic Law and Institution Review*, 36, 79-109.

Lin, PR (2009). Market orientation, marketing knowledge, marketing productivity and performance. Taiwan: Master's degree thesis, Graduate School of Business Administration, National Chengchi University.

Lin, ZR, Xu, QS and Chen, YZ (2004). The Impact of Industry's Investment in China on IC Industry's Productivity and Financial Performance in Taiwan. *Cross-Strait and International Affairs Quarterly*, 1(1), 127-159.

Lin[a], XJ (2013). Enterprise's Business Performance Indicators and Business Analysis. Taiwan: China Productivity Center, http://www.cpc.org.tw/.

Lin[b], XJ (2013). The Performance Evaluation Models of White Collar and Knowledge Workers. Taiwan: my Knowledge Management Center, http://mymkc.com/articles/contents. aspx?ArticleID=21712.

Ling, YH and Hong, L (2010). How Intellectual Capital Management Affects Organizational Performance: Using Intellectual Capital as the Mediating Variable, Taiwan: *Human Resource Management Student Newspaper*, 10 (1), pp.1-27.

Lu, CM (2009). The Study of Relationship between the Economic Value Added and Business Operating Performance Stocks.

MacKinnon, DP, Fritz, MS, Williams, J, & Lockwood, CM (2007). Distribution of the product

confidence limits for the indirect effect: Program PRODCLIN. *Behavior Research Methods*, 39, 384-389.

Marshall, A (1890). Principles of Economics. London: Macmillan and Co., Ltd.MBALIB.com, http://wiki.mbalib.com/zh-tw/%E4%BC%81%E4%B8%9A%E4%BB B7E5% 80%BC.

Ming, V (2001). Developing a Value Model for CRM. Taiwan: doctoral dissertation, Department of Information Management, National Central University.

Nahapiet, J and Ghoshal, S (1998). Social Capital, Intellectual Capital and the Organizational Advantage. *Academy of Management Review*, 23(2), 242-266.

Peng, TF (2009). An Empirical Study on Earnings Management, Operating Performance and Corporate Governance of Taiwan IC Design Industry. Taiwan: Master's degree thesis, National Chiao Tung University.

Peng, TL (2009).A Study of the Relations among KM-Stimulating Factors, *Intellectual Capital and Organizational Performance*, MA, Taiwan: Department of Business Administration, National Chung Cheng University.

Sobel, ME (1982). Asymptotic intervals for indirect effects in structural equations models. In S. Leinhart (Ed.), Sociological methodology, San Francisco:*Jassey-Bass*, 13, 290-312.

Stewart, TA (1997). Intellectual capital: the new wealth of organizations. Doubleday New York, NY, USA.

Sveiby, KE (1998). Measuring intangibles and intellectual capital: An emerging first standard. Posted on Internet at:http://www.sveiby.com.au/articles/EmergingStandard.html access date: 2002/08/21.

TEJ: http://www.tej.com.tw/tw/index.html.

Tsen, SH and Hu, HL (2010). A Study of the organizational competitiveness and intellectual capital indicators of international tourist hotels, *Human Resource Management Student Newspaper*, 10 (1), 2-3, ISSN: 1026-5309.

Wang,JC (1997). Performance Management. Taipei: East-West Managing Consulting, Inc.

Wang, WY and Chang, CF (2004). The Impacts of Intellectual Capital on Performance: An Empirical Investigation of the Taiwan Semiconductor Industry. *International Journal of Accounting Studies*, 39, 89-117.

Wu, JH and He, BZ (2008). Institution Productivity Analysis and Organization Performance Evaluation: An Introduction to Data Development Analysis and BSC System. Forum on Training and Development Featured Selection 2nd series: New Vision of Public Management, published by the Regional Civil Service Development Institute, DGPA, the Executive Yuan, 2, 435-458.

Yen, YY and Han, CS (2012). The Moderating Effects of Corporation Credit Risk Index on the Influence of Intellectual Capital on Business Values. Taiwan: *Soochow Journal of Economics and Business*, Soochow University, 77, 53-90.

AUTHORS' BIOGRAPHY

Chia-Hui Chaois a Ph. D. Candidate, College of Business, Chung Yuan Christian University, & Assistant Professor, Department of Information Management, Hsing Wu University, New Taipei City, Taiwan. She got MBA from Metropolitan State University, USA. Her research Interests areManagerial Accounting with Cross-field Management, and Educational Development etc.She has published some papers with the research team members in the international Journals.

Yu-Je Leeis Associate Professor in the Department of Marketing Management at Takming University of Science and Technology, Taipei City. He received Bachelor Degree from National Chung-Hsing University, and got MBA from Oklahoma City University, USA. He also acquired Ph.D.in the Specialty of Accounting from Ji-Nan University, Guangzhou. His research Interests are HRM with Cross-field Management, Managerial Accounting and Educational Development etc. He has published many papers in the international Journals with his research team members and has been inviting as the reviewer by the editors from all over the world.