行政院國家科學委員會專題研究計畫 成果報告

台灣智慧資本整合型研究--國家智慧資本初探與智慧資本之動態分析(2/2)
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行政院國家科學委員會補助專題研究計畫 ■ 成 果 報 告 □期中進度報告

台灣智慧資本整合型研究

“Intellectual Capital” integrated project summary

計畫類別：□ 個別型計畫　　■ 整合型計畫

執行期間： 94 年 8 月 1 日至 96 年 7 月 31 日

子計畫：

計 畫 項 目	主持人	計畫名稱
總計畫&子計畫一	林月雲	國家智慧資本初探與智慧資本之動態分析
子計畫二	陳世哲	人力資源策略、人力資本、員工行為與績效之研究
子計畫三	許壹傑	組織知識管理模型之建構 – 人力資本之觀點
子計畫四	方世榮	行銷資本模式之建構
子計畫五	羅家德	關係資本的衡量以及其對發明資本的影響
子計畫六	張元杰	智慧資本的衡量與報告: 跨國比較研究
子計畫七	彭朱如	醫療產業智慧資本之鑲鉗、管理及績效
子計畫八	陳端容	醫療產業智慧資本、組織學習與臨床治理之研究
子計畫九	楊朝旭	高階管理團隊社會資本與研發生產力
子計畫十	蘇桓彥/方世杰	策略性觀點之智慧資本發展與企業競爭優勢關聯性的研究
子計畫十一	郭文忠	無形資本、資產定價及公司融資決策

中　華　民　國　96　年　11　月　7　日

Two-year (August 2005 – July 2007) "Intellectual Capital" integrated project summary

Prepared by Yeh-Yun Lin, National Chengchi University

November 2007

It has been my honor to serve as the project leader of this "Intellectual Capital" integrated project with a total of 10 members (one member transferred to China and discontinued the project) covering the period from August 1, 2005 to July 31, 2007. The ten professors in various disciplines are from ten different universities in different cities. However, the geographical distance from Taipei to Kaohsiung did not hamper the gatherings of this research community. During the past two years, we had two total-group meetings chaired by the project leader each semester and some sub-group (strategy and HR groups) meetings chaired by the sub-group leader generally before the total-group meeting.

This integrated project was organized under a strong mission to explore this new field of research from various disciplines in different universities in order to reap inter-disciplinary insights, inter-university collaboration, and increase Taiwanese scholars' exposure in the international academic arena. With the members' consensus, when we submitted the proposals at 2004 year end, we have attached an "exit mechanism" to this project in order to prompt a higher self-expectation for academic publication. Now, we are proud to say that we have achieved and exceeded our original publication goals within two short years. We believe that more publications will follow in the coming years based on this two-year project.

In addition, this research community has been expanded to a larger group along the way with interested professors joining the conversation that we have to officially split them into strategy and HR two groups for more effective communication in the just started second stage three-year integrated "Intellectual Capital" project. Our past effort is only the advent of this field of study in Taiwan, therefore we are glad to see more scholars joining in. My overall summary of this integrated project contains the following sections:

I. Academic research performance of each project member
II. Scope and research focus of each individual project
III. Contribution of this integrated project
IV. Brief summary of each individual project
V. Publication list of each project member pertaining to this 2-year project

I. Academic research performance of each project member (as of Oct. 31, 2007)

Project #	Journal paper published	Journal paper under review or revision	Conference paper	Working paper
#1	3	1	6	-

#2	1	-	1	-
#3	-	-	2	3
#4	-	-	2	-
#6	2	2	4	2
#7	1	2	3	-
#8	2	-	1	-
#9	2	-	4	-
#10	1	1	1	-
#11	-	-	1	3
Total	**12** (two joint papers)	**6**	**25**	(for reference only)

The above table tallies the publications of this integrated project as of October 31, 2007. On an average, each member has 1.2 published or accepted journal papers and 2.5 conference papers. Generally speaking, our members have pretty good international exposures with papers mainly published in international journals and presented in international conferences. However, I have to make a special remark here that at the present time most of our journal papers are not published in the highly ranked journals for the reason that this is a new field still not fully recognized by the mainstream management scholars. Yet, some of them have been accepted by the field specific journal "Journal of Intellectual Capital" with the indication that research results of Taiwanese intellectual capital scholars have gained acknowledgement of pertinent international experts. In addition, with the ambition and commitment of our members, better quality journal papers and more joint papers can be anticipated.

II. Scope and research focus of each individual project

Project #	Micro	Macro
#1	Dynamics among ***human capital, organizational capital, and social capital*** (area of focus: general management, conceptual)	***National Intellectual Capital Index*** (NICI) ranking of 40 countries spanning from 1994 – 2005 (area of focus: national level, database)
#2	The relationship between ***human capital*** (through HR practices) and job performance is contingent on employee commitment and employee-employer perception consistency (area of focus: OB/HR, empirical)	
#3	Knowledge enhancement capabilities and utilization	

	mediate the relationship between ***intellectual capital*** and firm dynamic capabilities (area of focus: general management, empirical)	
#4	Developed a framework and measurement of ***internal market capital, external market capital, and interactive market capital*** (area of focus: marketing, conceptual)	
#6	-	Measure and report ***intellectual capital*** of Panama and Danish top 20 listed companies (area of focus: general management, national level, case study)
#7	Developed ***intellectual capital*** (58 questions) and performance (23 questions) measurement for a survey in the healthcare industry; examine ***intellectual capital transfer*** between and among partner hospitals (area of focus: general management, empirical)	
#8	***Human capital*** (education and accreditation) was found to be associated with the acceptance of new hospital management practices. (area of focus: general management, empirical)	
#9	Developed quantifiable and linked-to-performance indicators of R&D management capability in discovery, implementation, and commercialization stages; investigate whether financial analysts play a significant role in augmenting market efficiency by explaining ***intellectual capital*** information (R&D management capability) correctly. (area of focus: accounting, database empirical)	
#10	***Intellectual capital*** reporting enhanced the partnership among 4 key customers, case company, and 5 key suppliers. (area of focus: general management, case study)	
#11	Established a framework of asset prices including ***intangible capital*** and then empirically examine how intangible capital affects asset prices and financial performance; investigate how technology innovation and ***human capital*** affect market and accounting performance	

	and then explore the association between intellectual capital and analysts' recommendation (area of focus: finance, database empirical)	

This integrated project covers both micro and macro perspective studies. In the micro level, there are six general management studies, two accounting/finance studies, one human resource management study, and one marketing study. Research approach contains four empirical studies, three database empirical studies, two conceptual studies, and two case studies.

III. Contribution of this integrated project

Since Edvinsson and Malone's book was published in 1997, the concept of intellectual capital has been swiftly adopted by both academia and practitioners. Although the importance of "intangible assets" has long been recognized, it has never been articulated well enough to be included in the formal financial report. Professor Edvinsson is the first person to operationalize intellectual capital by using his own working experience and observation in Skandia Insurance Company in Sweden. That is, the concept was formalized from real-life business experience rather than from theory development. As a result, at its inception, there was no distinctive theory adhered to it. Up to the present, relevant researchers need to borrow theories from other disciplines, such as economics and sociology, which also explains why this field of study has not yet been fully recognized.

During the past ten years, relevant research has been centered on intellectual capital measurement development and reporting mainly initiated by accounting and finance professors. Recently, management professors join in the conversation by integrating human resources management perspective to cover human capital, strategic management perspective to cover organizational capital, and social network and marketing perspectives to cover social capital. Our project member selection was based on this domain integration. With two years dedication, most of our members have developed their own intellectual capital framework and some even progressed to measurement development. The synergy achieved includes peer review and idea contribution to improve the quality of each research, broader perspective with inputs from the viewpoint of different disciplines, and joint research.

Basically, the first contribution of this integrated project is establishing a comfortable community climate and laying a nurturing research ground for members to freely interact for more future intellectual dialogues. Second, research results of Taiwanese intellectual capital scholars have been recognized through our international journal papers and international conference presentations. Third, the unexpected contribution to the academic reputation of Taiwan is our strong alliance with some heavy-weight field experts. Professor Tzu-Ju Peng (Project #7) has joint papers with Professor Roos in the United Kingdom, Professor Yuan-Chieh Chang (Project #5) has

joint papers with Professor Mouritsen in Denmark, and Professor Yeh-Yun Lin (Project #1) has joint papers with Professor Edvinsson in Sweden. Partnership with these intellectual capital gurus has raised the profile of our research community in the international arena. Fourth, the added value of this integrated project is the international collaboration opportunities through sending members to overseas partners and the international conference encounters as evidenced in our publication list.

Our project members have just started to patch an intellectual capital puzzle from various perspectives and have not yet achieved theory integration during the two short years, yet we are confident that the research foundation that has been laid will lead to more cross-fertilization in this increasingly accepted research field.

IV. Brief summary of each individual project

Project #1 "An Exploratory Study of National Intellectual Capital Index and the Dynamics of Organizational Intellectual Capital"

Yeh-Yun Lin

1. First Year – National level Intellectual Capital Index (NICI) research result summary:

Based on extensive literature reviews of past relevant studies, a national level intellectual capital index framework was developed covering five capital dimensions, namely human capital, market capital, process capital, renewal capital, and financial capital. Based on literature and the results of several rounds of focus group discussion, a total of 29 variables were selected to represent the NICI; that is, seven each for human capital, market capital, process capital, renewal capital, and a single variable (GDP per capita adjusted by ppp) for financial capital. With a set of 12-year panel data covering 1994 – 2005 from OECD and IMD databank, an overall NICI for a total of 40 countries was ranked. Among which, Taiwan ranked number 17 in the list, with a descending order of renewal capital (#12), human capital (#14), process capital (#16), market capital (#18), and financial capital (#22). In other words, Taiwan has a pretty good performance with respect to renewal and innovation. The developed framework is valid as the ranking has a good correlation (.83) with that of IMD country competitiveness ranking. For this project performance, several papers based on this NICI framework have been accepted for publication in international journals as well as conferences.

2. Second Year – Organizational level intellectual capital dynamics research result summary:

The second year project focused on the dynamics of the components of intellectual capital at the organizational level, namely human capital, organizational capital, and social capital. In

addition to the literal description about the interdependence and the dynamics among the three capitals, the following portfolio with six systems of dynamic configurations for a company to effectively utilize its intellectual capital for better organizational performance was developed.

System congruence with dynamic configurations of human capital, organizational capital, and social capital

	Six systems	Configuration (for easier ratio presentation, total 12 points are utilized) HC : OC : SC	Positive/ Negative effect	Growth Paths
I.	Structural leverage system	2-3 : 4-6 : 4-6	+	I.->II.->(IV,V,VI)->IIx2
II.	Rational balance system	4 : 4 : 4	+	II.->(IV,V,VI)->IIx2
III.	Human facilitating system	3-5 : 2-3 : 5-6	+	III-> II.->(IV,V,VI)->IIx2
IV.	Bureaucratic system	1-4 : 5-7 : 3-6	-	
V.	Human control system	5-7 : 1-4 : 3-6	-	
VI.	Incompetent organizational system	1-4 : 1-4 : 7-8	-	

Remark: HC=human capital, OC=organizational capital, SC=social capital

Project #2 ”人力資源策略、人力資本、員工行為與績效之研究”

Shyh-jer Chen

This two-year study of intellectual capital has two purposes. First, I explore the black box concept by testing the mediating effects of employee commitment on their perception of HR practices and their job performance. This exploration is an attempt to advance strategic HRM knowledge and to develop a multilevel HR-performance framework bridging organizational (HR practices) and individual (organizational commitment and job performance) perspectives. Second, I attempt to measure consistency in perception of HR practices by using to questionnaires to find out how closely the employees’ and employers’ perceptions of HR practices agree with each other. This study hopes to contribute further understandings of the relationship between HRM (especially human capital) and firm performance.

A plethora of theoretical and empirical research has been devoted to investigating the effect of

human resource practices on firm performance (Arthur, 1992; 1994; Delery & Dotty, 1996 Huselid, 1995; Huselid, Jackson & Schuler, 1997; MacDuffie, 1995; Wright & McMahan, 1992). The theoretical background connecting HR practices and firm performance is mainly resource-based and rooted in the belief that a firms gain competitive advantage by developing a set of rare, valuable, inimitable, and non-substitutable human resources (Barney, 1991; Wright & McMahan, 1992). In strategic HRM, most studies have found that high-involvement work system, including extensive use of selection mechanism, in-house training, job enrichment, pay for performance and employee empowerment, have a positive impact on firm performance, measured by various indicators such as turnover (Shaw, Delery & Gupta, 1998; Batt, 2002; Huselid, 1995), financial performance (Huselid, 1995), and employee productivity (Huselid, 1995, Huselid, Jackson & Schuler, 1997).

Most studies of the HR-firm performance relationship have focused on analysis at the organization level. Although the relationship between high-involvement work system and firm performance has been reported to be positive, some critics had suggested that there may not be a direct effect between the two, but rather a "causal gap", as Wright & Boswell (2002) have described, a less explored "black box" or "specific mechanism" within the organization, itself, where the two can interact. Guest (1998) proposed a psychological contract model and posited that HR practices create an atmosphere of fairness and trust in employment relationship. The fairness and trust further foster employee organizational commitment, job satisfaction, organizational citizenship behavior, and reduce employee intention to quit. Becker & Huselid (1998) specified a causal model which included employee behavior and strategic implementation as mediating variables between high-involvement work system and employee job performance. The perspective of "black box" or "specific mechanism" in HR-firm performance relationship implies a multilevel framework (Kozloswski & Klein, 2000) in which organizational (e.g., HR practices) and individual (e.g., employee organizational commitment) factors function together to affect firm performance.

HR strategy can be viewed as a social exchange and communications between employers and employees (Rousseau, 1995). The communications create a workplace atmosphere that affects employee organizational commitment and job performance. Basing their ideas on the situationism defined by Lewin, Pippit & White, Bowen and Ostroff (2004) introduced the concept of "strength of HR system." In that study, they stated that employee perceptions of HR practices would influence their commitment and accumulation of human capital, and in turn affect employee job performance. One important aspect related to strength of HR system is "consistency," here referring to the extent to which HR message can be encoded and interpreted uniformly among employees and employers. Ostroff and Bowen (2000) indicated that HR consistency may moderate the relationship between employee perceptions of HR practices and employee commitment.

This study has two purposes. First, it explores the black box concept by testing the mediating effects of employee commitment on their perception of HR practices and their job performance. This exploration is an attempt to advance strategic HRM knowledge and to develop a multilevel HR-performance framework bridging organizational (HR practices) and individual (organizational

commitment and job performance) perspectives. Second, we attempt to measure consistency in perception of HR practices by using to questionnaires to find out how closely the employees' and employers' perceptions of HR practices agree with each other.

Two studies were conducted in hair salons in Taiwan. The first study, a preliminary study, was performed to develop and validate the construct of HR practices. The second study was to test our hypotheses, which are described in the next section. Data were collected by questionnaire from both hair salon owners and hairdressers of somewhat small independent salons. We excluded chain stores from our analysis because differentiating HR practices among stores belonging to the same chain is difficult. While most studies focused on HR systems in manufacturing (e.g. Arthur, 1992; 1994; Delaney & Huselid, 1995; Delery & Doty, 1996 Huselid, 1995), few have focused on the service sector. In fact, because service is more related to work attitude, HR quality should affect competitive advantage more in the service industry than in the manufacturing industry. We found the more consistent the perception of HR practices between hairdressers and owners, the greater the employee affective commitment to organization, emphasizing the value of HR practices in communicating clear and direct signals to employees regarding norms and expectations.

Project #3 "Toward a Model of Organizational Knowledge Management – A Human Capital Perspective"

I-Chieh Hsu

This research seeks to investigate how intellectual capital and organizational knowledge management processes contribute to dynamic capabilities of the firm. To facilitate this investigation, a survey methodology was adopted. The sample for this study was 1466 public-listed companies obtained from the Market Observation Post System in 2006 maintained by the Taiwan Stock Exchange Inc., Taiwan. A total of 533 effective questionnaires were collected from 533 companies, representing a response rate of 36.4%. The investigation has produced findings that have theoretical and practical implications. The following two papers have been drafted with Prof. Rajiv Sabherwal (University of Missouri Curators Professor, College of Business School, University of Missouri at St. Louis) with each having its theoretical and practical contributions. The abstracts of the two papers capture the contributions of this research.

1. Capabilities for Knowledge Enhancement and Knowledge Utilization: Relationships with Dynamic Capabilities and Human, Social, and Organizational Capital

Abstract. Despite considerable theoretical development and empirical research, two important issues remained unanswered: the causal mechanism by which organizational knowledge contributes to firm competitiveness and the antecedent for the accumulation and development of organizational knowledge. Thus, a comprehensive understanding of the source of firm competitiveness still remains elusive. This study proposes and tests a model of organizational

knowledge enhancement and utilization that takes into account intellectual capital as an umbrella term for differing types of organizational knowledge, dynamic capabilities as a construct for firm competitiveness in uncertain environments, and knowledge culture as the antecedent that facilitates the accumulation and development of organizational knowledge. In this model, knowledge enhancement capabilities and utilization capabilities mediate the relationship between intellectual capital and dynamic capabilities of the firm. To test the model, questionnaires obtained from 533 public-listed companies in Taiwan and secondary data for these companies were collected. The theoretical model is generally supported. Dynamic capabilities are also demonstrated to lead to high firm performance. However, the test of the theoretical model has led to an emergent model that presents better statistical results. This study sheds light on the roles of knowledge culture in accumulating and developing intellectual capital, and underlines the importance of human capital, social capital, knowledge enhancement capabilities, and knowledge utilization capabilities in improving dynamic capabilities of the firm.

2. Intellectual Capital and Knowledge Management: An Empirical Study of their Bi-directional Relationship and Effects on Dynamic Capabilities

Abstract. Despite considerable theoretical development and empirical research, three important issues remained unanswered: the relative importance of knowledge management and intellectual capital in determining dynamic capabilities, the relationship between knowledge management processes and intellectual capital, and the role of organizational culture in facilitating the development of intellectual capital. This study has proposed and tested a comprehensive model of dynamic capabilities to address these three issues. To test the model, questionnaires obtained from 533 public-listed companies in Taiwan and secondary data for these companies were collected. Major findings include the following: Intellectual capital has been found to affect both knowledge management processes and dynamic capabilities, which have been found to affect firm performance through innovation outcomes. Organizational culture (knowledge culture) has been found to facilitate the development of intellectual capital. However, the test of the theoretical model has led to an emergent model that presents better statistical results. This study sheds lights on inconsistent theoretical perspectives and inconsistent findings from parallel lines of enquiries. Our findings have both theoretical and practical implications.

Project #4 “行銷資本模式之建構”

方世榮

The value on the business market mainly comes from financial capital and intellectual capital; however, firms focus on the intangible asset rather than on the tangible asset in the knowledge-based market. Therefore, the exploration of the intellectual capital has been the important issues either in the academic or practical field. According to the resource-based view, intangible assets and organizational competence are the most unique and causal ambiguity

resources and the source of the competitive advantages (Mahoney, 1995). It is important for firms to search the intangible asset and organizational competence which could facilitate creation of the value. This value coming from the intangible assets is the concept of the intellectual capital.

In the filed of marketing, the marketing concepts can be applied to the service industry that is intangible in nature, and its subject even include internal customers (i.e., employees). Grönroos (1996) had provided the concept of the service marketing triangle which is composed of firms, employees and customers. It emphasized that marketing activities not only focused on the external customers (i.e., external marketing) but inside customers (i.e., internal marketing). Besides, employees and customers can interact well (i.e., interactive marketing). In addition, Grönroos (1996) suggested that the resources, used to resolve customers' problem, must create perfect service quality and value. Therefore, the marketing capital can be viewed as non-imitative and intangible assets, and can be a sustainable competitive advantage of the firms.

This study explores the concept of marketing capital and the relationship of the marketing capital and marketing performance. In the concept of the marketing capital, we used the internal marketing capital, interactive marketing and external marketing capital as the components of the marketing capital. The empirical results are consistent with our hypothesis; hence, the purposes of this research have been achieved. In addition, since little attention has connected the concept of intellectual capital and marketing, we provide a full model after exploring the intellectual capital, knowledge-based concept, resource-based views and relationship marketing. We use multidimensional constructs to measure marketing capital and explore the key components of marketing capital, which facilitate the research of marketing capital in the future. For example, future studies can examine, first, the relationships between internal marketing, interactive marketing and external marketing. Second, these interactive relationships impact on the marketing capital. Third, marketing capital and other capital, such as structural capital, simultaneously influence on the organizational capability.

In the practical contribution, we develop the scale of marketing capital. It is helpful for marketing managers that the scale can be used to measure the marketing capital of firms. Besides, marketing manager can confirm the advantages and disadvantages in marketing and understand which resources should be emphasized. Marketing managers can also establish a proper marketing strategy and accumulate marketing capital. In the end, they can achieve the marketing goals and improve the marketing performance.

Project #6 "Intellectual Capital Measuring and Reporting: A Comparative Study"

Yuan-Chieh Chang

The study was devoted in "Intellectual Capital (IC) Measuring and Reporting: A Comparative Study" during the period from August 1st, 2005 and July 31st 2007. The frameworks, methods of IC reporting in Denmark, Sweden, Finland and Netherlands were comparative. In the rise of

knowledge-based economy, the intellectual capital has become one of sources of competitive advantages for nations. The study mainly focused to measure and report intellectual capital in macro-environments such as regions, cities, communities and nations in the first year. We also investigated the possibilities of measuring the intellectual capital of nations in the developing countries, especially in Panama. We mainly investigated the intellectual reporting in the companies in the second year. One of research interests is to investigate what and how intellectual capital reporting in Danish top 20 companies, Taiwanese corporate R&D centers and Taiwanese IPO prospectuses. So the study advanced the understanding of IC reporting both in nations and in firms across Denmark and Taiwan.

Project #7 "Intellectual Capital Embeddedness, Management, and Performance: Hospital-level and Alliance-level Analysis in Healthcare Industry"

Tzu-Ju Peng

Although the Intellectual Capital Perspective has been widely applied to research in knowledge-intensive industry, less attention has been paid to the healthcare sector. Prior research pertaining to intellectual capital focus more on individual level or firm level analysis, this 2-year study is conducted by firm level as well as by alliance level, exploring the intellectual capital management and performance at both levels. The 1st-year study was based on intellectual capital perspective and performance measurement, examining the IC elements, IC importance, and performance measurement in Taiwan healthcare industry. The 2nd-year study was based on intellectual capital perspective with strategic alliance perspective, examining IC transformation between and among alliance partners within a healthcare alliance. In the 1st-year study, we conducted a survey from 104 hospitals. Statistical analysis has revealed the detailed elements of healthcare intellectual capital and the performance indicators. In the 2nd-year study, by using ICN (Intellectual Capital Navigator) as an analytical approach, we examined the IC transformation within a healthcare alliance, which is composed of 18 public hospitals. This study is expected to be a starting point of exploring healthcare intellectual capital in the Taiwanese healthcare industry. The report of this 2-year study includes the execution and results in the first and second years, and publications of this study.

1. The 1st-year study

This study used a development process that employs a set of procedures. In the first stage, we developed a preliminary check-list with detailed elements of healthcare intellectual capital and performance measurement. These items were derived from both the literature and healthcare practices in Taiwan. In the second stage, the preliminary check-list was refined by expert opinions. Five experts were consulted. From the expert-refined check-list a preliminary questionnaire was developed with each item. In the third stage, we conducted a pilot study with 30 senior managers.

We analyzed the data from pilot study and deleted some items. The final questionnaire contains 58 elements of intellectual capital comprised of 7 elements of human capital, 31 elements of organizational capital, and 20 elements of relational capital; and 23 performance indicators comprised of 5 indicators of income and growth, 4 indicators of cost control, 5 indicators of operation efficiency, 4 indicators of productivity, and 5 indicators of clinical and medical quality. In the fourth stage, we conducted a survey from the population of the 590 hospitals; of these 113 hospitals responded with 104 valid samples, including 10 medical centers, 37 regional hospitals, and 57 district hospitals, representing a valid response rate of 17.63%. In the fifth stage, we performed a reliability test and analyzed relative importance of those elements. According to the reliability test and factor analysis, the intellectual capital resources were categorized into human capital, organizational capital, and relational capital. Organizational capital was further divided into four groups: healthcare service and quality capital, strategic management capital, marketing capital, and information technology capital. Performance indicators were divided into five groups: income and growth, cost control, operation efficiency, productivity, and clinical and medical quality.

In this study, we have identified critical intellectual capital elements and performance measurement that are regarded as important for IC management practices in the Taiwanese healthcare industry. The results of intellectual capital and performance measurement in three different hospital accreditation level and all samples were revealed. This study also reveals the resource transformation data. The major contribution of this study is to figure out how healthcare executives can prioritize an array of critical intellectual capital and performance measurements. This study also demonstrated how the resources transformation between and among themselves. We adopt intellectual capital perspective as our theoretical base which is international. This study contributes to more valuable practical references of performance management in Taiwan healthcare organizations.

2. The 2nd-year study

The source of healthcare competitive advantages lies not only on monetary capital and physical assets but also on human capital, organizational capital, and interorganizational cooperative relationships. Current research pertaining to intellectual capital mainly focuses on individual-level and firm-level analysis, however, less attention has been paid to alliance-level analysis. Linking an intellectual capital perspective with a strategic alliance concept, this research explores how hospitals in a healthcare alliance transfer intellectual capital between and among partner hospitals.

This study selected and healthcare alliance, which is composed of 18 government-owned hospitals, as a research setting. In particular, this study examined the intellectual capital transformation in joint-logistic activities of the alliance. Conducting by an in-depth case study, we interviewed 14 informants from member hospitals in the alliance who are directors of logistic management and are responsible for join-logistic management activities in the alliance.

The joint-logistic intellectual capital is categorized in five groups: human capital, organizational capital, relational capital, monetary capital, and physical capital. Each group is composed of detailed intellectual capital elements. Based on an analytical approach, the ICN (Intellectual Capital Navigator) developed by Roos, Pike and Fernström (2005), this study has identified the importance of each detailed element of joint-logistic intellectual capital. More importantly, this study has demonstrated the ICN and Effector Plot to address the inward and outward transformations among partner hospitals. According to the results, this study provides practical implications as well as suggestions for future research, which contributes to healthcare managers for managing intellectual capital hospital at the alliance-level.

Project #8 "醫療產業智慧資本、組織學習與臨床治理之研究"

陳端容

My main purpose in the 2-year IC project is to understand whether highly dominant professionals as physicians can change their professional practices. If we were able to understand how their medical practice changes are possible, then we may be a step further to understand better how professionals can adopt management innovation. The purpose of this two-year project is to understand the factors associated with how medical professionals dealt with new hospital management practices, and how they adapt to it. We took this as an example to look into the mechanism associated with how professionals changed their professional practices. Using the data collected from 1,137 physicians, this study will be able to explore the characteristics associated with the acceptance of new hospital management practices, and whether their attitude toward new hospital management practices were associated with their perceived professional autonomy, learning behaviors and mode of decision making. In this study, we found that new hospital management practices to control medical practices such as use of information feedback mechanisms, restriction of medical resources utilization and setting medical use quota were only adopted by some hospitals. Half of the hospitals did not use strong medical intervention to control medical practices with respects to their utilization of medical resources. Human capital is found to be associated with the acceptance of new hospital management practices. Physicians with a learning behavior toward peer-oriented decision making, tended to decline the new hospital management practices. Physicians with a self-oriented learning for evidence-based literature also tended to decline the new hospital management practices. Learning behaviors are important for us to understand the mechanisms underlying the changing process of physicians' adaptation of new hospital management practices. It suggests that to better understand how innovation will be adopted in hospital, attention should be directed to the process of how different medical professionals (i.e., physicians) learn to recognize the innovations.

With the preliminary results from this 2-year project, we may be able to understand how professionals change their professional practices. As professions claims their practices are their

jurisdiction, how their medical practices and perceived autonomy being changed can lead us to understand how intellectual capital will be maintained and modified in the organizational context.

Using the coming 3 year project, the project is aimed to get to the core of the creation process of medical knowledge creation. We tend to understand how medical knowledge creation is processed in the interplay with professionals, health care organizations, and academia.

Project #9 "Intellectual Capital Information and Analysts' Forecasts: The Value Chain Perspective"

Chaur-Shiuh Young

1. First year

Intangible assets are substantially more difficult to manage and operate than tangible assets. Now the key point is not the quantities of intangibles an organization owns but the effectiveness of intangibles an organization uses. In fact, the major limitation on the use and growth of intangibles is managerial diseconomies. Investors and often managers too, are deprived of intangibles-related information on essential business capabilities and performance characteristics. Bukh (2003) argued that, for intellectual capital disclosure to be perceived as relevant from a capital market perspective, the information should be disclosed as an integral part of a framework illuminating the value creation processes of the firm. Bukh (2003)'s argument is very similar to Lev (2001)'s value chain framework for information system. In this project, I develop quantifiable and linked-to-performance indicators of R&D knowledge management capability based on Lev's (2001) R&D value chain framework, which covers three major stages: *discovery*, *implementation*, and *commercialization*. Three indicators are used to measure the R&D knowledge-nourishing, transforming and appropriating capabilities in various value chain stages. Further, I empirically validate these measures proposed in this study by examining their effects on the future R&D productivity. It is documented that the proposed measures of R&D management capability have significantly positive effects on firms' future realized sales and gross margins from investing in R&D. Hence, this study suggests that the measures of R&D management capability contain useful information about firms' value creation potential from the R&D investments in various value chain stages.

This is the first study, from an innovation value chain perspective, to develop quantitative and easy-to-use indices indicating a firm's knowledge management capabilities in R&D. Further, this capability indicator is decomposed as three measures, which enable the investors and managers to visualize the intellectual ability of managing R&D in a stage-oriented view. Thus, this study provides important academic and practical value. The value chain indicators of managers' R&D

knowledge management capabilities, developed in this current study, can arguably provide a platform for managers to examine a firm's R&D strengths and weaknesses in different innovation value chain stages and to identify the areas requiring more attention as they strive for R&D excellence. Also, improved disclosure of the R&D knowledge management capabilities based on the value chain perspective may provide lucid value creation storylines for communicating with market actors, which improves investors' assessment of the R&D performance and firm value.

2. Second year

Analysts' forecast information may fulfill a role in compensating for the intangibles-related deficiencies of corporate financial statements (via correctly explanations for IC information). This role stems from analysts' ability to use their individual (private) knowledge to produce forecasts that contain new analyst-specific information or interpretations about IC information. However, currently, there is only limited research-based insight into how this reading and interpretation are conducted. Seeing that we know little about the use of forward-looking IC information by investors and analysts, I investigate how analysts interpret these "intellectual capital information" in the second year of this project. Specifically, I examine whether market participants, i.e., investors and analysts, incorporate the implications of managers' R&D knowledge management capability indicators for future earnings in an efficient manner when determining stock prices and earnings forecasts. In addition, I investigate whether analysts play a significant role in augmenting market efficiency by explaining intellectual capital information correctly.

The results indicate that R&D is assessed at a significantly higher value by both investors and analysts when a firm had a better R&D knowledge management capability. As to the issue of market inefficiency, though important for understanding users' processing of nonfinancial information, has not been extensively examined by prior studies. My results indicate that, despite the ready availability and high reliability of R&D management capability measures, investors and analysts seem to under-react to the implication of some indicator for firms' future profitability, suggesting that the knowledge management nature of R&D management information may hinder users' processing of this information. The result of investors underestimating the true contribution of R&D knowledge management capability to future profits provides evidence for supporting disclosures of the R&D knowledge management capability indicators, meaningfully classified by the stage of value chain. Additionally, the documented market under-reaction to R&D management capability measures is an interesting contrast to the result of Rajgopal, Shevlin, and Venkatachalam (2003) that the stock market overweights the contribution of order backlog in predicting future earnings. Investigation of why investors exhibit different biases in processing dollar-denominated versus nondollar-denominated information is beyond the scope of this study and can be an interesting topic for future research.

Project #10 "Intellectual capital for the development of corporate competitive advantage in Taiwan: A strategic view"

Hwan-Yann Su and Shih-Chieh Fang

This study is concerned with the implementation of partnership enhancement within a business-to-business context. Forming partnerships with suppliers and customers to leverage their own resources and attain competitive advantage has become more and more important for the growth of businesses. Although in the business-to-business environment, the benefits for businesses to improve partnerships have been highly emphasized, little guidance has been provided regarding how to enhance their partnerships in practice. Based on the literature of business-to-business partnerships, this study adopts intellectual capital reporting as a way to enable the reporting of knowledge resources of a business of concern in order to honestly and confidently communicate with its partners and enhance partnerships.

The case study approach, using the guidelines of Yin (1993), was adopted as the research method in this study because of the dynamics inherent in implementation, our objective to provide a comprehensive picture of the process, and because single-case study can be used for exploration as well as explanation and illustration (Hakim, 1992; Yin, 1993). Therefore, a case study demonstrating and explaining how to report intellectual capital is detailed.

The case company is a multinational business which has established global operations in Taiwan, USA, Turkey, Thailand and China. The case company is in the fastener industry in which its hundreds of thousands of products are used in many industries for many purposes. Limited by facilities, size and manufacturing capability, a single manufacturer needs partnerships with other manufacturers to satisfy the full lines of products required by customers. From the perspective of customers, they have to manage a group of suppliers to fully satisfy their needs and this cost is high. Consequently, to manage suppliers and to offer one-stop shopping services for its customers, the case company aims to be the customer channel to OEM components and to play the major role of integrator and logistics service provider between customers and suppliers in the Asia-Pacific region. Therefore, due to its target role between its customers and suppliers, the case company was very suitable for addressing the issue of implementing business-to-business partnership enhancement. Four key customers and five key suppliers of the case company were selected by its CEO for partnership enhancement and for seeing things from their perspective due to their important high volume transactions. The four customers selected were all multinational companies. Among them, three were general distributors of fasteners and one was a fastener distributor specializing in the automobile industry. All four customers had an office in Taiwan. The five suppliers were all located in Taiwan. One was a manufacturer of nuts; one a manufacturer of screws and bolts; and three of them were specialized processing services providers of surface processing, anti-loosing and leaking processing, and stamping and welding processing.

The results of this study are the proposition of an approach of intellectual capital reporting for businesses to implement partnership enhancement in the business-to-business context and the provision a case study which demonstrates and explains how it operates. When reporting intellectual capital, the focal business should identify knowledge resources needed to achieve its vision and create its value, report current status of the needed knowledge resources under its particular context and compare numerical data from different fiscal years. To use intellectual capital reporting in the context of enhancing business-to-business partnership, the proposed approach particularly emphasizes the importance of honestly and confidently enabling partners of the focal business to better understand its professionalism concerning many aspects of its business in four steps. The first step is concerned with identifying partners' received value and their information needs. The second step is to incorporate partners' received value with the business' proposed value. In step three, the focal business prepares and reviews the information concerning knowledge resources to be reported. The final step is to communicate with partners through the report. The case company demonstrates that partnerships can be enhanced and partners are more satisfied with their partnerships, and are more willing to continue this relationship and feel further that it is more honest, trustworthy, and professional through intellectual capital reporting. It also demonstrates intellectual capital reporting can show its willingness to honestly face its own situation, keep important indicators on track and to provide additional and sometimes confidential information to support a strategy of signifying its honesty, sincerity and confidence in its professionalism.

Project #11 "無形資本、資產定價及公司融資決策"

郭文忠

The object of this research is to examine the association between intellectual capital and capital markets. In a knowledge-based economy, traditional measures of financial performance often fail to capture the wealth-creation effects of intangibles and to fully understand the competitive advantage of fast growth firms such as software developments companies, pharmaceutical companies and others. While an increasing literature recently describes the role intangible capital in managing the companies and other organizations in the modern economy, there is still a lack of a generally accepted approach for valuing intangible capital, especially for those intangible capitals not associated with intellectual property right.

This research aims to discuss the influence of intangible capital in the capital markets. It includes three parts. In the first part I attempt to establish a framework of asset prices including intangible capital and further examine empirically how intangible capitals may affect asset prices and financial performance. It finds that firms with more balance sheet intangibles, bonus and salary would have better accounting performance, with the exception when we consider the change in sales.

In the second part it also further how technology innovation, human capital and human capital affect market and accounting performance of 279 listed biotech firms. Our main results are summarized as follows. (1) The influence of intangible capital on asset prices depends on the effect of intangible capital on the production, sales, profits, market opinion and risk. (2) Empirically the result does not find consistent effect of intangible asset on the financial and market performance, but it suggests positive effect of human capital on financial and market performance. (3) For the biotech companies, it finds that human capital also affects the amount of patents, but research inputs may either affect negatively or not affect financial performance.

In the third part it examines the association between intellectual capital and analysts' recommendation and observes that the announcement effects are most observed before and at the event date. For the short term, our sample demonstrates that analysts' recommendations appear to have an impact on stock prices, with -1.5% abnormal return on the event date. I also demonstrates that "market leadership" has the largest impacts on accumulative returns -7.6%. Furthermore, the influences of expected revenue (profit) change and leadership and personnel matters also found in our sample.

V. Publication list of each project member pertaining to this 2-year project

國科會 2005-2007「台灣智慧資本整合型研究」研究員論文發表狀況　As of Oct. 31, 2007

計畫項目	主持人	服務機構	計畫名稱	**本整合型計畫論文**發表狀況
總計畫&子計畫一	林月雲	政大企管	國家智慧資本初探與智慧資本之動態分析	I. Journal paper: 1. Lin, Y.Y. & Edvinsson, L. (2008) National intellectual capital: Comparison of the Nordic Countries, *Journal of Intellectual Capital*, 9(4), 2. Chen, D.R. & Lin, Y.Y. (accepted) Physician's Career Success: Educational Stratification or Inequality in Social Capital (管理學報) 3. Lin, Y.Y. and Lin, T.Y. (2007) National intellectual capital: Exploring Taiwan's standing, *International Journal of Learning and Intellectual Capital Special Issue*, 4(2) II. Journal paper under revison: 1. 李怡禛、林月雲，從 Hofstede 國家文化觀點看國家智慧資本之創造(journal paper, under first revision) III. Conference paper: 1. Lin, Y.Y. & Edvinsson, L. National intellectual capital: Comparison of the BRIC Countries, to be presented in *McMaster World Congress*, Hamilton, Ontario, Canada, January 16-18, 2008 2. Lin, Y.Y. (2007) Intellectual capital: A comparison of seven European countries, presented at *Intellectual Capital Congress 2007*, May 3-4, in Haarlem, Netherlands. 3. 林月雲(2006) 從智慧資本的觀點探討中華文化之加值者-「得意典藏」，第十二屆服務管理研討會，國立政治大學企業管理學系，(Dec. 15/16, 2006) 4. Lin, Y.Y. and Lin, T.Y. (2006) National intellectual capital: A comparison of the Nordic countries, presented on Dec. 9 at 2006 科管年會 5. Lin, Y.Y. and Wei, Y.C. (2006) Environmental pressure and organizational decline: The moderating effects of human capital and social capital, presented on Dec. 19-21, 2006 at Asian Academy of Management, Waseda University, Japan.

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子計畫二	陳世哲	中山人管	人力資源策略、人力資本、員工行為與績效之研究	I. Journal paper: 1. Chen, Shyh-jer, Lin, Pei-fen, Lu, Chia-mei, & Tsao, Chiung-wen. 2007. The Moderation Effect of HR Consistency on the Relationship between Perceived HR Practices and Employee Job Performance. *Social Behavior and Personality*. 35(8): 1121-1138. (SSCI) II. Conference paper: 1. Chen, Shyh-jer, Lin, Pei-fen, and Lu, Chia-mei. 2006. A Multilevel Analysis of HR Practices and Employee Job Performance: Hairdressing Salon in Taiwan. Paper presented at the European Academy of Management Meeting, May 17-20, Oslo, Norway.
子計畫三	許壹傑	彰師大企管	組織知識管理模型之建構－人力資本之觀點	I. Conference paper: 1. 許壹傑、鍾慧婷. 2005. 組織知識管理對組織績效之影響 – 以人力資本為中介變數. 台灣商管與資訊研討會, 2005 年 9 月 29、30 日, 靜宜大學, 台灣。 2. Hsu, I.-C. 2005. *Developing a model of knowledge management from a human capital perspective – Preliminary thoughts*. Paper Presented at the 2005 Annual Meeting of the Academy of Management, Aug. 5-10. Honolulu, Hawaii, U.S. II. Working paper: 1. Hsu, I.-C., & Sabherwal, R. 200X. Intellectual capital and knowledge management: An empirical study of their bi-directional relationship and effects on dynamic capabilities. 2. Hsu, I.-C., & Sabherwal, R. 200X. Capabilities for knowledge enhancement and knowledge utilization: Relationships with dynamic capabilities and human, social, and organizational capital. 3. Hsu, I.-C. 200X. Developing a model of knowledge management from a human capital perspective – Preliminary thoughts.
子計畫四	方世	中興企管	行銷資本模式之建構	I. Conference paper:

	榮			1. 方世榮、黃瓊瑤、石渼華（2006），智慧資本觀點之行銷資本建立，第四屆跨領域管理學術與實務研討會，東海大學。 2. Fang, Shgh-Rong, Building the Model of Marketing Capital: Based on Intelliectual Capital Perspective, The R&D Management conference 2006 Taiwan.
子計畫五	羅家德	元智企管	關係資本的衡量以及其對發明資本的影響	(transferred to China and discontinued the project)
子計畫六	張元杰	清大科管	智慧資本的衡量與報告: 跨國比較研究	I. Journal paper: 1. Chen, M.-H., Wang, M. & Chang, Y.-C. (2007). Entrepreneurial Networks in Technology-Based Entrepreneurial Teams: A Social Capital Perspective, 科技管理學刊, Vol. 12 (3), pp. 107-130 2. Chen, M.-H., Chang, Y.-C. & Hung, S. (2007). Social Capital and Creativity in R&D project teams, *R&D Management*, (accepted in 15 Oct. 2007) [SSCI]. II. Journal paper under review: 1. Chang, Y.-C. and Kan, C., Measuring and reporting national intellectual capital: a study of Panama, Journal of Intellectual Capital (under review). 2. 張元杰& 鄭翔壬, Intellectual Capital disclosure: the study of IPO prospectuses in Taiwan, 組織與管理 (under review). III. Conference paper: 1. 張元杰& 鄭翔壬 (2007), Intellectual Capital disclosure: the study of IPO prospectuses in Taiwan, TAoM 2007:全球化之管理挑戰,九月八日,台北:政治大學. 2. 張元杰&余佩儒 (2007), Measuring R&D capabilities: the intellectual capital perspective, TAoM 2007:全球化之管理挑戰,九月八日,台北:政治大學. 3. Chang, Y-C. and Kan, C. (2007) Measuring and reporting national intellectual capital: a study of Panama, IC Congress 2007, 3~4th May 2007, Inholland University, Haarlem, the Netherlands. 4. Chang, Y-C., Mouritsen, J. and Malmjer, P. (2007), Mandatory intellectual capital reporting: a study of top Danish public-listed firms, IC Congress 2007, 3~4th May

				2007, Inholland University, Haarlem, the Netherlands. IV. Working paper: 1. Chang, Y-C., Mouritsen, J. and Malmjer, P. (2007), Intellectual capital reporting: Towards a knowledge narrative framework, Economy & Society [SSCI] (under submission). 2. Chang, Y.-C., Yu, P., Measuring R&D capabilities: the intellectual capital perspective, IEEE Transactions on Engineering Management (under submission) [SSCI]
子計畫七	彭朱如	靜宜企管	醫療產業智慧資本之鑲鉗、管理及績效	I. Journal paper: 1. Peng, Tzu-Ju Ann, Stephen Pike and Göran Roos (2007), "Intellectual capital and performance indicators: Taiwanese healthcare sector," *Journal of Intellectual Capital*, 8(3), pp. 538-556. II. Journal paper under review: 1. Pike, Stephen, Tzu-Ju Ann Peng, and Göran Roos, "Managing intellectual capital and performance: The Taiwanese healthcare industry", under 1st review, submitted abstract on 14th May 2007, submitted full paper on 30th Sep. 2007. 2. Peng, Tzu-Ju Ann, Johnson Chung-Hsin Yang, Stephen Pike, and Göran Roos, "Intellectual Capitals, Business models and Performance Measurements in Forming Strategic Network", under 1st review, submitted to International Journal of Learning and Intellectual Capital on 15th Sep. 2007. III. Conference paper: 1. Peng, Tzu-Ju Ann, Stephen Pike, and Göran Roos (2006) "Healthcare Intellectual capital and performance in Taiwan," The 3rd International Conference on Intellectual Capital, Knowledge Management and Organisational Learning (ICICKM 2006). Santiago, Chile, 19-20 OCT. 2006. 2. Peng, Tzu-Ju Ann, Göran Roos, and Stephen Pike (2006) "Intellectual Capital and Performance Measurement: An Exploratory Study in Taiwan Healthcare Sector," Performance Measurement Association 2006 Conference. London, UK, 25-28 JULY 2006.

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子計畫八	陳端容	台大管醫	醫療產業智慧資本、組織學習與臨床治理之研究	I. Journal paper: 1. Duan-Rung Chen, T-H. Kuo, "Determinants of Professional Incompetence: An Analysis of Medical Errors from Intellectual Capital Perspective", *International Journal of Learning and Intellectual Capital*, accepted. 2. Duan-Rung Chen, Y-Y Lin, "Career Success of Hospital-based Physicians: School Stratification or Inequality in Social Capital?", *Journal of Management* (管理學報) (TSSCI)，accepted. **II.** Conference papers: 1. Duan-Rung Chen, 2006, "Intellectual Capital, professional Competency and Medical Errors." Paper presented at 2006 International Intellectual Capital Conference, Taipei, 2006 April 24.
子計畫九	楊朝旭	成大會計	高階管理團隊社會資本與研發生產力	I. Journal paper: 1. Young, C. S. and L. C. Tsai. 2007. "The Sensitivity of Compensation to Social Capital: Family CEO vs. Nonfamily CEOs in the Family Business Groups", *Journal of Business Research*, accepted (SSCI). 2. Young, C. S., H. Y. Su, S. C. Fang, and S. R. Fang. 2007. "Cross-Country Comparison of Intellectual Capital Performance of Commercial Banks in Asian Economies", *The Service Industries Journal*, accepted for publication in Vo. 29 No. 9. (SSCI). II. Conference paper: 1. Young, C. S., and L. C. Tsai, Top Executives' Directorate Networks and Business Value Creation: Vertical vs. Horizontal Ties, *the AAA 2007 Management Accounting Section* (MAS) Midyear Meeting, Fort Worth, Texas, January 5–6, 2007. 2. Young, C. S. and Tsai, L. C. (2006), Knowledge Management

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子計畫十	蘇桓彥/方世杰	高雄太亞理管成企管／大管	策略性觀點之智慧資本發展與企業競爭優勢關聯性的研究	I. Journal paper: 1. Young, C., Su, H., Fang, S. & Fang, S. (2007). Cross-country comparison of intellectual capital performance of commercial banks in Asian economies, The Service Industries Journal. (accepted) (SSCI) II. Journal paper under revision: 1. Su, H., Fang, S. & Young, C. (2006). Implementing partnership enhancement: An intellectual capital reporting perspective. (submitted to an international journal - Industrial Marketing Management (SSCI) - and under revision) III. Conference paper: 1. Su, H., Fang, S. & Hu, C. (2006). Honesty and confidence in professionalism: Intellectual Capital reporting as a strategy for improving inter-organizational collaboration. Proceedings of The 16th International Conference on Pacific Rim Management, Honolulu, USA.
子計畫十一	郭文忠	台北經濟	無形資本、資產定價及公司融資決策	I. Conference paper 1. Guo, W.C., Shin-Rong, S.H., Chien, W.J. (2006), "Human Capital, Compensation Scheme and Performance of Biotech Firms," The R&D Management Conference 2006 Taiwan. II. Working paper 1. Guo, W.C., Shin-Rong, S.H., Pan, S.H. (2006, working

				paper) "Does Intellectual Capital Matter for Firms' Performance." 2. Guo, W.C., Lai, S.H. (2006, working paper), "Intangible Capitals and Financial Analyst Recommendations."

行政院國家科學委員會補助專題研究計畫■ 成 果 報 告
期中進度報告□

國家智慧資本初探與組織智慧資本之動態分析

計畫類別：□ 個別型計畫　　■ 整合型計畫
計畫編號：NSC 94－2416－H－004－023－SSS
執行期間：　94 年 08 月 01 日至　96 年 07 月 31 日

計畫主持人：林月雲教授
共同主持人：莊奕琦教授
計畫參與人員：林德怡

成果報告類型(依經費核定清單規定繳交)：□精簡報告　■完整報告

本成果報告包括以下應繳交之附件：
□赴國外出差或研習心得報告一份
□赴大陸地區出差或研習心得報告一份
■出席國際學術會議心得報告及發表之論文各一份
□國際合作研究計畫國外研究報告書一份

處理方式：除產學合作研究計畫、提升產業技術及人才培育研究計畫、列管計畫及下列情形者外，得立即公開查詢
□涉及專利或其他智慧財產權，□一年□二年後可公開查詢

執行單位：國立政治大學企業管理學系

中　華　民　國　　年　　月　　日

一、計畫成果中英文摘要

(一)計畫成果中文摘要

國家智慧資本初探與組織智慧資本之動探分析

本計畫為「總計劃」與「子計畫一」之合併，因此擔負著兩項任務。一為宏觀之國家智慧資本初探，二為微觀之組織智慧資本動態研究。納入宏觀研究的主要目的在於與既有的文獻進行國家間的比較研究，增加台灣在此新興學術領域的曝光度。

國家智慧資本之研究架構經由文獻探討、專家團體討論、與 LISREL 驗證發展出五構面含國家人力資本、市場資本、流程資本、更新資本與財務資本。根據此五構面，運用 OECD 與 IMD 十二年的資料從 1994-2005，計算四十個國家之總智慧資本並加以排序。至今整理出且於期刊或研討會發表的論文，含台灣之國家智慧資本，台灣、日本、與韓國之國家智慧資本比較研究，歐洲七國之國家智慧資本比較研究，北歐五國之國家智慧資本比較研究，與金磚四國之國家智慧資本比較研究。其中台灣之國家智慧資本於四十個國家中排名第十七。

組織智慧資本動態研究乃延續計畫主持人四年前之相關研究，發現組織之人力資本、結構資本，與關係資本係動態性的演進，失衡的發展將導致組織智慧資本之溶蝕。本計畫第二年之微觀組織智慧資本動態研究更進一步的發展出六種動態組合，即 Structural leverage system、Rational balance system、Human facilitating system、Bureaucratic system、 Human control system、Incompetent organizational system，其中前三種為成功的動態組合而後三種為失敗的動態組合。

關鍵詞：國家智慧資本、智慧資本、動態研究

(二)計畫成果英文摘要

An Exploratory Study of National Intellectual Capital Index and the Dynamics of Organizational Intellectual Capital

This project is a combination of the “Main Project” and “Sub-Project Number #1” which carries two missions: explore national intellectual capital index (NICI) at the macro-level and investigate the dynamics of organizational intellectual capital at the micro-level. The motivation to include a macro perspective study is to have country comparisons, which may facilitate the exposure of Taiwanese studies in the global intellectual capital research communities.

Based on extensive literature reviews, focus group discussion, and LISREL confirmation, a national level intellectual capital index framework was developed covering five capital dimensions, namely human capital, market capital, process capital, renewal capital, and financial capital. A total of 29 variables were selected to represent the NICI; that is, seven each for human capital, market capital, process capital, renewal capital, and a single variable (GDP per capita adjusted by ppp) for financial capital. Based on the 12-year panel data covering 1994 – 2005 from OECD and

IMD databank, an overall NICI ranking for a total of 40 countries was achieved. Among which, Taiwan ranked number 17 in the list, with the descending order of renewal capital (#12), human capital (#14), process capital (#16), market capital (#18), and financial capital (#22). The developed framework has been regarded valid as the ranking has a good correlation (.83) with that of IMD country competitiveness ranking. In addition, several papers based on this framework have been accepted for publication in international journals as well as conferences.

The second year project has been focused on the dynamics of the components of intellectual capital at the organizational levels, mainly human capital, organizational capital, and social capital. In addition to the verbal description about the mutual support and the dynamics among the three capitals, this study has developed the following six types of dynamic configurations, namely Structural leverage system, Rational balanced system, Human facilitating system, Bureaucratic system, Human control system, and Incompetent organizational system. The former three configurations should lead to successful organizational performance, whereas the latter three should result in performance failure.

Keywords: National intellectual capital index, NICI, Intellectual capital, Dynamic

二、報告內容

Research Background

Although the intellectual capital concept has been extended from a micro (organizational) level to the macro (national and regional) levels, the creation of national intellectual capital models suffers from the lack of widely accepted methodologies, mainly due to the embryonic nature of this field (Pomeda, et al., 2002). In other words, more studies need to be done to refine the existing national intellectual capital models. Up to now, there has been little research focusing on the East Asian region. A study of a nation like Taiwan that relies heavily on the output of its knowledge workers should enrich this field of study and provide a different perspective.

By utilizing the OECD database, the IMD's World Competitiveness Yearbook and matching Taiwanese data, this study proposes a set of national intellectual capital indices that can be used to rank the countries in the chosen data set, thereby clarifying Taiwan's intellectual capital standing from an East Asian perspective. Key features of this study that adds value to the existing literature include the fact that it is a longitudinal study spanning the period from 1994 to 2005 and covering a total of 40 countries. Furthermore, the study focuses on an emerging economy – Taiwan and provides a set of indices for future researchers to refine.

Year One research report:

Based on the following literature review, a national level intellectual capital framework was proposed and then National Intellectual Capital Index (NICI) was ranked for 40 countries based on 1994-2005 panel data.

The World Bank's Knowledge Assessment Methodology (KAM) and scorecards

The aim of the World Bank's Knowledge Assessment Methodology (KAM) is to illustrate and identify the problems and opportunities that a country encounters for policy reference and to facilitate future investment. It can also be used to benchmark "how an economy compares with its competitors or countries it wishes to imitate" (World Bank, 2002). As a comprehensive tool for reviewing world development, KAM consists of 69 structural and qualitative variables classified into five dimensions. Four of these are considered decisive in the development of a knowledge-based economy, while the fifth tracks the overall performance of the economy. The four key factors illustrate how well an economy is using knowledge for its overall economic development; they include: the economic and institutional regime, an educated and skilled population of citizens, a dynamic information infrastructure, and an efficient innovation system.

OECD measurement models for national intellectual capital

OECD regards inputs - rather than outputs - as having the most significance when measuring national intellectual capital (Malhotra, 2003). However, by nature, measuring knowledge assets is a major challenge, according to "OECD Science, Technology, and Industry Scoreboard 2001: Towards a Knowledge-Based Economy". A gross indicator may contain public and private spending on higher education, expenditure on R&D, and investment in software in terms of percentage of GDP investments. To put another way, the more investment a country makes in its higher education, expenditure on R&D and software, the more intellectual capital it has.

United Nations Economic Commission for Europe (ECE) Model

Another model proposed by a world development organization is the ECE Model developed by the United Nations Economic Commission for Europe (UNECE). With the objective of facilitating innovation and commercialization of knowledge assets, the model inspects the existing practices and methodologies for valuing intellectual capital. The model also examines the valuation of intellectual assets (inventions), intellectual property rights (patents), valuation of managerial flexibility, stock market valuation of companies, and R&D project valuation (United Nations Economic Commission for Europe, 2003).

The national intellectual capital measurement model proposed by this study

The present study adopts the most commonly used national intellectual capital framework, containing human capital, market capital, process capital and renewal capital. Selection of the seven variables for each capital was mainly based on the literature. Variable selection was implemented in two rounds. In the first round, the requirement was that variables must be

supported by at least two studies, and must be included in the OECD databank or the IMD World Competitiveness Yearbook. “Market capital” turned out to have the fewest identified variables. To remedy the unbalanced number of variables in market capital, a focus group was formed to obtain initial feedback regarding the appropriateness of the variables selected. With input from ten Taiwanese professors who also engaged in intellectual capital related research, the authors were able to revise the variables, finally settling on those shown in Table 1. Financial capital is also included, as it is a key factor of national wealth. Consequently, a total of 29 variables were selected; seven each for human capital, market capital, process capital, renewal capital and a single variable (GDP per capita) representing financial capital.

The first type of national capital - human capital – is defined as the competencies of individuals in realizing national goals (Bontis, 2004). According to OECD (2000), human capital consists of knowledge about facts, laws and principles in addition to knowledge relating to specialized, teamwork and communication skills. Education is the foundation of human capital. It is through education that knowledge and skills are developed. Students are taught a variety of subjects, not only to improve their labor productivity, but also to enrich their lives, make them better citizens and create additional value for the nation. However, formal education alone is not sufficient for the continuing development of human capital. Post-education training institutions, including private companies, must provide ongoing training to enable citizens to cope with a rapidly changing world. Therefore, the variables used in this study include the amount of skilled labor, the degree of employee training, the literacy rate, higher education enrollment, the pupil-teacher ratio, the number of Internet subscribers, and public expenditure on education.

The second type of national capital - market capital - is similar to social capital in a micro setting in that it represents a country’s capabilities and successes in providing an attractive, competitive solution to meet the needs of its international clients, while also sharing knowledge with the rest of world through knowledge coordination and contextualization (Bontis, 2004). Therefore, one major factor that determines market capital is international trade. The flow of people, technology, and ideas between countries is the key to overall market success. The present study therefore incorporates variables concerning investment and achievements in foreign relations, coupled with exports of quality products and services. In this study, we focus primarily on whether corporate tax policy facilitates trade, cross border venture, openness to foreign cultures, the degree of globalization, transparency of economic information, the image that the country projects abroad, and exports and imports of commercial services.

The third type of national capital – process capital – comprises the non-human powerhouses of knowledge in a nation, embedded in a country’s infrastructure, which facilitate the creation, accessibility and dissemination of current data, information and knowledge. The overall environment, government, capital and information technology appear to be the decisive factors here. Apart from these factors, countries with inadequate resources in terms of computers, Internet access and telecommunications are at risk of falling even further behind their competitors in the

world market (Bontis, 2004). Therefore, the business competition environment, government efficiency, intellectual property rights protection, capital availability, the number of computers per capita, the convenience of establishing new firms, and the number of mobile phone subscribers are included in this category of capital.

Table 1 Variables included in each type of capital proposed by this study

Human Capital index	**Market capital index**
1. Skilled labor*	1. Corporate Tax*
2. Employee training*	2. Cross border venture*
3. Literacy rate	3. Openness to foreign culture*
4. Higher education enrollment	4. Globalization*
5. Pupil-teacher ratio	5. Transparency*
6. Internet subscribers	6. Image of your country*
7. Public expenditure on education	7. Exports & imports of services
Process capital index	**Renewal capital index**
1. Business competition environment*	1. Business R&D spending
2. Government efficiency*	2. Basic Research*
3. Intellectual property right protection*	3. R&D spending/GDP
4. Capital availability*	4. R&D researchers*
5. Computers in use per capita	5. Cooperation between universities and enterprises*
6. Convenience of establishing new firms*	6. Scientific articles*
7. Mobile phone subscribers	7. Patents per capita (USPTO + EPO)

Remark:

- **Financial capital** is the logarithm of GDP per capita adjusted by purchasing power parity.
- Those variables marked with an asterisk are the ones rated using a scale of "1-10".

The fourth type of national capital - renewal capital – is defined as a nation's future intellectual wealth, which sustains a nation's competitive advantage. Research and development (R&D) and patents are two key parameters in renewal capital. Their significance derives from the direct relationship between the success of a country's financial systems and the effectiveness of its R&D sector (Bontis, 2004). Foreign patent applications represent the acknowledgement and renewing of ideas and innovation within industries throughout a country. Therefore, we selected business R&D spending, degree of basic research to enhance long-term economic development, R&D spending as a percentage of GDP, the number of R&D researchers, the level of cooperation between universities and enterprises, scientific articles, and USPTO & EPO per capita for inclusion in this capital type.

The fifth type of national capital – financial capital – is represented by a single indicator: the logarithm of GDP per capita adjusted by purchasing power parity. This is the most common metric denoting the financial wealth of a nation.

Method

In this section, we describe the data collection and data analysis methods. Using the variables listed in Table 1, we collected data from several sources including the OECD database, the World Competitiveness Yearbook published by the IMD, and the Taiwan Economic Statistical databank provided by the Taiwan Economic Data Center for matching Taiwanese data. A comprehensive list of 47 countries was compiled from these data sources. Due to the large number of missing values, the datasets for Columbia, Hong Kong, Indonesia, Israel, Luxembourg, Slovenia and Venezuela were excluded. The data analyzed in this study therefore covers 40 countries for a period of 12 years extending from 1994 to 2005.

In this study, there are two different data types, one with an absolute number such as "patents per capita"; the other with a qualitative rating on a scale of "1-10", such as "image of your country". Although subjective, rating on the degree or magnitude of certain variables is unavoidable as we are evaluating intangible assets, and intangibles cannot be fully represented by merely adding up certain quantitative variables. For a meaningful integration of the quantitative score and qualitative rating in each capital, we calculated the ratio of the absolute value relative to the highest value of each quantitative variable and multiplied it by 10 to transform the number into a 1-10 scale. The data transformation procedures have been repeated for all number indicators of human capital, market capital, process capital, and renewal capital. For financial capital, we use the logarithm of GDP per capita adjusted by the purchasing power parity of each country, calculated its ratio to the highest value and then transformed it into a "1-10" scale. Finally, we totaled the scores of the five capitals to come up with the Overall Index in Table 2.

Result

Based on the data analysis described in the last section, Table 2 displays the score and ranking of the five types of national capital investigated. The overall index is particularly revealing because it provides valuable information for policy makers to reflect on. As mentioned earlier in this paper, one of the purposes of this study is to provide another version of the national intellectual capital model for future researchers to replicate and refine. We have tried to identify variables that are well represented based on the literature review, while at the same time balancing the number of variables for the four capital types (7 variables each, excluding financial capital) and balancing the number of quantitative and qualitative variables (13 vs. 16).

With 12 years of data spanning the period from 1994 to 2005, the overall results agree with the general perception that the Nordic countries have the highest degree of national intellectual capital. The top ten countries in the list are, in order, Sweden, Finland, Switzerland, Denmark, the USA, Norway, Iceland, Singapore, the Netherlands, and Canada. Of these, five are Nordic countries, two are in other parts of Europe, two are in North America, and one is in Asia. Taiwan is

number seventeenth in the list.

The bottom five countries in the list are India, China, Mexico, Russia, and Argentina. Three of the BRIC countries, namely -- Russia, India, and China, which are currently showing so much promise, are among the bottom five, probably because the rankings is based on historical data covering an 12-year period, and not the last few years; in addition, the population of these countries is relatively large, which may lead to their efforts in certain areas being stretched too thin.

Table 2 Composite Score and Ranking for the Different Types of National Capital Index for 40 Countries from 1994 to 2005

	Human capital index		**Market capital index**		**Process capital index**		**Renewal capital index**		**Financial capital index**		**Overall Index**	
Mean	5.71		5.59		5.13		3.78		8.75		28.96	
SD	1.24		0.93		1.44		1.88		1.06		5.85	
Country	**Score**	**Ranking**	**Score**	**Ranking**	**Score**	**Ranking**	**Score**	**Ranking**	**Score**	**Ranking**	**Score**	**Ranking**
Argentina	4.60	32	4.14	38	2.91	39	1.74	36	8.32	26	21.70	36
Australia	6.48	11	6.04	15	6.81	7	4.33	17	9.42	18	33.07	11
Austria	6.69	9	6.46	7	5.94	15	4.33	18	9.63	7	33.04	12
Belgium	6.39	13	5.58	21	5.50	18	4.60	15	9.57	11	31.63	16
Brazil	4.19	36	4.76	31	3.39	33	1.83	35	7.78	33	21.95	34
Canada	6.95	8	6.14	12	6.55	10	4.76	11	9.46	17	33.86	10
Chile	4.66	30	6.35	8	4.54	25	1.99	33	8.00	30	25.54	26
China	3.80	39	5.11	27	3.38	35	2.38	27	6.44	39	21.11	39
Czech Republic	4.90	28	5.41	23	4.18	28	2.54	25	8.22	27	25.24	27
Denmark	8.30	1	6.59	5	7.06	3	5.54	7	9.81	5	37.30	4
Finland	7.55	4	6.56	6	7.59	1	7.08	4	9.56	13	38.33	2
France	6.04	17	4.79	30	5.23	19	5.08	9	9.56	12	30.69	20
Germany	6.12	15	5.34	24	5.76	17	5.86	6	9.60	9	32.67	14
Greece	4.90	27	5.13	26	4.12	29	2.05	31	8.89	23	25.10	28
Hungary	5.68	22	5.84	17	4.47	26	2.48	26	8.16	28	26.63	24
Iceland	7.23	5	6.70	4	6.76	8	4.89	10	9.72	6	35.30	7
India	3.41	40	4.75	32	3.38	34	1.85	34	5.82	40	19.22	40
Ireland	5.76	20	7.10	2	6.25	13	3.88	20	9.54	14	32.54	15
Italy	6.00	18	4.59	36	4.57	24	2.70	23	9.39	19	27.25	23
Japan	6.50	10	4.40	37	4.98	20	7.17	3	9.85	3	32.91	13
Korea	5.57	23	4.72	33	4.66	23	4.07	19	8.72	25	27.73	21
Malaysia	4.95	26	6.11	13	4.94	21	2.22	28	7.89	31	26.12	25
Mexico	4.08	37	4.71	34	3.26	37	1.41	40	8.04	29	21.51	38
Netherlands	6.47	12	6.92	3	6.60	9	5.20	8	9.57	10	34.77	9

New Zealand	6.05	16	6.25	10	6.26	12	3.54	21	9.14	20	31.24	19
Norway	7.81	3	5.96	16	6.99	4	4.69	13	9.92	2	35.37	6
Poland	4.36	34	4.89	29	3.29	36	1.67	38	7.80	32	22.00	33
Portugal	4.86	29	4.05	39	3.19	38	2.11	30	8.78	24	23.00	30
Philippines	5.49	24	5.24	25	4.43	27	2.01	32	6.75	38	23.92	29
Russia	4.64	31	3.89	40	2.70	40	2.94	22	7.42	36	21.57	37
Singapore	5.88	19	8.17	1	6.95	6	4.64	14	9.52	15	35.17	8
South Africa	4.19	35	4.67	35	4.11	30	2.21	29	7.65	34	22.83	31
Spain	5.32	25	5.66	20	4.77	22	2.60	24	9.12	21	27.47	22
Sweden	8.08	2	6.18	11	6.98	5	7.54	2	9.61	8	38.39	1
Switzerland	7.01	6	6.27	9	6.38	11	7.80	1	9.94	1	37.40	3
Taiwan	6.20	14	5.83	18	5.82	16	4.75	12	8.97	22	31.57	17
Thailand	4.48	33	5.55	22	3.80	31	1.57	39	7.38	37	22.78	32
Turkey	3.99	38	5.01	28	3.46	32	1.67	37	7.59	35	21.72	35
UK	5.74	21	5.67	19	6.17	14	4.43	16	9.51	16	31.52	18
USA	6.98	7	6.07	14	7.26	2	7.00	5	9.82	4	37.12	5

Conclusion

Assessing the intellectual capital of a nation reveals the hidden values of individuals, companies, institutions, and communities that constitute current and potential sources for wealth creation. The expectation is that finding a reliable measurement of knowledge assets will help governments to achieve more effective management of the intangible resources that increasingly determine the success of their economies (Bontis, 2004). Although assessing a nation's intellectual capital is a daunting task, the steady stream of research results that have been published in the last few years has made managers and policy makers begin to pay more attention to the increasing importance of intangible assets issues. The present study provides a platform that a country can use to examine its strengths and weaknesses and identify the areas on which it should be focusing as it strives for excellence.

Year Two research report:

The major purpose of the second year project is to explore the dynamics of the human capital, organizational (structural) capital, and social (relational) capital at the organizational level. Various scholars have devised their own definitions of intellectual capital, including a collective brainpower or packaged useful knowledge needed for problem solving and for performing certain tasks (Stewart, 1997); employee intelligence, know-how, knowledge and process (Bassi & McMurrer, 1998); the sum or stock of employee knowledge (Roos et al., 1998); and the multiple effects of employee ability and commitment (Ulrich, 1998).

The common elements listed above are employees, knowledge, and values. Intellectual capital mainly resides in employees with knowledge, intelligence, and experience, which should be accumulated and transformed to organizational wisdom through organizational (structural) capital for facilitating social (relational) capital.

Human Capital

Human capital is a combination of genetic inheritance, education, experience, and attitude about life and business (Bontis et al., 2000); in other words, the sheer intelligence of organizational members (Bontis, 1998; Pablos, 2003). It is valuable, rare, inimitable, and nontransferable, yet a source of innovation and strategic renewal (Bontis & Fitz-enz, 2002). Bontis (1998) further describes it as the collective capability of one firm to extract the best solutions from the knowledge of its individual members. However, it also represents the most mobile of all assets, an asset that organizations cannot own (Bontis & Fitz-enz, 2002). Therefore, the magnitude of this capital is conditioned by the commitment of each individual and factors such as their motivation, and the correlation between their individual goals and team goals (Palacios-Marques & Garrigos-Simon, 2003). As a result, management skills and leadership styles are the important components that facilitate the maximization of human capital (Bontis et al., 2000).

Organizational Capital

Organizational capital is described as "what remains in the company when employees go home for the night" (Roos et al., 1997: 42). It is this capital that allows intellectual capital to be measured and developed in an organization. It is also the codified knowledge that can be reproduced and shared, including technologies, inventions, data, publication, strategy, structures, systems, organizational routines, and procedures (Bontis & Fitz-enz, 2002). This construct therefore contains elements of efficiency, transaction time, procedural innovativeness, cost minimization, profit maximization, access to information for codification into knowledge, and effective information systems that turn individual know-how into group property (Bontis et al., 2000). Hubert (1996) proposed that organizational capital of a firm consists of four elements, namely systems, structure, strategy, and culture. Systems is the way in which an organization's processes (information, communication, decision-making) and outputs (products/services and capital) proceed. Structure is the arrangement of responsibilities and accountabilities that defines the position of and relationship between members of an organization. Strategy means the goals of the organization and the ways it seeks to achieve them. Culture represents the sum of individual opinions, shared mindsets, values, and norms within the organization. The work we have done in trying to understand the deep-seated values of individuals in our organizations tells us that many managers are currently incapable of collaborating because of their mental orientation and their lack of interpersonal skills. They have never been exposed to environments with a level of interdependence that would encourage them to develop the interpersonal skills that collaboration requires.

Social Capital

Dudley (2004) mentioned that social (relational) capital not a single entity but a variety of different entities, with two elements in common: they all consist of some aspect of social structures, and they facilitate certain actions of actors, whether persons or corporate actors, within the structure. Relational capital is less tangible than physical or human capital for it exists in the relations among persons. This capital allows individuals to work together more smoothly producing benefits. Ultimately we would expect that somehow these benefits reinforce relational capital connections.

To attain effective social capital accumulation, there has to be organization-wide generation of market intelligence pertaining to the current and future needs of customers. The dissemination of this intelligence must be done horizontally and vertically so that responsiveness to market changes can be developed fully to facilitate customer satisfaction and promote customer loyalty. Snell (1999) commented that understanding what customers want in a product or a service better than anyone else is what makes someone a business leader, as opposed to a follower. At the end of accumulation process, customer capital should lead to better financial performance.

Dynamics of Organizational Intellectual Capital

The three components of IC described above are not mutually exclusive; they interact with each other all the time. Although human capital is the very base of all the intangible capitals a company could possibly have, it can only be transferred into an organization's core competencies when combined with organizational capital. By multiplying human capital with organizational capital, an organization capitalizes the brains, skills, insights and potential of employees, forging them into customer service, systems, processes, databases, and then transforming these intangible assets into wealth creating organizational resources. Further, human capital is only the raw material of competitive advantage and depends on effective management of social capital to maximize its value. For instance, an effective integration of customers into the value chain brings in precious social capital. However, its success depends on employees' efforts in identifying and developing opportunities for customer delight. Organizational capital reinforces relational capital by providing easier access to information to better serve customers and offering effective incentives in motivating employees to create social capital. Organizational capital is also the critical link that allows human capital and relational capitals to be measured.

From a dynamic perspective, the firm must continually build, adapt, and reconfigure internal and external competences to achieve congruence with the changing business environment when time-to-market and product timing are critical, the rate of technological change is rapid, and the nature of future competition and markets are difficult to determine (Teece et al. 1997). They are also organizational routines through which firms achieve new resource configurations (Eisenhardt & Martin, 2000).

In the second year, after extensive literature review and four in-depth case studies, a typology

of six dynamic configurations was developed as Table 3, Figure 1, and Figure 2 shown. They are Structural leverage system, Rational balance system, Human facilitating system, Bureaucratic system, Human control system, and Incompetent organizational system. With the assumption of equifinality, in the real business world there should have more than one congruent system. Therefore, the former three configurations should lead to successful organizational performance, whereas the latter three should result in performance failure. Incorporating the data from literature reviews, case studies, and the researcher's conceptualization, Table 3 also represents the potential evolving path for growth, the features of each dynamic configuration, matching organizational culture, leadership style, and sample companies.

Table 3 Proposed typology of six dynamic configurations of human capital, organizational capital, and social capital

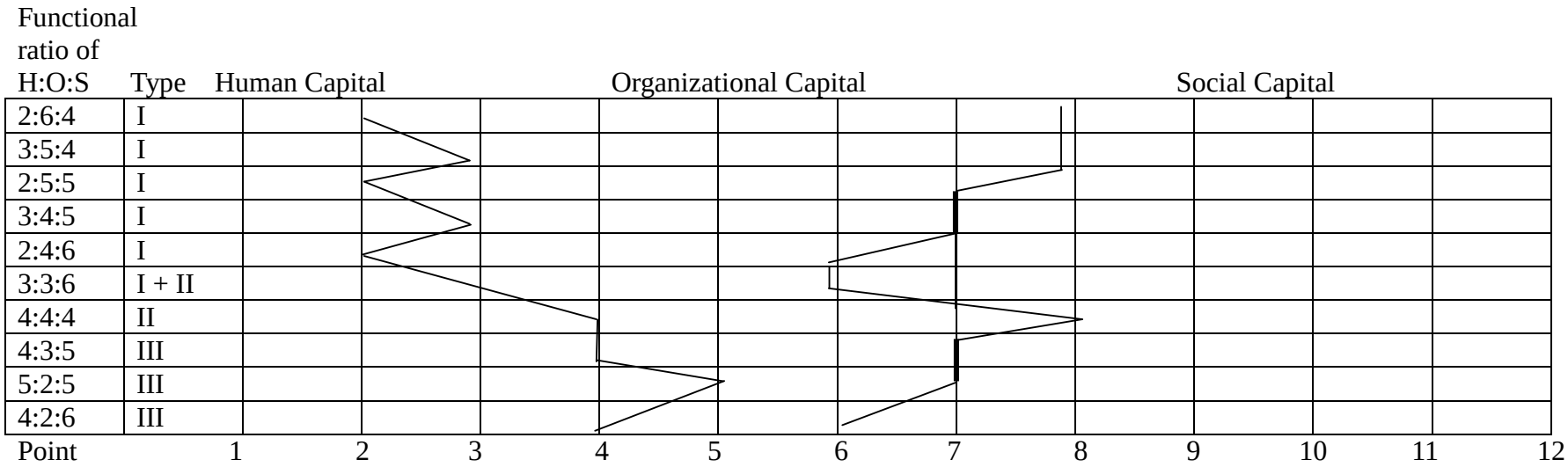
	Six types of intellectual capital system congruence	Configuration (total 12 points) HC : OC : SC	Congruent status of the three capitals	Potential evolving process for growth	Features	Organizational culture	Leadership	Sample company
I.	Structural leverage system	2-3 : 4-6 : 4-6	Congruent	I.->II.->(IV,V,VI) ->IIx2 (2 represents growth)	Lean elite staffing yet leverage organizational system to satisfy external stakeholders' needs	Market culture	Leader is a goal-oriented hard-driver	Successful aggressive small companies
II.	Rational balance system	4 : 4 : 4	Congruent	II.->(IV,V,VI)->II x2 (2 represents growth)	Reach an equilibrium among human capital, organizational capital, and relational capital	Market culture	Leader aims for goal-oriented with a balanced system	Successful and well established companies, such as MNC
III.	Human facilitating system	3-5 : 2-3 : 5-6	Congruent	III-> II.->(IV,V,VI)->II x2(2 represents growth)	Comparatively weak organizational capital and rely on human capital to satisfy external stakeholders' needs	Market + clan culture	Leader is goal-oriented yet has difficulties improving organizational capital and relies on people to run the business	Successful small companies with many loyal and long tenure employees

IV.	Bureaucratic system	1-4 : 5-7 : 3-6	Incongruent	IV > II.->(IV,V,VI)->II x2(2 represents growth)	An overpowered organizational capital that stifles system congruence, which results in a bureaucratic system	Hierarchy culture	Leader is control and efficiency oriented and relies on rules and regulation to run the business	Public sectors and over rigid companies
V.	Human control system	5-7 : 1-4 : 3-6	Incongruent	V > II.->(IV,V,VI)->II x2(2 represents growth)	An over expanded human resources and weak organizational capital that relies on human control	Clan culture	Leader acts like a parent and allows an overpowered human resources to run the business	Companies with too many redundant human resources
VI.	Incompetent organizational system	1-4 : 1-4 : 7-8	Incongruent	VI > II.->(IV,V,VI)->II x2(2 represents growth)	Out numbered stakeholders that human capital together with organizational capital cannot support a fully functioning system	Anarchy without a specific organizational culture	Leader is incompetent to mobilize human capital and organizational capital to satisfy external stakeholders' needs	Private companies with this nature will not survive. Only the monopoly company can run the business in this status.

Remark: (1) HC=human capital, OC=organizational capital, SC=social capital. (2) For easier calculation, 12 points represent the total resources a congruent company generates. For example, 2:6:4 means the existing human capital can generate 2 units of resources, yet by effectively utilizing organizational capital to generate 6 units of resources, human capital and organizational capital combined can meet the requirements of the 4 units of the resources that relational capital can generate.

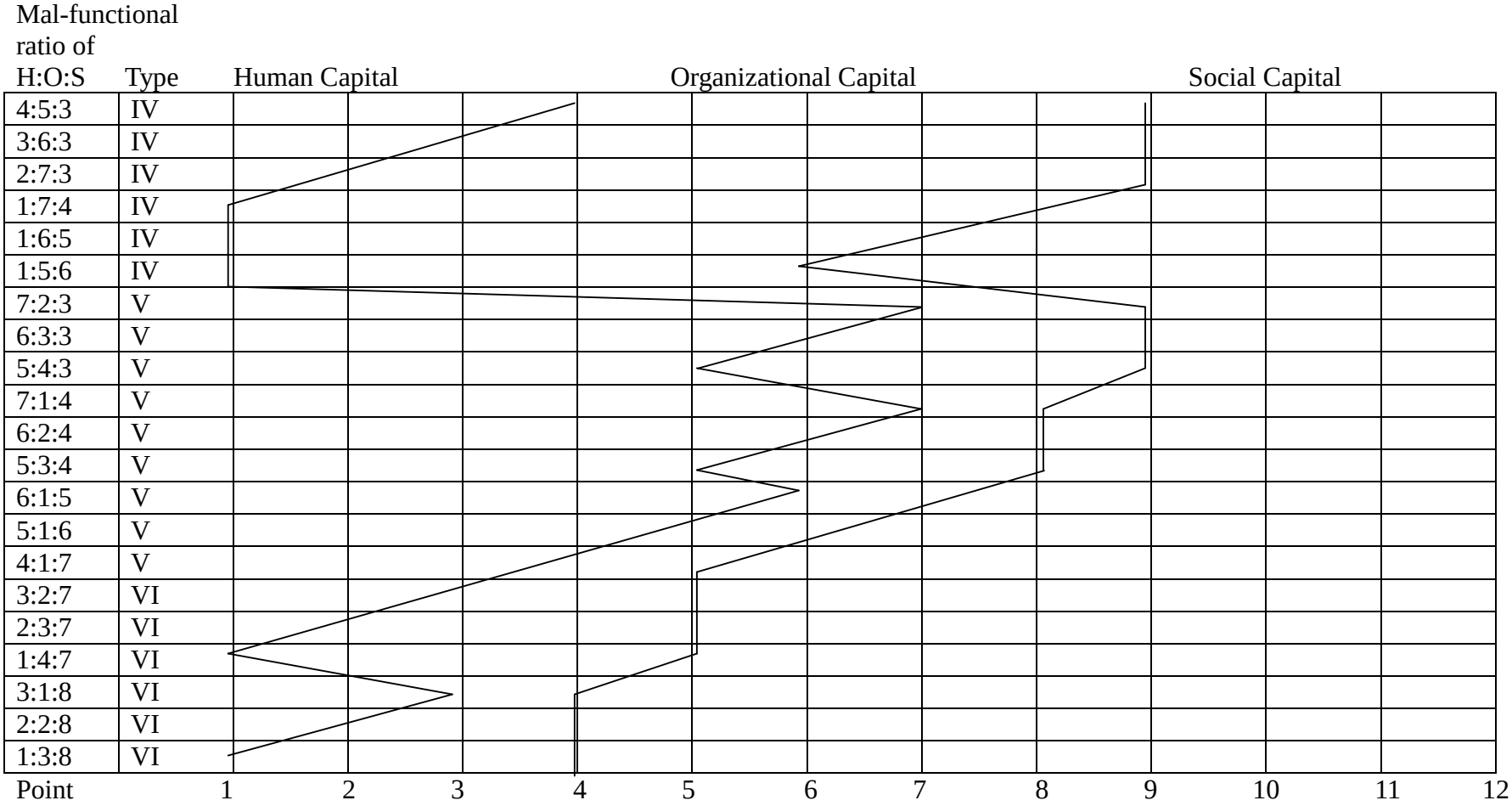
Assumption: The proportion of human capital should not exceed that of social capital in order to be regarded as "fit".

Figure 1 Graphical presentation of ***congruent*** intellectual capital configurations (total 12 points)



Remark:
(1) H= human capital, O=organizational capital, S=social capital
(2) For easier calculation, 12 points represent the total resources a congruent company generates. For example, 2:6:4 means the existing human capital can generate 2 units of resources, yet by effectively utilizing organizational capital to generate 6 units of resources, human capital and organizational capital combined can meet the requirements of the 4 units of the resources that social capital can generate.

Figure 2 Graphical presentation of ***incongruent*** intellectual capital configurations (total 12 points)



Remark: H= human capital, O=organizational capital, S=social capital

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三、計劃結果自評

本計畫第一年之研究目的在於探討構成國家智慧資本之要素，結果發展出五大資本：國家人力資本、流程資本、市場資本、更新資本與國家財務資本，並據以衡量與比較各國智慧資本存量之多寡，且深入探討智慧資本存量領先之北歐國家與落後之金磚四國的特性。根據此一架構至今整理出且於期刊或研討會發表的論文，含台灣之國家智慧資本，台灣、日本、與韓國之國家智慧資本比較研究，歐洲七國之國家智慧資本比較研究，北歐五國之國家智慧資本比較研究，與金磚四國之國家智慧資本比較研究，目前繼續撰寫中的論文為南歐四國之國家智慧資本比較研究。明年更計畫與瑞典智慧資本大師 Professor Leif Edvinsson 共同撰寫約十章之國家智慧資本比較研究書籍，於國外出版。本計畫執行過程中之額外收穫為與 Professor Leif Edvinsson 建立合作關係，並藉其影響力將台灣學術界智慧資本研究能量公諸於世。台灣智慧資本研究團隊之研究成果不但已載入其書籍中，上述 Table 2 之四十個國家智慧資本排序也經由 Professor Leif Edvinsson 呈給芬蘭政府參考，並已編成正式文獻 Stahle, P. (ed.) (2007), "Five steps for Finland's future: A high-level Round Table", initiated by the New Club of Paris held in Helsinki, November 11th, 2006 with and for Prime Minister Matti Vanhanen, Technology Review 202/2007, Helsinki: Tekes。

本計畫第二年之研究目的在於探討組織智慧資本三要素人力資本、組織資本、與社會資本之動態關係。有別於過去的個案研究整理報告，個人由最基礎的七十年代、八十年代管理理論文獻著手，並整合企業實務觀察、個案研究與歷年智慧資本研究心得，發展出三種成功的動態組合與三種失敗的動態組合模式。形塑觀念性理論架構為管理學術研究最艱難的一類，個人決定挑戰此一艱鉅工作，準備花費較長的時間撰寫理論建構類型的論文。

由於智慧資本屬於新興研究領域，且近年來也已漸漸為管理學術界主流大師們所接受，因此頗具國際期刊之發表潛力。本研究與國科會智慧資本整合型計畫之研究團隊教授們之努力，已發展出不同領域智慧資本衡量方法與成果，除了增加台灣智慧資本研究能量之曝光度外，並有助於政策制定者未來制定政策時之參考，故不論其於學術上或應用上之價值，均需獲得肯定，以確保研究資源的持續投入，好更加提升台灣目前已建立的智慧資本學術研究聲望。

綜合上述，本計畫之研究內容符合原計畫之構想與目的，並已達成原計畫之預期目標，本研究成果請參閱所附之論文發表清單。

NSC Intellectual Capital Integrated Project

Carol Yeh-Yun Lin Publication list – As of Oct. 31, 2007

I. Journal paper:

4. Lin, Y.Y. & Edvinsson, L. (accepted) National intellectual capital: Comparison of the Nordic Countries, *Journal of Intellectual Capital*
5. Chen, D.R. & Lin, Y.Y. (accepted) Physician's Career Success: Educational Stratification or Inequality in Social Capital? (管理學報)
6. Lin, Y.Y. and Lin, T.Y. (2007) National intellectual capital: Exploring Taiwan's standing, *International Journal of Learning and Intellectual Capital Special Issue*, 4(2)
7. 李怡禛、林月雲，從 Hofstede 國家文化觀點看國家智慧資本之創造(journal paper, under first revision)

II. Conference paper:

7. Lin, Y.Y. & Edvinsson, L. National intellectual capital: Comparison of the BRIC Countries (submitted to *McMaster World Congress*, Hamilton, Ontario, Canada, January 16-18, 2008)
8. Lin, Y.Y. (2007) Intellectual capital: A comparison of seven European countries, presented at *Intellectual Capital Congress 2007*, May 3-4, in Haarlem, Netherlands.
9. 林月雲(2006) 從智慧資本的觀點探討中華文化之加值者 -「得意典藏」，第十二屆服務管理研討會，國立政治大學企業管理學系，（Dec. 15/16, 2006）
10. Lin, Y.Y. and Lin, T.Y. (2006) National intellectual capital: A comparison of the Nordic countries, presented on Dec. 9 at 2006 科管年會
11. Lin, Y.Y. and Wei, Y.C. (2006) Environmental pressure and organizational decline: The moderating effects of human capital and social capital, presented on Dec. 19-21, 2006 at Asian Academy of Management, Waseda University, Japan.
12. Lin, Y.Y. and Lee, I.C. (2006). National intellectual capital: A comparison of Japan, Korea and Taiwan, presented on Dec. 19-21, 2006 at Asian Academy of Management, Waseda University, Japan.

2007 AOM Philadelphia Conference –

prepared by Yeh-Yun Lin
National Chengchi University
August 9, 2007

Major theme: Doing well by doing good
Time: August 3 – 8, 2007
Place: Philadelphia, USA
Total participants: around 10,000 including on-site registration
Total authors from Taiwan: 226 (ranked 4th, following USA, UK, and Canada)

Sessions I have attended:

1. Intellectual Capital – 3 papers presented by Brazilian, Italian, and Portugal scholars respectively.
2. Latent congruence modeling: Improving the assessment of similarity, agreement, and fit in research, conducted by Gordon Chang
3. The analysis of change through latent growth modeling, conducted by Robert J. Vandenberg
4. An overview of the logic and rationale of hierarchical linear modeling with substantive applications, conducted by David Hofmann
5. Publishing in US journals
6. Expatriates and HR, paper presentation
7. Prof. Egri, my co-author presented a corporate social responsibility paper
8. I presented my single author paper in a symposium – The birth, transformation, and death of organizations: Two industries in Taiwan
9. Brain circulation or international talent flow: The human resource challenge in the 21st century, chaired by Rosalie Tung
10. The rapidly changing face of Korean companies: From corporate strategy to organizational culture
11. Dynamic perspectives on the (re-)structuring of health care organizations

Activities I have participated:

1. HR welcome lunch
2. OB/HR reception
3. IACMR reception
4. AAOM reception

5. All academy reception
6. Brigham Young University ice cream social
7. Discussion with Prof. Egri for a CSR paper
8. Dinner with CSR project research team-members in Doubletree Hotel August 7 night
9. Coffee with Taiwanese students (National Chengchi University students, Taiwanese scholars teaching in North America, professors of other Taiwanese universities, Prof. Ming-Jer Cheng, Prof. Shifeng Chen)

心得

1. 智慧資本之概念已被管理學術界所接受,八月四日有一個場次即以智慧資本為主題,收錄了三篇文章因此智慧資本之議題應該可以繼續研究.
2. 企業社會責任已成為一個重要的議題,整個六天的會議均有以此為主題的場次.個人參與加拿大 Professor Egri 領導的二十四國研究團隊之專案有很大的發展空間.
3. 韓國學者團隊申請一個場次,有相當的曝光度,台灣的論文也已經達到一個規模應該可以有更好的參與模式,例如仿效韓國模式.
4. 台灣參與學者數目已經名列全球第四,應該已引起大會的矚目,然而在 best paper 的數量上,並沒有相對的比例.顯見台灣學者投稿論文的品質仍有提升的空間.
5. 台灣之海外傑出學者陳時奮教授提醒我們,台灣已經連續幾年在 AOM 有不少的論文發表,累積起來應該已有 2-300 篇,可以追蹤有多少已經投稿或已經被國際期刊所接受,要讓台灣學者與博士生知道轉投期刊的重要性,而不是研討會發表完就好了.
6. 報告個人參加各類活動的用意為,在很多活動中並沒有看到台灣與會者積極的參與,在這類大型國際會議場所是最好曝光的機會應該多與他國學者互動.