The Impact Of Intellectual Capital On Business Performance In Taiwanese Design Industry

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ABSTRACT:

Transforming into a knowledge-based economy, there is an increasing need for Taiwan to explore how intellectual capital creates value for companies. This paper presents empirical data in understanding how intellectual capital influences business performance; specifically in the context of Taiwanese design companies. An Intellectual capital questionnaire was adopted to measure the intellectual capital components, including human capital, structural capital, and relational capital. 87 samples are collected and the data are analyzed by Partial Least Squares (PLS) method. The empirical result of PLS shows that intellectual capital does have significant influence on Taiwanese design companies' performance. However, due to Taiwanese design companies' organizational structure, structural capital does not support a positive influence on their performance. Also, it is indicated that 'number of employees in the company' and the 'company age' influence the structural capital on business performance.

Keywords: *Intellectual capital, Structural capital, Relational capital, Business performance, Taiwan design industry*

1. Introduction

In the era of knowledge economy, the intangible assets of a company have most likely taken the place of tangible assets and have probably become the most important resources that create value for enterprises nowadays. "Intellectual capital", namely the knowledge assets, has become one of the most-discussed business management topics, and it determines success or failure of modern enterprises (Thomas, 2003). Many researchers regard intellectual capital as assets that generate a company's competitive advantage and value (Bontis, 1999, 2001, Edvinsson & Malone, 1997; Roos & Roos, 1997; Stewart, 1997).

It could possibly be so for design industries as well, as its intangible assets are far more important than its tangible assets. This year Taiwan has so far obtained at least 165 international design awards, which is an improvement from the 133 awards in 2007, and 148 in 2006 (Yang, 2008). This is the evidence that Taiwanese design industry has the potential to contribute to the nation's economy. It was the first time for design industry to be officially considered in "Challenge 2008 – National Development Plan", in which design industry development is included as a sub-plan. Also, Taiwan Design Center (TDC), a national design center, was founded to foster the development of Taiwanese design industry.

Theoretically, many researchers have emphasized the influence of intellectual capital on business performance; and empirical studies are still developing. Moreover, even though some researchers has contributed to intellectual capital studies in the scope of Taiwanese high-tech and financial industry (Wang & Chang, 2005; Chen et al, 2006; Lin & Huang, 2006; Huang & Liu, 2006; Tsan & Chang, 2006), none of them have conducted empirical researches in design-related industries.

As a result, the researcher is interested in investigating the impact of intellectual capital on the performance of Taiwanese design industries. The paper thus examines the interrelationships among intellectual capital components and their influence on business performance respectively. Also, recommendations are provided to assist design company managers in managing the intellectual capital of their company.

Having the intentions to enrich Taiwan's intellectual capital studies, specifically in the design industry, as defined in the study, this research aims to find out (1) how does intellectual capital influence Taiwanese design companies' performance? And (2) what are the characteristics of the Taiwanese design industry's intellectual capital?

The design industry in Taiwan has not been seen as important until recent years. It is hoped to bring Taiwan to a brand new knowledge economy phase. Behind the high value-added industry performance of design industry, it is the intellectual capital of these companies that plays a major role in creating values. Despite the fact that the importance of intellectual capital has been noticed, it is just beginning to be unveiled by Taiwan's academic and practitioners' fields. In order to understand more about intellectual capital of design industry in Taiwan, this paper proposes to (1) understand the characteristics of Taiwanese design industry intellectual capital, (2) investigate and analyze how the components (i.e., the variables of this paper) for intellectual capital (Human Capital, Structural Capital, and Relational Capital as defined in the paper) may influence the performance of design industry in Taiwan and (3) provide recommendations to the managers of design industry on how to utilize and manage the intellectual capital of their companies.

2.   Literature Review

The concept of "intellectual capital" (IC) was first proposed by an economic scholar named John Kenneth Galbraith (Edvinsson & Sullivan, 1996, p. 358; Edvinsson, 1998, p.279; Roos et al, 1998, p. 4). He used it to explain the difference between a company's market value and book value and further advocated IC an intellectual action, instead of mere knowledge and intelligence (Taiwan Intellectual Capital Research Center [TICRC], & Market Intelligence Center [MIC], 2006). With the approach of "innovation era," many scholars begin to discuss the issue of IC. It is seen as the most valuable economic resource (Bontis, 1999; Drucker, 1993; Stewart, 1997; Sveiby, 1997) and is considered to be a potential source of sustainable competitive advantage (Bontis, 2002; Choo & Bontis, 2002; Edvinsson & Malone, 1997; Nonaka & Takeuchi, 1995).

Edvinsson and Sullivan (1996) define IC as the knowledge assets that can be converted into value. Whereas Stewart (1997) argues IC is the sum of all the knowledge and abilities of the members that forms the company's competitive advantage, including intellectual material like knowledge, information, intellectual property and experience that makes profit. Still yet, Ulrich (1998) considers intellectual capital originates from employees' competence and commitment. Among the many studies, the definition of IC remains inconsistent. However, the common features of IC can still be seen: its intangibility, the fact that it creates value, and the growth effect of collective practice (Cabrita, & Bontis, 2008).

3.   Intellectual Capital Components

The previous section describes how the definition and the classification vary due to research directions and the background of the researchers. However, as Cabrita and Bontis (2008) have pointed out, a common taxonomy has emerged in which intellectual capital adopts a tripartite dimension which includes: human capital, structural capital and relational capital.

This paper therefore adopts the classification of Cabrita and Bontis' (2008) study and defines these three major components of IC:

> ➢ *human capital* represents the individual knowledge stock of an organization as represented by its employees (Bontis et al., 2002);

> ➢ *structural capital* is a valuable strategic asset, which is comprised of non-human assets such as information systems, routines, procedures and databases;

> ➢ *relational capital* is the knowledge embedded in relationships with customers, suppliers, industry associations or any other stakeholder that influence the organization's life.

4.   Measurement Indicators Of Intellectual Capital And Business Performance

Indicators used to measure IC varies from scholar to scholar, but many of the indicators falls into the three major categories [human capital (HC), structural capital (SC) and relational capital (RC)]. Additionally, Bontis has developed a comprehensive Intellectual Capital Questionnaire in 2007, which was administered in Canada (Bontis, 1998), Malaysia (Bontis et al., 2000), and Portugal (Cabrita & Bontis, 2008). Within the questionnaire, fifty-three measurement indicators are used to measure IC. In 2008, Cabrita & Bontis (2008) further extended customer capital to relational capital by adding eight items to relational capital, which comprise of sixty-one IC measurement indicators (twenty HC indicators, sixteen SC indicators, and twenty-five RC indicators). With respect to business performance, ten measurement indicators are used to assess business performance, including industry leadership, future outlook, profit, profit growth, sales growth, after-

tax return on assets, after-tax return on sales, overall response to competition, success rate in new product launch, and overall business performance.

5.   Intellectual Capital Studies

Previous studies (Bontis, 1998; Bontis et al., 2000; Cabrita & Bontis, 2008) identified the positive relationship between IC and business performance. These are three empirical studies conducted respectively in Canada, Malaysia, and Portugal. All of the research results indicated that human capital (HC) significantly influences structural capital (SC) and relational capital (RC), and also impact business performance indirectly through SC and RC. Also, SC and RC showed significant influence on business performance (except in the study of Malaysia). Interestingly, Chen (2001) conducted an IC empirical study in Taiwan investigating the effect on information technology investment and intellectual capital on business performance, and the results support the studies of these three aforementioned studies.

6.   Taiwanese Design Industry

6.1.   Background Of Taiwanese Design Industry

According to the statement of "Challenge 2008 – National Development Plan" proposed by the CEPD (2005), Executive Yuan, Taiwan is faced with the highly-industrialized economy which used to be manufacturing-oriented; it has lost its advantage under the challenge of China. As a matter of fact, the highest value-added industry is the one that is creativity or design-based, especially the design which originates from aesthetics. This kind of industry, named cultural and creative industry, features its variety, dispersion, small-scale staff but the number of employment and the industry value of it have kept on growing, which enriches the quality of life. It is also an industry that all developed countries, such as north European countries, the UK, and Japan, have been progressively promoting. However, this industry has relatively been ignored in Taiwan's past economical policies.

Within the cultural and creative industry, the design industry shows great potential to contribute to the nation's economy. According to the latest statistics (2003-2006 Taiwan Cultural and Creative Industry Relevant Statistics, n. d.), the sales growth of the design industry contributed 55.69 billion NTD to the economy in 2006, which accounted for 9.5% of the entire cultural and creative industry. It also ranked the second highest sales growth among all Taiwan's cultural and creative industry. This showed the great potential of the design industry with regard to its contribution to Taiwan's economy. Potential to increase employment and, hopefully, Taiwan could be saved from the dilemma of micro-profit competition.

6.2.   Characteristics Of Design Industry

According to Oakley (1990), design projects are usually more irrational, unpredictable, and changing. Also, it requires much creativity from individuals. Design companies are usually more like organic organizations; this idea was proposed by Burns and Stalker (1961), which is suitable for companies situated in an unpredictable and changing environment. This kind of organizational structure provides the company with more flexibility and adaptability, and encourages creativity and innovation. On the other hand, it requires higher cost and more complicated administration to maintain the structure, which could be an obstacle to business performance.

6.3.   Definition And Scope Of Taiwanese Design Industry

Based on Taiwan Ministry of Economic Affairs[MOEA] (2004) definition, the design industry refers to business that are involved in product design and planning, product exterior design, mechanism design, prototype and model production, fashion design, patent logo design, brand visual design, graphic design, packaging design, webpage/multimedia design, and design consultancy. Additionally, TDC represents the key organizations of Taiwanese design industry, however, this research decided to take the companies in the TDC sector catalog as research samples. In the classification of TDC, the design industry falls into the following four categories: product design, service design, activity design, and space design. TDC included space design as its business scope, which is the slight difference from MOEA's definition.

6.4.   Development Of Hypothesis

This research framework was developed in accordance with the literature review. From the review, it was noticed that intellectual capital is related to business performance. The Intellectual Capital Variables defined

in the study are in relation to Cabrita and Bontis' (2008) classification of intellectual capital: Human Capital, Structural Capital, and Relational Capital. Their interrelation and their impact on Business Performance will be tested.
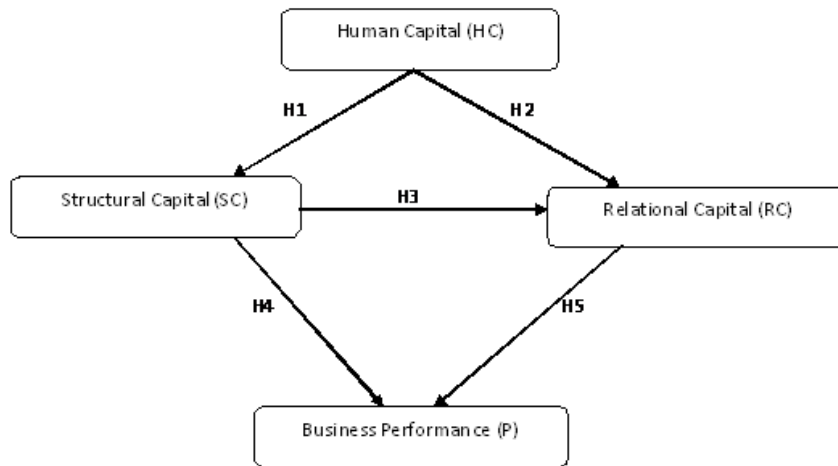

Figure 1: Conceptual Framework Of This Study (*Source:* Revised From Cabrita And Bontis, 2008)

Previous studies have indicated that human capital is positively associated with structural capital and relational capital (Bontis, 1998; Bontis et al., 2000; Chen, 2001; Cabrita & Bontis, 2008); also, structural and relational capital respectively mediate the impact of human capital on business performance. Therefore, the following hypotheses are developed.

H1. Human capital is positively associated with structural capital.

H2. Human capital is positively associated with relational capital.

H3. Structural capital is positively associated with relational capital.

H4. Structural capital is positively associated with business performance.

H5. Relational capital is positively associated with business performance

6.5.   Methods

 A pilot test, reviewed by four experts in this field, was administered in December 2008 and the data were collected by paper questionnaire. For the pilot test sample, four executives of Taiwanese design companies and six students from the extended education division of Department of Fine Arts, National Taiwan Normal University were chosen using convenience sampling method. All participants are managers or directors who come from ten different design companies in Taiwan and their permissions to participate in the pilot study were obtained. The questionnaire items come from the empirical study of Cabrita and Bontis (2008), which are 71 items in total. All items are translated into Chinese by a bilingual translator and are revised by experts to suit the study. Also, the items are placed categorically as Cabrita and Bontis' (2008) classification of intellectual capital.

For the main study, the researcher contacted Taiwan Design Center (TDC) requesting permission to mail surveys electronically using their design industry catalog. The researcher explained by telephone and mails the research background, the research purpose, along with a note of confidentiality detailing that the data collected will be used solely for the researcher's thesis and all names of companies will be excluded. Additionally, the researcher made phone calls by using the public catalog provided by the website of TDC (http://www.boco.com.tw). For every phone call, the researcher explained the purpose of the study and the contributions it may have to Taiwanese design industry. The participants were assured their anonymity and that the results will be sent to them if requested. Moreover, the researcher also reminded that the survey should be answered by managers or directors of the company as recommended by Bontis (1998) and Bukh et

al (1999). Electric surveys are mailed to these respondents so as to reduce the trouble of replying to paper questionnaires and increase respondents' willingness of reply.

After all the phone calls are made, the researcher waited and collected all the data. The data was coded and the information was keyed into the Statistical Package for Social Sciences (SPSS) PC 12.0 statistical software program.

6.5.   Partial Least Squares

Partial least squares (PLS) is a kind of structural equation modeling (SEM) technique. It is based on regression and originates from path analysis. As stated by Cabrita and Bontis (2008), it is a powerful tool in social and behavioral sciences where theories are formulated in terms of hypothetical construct, which are theoretical and cannot be observed or measured directly. Besides, PLS estimation does not require assumptions of normality or independence of observations. Moreover, it works well with small samples and is better suited for exploratory work. These are also the reasons that make PLS a more suitable analyzing method for this study.

Therefore, in this study, PLS is used to analyze intellectual capital data and business performance data. Through the use of PLS, the researcher can conduct confirmatory factor analysis and path analysis.

Due to the exploratory feature and small samples of this study, the researcher decided to adopt Visual PLS 1.04b1 as one of the major tools to investigate causal relationship between intellectual capital and business performance.

Finally, the "rule of thumb" for sample size requirements suggests that it will be equal to the larger of the following (Cabrita & Bontis, 2008):

i.   10 times the scale with the largest number of formative indicators (scales with reflective indicators can be ignored) or

ii.   10 times the largest number of antecedent constructs leading to an endogenous construct. In our study we applied the second requirement as all indicators are reflective. The final full test with interaction effects would have 3 constructs.

Therefore, a minimum of 30 (3 x 10) was required. Our sample size (87 samples) met the criterion.

6.6.   Testing The Measurement Model

This paper uses Cronbach's alpha in SPSS and PLS approach to assess the measurement model (outer model). All the Cronbach's alpha values of the four constructs exceeded 0.91 (0.942 for human capital; 0.914 for relational capital; 0.935 for relational capital; 0.958 for business performance).

Individual item reliabilities were evaluated by examining the loadings of the measures with their corresponding construct. All loadings were greater than 0.522 except the loading of R9, which is 0.4857; however, it is not too low to be deleted (see Table 7). Convergent validity was assessed using the internal consistency measure, developed by Fornell and Larcker (1981). All values for the four constructs exceeded 0.7, as recommended by Nunnally (1978).

Table 1 Measurement model results

Constructs	Number of items	Cronbach's Alpha	Internal Consistency	R² (%)
Human	16	0.939	0.949	
Structural	12	0.913	0.928	75.6
Relational	16	0.935	0.944	70.1
Performance	10	0.957	0.963	35.5
Loadings				

Human | H1(0.7154), H3(0.7140), H4(0.7156), H6(0.7337), H7(0.6656), H8(0.8157), H9(0.6781), H10(0.8392), H11(0.8938), H12(0.7325), H15R(0.5482), H16(0.7487), H17(0.6493), H18(0.81829), H19R(0.5858), H20(0.8174)

Structural	S3(0.7704), S4 (0.6929), S5(0.6055), S7(0.7977), S8(0.8164), S9(0.7870), S10(0.6038), S11(0.6163), S12(0.6859), S13R(0.6079), S14(0.7800), S15(0.8314)
Relational	R1(0.8287), R2(0.6128), R3(0.7605), R5(0.6934), R6(0.7561), R7(0.8230), R8(0.7700), R9(0.4857), R10(0.6177), R11(0.7514), R12(0.7718), R13R(0.6554), R14(0.7605), R15R(0.6964), R16(0.8873), R24(0.5222)
Performance	P1(0.7531), P2(0.8353), P3 (0.8057), P4(0.9025), P5(0.8617), P6(0.8203), P7(0.8562), P8(0.9120), P9(0.8497), P10(0.9000)

6.7.   Reliability And Validity: Cronbach's Alpha And Individual Item Reliabilities

The reliability of the final test is inspected using Cronbach's alpha. The reliabilities for each of the four constructs were greater than 0.86, which exceeds the criterion of 0.7, considered good for exploratory research (Nunnally, 1978). Then, PLS is used to assess individual item reliabilities in the purpose of confirming factor findings. At early stages of scale development, loadings of 0.5 or greater maybe acceptable if there exists additional indicators for describing the latent construct (Chin, 1998). Therefore, items with loadings of 0.5 or greater are retained. There are other authors (Birkinshaw et al, 1995) who have also followed this criterion in their exploratory studies. Table 2 shows the results of PLS loadings on all the items.

Table 2 PLS loadings

Items	Loading	Items	Loading	Items	Loading	Items	Loading
H1	0.7116	S1	-0.0429	R1	0.7935	P1	0.7550
H2R	0.2901	S2	0.0522	R2	0.5848	P2	0.8353
H3	0.7169	S3	0.7699	R3	0.7495	P3	0.8061
H4	0.7166	S4	0.6938	R4	0.3555	P4	0.9023
H5R	0.2611	S5	0.6162	R5	0.6736	P5	0.8617
H6	0.7339	S6	0.3335	R6	0.7546	P6	0.8206
H7	0.6619	S7	0.7976	R7	0.8066	P7	0.8563
H8	0.8087	S8	0.8126	R8	0.7590	P8	0.9116
H9	0.6665	S9	0.7866	R9	0.5124	P9	0.8489
H10	0.8365	S10	0.6127	R10	0.6102	P10	0.8996
H11	0.8920	S11	0.6117	R11	0.7459		
H12	0.7353	S12	0.6829	R12	0.7647		
H13R	0.1934	S13R	0.6052	R13R	0.6469		
H14R	0.4964	S14	0.7767	R14	0.7450		
H15R	0.5569	S15	0.8279	R15R	0.6802		
H16	0.7550	S16R	-0.0241	R16	0.8782		
H17	0.6453			R17	0.5328		
H18	0.8123			R18	0.3527		
H19R	0.5958			R19	0.3338		
H20	0.8128			R20	0.3107		
				R21	0.4583		
				R22	0.3402		
				R23	0.4751		
				R24	0.5666		
				R25	0.2064		

Item R17 (We get as much feedback out of our customers as we possibly can under the circumstances) was dropped because it was loaded incorrectly at 0.5449 for the human capital construct when we used PLS techniques. This left us with 16 indicators for the human capital construct; 12 indicators for structural construct; 16 indicators for relational capital and; 10 items to measure performance. The researcher compared the results with the studies administered in Canada, Malaysia, and Portugal and confirmed that 15 items were reliable in all four researches and 17 were reliable in at least three contexts (See Table 3).

According to Cabrita and Bontis (2008), in spite of that the measurement and structural parameters are estimated together, a PLS model is analyzed and interpreted in two stages: the assessment of the reliability and validity of the measurement model, and the assessment of the structural model. The sequence ensures reliable and valid measures of constructs before we try to draw conclusions with regard to the relationships among the constructs.

Table 3 Reliable Items – Comparing Studies in Canada, Malaysia, Portugal and Taiwan							
Canada	Malaysia	Portugal	Taiwan	Canada	Malaysia	Portugal	Taiwan
Human capital				Structural capital			
H6	H3	H1	H1*	S1	S7	S2	S3**
H8	H8	H3	H3**	S2	S9	S3	S4*
H9	H10	H5R	H4	S3	S10	S6	S5*
H11	H11	H6	H6**	S4	S11	S7	S7**
H15R	H20	H7	H7*	S5	S12	S8	S8*
H18		H8	H8***	S6		S9	S9**
H20		H9	H9**	S10		S10	S10***
		H10	H10**			S11	S11**
		H11	H11***			S12	S12**
		H12	H12*			S15	S13R
		H15R	H15R**				S14
		H17	H16				S15*
		H18	H17*				
		H20	H18**				
			H19R				
			H20***				
Relational capital				Performance			
R1	R5	R6	R1*	P2	P2	P1	P1
R5	R6	R8	R2	P3	P3	P2	P2***
R6	R7	R9	R3	P4	P4	P3	P3***
R8	R10	R10	R5**	P5	P5	P4	P4***
R9	R14	R11	R6**	P6	P6	P5	P5***
R14	R16	R14	R7*	P7	P7	P6	P6***
R15	R17	R16	R8**	P8	P8	P7	P7***
		R17	R9**	P9	P9	P8	P8***
		R18	R10**	P10	P10	P9	P9***
		R19	R11*			P10	P10***

R20	R12
R21	R13R
R22	R14***
R23	R15R*
	R16**
	R24

*reliable measures in the Taiwan context and one other country

**reliable measures in the Taiwan context and two other country

*** reliable measures in all four studies

Source: Revised from Cabrita and Bontis' (2008) study\

6.8.   Results

The data analysis method used in this paper is Partial Least Squares (PLS). PLS is used to analyze simultaneously the interrelationships among all the constructs. Additionally, in order to evaluate the statistical significance of the loadings and the path coefficients (standardized betas), a jackknife analysis was performed. In this case 43 sub-samples were created by two cases from the total data set. By applying the jackknife formula, PLS estimates the parameters for each sub-sample and compute the "pseudovalues" (Table 4). Four paths (human capital to structural capital, human capital to relational capital, structural capital to relational capital, and relational capital to performance) have shown significance at the p-value < 0.10. Results showed that the explanatory power (R^2) for the model is 35.5 %. Nevertheless, the path between structural capital and business performance was not significant and thus didn't support the hypothesis.

Table 4 PLS Path Analysis Results (Standardized Beta Coefficients and Adjusted T-values)

Path	Hypotheses	β-path	Adj. t-value	Sig.	Support	Direction
H→S	H1	0.870	22.261	***	V	+
H→R	H2	0.244	1.136	*	V	+
S→R	H3	0.616	3.295	***	V	+
S→P	H4	0.087	0.280	not sig.	X	+
R→P	H5	0.521	1.747	**	V	+

* $p < 0.10$. **$p < 0.05$. *** $p < 0.001$.

Figure 1 below demonstrates the results for the structural model. The results pinpoint that the three constructs that forms intellectual capital really affect one another. Also, human capital is the most important construct in the context of the model given its substantive beta value.

One important benefit of the PLS methodology is that it makes it possible to separate direct and total effects of the variables included in the model (Cabrita & Bontis, 2008). As we can see from Figure 1.2, decomposition of effects shows that Human Capital (HC) has important effects on both structural capital (0.870) and relational capital (0.244). Human capital influences relational capital not only directly (0.244) but also indirectly through the structural capital (0.870 x 0.616 = 0.536), giving a total effect of 0.780. Furthermore, human capital also influences business performance indirectly HC→RC→P (0.244 x 0.521) and HC→SC→RC→P (0.870 x 0.616 x 0.521).
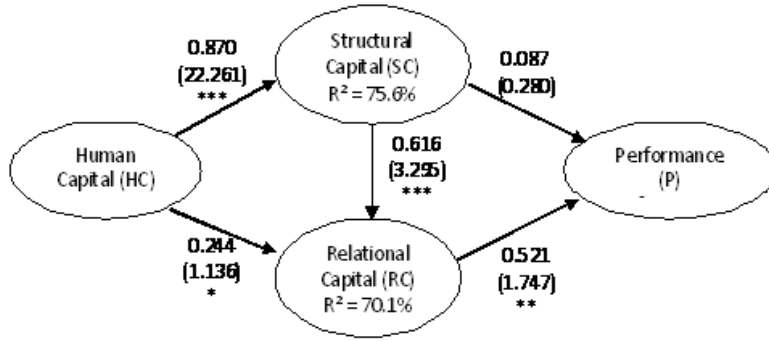
Figure 1: Major Structural Model

* p < 0.15. **p <0.05. *** p <0.001.

6.8.1. PLS Findings: Human Capital

Concerning human capital, the executives showed high agreement to H4, which shows that many managers agree that their employees cooperate in teams. H20 pointed out that the employees gave it their all which makes the company different from the others in the industry. The lowest score of H13R indicated that if certain individuals in the firm unexpectedly left, they would be in big trouble. However this is not too significant to notice (See Table 5).

Table 5 Human Capital by Likert Scale, Mean, and Standard Deviation (N=87)

	Min.	Max.	Mean	Std. Deviation
H1 competence ideal level	1	7	4.82	1.317
H2R no succession training program	1	7	4.92	1.894
H3 planners on schedule	1	7	4.56	1.412

Table 5 continued

	Min.	Max.	Mean	Std. Deviation
H4 employees cooperate in teams	2	7	5.92	1.183
H5R no internal relationships	1	7	5.29	1.670
H6 come up with new ideas	1	7	5.41	1.369
H7 upgrade employees' skills	1	7	5.46	1.429
H8 employees are bright	2	7	5.44	1.158
H9 employees are best in industry	2	7	5.22	1.125
H10 employees are satisfied	1	7	5.18	1.225
H11 employees perform their best	2	7	5.36	1.131
H12 recruitment program comprehensive	2	7	4.98	1.312
H13R big trouble if individuals left	1	7	4.43	1.821
H14R rarely think actions through	1	7	4.54	1.546
H15R do things without energy	1	7	5.37	1.390
H16 individuals learn from others	1	7	5.45	1.265
H17 employees voice opinions	2	7	5.07	1.246
H18 get the most out of employees	2	7	5.30	1.221

H19R bring down to others' level	2	7	5.29	1.405	phere of
					eas and
H20 employees give it their all	2	7	5.56	1.208	al structure

Note: The 7-Point Likert scale is used; R represents reverse coded items, but are positively coded before   ıeir
analysis

Table 6 Structural Capital by Likert Scale, Mean, and Standard Deviation (N=87)

	Min.	Max.	Mean	Std. Deviation
S1 lowest cost per transaction	1	7	3.80	1.598
S2 improving cost per revenue $	1	7	4.22	1.458
S3 increase revenue per employee	2	7	4.94	1.124
S4 revenue per employee is best	1	7	4.76	1.320
S5 transaction time decreasing	1	7	4.55	1.292
S6 transaction time is best	1	7	4.25	1.323
S7 implement new ideas	2	7	5.06	1.297
S8 supports development of ideas	1	7	5.80	1.199
S9 develops most ideas in industry	1	7	5.26	1.316
S10 firm is efficient	1	7	4.95	1.266
S11 systems allow easy info access	1	7	5.01	1.451
S12 procedures support innovation	1	7	4.90	1.347
S13R firm is bureaucratic nightmare	1	7	5.63	1.356
S14 not too far removed from each other	1	7	5.41	1.394
S15 atmosphere is supportive	1	7	5.51	1.380
S16R do not share knowledge	1	7	5.17	1.740

Note: The 7-Point Likert scale is used. R represents reverse coded items, but are positively coded before analysis

6.8.3. PLS Findings: Relational Capital

In the dimension of relational capital, five variables showed the managers' agreement concerning the aspects of customers. Item R13R, R14, R15R, R16, R17 showed that design companies generally care about what customer thinks or wants from them. They capitalize on customers' wants and needs by: continually striving to make them satisfied, getting as much feedback out of customers as they possibly can, and launching services or products that fits customers' needs. Also, they feel confident that their customers will continue to do business with them. Nevertheless, R4 pointed out the market share of design companies are not usually high (See Table 7).

Table 7 Relational Capital by Likert Scale, Mean and Standard Deviation (N=87)

	Min.	Max.	Mean	Std. Deviation
R1 customers generally satisfied	3	7	5.59	1.018
R2 reduce time to resolve problem	1	7	5.00	1.347
R3 market share improving	2	7	4.79	1.374
R4 market share is highest	1	7	3.52	1.477
R5 longevity of relationships	1	7	4.87	1.265
R6 value added service	1	7	5.20	1.310
R7 customers are loyal	2	7	5.30	1.259
R8 customers increasingly select us	1	7	4.90	1.239
R9 firm is market-oriented	1	7	4.72	1.300
R10 meet with customers	2	7	5.56	1.198

R11 customer info disseminated	3	7	5.26	1.289
R12 understand target markets	1	7	5.20	1.284
R13R do not care what customer wants	1	7	6.00	1.248
R14 capitalize on customers' wants	1	7	5.62	1.287
R15R launch what customers don't want	2	7	5.70	1.202
R16 confident of future with customer	1	7	5.71	1.238
R17 feedback with customer	1	7	5.64	1.161
R18 react to competition	2	7	5.07	1.283
R19 discuss competitors' strength and weakness	1	7	5.00	1.525
R20 contact with sector	1	7	4.44	1.568
R21 consider info from sector	1	7	4.54	1.328
R22 decisions based on info from sector	1	7	4.51	1.311
R23 supports share of info from sector	1	7	4.74	1.316
R24 share competitor info	1	7	5.37	1.192
R25 competitors are sources of innovation	1	7	4.78	1.603

Note: The 7-Point Likert scale is used. R represents reverse coded items, but are positively coded before analysis

From all the tables above, the researcher has decided to show the top 5 and the bottom 5 intellectual variables as indicated by the respondents. In Table 8 we can see that Taiwanese design companies do care about customers' opinions and needs, they have confidence in repeat customers, and they launch new products or services that fits customers' needs. Also, the employees cooperate in teams and the company supports the development of new ideas and products.

Table 8 Top Five Intellectual Capital Responses (N=87)

Items	Score	Descriptions
R13R	6.00	We generally do not care about what the customer thinks or wants from us
H4	5.92	The firm gets the most of out of its employees when they cooperate with each other in team tasks
S8	5.80	Our company supports the development of new ideas and products
R16	5.71	We feel confident that our customers will continue to do business with us
R15R	5.70	We often launch something new only to find out that our customers do not want it

In Table 9 we can see that Taiwanese design companies generally don't have a high market share, they don't focus much on improving cost per transaction and cost per revenue dollar, neither on time to complete a whole transaction. In addition, if certain individuals in the firm unexpectedly left, the company would be in big trouble.

Table 9 Bottom Five Intellectual Capital Responses (N=87)

Items	Score	Descriptions
R4	3.52	Our market share is the highest in the industry
S1	3.80	Our organization has the lowest costs per transaction of any in the industry
S2	4.22	We have continually been improving our costs per revenue dollar
S6	4.25	The time it takes to complete one whole transaction is the best in the industry
H13R	4.43	If certain individuals in the firm unexpectedly left, we would be in big trouble

7.   Discussion

From the descriptive statistics, we have found out some characteristics of intellectual capital in Taiwanese design industry. The results showed that employees work in teams in design companies (H4) to complete tasks, and they give it their all when they work (H20). Also, if certain individuals unexpectedly left, the firm would be in big trouble (H13R). This might be due to the fact that design companies are usually small-scaled and teamwork plays a crucial role in contributing to company's performance.

Moreover, the organizational structure of design companies is not bureaucratic (S13) and supports the development of new ideas and products. Also, the culture of the design companies is usually supportive (S15). Additionally, the managers don't seem to focus on reducing costs (S1). It can be inferred that design companies needs a supportive culture and flexible organizational structure to support creation and innovation. However, to maintain a working environment like this, some efficiency might be sacrificed in replace of more flexibility.

Furthermore, customers' needs (R14 to R17) are considered crucial in the design industry. Another fact is that design companies don't seem to have high market share (R4). There are few design companies that possesses high market share in Taiwan's market.

All of the hypotheses were supported except hypothesis 4 (H4: Structural capital is positively associated with relational capital). After analyzing the research data, the researcher is interested in whether there are other factors, such as number of employees in a company, or company age, that influence the impact of structural capital on business performance. For this reason, the researcher divided the 87 samples into four sample groups to examine if there is a trend in the change of the path coefficient.

To do so, the researcher first divided the sample into two sample groups: Sample B (companies with less than five employees, 34 samples) and Sample C (companies with more than five employees, 53 samples) and ran PLS separately to see the difference. The results indicated that all path coefficients on the structural model of Sample C (Please see Figure 1.2), are significant at p-value <0.05; while Sample B companies, only three paths are significant at p-value < 0.15.

To examine whether there is a trend of the change, the researcher picked another two sub-samples respectively from Sample B and Sample C. Out of Sample B's 34 samples, 32 companies of age less than 15 years are picked out and named Sample A; out of Sample C's 53 samples, 40 companies of age more than 5 years are picked out and named Sample D. Thus Sample A to D are manipulated to represent respectively, a sample group with younger companies and the other with older companies, i.e., Sample A to Sample D represents companies with fewer employees (or younger companies) to those with more employees (or older companies).

Figure 2: Structural Models of Different Samples
* p <0.1. **p <0.05. *** p <0.001. T-stat in brackets

Samples A to D represent ... with different numbers of employees (from few to ...) compared with different age (from young to old)

The ... showed some interesting f ... the ... fewer employees or y ... Sample B, the results is ... ple ... ses when compared to ... en ... hose older ones (Sample ... ce th ... s were bigger and more ... addi ... explanatory power of small-... mples was ... gger. We can thus infer that w ... wth of the number of employ ... company age of a design compa ... the extent ... intellectual capital contributes to a desi ... performance decreases, especially the st ... l. The structural capital becomes eve ... rrelated with business performance wh ... grows.

Unlike the samples of p ... studies (Bontis, 1998; Bontis et al., 2000; Ca ... ntis, 2008; Chen, 2001), design companies have many characteristics that are not possessed by other industries. The results correspond to the literature saying that design projects are usually more irrational, unpredictable, and changing, and they require much creativity of individuals (Oakley, 1990). Moreover, these results again supported the fact that design companies are more like organic organizations. This unique characteristic makes design industry more easily to cope with the unpredictable and changing environment. It also provides the company with more flexibility and adaptability, and encourages creativity and innovation. However, the disadvantage lies in that it requires higher cost and more complicated administration to maintain the structure, which could be an obstacle of business performance.

However, one limitation lies in the results is that the samples in the study contain companies that are not traditional design companies, such as the design or R&D departments of a technology companies. It is possible that these non-traditional design companies are more like manufacturing companies whose structural capital has significant influence on business performance. That is to say, an inclusion of these samples (in order to retain merely traditional design companies) might lead to different research results. Last but not least, the PLS results of the study also indicated the limitation of use of Cabrita and Bontis' (2008) model.

8. Conclusions

The empirical findings of this research suggests that the human capital of Taiwanese design industry have positive influence on structural capital, and structural capital have positive impact on relational capital. The path of human capital to relational capital and structural capital to business performance is not shown to be significant. However, relational capital is a significant mediator that contributes to Taiwanese design companies' performance instead of structural capital. That is to say, the talents of design companies are helpful in building the firms—information systems, routines, procedures and databases—instead of maintaining good relationship with the organizations' stakeholders. However, good relationship with the companies' customer, competitor, and sector association is vital to design companies' good performance.

In addition, deeper investigation found out that the model of the study is more appropriate in explaining the business performance of younger companies or companies with fewer employees, which left room for future research improvement. Other variables such as the capital or sales revenue of design companies could be added into the research model to see if the model explanatory power could be improved.

Furthermore, the empirical findings of this research are also in support of the fact that that the human capital of Taiwanese design industry not only has positive influence on structural capital and relational capital (the mediators), but also positively impact on business performance. Structural capital also positively influences relational capital as hypothesized. Besides, relational capital shows a positive association with business performance, while the positive impact of structural capital on business performance is not significant. This might result from the characteristics of Taiwanese design companies' organizational structure. Their organic structure brought the firm the advantage of high flexibility and adaptability, however, the efficiency of the organization is sacrificed as it is difficult and it takes much cost to maintain such a structure.

The results indicated that with the growth of number of employees and company age, the impact of structural capital on business performance decreases, or even have negative impact on business performance. Also, the explanatory power of intellectual capital on business performance reduces. However, this might result from the special sample of the study. The sample of this research includes not only traditional design companies, but also some design or R&D department of technology companies, design sector associations, etc., as they are also included in TDC's catalog. That is to say, a sample that excluded these non-traditional design companies might lead to different results, which leaves room for future study improvement.

9.   Descriptive Statistics

Results of this study showed some characteristics of intellectual capital in Taiwanese design companies. Concerning human capital, Taiwanese design industry emphasizes teamwork and employees give it their all when they work. Additionally, because design companies are usually small-scaled, every employee plays a certain crucial role in the company. In relation to structural capital, the organizational structure of design companies is an organic structure which features its flexibility. The culture of the firm is supportive and fosters the development of new products and ideas. As to relational capital, the interaction between the firm and customers is crucial to the company. Design companies make profit by striving for understanding and satisfying customers' needs.

10.   Recommendations

Based on the findings of this study the following recommendations are devised.

10.1.   Recommendations For Government And Managers Of Taiwanese Design Companies

As far as the government is concerned, it should provide Taiwanese design companies with the education such as team building (H4), compensation and benefit system, succession training (H13R), and motivating and leading employees (H20). This could be conducted by holding international academic conferences or symposiums to boost Taiwanese design company managers' interaction with foreign scholars to learn from their experiences. Also, the government should continuously hold and improve international exhibition or competition, so that design companies could have more opportunities to introduce their service to customers (R14 to R17).

Concerning managers of design companies, for the human capital construct, they should encourage employees to work in teams (H4) and motivate them to give it their all (H20). Besides, employees' compensation and benefit need to be improved to retain talents in the company, as well as develop appropriate succession plan for employees' unexpected leave (H13R). For structural capital construct,

managers should create an organic structure (S13R) and a supportive atmosphere (S15) where employees can be inspired and creative. Moreover, cost leadership strategy might not work well for design companies (S1), which is worth noticing for managers. Concerning relational capital, the company should incorporate customer relationship management systems; the managers should capitalize on customers' wants (R14), launch products that fit their needs (R15R), and get feedback from customers (R17).

10.2. Recommendations From The Perspective Of Market Leadership

Managers can improve the companies' market leadership through the three intellectual capital components respectively.

First, from human capital construct, design companies need to improve employee satisfaction (H10); employees' loyalty need to be enhanced since their devotion to the company does not seem to be satisfying (H11); managers should strive for fully utilizing employees' under-utilized talents and discovering their potential (H18).

Second, from structural capital construct, the efficiency of task accomplishment needs to be improved (S10); the companies should reinforce their decision making system. Also, the managers should ask their staff to take the responsibility to make decisions after discussing important issues (S13R).

Third, from relational capital construct, design companies lack of concern and understanding of competitors, and more attention should be paid to their potential competitors (R19).

10.3. Recommendations From The Perspective Of Financial Performance

Managers can improve the companies' financial performance through the three intellectual capital components respectively.

First, from human capital construct, a more comprehensive staffing program need to be developed to recruit talents (H12); employees are too passive in voicing their opinions, so managers should discuss problems with them and encourage them to be more active and constructive (H15R); also, in order to achieve the objectives of the firm, managers should provide more incentives for employees to give their all (H20).

Second, from structural capital construct, the company should create a supportive and comfortable culture that helps employees to produce new ideas (S9); hire employees that can work as a team, instead of those who are too self-centered and not willing to cooperate with others (S14).

Third, from relational capital construct, the firm should spend more time meeting with customers (R10); with public recognition of intellectual property right protection, the managers might consider to establish knowledge management system to enhance sharing of customer feedback (R11).

10.4. General Recommendations (Market Leadership And Financial Performance)

Managers can improve the companies' entire business performance through following aspects.

First, from human capital construct, companies should create an environment where employees can brainstorm for creativity freely (H8) in order to improve companies' business performance.

Second, from relational capital construct, employees should be trained to understand the firms' target market more (R12). Also, the idea that good business performance comes from satisfying customers' needs and capitalizing on their wants (R14) should be encouraged in the company; Additionally, design companies need to consider information from sector association more (R21); and lastly, the company should introduce knowledge management system to enrich the share of competitor information (R24).

10.5. Recommendations For Future Research

The contribution of the study lies in assessing the interrelations among intellectual capital components and their influence on business performance of design companies in Taiwan. However, different research participants, and different research questions and methods would produce varying patterns of engagement that may add or deviate from the results of this study.

Despite the many researches on intellectual capital, there is very little research focusing on the scope of design industry. As a result if researchers interested in pursuing an even stronger understanding of intellectual capital in Taiwan may want to investigate different scopes of industry, use other methods, or discuss different issues. The following list specifies the type of research:

- ➢ Adding other variables such as the scale of the company, e.g., sales revenue, or capital, to see if they change the intellectual capital and the relationship between intellectual capital and business performance.

- ➢ Research with design industries in other countries, investigating their intellectual capital performance and its impact on business performance.

- ➢ Research with qualitative research to compare and contrast with the findings of quantitative studies.

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