CHAPTER V

THE ROLE OF INTELLECTUAL CAPITAL IN CREATING VALUE IN THE BANKING INDUSTRY

5.1. Introduction

The pattern of global economic growth has fundamentally changed since the 1970s with the rapid development of high technology, especially in communication, computer, and biology engineering. Knowledge thereupon has taken the place of monetary capital, land, and material capital as the most important capital, especially in the competitive high-tech realm. Although widely used in literature, the concept of intellectual capital (IC) has not become popular until recently. The burgeoning field of intellectual capital is becoming an exciting area for both researchers and practitioners, but before the mid-1990s a great deal of work iwas purely descriptive of what was happening in various organizations without specifically relating the generalized comments to an organizational context. Since then, investigations dealt mainly with the process of managing and measuring intellectual capital.

5.2. Development of Intellectual Capital

The development of the field of intellectual capital has primarily been guided by the practices of pioneering companies around the world. The existing literatures argue that intellectual capital is composed of three sub-constructs: human capital, structural capital; and relational capital (Bontis, 1998; Bontis et al., 1999, 2000). Human capital, in particular, represents the individual stock of knowledge embedded in the firm's collective capability to extract the best solutions from its individual employees (Bontis, 1999, 2001). It is defined as the sum of the workers' skills, experience, capabilities, and tacit knowledge (Edvinsson and Malone, 1997) add that "human capital includes the intangible resources of abilities, effort, and time that workers bring to invest in their

work". Human capital is considered one of the core components of intellectual capital and is a critical resource in many industries such as software development, management consulting, and financial services. The relationship between human capital and various outcome variables can be traced back to many streams of research, including economic human capital theory, organizational learning, the resource-based view of the firm (Barney, 1991) and more recently the knowledge-based view of the firm.

Individuals, organizations, and nations increasingly recognize that high levels of skills and competencies are essential to future security and success. It is common knowledge that as individuals acquire more education and training during a lifetime, human capital drives the production of goods and services, as well as new innovations in the marketplace. Currently, such linkage between these human capital elements and economic development is well established. While the economic value of human capital cannot be questioned, an important concern among scholars is what type and how much human capital is required to create a competitive advantage for firms. IC is used to create and enhance the organizational value, and success requires IC and the ability to manage this scarce resource controlled by a company. As a result, IC measurement is of great significance in value measurement.

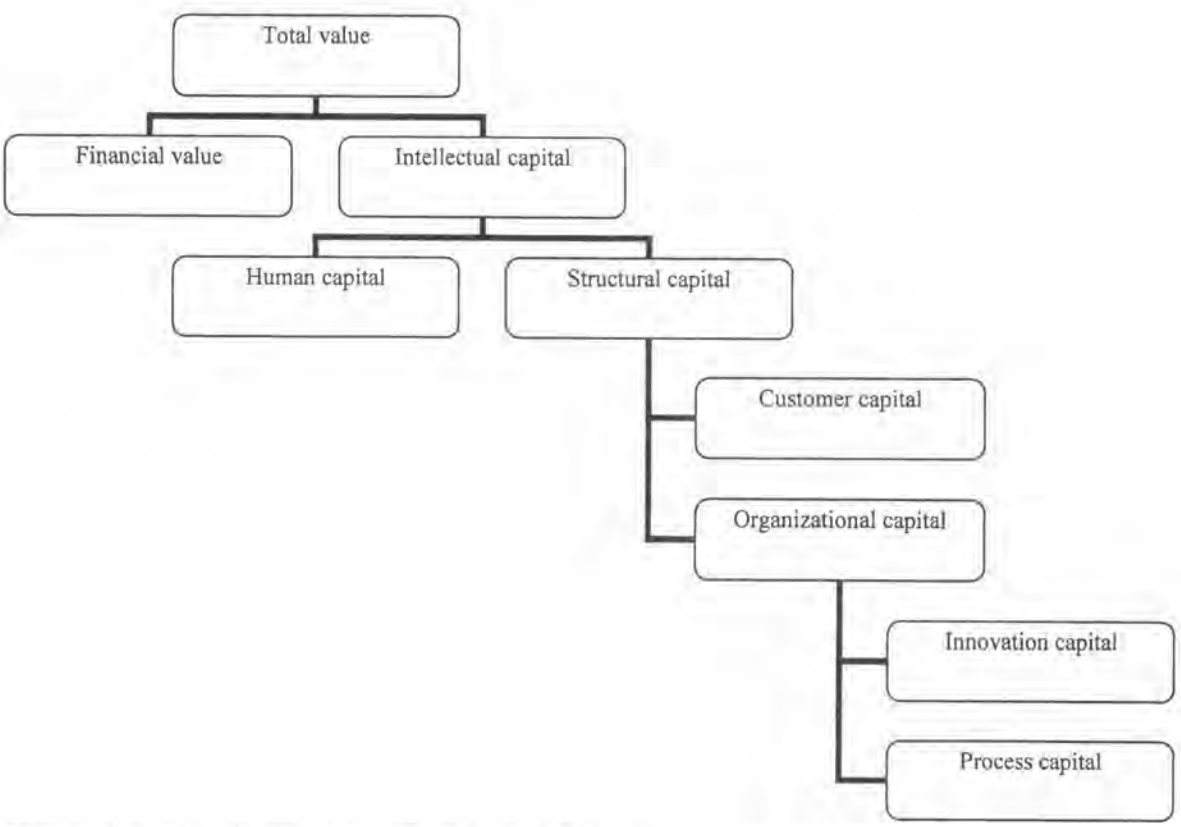
5.3. The structure of Intellectual Capital

IC measurement has become the main research field for both researchers and practitioners since the 1990s. Both sides have been making various efforts to measure and evaluate IC. Therefore it is necessary to review the most popular and influential IC measurement models. IC much extended a practitioner-created concept and enjoyed a very rapid popularity in the 1990s. Skandia – the largest insurance company in Sweden developed a dynamic and holistic IC reporting model named the Navigator. According to Skandia's model, IC was categorized into human capital and structural capital (Edvinsson and Malone, 1997). Human capital can be described as the employees' competence, inter-relationship ability and values. Structural capital can be described as "what remains in the company when employees go home for the night" (Roos et al.,

1997) such as brands, patents, processes, organizational structure and concepts. This categorization of IC, named the distinction tree, is illustrated in Figure 15.

Skandia's value scheme contains both financial and non-financial building blocks which combine to estimate the company's market value. It makes considerable effort to create taxonomy to measure a company's intangible assets and has emboldened others to look beyond the traditional financial factor to measure the real value for the company.

Figure 15 Structure of intellectual capital



Source: Nazari, J. A. and Herremans, I. M. 2007.

IC does not exist isolated, so the first step of setting up this new measurement model is to define the structure of IC. In this model, IC is categorized into four elements, human capital, structural capital, innovation capital and customer capital. It is a fragile structure, which has to be continuously supported by an integral array of the four interrelated and independent elements in order to realize a company's value.

Human capital is the foundation of IC, a primary element to perform IC's functions. It refers to factors such as employees' knowledge, skills, capability, and attitudes in relation to fostering performances which customers are willing to pay for and the company's profit comes from. In addition, such knowledge and skills are contained in an employee's head, i.e. the head is the carrier of knowledge and skills. If an intellectual employee does not serve the company, the knowledge and skills in his/her head cannot be activated, let alone converted into market value.

Structural capital, innovation capital, and customer capital are affiliated to human capital. On one hand, human capital can convert knowledge into market value by converting the other three capitals. On the other hand, human capital can determine the operational forms of the other three capitals while the latter can convert immaterial knowledge and information into material output and benefit, so as to accomplish the whole conversion. Structural capital deals with the mechanism and structure of an enterprise that can help support employees in their quest for optimum intellectual performance, and the overall business performance can thereupon be achieved. Structural capital is subject to human capital, since human capital is a determinative factor of the organizational form. Furthermore, structural capital and human capital enable enterprises to form, develop, and use innovation capital and customer capital in a coordinated way.

Innovation capital is regarded as a part of structural capital, which undervalues innovation in the new economic era. Innovation is becoming a key factor for a company to keep its long-term competitive excellence. Economic growth in developed countries has been driven by innovation rather than by investment. Innovation capital are based on the conjoint effects of human capital and structural capital. Innovation can be made only with the combination of excellent employees, reasonable regulations, cultures and techniques.

Customer capital, acting as a bridge and a catalyst on the operations of IC, is the main requirement and determinant in converting IC into market value and thereupon organization business performance. Without customer capital, market value or organizational performance cannot be achieved. Customer capital is most directly

related to a company's business performance. The cultivation of customer capital relies on the support from human capital, structural capital and innovation capital.

5.4. The measurement of intellectual capital

The method of Value Added Intellectual Coefficient (VAIC™) is an insight into the measures of value creation and it monitors the value creation efficiency in companies using basic accounting figures. VAIC is designed to effectively monitor and evaluate the 'efficiency' in adding value (VA) to a firm's total resources and each major resource component, focusing on value addition in an organization and not on cost control (Pulic, 2000).

The VAIC approach is based on five steps or assumptions.

Step 1: To find out the competency of a company in 'creating' or value added (VA). The difference between output and input should first be calculated.

OUT - IN =VA

where OUT (output) = the overall income from all products and services sold on market,

IN (input) = all expenses for operating the company, exclusive of labor expenses, which is not regarded as a cost,

VA (value added) results from how current business and related resources, capital employed, human and structural, are used or employed

Step 2: To determine how much new value has been created by one unit of investment capital employed, with the calculation of the relation of value added and capital employed (including physical and financial capital)

VA/CA = CEE

where CEE is the Value Added Capital Coefficient.

Step 3: To assess the relation between value added and human capital employed, to indicate how much value added has been created by one financial unit invested in employees. Human capital expenses refer to overall employee expenses (salaries, education, training).

VA/HC = HCE

where HCE is the Value Added Human Capital Coefficient.

Step 4: Structural capital (SC) is obtained when human capital (HC) is deducted from value added; with HC and SC being in reverse proportion. Structural Capital (SC) is a result of human capital's past performance (organization, licenses, patents, image, standards, and relationship with customers).

To find the relation between VA and SC, indicating the share of SC in created value.

SC/VA = SCE

where SCE is the Value Added Structural Capital Coefficient

Pulic (1998) argues there is a proportionate inverse relationship between HC and SC in the value creation process. Therefore, Pulic (1998) argues the formula for calculating SCE differed to that for CEE and HCE respectively.

Step 5: To assess each resource that helps to create or produce VA.

$VAIC^{TM}$ = CEE + HCE + SCE

Where VAIC, the Value Added Intelligent Coefficient, Indicating corporate value creation efficiency on firm resources. Therefore, VAIC is defined as a composite sum of three separate indicators: Capital employed efficiency (CEE), Human capital efficiency (HCE), and Structural capital efficiency (SCE). In addition, Intellectual Capital Efficiency (ICE=HCE+SCE) is an indicator which shows how efficiently IC has created value.

To be summarized, the formular will be as follows:

$VAIC_i = CEE_i + HCE_i + SCE_i$

where $VAIC_i$ = VA intellectual coefficient for firm i;

$CEE_i = VA_i / CE_i$; VA capital employed coefficient for firm i;

$HCE_i = VA_i / HC_i$; human capital coefficient for firm i; and

$SCE_i = SC_i / VA_i$; structural capital VA for firm i;

$ICE_i = HCE_i + SCE_i$; intellectual capital coefficient for firm i;

$VA_i = I_i$ (sum of interest expenses) + DP_i (depreciation expenses) +

D_i (dividends) + T_i (corporate taxes) + RE_i (profits retains for the year)

CE_i = book value of the net assets for firm i;

HC_i = total investment salary and wages for firm i;

$SC_i = VA_i - HC_i$; structural capital for firm i;

5.5. Statement of Problem

When comparing the performance between the group of Thai banks and the group of foreign-owned banks, starting from 2000, it is found that the performance between Thai banks and foreign banks are different. Therefore, it is essential that the study of the difference in financial performance is aimed at how the intellectual capital makes an impact on the different performances.

5.6. Research Objectives

There are two objectives in this study. The first objective of this research is to analyze differences in the utilization of Factors of production among local firms and Foreign-owned firms, especially comparing the difference in the intellectual capital. The other objective is to compare the aspects of firm economic activies ~~is~~ aimed at focusing on the sustainability of Thai local firms and determining how they position themselves in the market. The determinants of bank performance can be classified by the internal resources and external environment variables of the bank. For internal resources, bank performance is related to factors such as size, equity-assets ratio, liquidity, level of expenses, growth rate of assets, and the number of personnel per branch. External environment variables, which are the market factors or country factors influencing the operation of banks, are market concentration, rate to interest, government ownership, the growth rate of money, the level of equity investment for governing firms, and the level of financial market development.

5.7. Research Methodology

5.7.1. Model Estimation

5.7.1.1. The first objective

Two dependent variables:

ROA =Ratio of the net income divided by book value of total assets)

RTB = Ratio of the total revenue to total book value of assets

CTI = Ratio of operating expense over total income

SPR = Staff Productivity refers to Total income, including net interest income and non interest income, over human capital expenses.

They were used as proxy measures respectively for the analysis of profitability and productivity

Independent variables:

$CEE_i = VA_i / CE_i$; VA capital employed coefficient for firm i;

$HCE_i = VA_i / HC_i$; human capital coefficient for firm i; and

$SCE_i = SC_i / VA_i$; structural capital VA for firm i;

$ICE_i = HCE_i + SCE_i$; intellectual capital coefficient for firm i;

$VAIC_i = CEE_i + HCE_i + SCE_i$

Three control variables:

1. SIZE Size of the firm:
2. LEV Leverage: total debt divided by book value of total assets
3. ROE Return on Equity: ratio of the net income divided by book value of total shareholders' equity.

The linear multiple regression is used to analyze the data as follows:

Model 5.1: $ROA_{it} = \alpha + \alpha_{1it}VAIC + \alpha_{2it}LEV + \alpha_{3it}ROE + e_{it}$,

Model 5.2: $RTB_{it} = \alpha + \alpha_{1it}VAIC + \alpha_{2it}LEV + \alpha_{3it}ROE + e_{it}$,

Model 5.3: $CTI_{it} = \alpha + \alpha_{1it}VAIC + \alpha_{2it}LEV + \alpha_{3it}ROE + e_{it}$,

Model 5.4: $SPR_{it} = \alpha + \alpha_{1it}VAIC + \alpha_{2it}LEV + \alpha_{3it}ROE + e_{it}$,

Model 5.5: $ROA_{it} = \alpha + \alpha_{1it}CEE + \alpha_{2it}ICE + \alpha_{3it}SIZE + \alpha_{4it}LEV + \alpha_{5it}ROE + e_{it}$,

Model 5.6: $RTB_{it} = \alpha + \alpha_{1it}CEE + \alpha_{2it}ICE + \alpha_{3it}SIZE + \alpha_{4it}LEV + \alpha_{5it}ROE + e_{it}$,

Model 5.7: $CTI_{it} = \alpha + \alpha_{1it}CEE + \alpha_{2it}ICE + \alpha_{3it}SIZE + \alpha_{4it}LEV + \alpha_{5it}ROE + e_{it}$,

Model 5.8: $SPR_{it} = \alpha + \alpha_{1it}CEE + \alpha_{2it}ICE + \alpha_{3it}SIZE + \alpha_{4it}LEV + \alpha_{5it}ROE + e_{it}$,

Model 5.9: $ROA_{it} = \alpha + \alpha_{1it}CEE + \alpha_{2it}HCE + \alpha_{3it}SCE + \alpha_{4it}SIZE + \alpha_{5it}LEV + \alpha_{6it}ROE + e_{it}$,

Model 5.10: $RTB_{it} = \alpha + \alpha_{1it}CEE + \alpha_{2it}HCE + \alpha_{3it}SCE + \alpha_{4it}SIZE + \alpha_{5it}LEV + \alpha_{6it}ROE + e_{it}$,

Model 5.11: $CTI_{it} = \alpha + \alpha_{1it}CEE + \alpha_{2it}HCE + \alpha_{3it}SCE + \alpha_{4it}SIZE + \alpha_{5it}LEV + \alpha_{6it}ROE + e_{it}$,

Model 5.12: $SPR_{it} = \alpha + \alpha_{1it} CEE + \alpha_{2it} HCE + \alpha_{3it} SCE + \alpha_{4it} SIZE + \alpha_{5it} LEV + \alpha_{6it} ROE + e_{it}$,

5.7.1.2. The second objective

The banks are divided into types of ownership. Then, controlling for bank-specific factors and market-specific factors, we try to find whether there exists any significant differences between the two groups. Inter-group differences are shown by using dummy variables. By adding more performance-related variables, individual banks and market characteristics are controlled.

To analyze the panel data, the Random Effect Model is adopted. Generally, in analyzing panel data, the Fixed Effect Model with dummy variables is used. Kasikorn Bank, Siam Commercial Bank, Bangkok Bank, Bank of Ayudhya and Krung Thai Bank and the group of foreign banks have been classified to be Bank 1 to Bank 6 respectively

The basic model is as follows

$$Y_{it} = \alpha + \gamma OWN + \sum_{k=1}^{p} X_{itk} \beta_k + u_{it}, \; i=1,..., N; \; t=1,...,T$$

Y_{it} : dependent variable;

D_OWN : dummy variable representing each bank's ownership;

X_{itk} : variables relating each bank's internal resources and market environments

Model 5.13: $$ROA_{it} = \alpha + \gamma OWN + \sum_{k=1}^{p} X_{itk} \beta_k + u_{it}, \; i=1,..., N; \; t=1,...,T$$

Model 5.14: $$RTB_{it} = \alpha + \gamma OWN + \sum_{k=1}^{p} X_{itk} \beta_k + u_{it}, \; i=1,..., N; \; t=1,...,T$$

Variables

As a dependent variable of the bank performance indicator,

1. ROA =Net Income on Assets
2. RTB = Total Income on Assets

The independent variables are as follows:

1. The internal resource-related variables of banks to control the size-effect on performance

    a. Asset, can be obtained by taking the total assets of a bank taken by the log. Another variable,

    b. EARATIO, equity to total assets, is introduced for the purpose of a bank stability indicator.

    c. NIA, net interest income over assets

    d. CTI, operating expense to operating income, is added to see the efficiency of cost side,

    e. LOANS, defined as the weight of loans to total deposits,

    f. LIQ, the weight of liquid assets from total assets, is considered for liquidity

2. External market environment variables are defined as

    a. E_ECO, the economic indicator

    b. E_BSI. Business sentimental indicator

c. E_ INT , interest rates on bank performance

5.7.2. Data

The data used in the model consists of quarterly bank-level data which is acquired from the published statistics by the Bank of Thailand, which classify the data on foreign banks' branches. The data for selected Thai banks, including Kasikorn Bank, Siam Commercial Bank, Bangkok Bank, Bank of Ayudhaya and Krung Thai Bank comes from the Stock Exchange of Thailand. Kasikorn Bank, Siam Commercial Bank and Bangkok Bank are in the same group, which Bangkok Bank has the largest asset size where as Krung Thai Bank is the state enterprise bank. The variables are selected from the banks' balance sheet and income statements. The variables are selected from the banks' balance sheet and income statements.

5.8. Empirical Results

Tables 4 to 9 represent descriptive statistics and correlation analyses for the dependent and independent variables for the first objective. From Table 4, model 5.1 shows that ROA has no relationship with VAIC, whereas RTB is strongly related to VAIC in-model 5.2. In terms of cost, CTI in model 5.3 has no relationship with VAIC. However, VAIC in model 5.4 has a significant impact on the productivity of the bank (SPR). Looking at the fixed effect in models 5.1 to 5.4 in Table 5, VAIC has an impact on ROA, RTB, CTI and SPR. In addition, different banks have different levels of impacts. From t-ratio, foreign banks have higher impact of VAIC than the other Thai banks.

When separating the factors of VAIC into physical capital and intellectual capital in Table 6 and Table 7, it is found that the utilization of physical capital by the commercial banks has an impact on ROA, RTB and CTI, except for SPR. However, the intellectual capital has effects on profitability (ROA, RTB and CTI) and productivity of commercial banks (SPR). With the fixed effect model, except for model 5.5, different banks have different impacts from intellectual capital. Significantly, foreign banks gain more benefits from employing the intellectual capital.

In terms of Intellectual capital, the models, from model 5.9 to 5.12, separate it into human capital and structural capital. From Table 8 to Table 9, the results show that human capital efficiency has relationships with the creation of profitability, cost efficiency and productivity of commercial banks. Structural capital has impact on cost management. In the fixed effect model, foreign banks outperform major Thai commercial banks.

With regards to the second objective, from Table 10 to Table 11, there is no difference between Thai banks and foreign banks on their sustainability. For internal resources, only net interest income and equity to total assets over assets have significant relationships with the bank performance. In terms of external environment variables, the market factors or country factors have no influence on the operations of the banks.

Table 4 Estimation results: Least Squares without Group Dummy Variables

	Model 5.1			Model 5.2			Model 5.3			Model 5.4		
	ROA			RTB			CTI			SPR		
Variable	Coefficient	t-ratio		Coefficient	t-ratio		Coefficient	t-ratio		Coefficient	t-ratio	
VAIC	- 0.0001	- 0.9670		0.0010	10.4510	***	0.0034	-		0.6135	12.4610	***
SIZE	0.0083	1.3430	*	- 0.0030	- 0.6610		0.1598	0.2567		- 2.3662	- 1.0180	
LEV	- 0.0061	- 2.7530	***	- 0.0049	- 2.9760	***	0.0574	0.0019		- 3.9277	- 4.7000	***
ROE	0.0508	29.2230	***	0.0014	1.0590		0.0451	0.3055		0.9049	1.3780	*
Constant	0.0061	2.7500	***	0.0104	6.3130	***	0.0571	-		6.8950	8.3020	***
R-squared	0.8235			0.4447			0.8617			0.5532		

*, **, *** indicate significant levels of 10, 5, 1 percent respectively

Table 5 Estimation results: Least Squares with Group Dummy Variables

	Model 5.1		Model 5.2		Model 5.3		Model 5.4	
	ROA		RTB		CTI		SPR	
Variable	Coefficient	t-ratio	Coefficient	t-ratio	Coefficient	t-ratio	Coefficient	t-ratio
VAIC	- 0.0002	- 1.2970 *	0.0009	8.8920 ***	- 0.1125	- 30.8690 ***	0.6017	11.3350 ***
SIZE	0.0044	0.2910	- 0.0145	- 1.3840 *	0.0871	0.2280	- 7.8463	- 1.4080
LEV	- 0.0017	- 0.3110	- 0.0174	- 4.5450 ***	- 0.1517	- 1.0820	- 0.6773	- 0.3310
ROE	0.0509	-	0.0008	0.6520	- 0.0322	- 0.7070	1.2198	1.8400 **
R-squared	0.8259		0.5253		0.8686		0.5742	

Estimated Fixed Effects

Group	Coefficient	t-ratio	Coefficient	t-ratio	Coefficient	t-ratio	Coefficient	t-ratio
1	0.0026	0.4853	0.0250	6.6868 ***	1.1779	8.6111 ***	4.4096	2.2126 **
2	0.0033	0.6343	0.0242	6.6380 ***	1.1807	8.8730 ***	4.7469	2.4486 ***
3	0.0029	0.5103	0.0248	6.2746 ***	1.1636	8.0442 ***	5.1469	2.4422 ***
4	0.0020	0.3757	0.0226	6.1315 ***	1.1843	8.8123 ***	4.2511	2.1712 **
5	0.0025	0.4490	0.0238	6.2752 ***	1.1230	8.0975 ***	4.2870	2.1217 **
6	0.0040	0.9746	0.0202	7.1171 ***	1.1782	11.3455 ***	5.5422	3.6632 ***

*, **, *** indicate significant levels of 10, 5, 1 percent respectively

Table 6 Estimation results: Least Squares without Group Dummy Variables

	Model 5.5			Model 5.6			Model 5.7			Model 5.8		
	ROA			RTB			CTI			SPR		
Variable	Coefficient	t-ratio		Coefficient	t-ratio		Coefficient	t-ratio		Coefficient	t-ratio	
CEE	0.4471	2.4970	***	1.1499	10.7350	***	-11.3493	-2.4410	***	-40.2711	-0.5870	
ICE	-0.0006	-2.6300	***	-0.0003	-1.7940	**	-0.0980	-15.9470	***	0.6588	7.2620	***
SIZE	0.0095	1.5530	*	0.0000	0.0010		-0.2117	-1.3380	*	-2.4749	-1.0590	
LEV	-0.0062	-2.8450	***	-0.0052	-4.0080	***	-0.1780	-3.1370	***	-3.9169	-4.6770	***
ROE	0.0501	28.7900	***	-0.0005	-0.4740		-0.0281	-0.6200		0.9716	1.4560	*
Constant	0.0053	2.4360	***	0.0086	6.5330	***	1.2383	21.7790	***	6.9606	8.2940	***
R-squared	0.8292			0.6569			0.8659			0.5541		

*, **, *** indicate significant levels of 10, 5, 1 percent respectively

Table 7 Estimation results: Least Squares with Group Dummy Variables

	Model 5.5		Model 5.6		Model 5.7		Model 5.8	
	ROA		RTB		CTI		SPR	
Variable	Coefficient	t-ratio	Coefficient	t-ratio	Coefficient	t-ratio	Coefficient	t-ratio
CEE	0.6222	2.9920 ***	1.1020	8.8970 ***	-13.5387	-2.5390 ***	11.0594	0.1400
ICE	-0.0008	-3.2310 ***	-0.0003	-1.6440 **	-0.0986	-14.9920 ***	0.5909	6.0620 ***
SIZE	0.0094	0.6340	-0.0056	-0.6360	-0.0211	-0.0560	-7.7620	-1.3800 *
LEV	0.0049	0.8460	-0.0057	-1.6380 **	-0.2951	-1.9730 **	-0.5656	-0.2550
ROE	0.0503	28.5490 ***	-0.0003	-0.2840	-0.0186	-0.4130	1.2092	1.8060 **
R-squared	0.8341		0.6696		0.8730		0.5742	

Estimated Fixed Effects

Group	Coefficient	t-ratio	Coefficient	t-ratio	Coefficient	t-ratio	Coefficient	t-ratio
1	-0.0057	-0.9578	0.0104	2.9225 ***	1.3570	8.9022 ***	4.2701	1.8900 **
2	-0.0047	-0.8124	0.0100	2.9129 ***	1.3533	9.1443 ***	4.6125	2.1028 **
3	-0.0052	-0.8410	0.0105	2.8538 ***	1.3383	8.4402 ***	5.0108	2.1321 **
4	-0.0055	-0.9530	0.0094	2.7456 ***	1.3449	9.1476 ***	4.1260	1.8934 **
5	-0.0057	-0.9516	0.0094	2.6418 ***	1.2986	8.4623 ***	4.1503	1.8248 **
6	-0.0019	-0.4308	0.0098	3.6981 ***	1.3052	11.4373 ***	5.4432	3.2181 ***

*, **, *** indicate significant levels of 10, 5, 1 percent respectively

Table 8 Estimation results: Least Squares without Group Dummy Variables

	Model 5.9			Model 5.10			Model 5.11			Model 5.12		
	ROA			RTB			CTI			SPR		
Variable	Coefficient	t-ratio		Coefficient	t-ratio		Coefficient	t-ratio		Coefficient	t-ratio	
CEE	- 187.8303	- 2.6220	***	1.2276	10.4120	***	- 11.7132	- 2.2740		- 187.8303	- 2.6220	***
HCE	1.2385	8.4140	***	- 0.0006	- 2.3100	**	- 0.0966	- 9.1250	***	1.2385	8.4140	***
SCE	0.0412	0.2690		0.0001	0.2830		- 0.0995	- 9.0100	***	0.0412	0.2690	
SIZE	- 0.7930	- 0.3550		- 0.0009	- 0.2400		- 0.2075	- 1.2920	*	- 0.7930	- 0.3550	
LEV	- 3.2224	- 4.0090	***	- 0.0056	- 4.2350	***	- 0.1762	- 3.0490	***	- 3.2224	- 4.0090	***
ROE	0.1506	0.2310		- 0.0001	- 0.0570		- 0.0301	- 0.6410		0.1506	0.2310	
Constant	5.4257	6.3550	***	0.0094	6.6650	***	1.2345	20.1090	***	5.4257	6.3550	***
R-squared	0.8366			0.6613			0.8660			0.6043		

*, **, *** indicate significant levels of 10, 5, 1 percent respectively

Table 9 Estimation results: Least Squares with Group Dummy Variables

	Model 5.9			Model 5.10			Model 5.11			Model 5.12		
	ROA			RTB			CTI			SPR		
Variable	Coefficient	t-ratio		Coefficient	t-ratio		Coefficient	t-ratio		Coefficient	t-ratio	
CEE	0.3409	1.4230	*	1.2157	8.4540		- 14.4548	- 2.3200	**	- 184.9436	- 2.1050	**
HCE	0.0000	0.0990		- 0.0006	- 2.1950	**	- 0.0958	- 8.0290	***	1.1996	7.1320	***
SCE	- 0.0016	- 3.7900	***	0.0001	0.2430		- 0.1011	- 9.1910	***	0.0513	0.3310	
SIZE	0.0116	0.7900		- 0.0065	- 0.7380		- 0.0140	- 0.0370		- 6.2333	- 1.1590	
LEV	0.0023	0.3880		- 0.0046	- 1.3080	*	- 0.3037	- 1.9860	**	- 2.4143	- 1.1190	
ROE	0.0491	26.8830	***	0.0002	0.1880		- 0.0227	- 0.4780		0.3420	0.5110	
R-squared	0.8388			0.6739			0.8731			0.6146		
Estimated Fixed Effects												
Group	Coefficient	t-ratio		Coefficient	t-ratio		Coefficient	t-ratio		Coefficient	t-ratio	
1	- 0.0040	- 0.6695		0.0097	2.7134	***	0.3626	8.8436	***	5.4733	2.5186	***
2	- 0.0034	- 0.5920		0.0095	2.7577	***	1.3575	9.1048	***	5.5143	2.6222	***
3	- 0.0039	- 0.6272		0.0100	2.7035	***	1.3427	8.4074	***	5.9504	2.6416	***
4	- 0.0041	- 0.7249		0.0088	2.5839	***	1.3493	9.1058	***	5.0553	2.4189	***
5	- 0.0041	- 0.6938		0.0088	2.4576	***	1.3037	8.4179	***	5.2388	2.3984	***
6	- 0.0016	- 0.3565		0.0097	3.6567	***	1.3064	11.4113	***	5.6855	3.5213	***

*, **, *** indicate significant levels of 10, 5, 1 percent respectively

Table 10 Estimation results: Least Squares without Group Dummy Variables

	Model 5.13			Model 5.14		
	ROA			RTB		
Variable	Coefficient	t-ratio		Coefficient	t-ratio	
LASSET	0.00366	1.96000	**	0.00020	0.34900	
EARATIO	0.01306	0.93100		0.00694	1.63600	**
NIA	- 0.06233	- 0.12000		0.99401	6.33500	***
CTI	0.00564	1.68800	**	- 0.00160	- 1.58100	*
LOAN	- 0.00052	- 0.48200		0.00005	0.16200	
LIQ	0.00072	0.28200		- 0.00008	- 0.10300	
EECO	0.00010	0.61300		- 0.00003	- 0.55500	
EINT	- 0.00114	- 1.27600		- 0.00022	- 0.80700	
Constant	- 0.06058	- 2.07900	**	0.00427	0.48400	
R-squared	0.04518			0.50894		

*, **, *** indicate significant levels of 10, 5, 1 percent respectively

Table 11 Estimation results: Least Squares with Group Dummy Variables

	Model 5.13		Model 5.14	
	ROA		RTB	
Variable	Coefficient	t-ratio	Coefficient	t-ratio
LASSET	0.01395	1.58700 *	-0.00178	-0.69000
EARATIO	0.03529	1.97100 **	0.00549	1.04200
NIA	-1.08492	-1.69800 **	0.93900	4.99500 ***
CTI	0.00569	1.60700 *	-0.00067	-0.64200
LOAN	0.00037	0.22200	-0.00003	-0.05500
LIQ	0.00555	0.87300	-0.00060	-0.32300
EECO	0.00010	0.39800	0.00005	0.74100
EINT	-0.00112	-1.11700	-0.00010	-0.35100
R-squared	0.09428		0.56002	

Estimated Fixed Effects

Group	Coefficient	t-ratio	Coefficient	t-ratio
1	-0.19891	-1.85302 **	0.02304	0.72972
2	-0.19941	-1.86221 **	0.02341	0.74314
3	-0.20836	-1.86486 **	0.02383	0.72501
4	-0.19871	-1.91202 **	0.02084	0.68177
5	-0.20260	-1.83730 **	0.02195	0.67654
6	-0.20990	-1.88343 **	0.02315	0.70608

*, **, *** indicate significant levels of 10, 5, 1 percent respectively

5.9. Conclusion

With regards to the examination on the differences in utilization of factors of production among local firms and Foreign-owned firms, espcially comparing the differences in the intellectual capital, intellectual capital have a strong impact on the performance of commercial banks, especially on profitability and productivity. For the fixed effects, different banks have different levels of impacts. Statistically, foreign banks have higher impact of VAIC than the other Thai banks.

When separating the factors of VAIC into physical capital and intellectual capital, it is found that the utilization of physical capital by the commercial banks has an impact on profitability and cost efficiency. In case of the intellectual capital, it has effects on profitability and productivity of commercial banks. Significantly, foreign banks gain more benefits from employing the intellectual capital.

In terms of Intellectual capital, separated into human capital and structural capital, the results show that human capital efficiency has relationships with the creation of profitability. In the fixed effect model, foreign banks outperform major Thai commercial banks.

With regards to the examination on the sustainability of Thai local firms, there is no difference between Thai banks and foreign banks on their sustainability, since Thai banks started to improve their performance. There are no significant factors, both from internal resources and external environment variables, influencing on the operations of the banks.

In summary, the VAIC model has been used extensively to compare the IC performance in different settings. Empirical results have shown strong relationship between the intellectual capital and banks' profitability and productivity. With the classification of physical capital and intellectual capital, value creation can be achieved through enhancing the ability of intellectual capital. Intellectual capital is increasingly becoming acceptable as an important factor for pursuing sustainable corporate advantages. The results underline the importance of intellectual capital especially human capital in enhancing banks' profitability and productivity. Foreign banks are much better than Thai banks in employing intellectual capital to develop economic

profits. Therefore, Intellectual capital should be increasingly recognized as one of the major in factors of production.