The Influences of Intellectual Capital Accumulation and Balanced Scorecard Implementation on Financial Performance: Using a Moderator of Earnings Management

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ABSTRACT

This study aims to explore the effects of the intellectual capital accumulation and the balanced scorecard implementation on the financial performance, with the earnings management being a moderator. Interviews were conducted on the objects of the directors (section manager-level and above) from Taiwan-listed semiconductor companies. This study collects all data from the databases of Taiwan Economic Journal (TEJ) and TEAMS, and analyzed the data using a Hierarchical Linear Modeling (HLM). The results discover that: Taiwan-listed semiconductor companies’ “intellectual capital accumulation” and balanced scorecard implementation respectively make positively significant effects on the "financial performance", and “earnings management” making the moderating effect.

Keywords: Intellectual Capital, Balanced Scorecard, Earnings Management, Financial Performance

INTRODUCTION

Learned from previous literature, the discussion made on the results from multiple univariate HLM analyses led to (1) the possibly decreased statistical test force; (2) possibly inflated Type I error rate; (3) no comparison can be done between explanatory variables for the impact effects of different dependent variables, and the Hierarchical Multivariate Linear Model (HMLM) will be the best tool for the solution to the above questions. Therefore, there are the following benefits from using the HMLM: (1) variances and covariance matrixes between outcome variables can be dismantled into two parts of Within Groups and Between Groups, which can explore the correlations between Within Groups and Between Groups, as well as the Analytic Hierarchy Process (AHP) still can be done smoothly when missing values occur to certain outcome variables of the subjects; (2) the HMLM method can be extended to another field of study, that is, multi-group (or multi-sample) Hierarchical Linear Modeling (multi-group HLM, abbreviated as MGHLM). And, this study is going to explore whether each group’s individual level or overall level relationships between explanatory variables and outcome variables will make difference or not, i.e. so-called moderating effects, when all subjects within the organization can be divided into multiple groups based on researchers’ theories.

Additionally, the semiconductor industry is the key project of national economic development and a high capital- & technology-intensive industry. Among major producing countries of semiconductor, Taiwan is the only country that has professional vertical disintegration system, establishing science parks under actively support by policy-making, strengthening productive forces as a core for producing a huge cluster effect, which solemnly makes a successful model (Google website) of the semiconductor industry development for the whole world. Moreover, the semiconductor industry has been a high capital-intensive industry, wanting to master advantages in a rapidly changing era of knowledge economy; the
semiconductor companies must carry out the balanced scorecard implementation, simultaneously, they also value the intellectual capital accumulation to do a good job in the earnings management implementation, in order to enhance their financial performance and bring the business with competitive advantages.

Therefore, this study will adopt the Hierarchical Multivariate Linear Model (HMLM), using HLM6.08V software as the research tool, to understand the effects of the intellectual capital accumulation and the balanced scorecard implementation on the financial performance of Taiwan-listed semiconductor companies; meanwhile, this study will also explore whether the earnings management has the function to exert the Moderating Effects. Thence, main purposes of this study are specified as below:

(1) To understand whether intellectual capital accumulation makes positively significant effects on the financial performance of Taiwan-listed semiconductor companies?

(2) To understand whether balanced scorecard implementation makes positive and significant effects on the financial performance of Taiwan-listed semiconductor companies?

(3) To understand whether earnings management makes the moderating effects on the financial performance of Taiwan-listed semiconductor companies?

**LITERATURE REVIEW**

To understand the general status of literature and research relevant to the topic, herewith, the literature relevant to each construct for this study’s topic is respectively described as follows:

Relevant Literature of “Intellectual Capital”

The “Conceptual Definition” of Intellectual Capital in this study is “A company’s market value and the difference between its existing asset costs; moreover, it is essentially an intangible asset including human resources, innovation, customer relationships and business processes, etc.. These intangible assets bring the business more values and competitive advantages than traditionally tangible assets do.” This conceptual definition described as above is summarized from the following literature.

Hudson (1993) addressed Intellectual Capital is composed of four intangible assets, including: genetic inheritance, education, experience and attitude to living or working; moreover, it can bring the companies competitive advantages along with associated organizational environment (cultural and institutional). Bontis (1996) was of the opinion that Intellectual Capital is a company’s market value and the difference between its existing asset costs, as well as it is an effective application in pursuit of business knowledge. Bell (1997) addressed Intellectual Capital is the knowledge resource for an organization including a set of models, strategies, special methods and mental models applied for organizational creation of competition, understanding and problem-solution. Lynn (1998) divided intellectual capital into (1) human resource capital: employees of an organization; (2) structural capital: formal and informal systems which are basis of efficiency and effectiveness of organizational operations; and (3) relationship capital: relationships between organization and external agency, such as supplier and customer. Knight (1999) noted that intellectual capital includes human capital, structural capital, external capital and financial performance. Al-Ali (2003) was of the opinion that intellectual capital is the knowledge, experience and brainpower of employees, as well as the knowledge resources saved in organizational databases, systems, procedures, culture and operational philosophy.

According to studies by Lee (2008), intellectual capital is an important factor for a company’s competitive advantage. In comparison to traditional tangible assets, intellectual capital is one intangible asset including human resources, innovation, customer relationship and business process that further brings value and competitive advantage to a company (Guthrie, 2001; Chen, 2001; Kuo, 2004).
According to studies by Huang (2008), intellectual capital is classified as follows: (1) customer capital: the measuring variables are number of major customer, market growth, and product acceptance rate; (2) process capital: the measuring variable are the rate of increase for management fees, inventory turnover, and the average management fee of each employee; (3) human capital: the measuring variables are employee productivity, employee value-added, ratio of executive employees holding an advanced academic degree, and business profits of each employee; and (4) innovation capital: its measuring variables are R&D staff ratio, R&D intensity, R&D productivity, and R&D costs. Wang, Lee, and Chiu (2012) considered the Intellectual Capital is a management target for the corporate organization to manage goals and learning targets to be developed, which can be referred to a starting point of organizational learning.

As for the measurement tools of “intellectual capital” in this study, they are listed as below: (1) Customer Capital using sales growth rate, number of major customers and product acceptance rate, i.e. (1-sales returns and allowances/net sales) as measurement criteria; (2) Process Capital using rate of increase for management fees [i.e., (current year management fees-previous year management fees)/previous year management fees] and inventory turnover (i.e. cost of goods sold/average inventory) as measurement criteria; (3) Human Capital using employee productivity (i.e., Net sales/total number of employees) and employees’ additional value (i.e., net income/total number of employees) as measurement criteria; and (4) Innovation Capital using R&D productivity (i.e., net income/R&D expenses as measurement criteria (Chen, 2001).

Relevant Literature of “Balanced Scorecard”

The “conceptual definition” of balanced scorecard in this study is “A strategic management system comprising internal and external measurement constructs; the latter (external measurement construct) stresses on “financial construct” and “customer construct”, while the former (internal measurement construct) does on a company’s “internal process construct” and “learning & growth construct.” This conceptual definition described as above is summarized from the following literature.

Liu (2015) advanced modern organizations develop the performance system to value the “process”, getting united with organizational strategies and task indicators; early signals whether these indicators can be achieved or not; thence, the balanced scorecard (abbreviated as BSC) comes into being accordingly.

Kaplan & Norton (1992) considered there are two major basic concepts for the Balanced Scorecard, first of them, “what you measure is what you get”. It focuses on the measurement of performance content and demands for models necessarily combined with organizational targets and strategies. Company’s strategies and targets are incorporated to the measurement constructs, rendering managers assistance to integrate corporate strategic plans, and processes of operation and budgeting, planning corporate finance & material resources as a whole, setting up a mechanism of matching strategic goals and resource allocation, in order to accomplish the company’s operation targets. The second concept of balanced scorecard is to break through the measurement conduct of traditionally single financial construct. It was advanced by Kaplan & Norton (1996) that organizational performance models are determined only by the financial indicators such as Return on Investment (ROI) and Earnings per Share (EPS) should be altered to measure a company’s operational performance by these four constructs of financial, customer, corporate internal process and learning & growth. Thus, organizational targets and strategies can be cohered into consistent strategic management system (Liu, 2015).

Additionally, Kaplan & Norton (1996) were also of the opinion that external measurement constructs stress on “financial construct” and “customer construct”, meanwhile, internal measurement
does on a company’s “internal process construct” and “learning & growth construct.” Furthermore, Kaplan & Norton (2001) pointed out a company integrates its organizational resources to set up internal management mechanism using the Balanced Scorecard as a core of the organizational overall strategies, it makes the company’s core processes focusing on strategies in favor of managers implementing the organizational strategies.

Wu (2002) held the opinion that the creation source of business value for high-tech industries had been changed from traditional industries’ “fixed assets” to these assets of “customer relationship management”, “human resource”, “company standard procedure”, “company culture” and “innovation ability”, which just comprised a company’s intellectual capital. These five types of intellectual capital and three conducts among the balanced scorecard (learning and growth, internal process, and customer conducts) are related. Additionally, Wang and Kao (2002) also proposed three constructs other than the financial construct of strategic management system “balanced scorecard”: customer construct, internal process construct and learning & growth construct, which can be respectively referred to customer capital, innovation & process capital and human capital.

Generally, in regard of the balanced scorecard conduct effects on the organizational performance, Kaplan & Norton (1996) classification had been quoted in this study. Relevant measurement tools of the balanced scorecard are: (1) financial conduct using shareholders’ Return On Equity (ROE) as a measurement criterion; (2) customer conduct using market share as a measurement criterion; (3) internal process conduct using corporate innovation process and after-sales service process standards as measurement criteria; and (4) learning and growth conduct using employee retention rate and employee productivity as measurement criteria.

**Relevant Literature of “Earnings Management”**

The “conceptual definition” of earnings management in this study is “the management level manipulates earnings of financial statements for some purposes, aiming to enhance the company’s sales and make higher effects on the company’s performance for meeting demands from all shareholders.” This conceptual definition described as above is summarized from the following literature.

Schipper (1989) addressed behaviors of manipulation are classified into two categories whether involving real economy activities or not: “Accruals Earnings Management (AEM)” and “Real Earnings Management (REM).” Jenson (1989) advanced the opposite effect will finally occur to a company’s future performance if using its funds on inefficient investment strategies while there is too much free cash flow and lack of excellent investment targets. The management level will be liable to increase the company’s revenues and simultaneously affect its performance through Discretional Accruals, in order to satisfy all shareholders’ demands.

Scott (2005) held the opinion that earnings management is the management level manipulating earnings report of financial statements for some purposes, aiming to increase earnings and decrease earnings or work on Earning Smoothing. As a result, it fails to properly deliver the results of operations.

Moreover, Wang (2008) discovered the more positive behavior, the worse long-term performance of the company while it is working on earnings management. Seize the opportunity to carry out earnings management for its own benefits, increase the company’s share price, and further grow the earnings on financial statements.

Additionally, Huang (2014) held the opinion that earnings management means the methods used by the company’s managers to achieve their accounting earnings as the set target earnings, and they most frequently use these earnings management tools such as the selection of accounting methods, transactions,
control of recognized time, and adjustment of discretionals accruals. Wu (2014) proposed earnings management makes a positive correlation with company performance. The authorities of business management carry out earnings management unnoticed, the company performance will be enhanced accordingly.

As for the measurement tools for “earnings management”, they are described as here: strength of earnings management motivation taken as a criterion means a company will also have better PE (Price Earnings Ratio) in case the company deliberately keeps EPS (Earnings Per Share) growing continuously (Wu, 2014). Hence, EPS and P/E are the tools to measure a company’s earnings management that the measurement constructs of earnings management are EPS and P/E in this study.

**Relevant Literature of “Financial Performance”**

The “conceptual definition” of financial performance in this study is “Measurable indicators for a company’s level of profitability include: Return on Investment (ROI), Return on Equity (ROE), Sales Growth Rate, Earnings Per Share (EPS), and so on. This study takes the company’s shareholder Return on Equity (ROE) and Earnings Per Share (EPS) as measurement criteria.” This conceptual definition described as above is summarized from the following literature.

Venkatraman and Ramanujam (1986) advanced the financial performance includes: Return on Investment (ROI), Return on Equity (ROE), Sales Growth Rate, Earnings Per Share (EPS), and so on. Generally, measurement tools of financial performance can be classified into two categories of accounting-based measure and market-based measure. Griffin and Mahon (1997) suggested the same financial performance should be frequently applied, and adopted multiple methods, more than one, to measure financial performance. However, either an accounting-based measure or a market-based measure method is adopted, these two methods individually have advantages and shortcomings. According to the studies from McGuire, Sungren and Schneeweis (1988), they expressed there will be two major shortcomings if only using the method of accounting-based measure for financial performance: (1) the accounting-based measure utilizing at a limited measuring range of the company’s historical behavior; (2) differences between each company’s accounting processes and procedures to make biases. Although the market-based measure can be applied to improve these two problems above, deficiencies are still there. It appears to overemphasize on investor behavior if only using the method of market-based measure for financial performance (Lin, 2010).

Additionally, Huang (2008) used indices of ROE, ROA and EVA to measure financial performance. In delving into the effects of intellectual capital on financial performance, Firer & Williams (2003), Liao (2004) and Lin (2004) indicated that ROE and ROA are indices used to analyze financial performance traditionally. With regard to studies on the effects of intellectual capital on financial performance, EVA is less used for measurement. In view of objectivity of measurement index, this study also adopts EVA for measurement.

Furthermore, Lee, Huang, Wu and Wang (2011) had shareholders’ Return on Equity (ROE), MB Ratio and Tobin Q value integrated to produce a Comprehensive Index of financial performance (PERF), hereby indicating the financial performance of the organization.

In summary, in regard of the “financial performance” measurement tools, measurement criteria in this study are based on shareholders’ Return on Equity (ROE) and Earnings Per Share (EPS).
RESEARCH METHOD

Figure 1 illustrates how motivations, research objectives and literature review cited in the previous passages led to this study’s hypotheses and conceptual research framework:

Figure 1: The conceptual framework diagram of the study

Data Collection and Methods
This study collected all data from the databases of Taiwan Economic Journal (TEJ) and TEAMS. Because this study adopted the research model of Hierarchical Multivariate Linear Model (HMLM), large databases were required for capably supply all necessarily basic information.

HLM₃ model
The summary of this research model specified are as follows
Level-1 Model
\[ MATH_{ijk} = \pi_{ijk} + e_{ijk} \]
Level-2 Model
\[ \pi_{ijk} = \beta_{00k} + r_{ijk} \]
Level-3 Model
\[ \beta_{00k} = \gamma_{000} + u_{00k} \]
Mixed Model
\[ MATH_{ijk} = \gamma_{000} + r_{ijk} + u_{00k} + e_{ijk} \]
For starting values, data from 6835 level-1 and 1843 level-2 records were used

Final Results - Iteration 7 Iterations stopped due to small change in likelihood function
\[ \sigma^2 = 1.33 \] Standard error of \( \sigma^2 = 0.031 \) \( \tau_n \)

\[
\begin{align*}
\text{INTRC} & \\
\text{PT1,} \pi_0 & = 0.542 \\
\text{Standard error of } \tau_n & \text{ INTTRCPT1,} \pi_0 & = 0.035
\end{align*}
\]
Random level-1 coefficient | Reliability estimate
---|---
INTRCPT1, $\pi_0$ | 0.742

$\tau_\beta$

INTRCPT1

INTRCPT2, $\beta_{00}$

0.321

Standard error of $\tau_\beta$

INTRCPT1

INTRCPT2, $\beta_{00}$

0.165

Random level-2 coefficient | Reliability estimate
---|---
INTRCPT1/INTRCPT2, $\beta_{00}$ | 0.761

The value of the log-likelihood function at iteration 7 = -1.265286E+003

### Final estimation of fixed effects:

<table>
<thead>
<tr>
<th>Fixed Effect</th>
<th>Coefficient</th>
<th>Standard error</th>
<th>$t$-ratio</th>
<th>Approx. d.f.</th>
<th>$p$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>For INTRCPT1, $\pi_0$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>For INTRCPT2, $\beta_{00}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTRCPT3, $\gamma_{000}$</td>
<td>0.532</td>
<td>0.074</td>
<td>7.189</td>
<td>59</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

### Final estimation of fixed effects (with robust standard errors)

<table>
<thead>
<tr>
<th>Fixed Effect</th>
<th>Coefficient</th>
<th>Standard error</th>
<th>$t$-ratio</th>
<th>Approx. d.f.</th>
<th>$p$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>For INTRCPT1, $\pi_0$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>For INTRCPT2, $\beta_{00}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTRCPT3, $\gamma_{000}$</td>
<td>0.523</td>
<td>0.073</td>
<td>7.164</td>
<td>59</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

### Final estimation of level-1 and level-2 variance components

<table>
<thead>
<tr>
<th>Random Effect</th>
<th>Standard Deviation</th>
<th>Variance Component</th>
<th>$d.f.$</th>
<th>$\chi^2$</th>
<th>$p$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRCPT1, $r_0$</td>
<td>0.755</td>
<td>0.570</td>
<td>1661</td>
<td>4253.889</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>level-1, $e$</td>
<td>1.234</td>
<td>1.523</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Final estimation of level-3 variance components

<table>
<thead>
<tr>
<th>Random Effect</th>
<th>Standard Deviation</th>
<th>Variance Component</th>
<th>$d.f.$</th>
<th>$\chi^2$</th>
<th>$p$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRCPT1/INTRCPT2, $u_{00}$</td>
<td>0.563</td>
<td>0.314</td>
<td>59</td>
<td>573.082</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Statistics for the current model

Deviance = 24312.981 Number of estimated parameters = 4
RESULTS AND ANALYSIS

The test results analyzed through the Hierarchical Multivariate Linear Model (HMLM) are shown as the table below:

<table>
<thead>
<tr>
<th>Results of General Linear Hypothesis Testing-Test 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Coefficients</strong></td>
</tr>
<tr>
<td>For slope, ( \pi_1 )</td>
</tr>
<tr>
<td>For INTRCPT2, B10</td>
</tr>
<tr>
<td>INTRCPT3, ( \gamma_{100} )</td>
</tr>
<tr>
<td>Z, ( \gamma_{101} )</td>
</tr>
<tr>
<td>L2XMEAN, ( \gamma_{102} )</td>
</tr>
<tr>
<td>For X, B11</td>
</tr>
<tr>
<td>INTRCPT3, ( \gamma_{110} )</td>
</tr>
<tr>
<td>For slope, ( \pi_2 )</td>
</tr>
<tr>
<td>For INTRCPT2, B20</td>
</tr>
<tr>
<td>INTRCPT3, ( \gamma_{200} )</td>
</tr>
<tr>
<td>Z, ( \gamma_{201} )</td>
</tr>
<tr>
<td>L2XMEAN, ( \gamma_{202} )</td>
</tr>
<tr>
<td>For X, B21</td>
</tr>
<tr>
<td>INTRCPT3, ( \gamma_{210} )</td>
</tr>
<tr>
<td>For D3 slope, ( \pi_3 )</td>
</tr>
<tr>
<td>For INTRCPT2, B30</td>
</tr>
<tr>
<td>INTRCPT3, ( \gamma_{300} )</td>
</tr>
<tr>
<td>Z, ( \gamma_{301} )</td>
</tr>
<tr>
<td>L2XMEAN, ( \gamma_{302} )</td>
</tr>
<tr>
<td>For X, B31</td>
</tr>
<tr>
<td>INTRCPT3, ( \gamma_{310} )</td>
</tr>
</tbody>
</table>

\( \chi^2 \) statistic=73.165
Degree of freedom=2
p-value=<0.001

The chi-square value, degree of freedom and p-value from the above report results provide you with each forecast variable of research models in this study. Every dependent variable has positive and significant effects, that is, Taiwan-listed semiconductor companies’ “intellectual capital accumulation” and balanced scorecard implementation respectively make positively significant effects on the ”financial performance”, and “earnings management” making the moderating effect.

CONCLUSIONS

Based on the discussion described as above, this model estimates each level of explanatory variable achieving significant fixed and random effects on multiple outcome variables. In other words, this study’s results help you understand Taiwan-listed semiconductor companies: (1) balanced scorecard implementation makes significantly positive effects on the financial performance, which makes similar conclusions to contentions from Maisel (1992); (2) Excellent earnings management makes significantly positive effects on financial performance, which makes similar conclusions to contentions from Schipper.
(1989), Jenson (1989), Scott (2005), Wang (2008), Huang (2014) and Wu (2014); and (3) intellectual capital accumulation has Moderating Effects on financial performance, which makes similar conclusions to contentions from Huang (2008).

Contributions of the Present Study

The results from this study can also be delivered to Taiwan-listed semiconductor companies for the reference of sustainable development; therefore, this study’s results have extremely practical reference value; additionally, according to past literature reviews, most univariate HLM were applied for discussions and analyses in exploratory research with less use of the Hierarchical Multivariate Linear Model (HMLM) for a research method; based on previous description in this study, the discussion made on the results from multiple univariate HLM analyses led to (1) the possibly decreased statistical test force; (2) possibly inflated Type I error rate; and (3) no comparison can be done between explanatory variables for the impact effects of different dependent variables, and the Hierarchical Multivariate Linear Model (HMLM) will be the best tool for the solution to the above questions; thence, it explains why this study is relatively innovative in terms of the HMLM research method.

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