Verification of the Effects of Balance Scorecard Implementation on a Company’s Financial Performance: Using Intellectual Capital Accumulation as the Mediator

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ABSTRACT

This study was intended to verify the effects of implementing the Balance Scorecard (BSC) on the financial performance of small- and medium-sized enterprises (SMEs) in Taiwan’s electronics industry, with the accumulation of Intellectual Capital (IC) being the mediator variable. This study's author interviewed section chiefs and managers at the aforementioned companies, selected by way of stratified random sampling, and used Structural Equation Modeling (SEM) to verify the goodness-of-fit effects of the overall model, structural model, and measurement model, with the mediation effect tested by means of the Sobel Test, Bootstrapping, and the MacKinnon PRODCLIN 2 program. The research results suggest that: (1) BSC implementation has a significantly positive effect on IC accumulation; (2) IC accumulation has a significantly positive effect on a company’s financial performance; (3) BSC implementation affects a company’s financial performance, though insignificant. All in all, this study proves that IC accumulation has a full mediation effect.

Keywords: Balance Scorecard, Intellectual capital, Financial performance

RESEARCH BACKGROUND AND PURPOSES

Ever since it was introduced, the Balance Scorecard (BSC) has attracted attention across academic circles and industries, inspiring research efforts worldwide. BSC is arguably one of the most popular management tools not only because it effectively helps companies achieve missions, execute strategies and attain objectives, but also because it combines the essences of the five approaches to business administration, namely the management of production, marketing, human resources, information and finance (Kaplan and Norton, 1996; Kuo, 2002).

Strategic integration is gaining in importance from the viewpoint of management accounting; it is shifting from the usually one-dimensional principle of performance evaluation toward a multi-dimensional one that is linked to the key success factors for all levels of the organization (Kaplan, 1984; Johnson, 1990; Hall, 1990). The BSC system comprises indicators in three non-financial perspectives (i.e., the “customer”, “internal-business-process”, and “innovation and learning” perspectives) besides those in the conventional, or financial, perspective. The four perspectives put an organization’s vision and strategies together, and constitute a new system that measures performance on the basis of objectives and measures. All of the four perspectives are principal driving forces for the future competitiveness. Chow and Haddad (1997) said BSC is valuable mostly because it integrates a business organization’s strategies, framework and vision, while transforming its long-term strategies and objectives (e.g., creating customer value) into tangible actions either internally or externally (Liu, 2002).

BSC, a measure of the driving forces behind a company’s future performance, not only remedies inadequate measures for the past financial performance, but also is a strategic management tool integrated with corporate strategies and vision. Meanwhile, Intellectual Capital (IC) ensures a company’s high Enterprise Value (EV) and an edge over rivals, and eventually the core competitiveness essential to survival (Chiang, 2006).

As an advocate of BSC-enabled Knowledge Management (KM), Arora (2002) argued that the rapidly changing business context nowadays requires competitiveness-minded corporate organizations to properly conduct IC management. In other words, a company is advised to efficiently manage knowledge in a BSC-enabled strategy-making process that involves a set of self-developed KM indicators.

Bukh, Johansen and Mouristen (2002) said IC and BSC help integrate the corporate-performance management systems, citing their relevance to company strategies.
For 10 years or so, IC has been discussed by many researchers as a source of sustainable corporate competitiveness (Kaplan and Norton, 2004). IC in a broader sense consists of human, social and structural capitals, and is considered a new mediator variable that explains the relationship between a High-performance Work System (HPWS) and organizational performance (Becker et al, 1997). With human, social and structural capitals improved/harnessed by a HPWS, an organization is able to enhance its operating effectiveness and eventually reach the performance targets (Chang, 2010).

Since electronics manufacturing has dominated the Taiwanese industrial scene for decades and represents an ever-growing portion of the GDP, a considerable amount of applied, or empirical, literature is focused on Taiwanese electronics companies, especially the mid- to large-sized firms. The scarcity of previous studies dealing with electronics SMEs prompted this study’s author to verify and delve into the effects of BSC implementation on the organizational performance of Taiwan-based electronics SMEs, with IC accumulation being the mediator variable. The specific purposes of this study are:

1. To verify whether BSC implementation affects the IC accumulation of Taiwan-based electronics SMEs in a significantly positive way;
2. To verify whether IC accumulation affects the financial performance of Taiwan-based electronics SMEs in a significantly positive way;
3. To verify whether BSC implementation affects the financial performance of Taiwan-based electronics SMEs in a significantly positive way.

**LITERATURE REVIEW**

Literature concerning the main dimensions of the present study (i.e., BSC, IC and organizational performance) is reviewed in the following passages:

**Literature Concerning Balance Scorecard**

Kaplan and Norton (1996) proposed the four perspectives of BSC: (1) financial perspective; (2) customer perspective; (3) internal-business-process perspective; (4) learning-and-growth perspective.

Because the BSC system is centered on strategies, rather than control, some insightful managers used it to clarify, communicate and manage strategies. Apparently, BSC has been transformed from an improved measurement system into a core management system (Kuo, 2002).

Wu (1999) contended that the BSC system involves all functions of an organization, citing the relevance of financial perspective to corporate finance and accounting; the relevance of customer perspective to marketing; the internal-business-process perspective, value chain as a whole; the learning-and-growth perspective for employees, human resources.

From a BSC point of view, Lu (2000) explored how capital structure was relevant to the operating performance of IT & electronics firms publicly trade on the Taiwan Stock Exchange over the years between 1958 and 1999. Lu adopted the Cash Flow Adequacy Ratio, sales growth, operating profit margin and Return on Equity (ROE) as indicators for the financial perspective of BSC system; market share and product return rate for the customer perspective; research and development (R&D) benefit, average cash-turnover period, and percentage of maintenance costs for the internal-business-process perspective; revenue per employee and wage per unit for the learning-and-growth perspective.

In a case study of how the organizational learning model was connected to the performance of Taiwanese electronics technology companies’ product development departments, Yeh (2001) valued the performance using three non-financial BSC perspectives (i.e., the customer, internal-business-process and learning-and-growth perspectives).

Apparently, companies in all industries consider both financial and non-financial perspectives when implementing the BSC. In the present study, BSC is conceptually defined as a performance measurement indicator that comprises four perspectives: (1) financial perspective; (2) customer perspective; (3) internal-business-process perspective; (4) learning-and-growth perspective. This study’s author adopted the four BSC perspectives proposed by Kaplan and Norton (1996) to measure how BSC implementation affects the financial performance of Taiwan-based electronics SMEs.
Literature Concerning Intellectual Capital

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

Sveiby (1998) noted IC comprises individual competencies besides a company’s internal and external structures, with individual competencies being an employee’s ability to take actions under various situations (e.g., explicit knowledge, skills, experiences, value judgments and social networks); the internal structure involves patents, concepts, patterns/models, computer and management systems; the external structure involves the brand, goodwill, trademark, and any other component of company–customer or company-supplier relationships.

As Knight (1999) contended, IC comprises human, structural and external capitals besides financial performance, where human capital is the sum of employee turnover rate, employee satisfaction, the number of new products/ideas conceived and recommended for delivery/reception; structural capital involves the operating-capital turnover rate, the ratio of salespersons to general/administrative staff, and the length of time it takes to launch a new product; external capital is the persistency and satisfaction of customers, the list of customers that bring the greatest profits, indicators of suppliers’ product quality and reliability; financial performance involves the Economic Value Added (EVA), the 90-day accounts receivable, and value added per employee.

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

Chen (2001) said the intangible IC is an important reference indicator of EV that comprises human, structural and relationship capitals. She defined IC as something that covers all the skills, knowledge, information, experiences, problem-solving capabilities and wisdom of a company, as incorporated into the human, structural and relationship capitals. Human capital, according to Chen, is the knowledge, skills and experiences of a company’s entire staff and management; the structural capital is a company’s overall system/procedures for problem-solving and value creation; the relationship capital is the establishment, maintenance and development of an organization’s external relationships with customers, suppliers and business partners.

In a simple description, Edvinsson (2003) noted IC is something any company will rely on in the future and also an indicator of efficient business operations. No company will be able to gain momentum for reforms without investing in intangible assets (Tsen and Hu, 2010).

In summary, this study’s author adopted the conceptual definition of IC proposed by Chen (2001): “the sum of a company’s skills, knowledge, information, experiences, problem-solving capabilities and wisdom, as incorporated into the human, structural and relationship capitals”. The operational definition of IC is briefly stated as follows:
A. Human capital: the knowledge, skills and work experiences of a company’s entire staff and management;
B. Structural capital: a company’s overall system/procedures for problem-solving and value creation;
C. Relationship capital: the establishment, maintenance and development of an organization’s external relationships with customers, suppliers and business partners.
Literature Concerning Financial Performance

There are many ways to measure a company’s performance with indicators varying among research topics. As a rule, financial indicators measure the financial performance, which is a tool to assess how well a company fares (Gasbarro and Zumwalt, 2002).

Venkartrama and Ramanujam (1986) proposed corporate-performance measures in three categories: (1) financial performance: return on investment (ROI) and sales growth; (2) operating performance: product quality, market share, attractiveness of new products, and value-added ratio; (3) organizational effectiveness: employee morale, etc.

According to Ramaswamy, Kroeck and Renforth (1996), there are multiple standards for performance evaluations enabled by financial indicators. That is, single constructs such as Return on Assets (ROA), Return on Sales (ROS), ROE and sales growth could be adopted as performance measures, depending on the target and scope of research.

To sum up, this study’s author conceptually defined financial performance as something determined by the level of such measures as ROI and sales growth. In this study, the financial performance of Taiwan-based electronics SMEs was determined by ROI and sales growth, the two measures proposed by Venkartrama and Ramanujam (1986).

Literature Concerning BSC and Intellectual Capital

Allee (1999) compared IC with BSC and considered both a company’s building blocks. Unlike BSC that was derived from the balanced value-creation model, Allee said IC contributes to knowledge-capital accumulation in a dynamic flow model while sharing two things in common with BSC: (1) they both expand the public perception of value creation and organizational performance indicators; (2) they both offer extra information about a company’s latest development and non-financial performance measurements besides financial performance measurements.

As for the relation between BSC and IC, Wu (2002) contended that BSC with its distinctive framework leads to both the formation and reinforced management of IC. Wu (2002) believed that the strategic topics and strategic objectives under BSC’s learning-and-growth perspective are precursors of the innovation capital and human capital in IC; the strategic topics and strategic objectives under BSC’s internal-business-process perspective, the process capital; the strategic topics and strategic objectives under BSC’s customer perspective, the customer capital (or “relationship capital” in the present study).

Citing IC’s contributions to a company’s KM-related communications and the fact that BSC helps monitor the progress/results of projects, Bukh, Johansen and Mourišten (2002) suggested that IC and BSC be integrated for complimentary effects.


To a certain extent, the studies mentioned above displayed similar viewpoints even if they do not discuss companies from the same industry or of the same size, which prompted this study’s author to boldly propose the following hypothesis:

\[ H_1: \text{BSC implementation affects the IC accumulation of Taiwan-based electronics SMEs in a significantly positive way.} \]

Literature Concerning Intellectual Capital and Financial Performance

Chen (2006) studied connections between IC and BSC using the typical correlation analysis and concluded that the higher consistency in effective IC applications, the better the company’s operating performance.

In his paper entitled “Evaluation of the Drivers of Financial Performance from the Viewpoint of Intellectual Capital: Evidence from the Taiwan IT Industries”, Wang (2008) noted that organizational capital indirectly, but not directly, affects corporate financial performance through human and customer capitals. In other words, the hypothesis in the present study that organizational capital exerts a value-added effect on a company’s financial performance through human, customer and relationship capitals is partially substantiated.

In his paper entitled “Effects of Corporate Social Responsibility and Intellectual Capital on Corporate Financial Performance: A Path Analysis Model” Dang (2011) said the positive relation between corporate social responsibilities and IC exerts a positive influence on a company’s financial performance.

To a certain extent, the studies mentioned above displayed similar viewpoints even if they do not discuss companies from the same industry or of the same size, which prompted this study’s author to boldly propose the following hypothesis:

\[ H_2: \text{IC accumulation affects the financial performance of Taiwan-based electronics SMEs in a significantly positive way.} \]

**Literature Concerning BSC and Financial Performance**

In a regression analysis of IC and non-financial BSC perspectives, Yu (2003) concluded that a good-fitting model is achievable by building the components of IC with non-financial BSC indicators, and that non-financial indicators have explanatory power regarding the financial ones. In other words, the increased value of non-financial indicators contributes to a company’s financial performance.

In his thesis entitled “Exploring the Effect of Balanced Scorecard on Corporate Performance: a Before-and-After Study of BSC Implementation at Taiwan-based Bank A” Tsao (2006) mentioned noticeable gaps among the vision, missions and strategic objectives of a BSC-implementing bank he studied and the objectives of individual bank workers. He went on to suggest that companies should better integrate the vision, missions and strategic objectives for better performance.

Cho (2011) in a study entitled “Research on Evaluating the Performance Improvement of Organizational Change for IC Design House by the Dimensions of Balanced Score Card-A Case Study of F Company” concluded that IC design houses are affected by technologies and tasks when it comes to organizational changes, and affected by the learning-and-growth and internal-business-process perspectives with regard to performance enhancement.

To a certain extent, the studies mentioned above displayed similar viewpoints even if they do not discuss companies from the same industry or of the same size, which prompted this study’s author to boldly propose the following hypothesis:

\[ H_3: \text{BSC implementation affects the financial performance of Taiwan-based electronics SMEs in a significantly positive way.} \]

Figure 1 shows the research framework derived from the afore-mentioned research purposes, hypotheses and literature review:

![Figure 1: This Research Framework](image-url)
RESEARCH METHOD

The Targets and Design of Questionnaire

Respondents of questionnaire survey in this study were selected by stratified random sampling. For better content validity and reliability, copies of expert questionnaire were given out after the questionnaire was designed and before pilot-testing. After unsuitable items were revised or removed, 450 copies of questionnaire were sent in a post-test to section chiefs and managers at electronics SMEs in various administrative districts across Taiwan. 152 out of the 450 questionnaire copies given out were returned valid, hence the 33.8% valid response rate. Consisting of the observable perspectives mentioned earlier, the questionnaire was designed on the basis of Multi-Dimension Measurement and all answers were measured on a 7-point Likert Scale, with 7 being Strongly Agree and 1 being Strongly Disagree. A higher score represents a greater degree of agreement, and vice versa.

The 16-item questionnaire for BSC was patterned after the four BSC perspectives proposed by Kaplan and Norton (1996), namely the financial, customer, internal-business-process, and learning-and-growth perspectives.

The 12-item questionnaire for IC was patterned after the findings put forth by Chen (2001).

The 8-item questionnaire for financial performance was patterned after the findings put forth by Venkartrama and Ramanujam (1986), with the “minimum score for admissions” and “realized enrollment rate” both taken into consideration.

SEM and the Measurement System

Linear SEM was used in a Confirmatory Factor Analysis (CFA) of this study’s research framework. The questionnaire was constructed on the basis of three latent variables (i.e., BSC, IC and financial performance), each divided into sub-variables that contain several questionnaire items (as stated below). The data collected was processed to create a primary file for the questionnaire. As for the measurement model, this study’s author designed the questionnaire using Multi-Dimension Measurement but adopted the Dual Measurement method to ensure successfully processed/measured data with the aid of computer software (Chen, 2010). Table 1 shows the number of questionnaire items under each implicit and explicit variable, along with the referential sources (Lee, 2011).

<table>
<thead>
<tr>
<th>Main perspectives</th>
<th>Sub-perspectives/measures</th>
<th>Number of Questionnaire Items</th>
<th>Referential sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSC</td>
<td>Financial perspective</td>
<td>4</td>
<td>Kaplan and Norton (1996)</td>
</tr>
<tr>
<td></td>
<td>Customer perspective</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Internal-business-process</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Learning-and-growth perspective</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Intellectual capital</td>
<td>Relationship capital</td>
<td>4</td>
<td>Chen (2001)</td>
</tr>
<tr>
<td></td>
<td>Structural capital</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Human capital</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Financial performance</td>
<td>ROI</td>
<td>4</td>
<td>Venkartrama and Ramanujam (1986)</td>
</tr>
<tr>
<td></td>
<td>Sales growth</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

Linear Structural Model

This study’s author conducted a CFA, an analytical approach contrary to the Exploratory Factor Analysis (EFA), on each pair of the three main perspectives (i.e., BSC, IC and financial performance). Made up of structural and measurement models, SEM effectively addresses the cause-effect relations among implicit variables. Models in this study were verified in three regards: (1) whether the overall model conforms to the goodness-of-fit indicators; (2) goodness-of-fit of the measurement model; (3) goodness-of-fit of the structural model (Lee, 2011).
ANALYSES AND RESULTS

Test results regarding fit of the overall model

This study’s author built the overall model framework following a literature review and a factor analysis of sample data and, as recommended by Hair et al. (1998), measured the overall model’s goodness-of-fit in three different ways: the Measures of Absolute Fit, the Incremental Fit Measures, and the Parsimonious Fit Measures. The test results are listed in Table 2 (Chen, Fang, Chen and Chien, 2008; Lee³).

Table 2: Test Results Regarding Fit of the Overall Model

<table>
<thead>
<tr>
<th>Indices</th>
<th>Standards of Judgment</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measures of Absolute Fit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GFI</td>
<td>&gt;0.9</td>
<td>0.912</td>
</tr>
<tr>
<td>AGFI</td>
<td>&gt;0.8</td>
<td>0.896</td>
</tr>
<tr>
<td>RMR</td>
<td>&lt;0.05</td>
<td>0.022</td>
</tr>
<tr>
<td>Incremental Fit Measures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NFI</td>
<td>&gt;0.9</td>
<td>0.906</td>
</tr>
<tr>
<td>CFI</td>
<td>&gt;0.9</td>
<td>0.902</td>
</tr>
<tr>
<td>Parsimonious Fit Measures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PNFI</td>
<td>&gt;0.5</td>
<td>0.624</td>
</tr>
<tr>
<td>PGFI</td>
<td>&gt;0.5</td>
<td>0.623</td>
</tr>
</tbody>
</table>

Measurement model

The factor loading measures the intensity of linear correlation between each item under the manifest/explicit variables (or sub-perspectives) and latent/implicit variables (or main perspectives). The closer the factor loading is to 1, the more capable an observable variable (or sub-perspective) is in measuring the main perspectives. The present study proves reliable with an above-0.7 factor loading in any sub-perspective. That is, all sub-perspectives (i.e., explicit variables) in the proposed measurement model properly measure the main perspectives (i.e., implicit variables). Meanwhile, the Average Variance Extracted (AVE) measures the unobservable/implicit variables’ explanatory power of variance regarding observable ones; a higher VE suggests greater reliability and convergent validity of an implicit variable. It usually takes an above-0.5 VE to prove a perspective’s explainable variance exceeds the measurement error (Fornell and Larcker, 1981). As AVEs in this study invariably exceed 0.5, the latent/implicit variables have excellent reliability and convergent validity (See Table 3 and Figure 2).

Table 3: Judgment Indicators for the Measurement Model

<table>
<thead>
<tr>
<th>Main perspectives</th>
<th>Sub-perspectives/ measures</th>
<th>Factor loading</th>
<th>Cronbach’s α</th>
<th>Average Variance Extracted</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSC</td>
<td>Financial perspective</td>
<td>.93</td>
<td>.89</td>
<td>.68</td>
</tr>
<tr>
<td></td>
<td>Customer perspective</td>
<td>.92</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Internal-business-process perspective</td>
<td>.84</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Learning-and-growth perspective</td>
<td>.85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intellectual capital</td>
<td>Relationship capital</td>
<td>.92</td>
<td>.88</td>
<td>.69</td>
</tr>
<tr>
<td></td>
<td>Structural capital</td>
<td>.88</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Human capital</td>
<td>.89</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financial performance</td>
<td>ROI</td>
<td>.86</td>
<td>.87</td>
<td>.65</td>
</tr>
<tr>
<td></td>
<td>Sales growth</td>
<td>.89</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Coefficient of Determination

Also known as Squared Multiple Correlation (SMC), the Coefficient of Determination is an implicit independent variable’s explanatory power regarding an implicit dependent one. That is, the R² values shown in table 4 indicate that the implicit independent variables have adequate explaining power on the implicit dependent variables respectively (Lee⁵, 2011).
Table 4: Path Coefficient of Determination

<table>
<thead>
<tr>
<th>Coefficients of Determination</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSC (X) $\rightarrow$ Intellectual capital (Me)</td>
<td>.71</td>
</tr>
<tr>
<td>Intellectual capital (Me) $\rightarrow$ Financial performance (Y)</td>
<td>.85</td>
</tr>
<tr>
<td>BSC (X) $\rightarrow$ Financial performance (Y)</td>
<td>.73</td>
</tr>
</tbody>
</table>

Path coefficient of implicit variables in the model

After the mode passed an internal goodness-of-fit test, the estimates of standardized path coefficients and Critical Ratio (C.R.) for latent/implicit variables were calculated (see Table 5). Figure 2 is an illustration of the path analysis results (Lee et al., 2011).

Table 5 Parameter Estimates for Implicit Variables

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>S.E.</th>
<th>C.R.</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSC (X) $\rightarrow$ Intellectual capital (Me)</td>
<td>.82</td>
<td>.16</td>
<td>5.13</td>
<td>***</td>
</tr>
<tr>
<td>Intellectual capital (Me) $\rightarrow$ Financial performance (Y)</td>
<td>.89</td>
<td>.17</td>
<td>5.24</td>
<td>***</td>
</tr>
<tr>
<td>BSC (X) $\rightarrow$ Financial performance (Y)</td>
<td>.21</td>
<td>.12</td>
<td>1.75</td>
<td></td>
</tr>
</tbody>
</table>

Note: *** indicates a statistically significant C.R. value ($\alpha=0.001$)

Figure 2: Standardized Results of SEM Analysis

Analytical testing of path effect for the structural model

Regarding on the path coefficients for implicit/unobservable variables in the structural model, this study’s author used Sobel Test, Bootstrapping and Mackinnon PRODCLIN2 to test the structural model’s path effect, with IC accumulation (Me) as the mediating factor. Table 6 shows the test results (Sobel, 1982; MacKinnon, Fritz, Williams and Lockwood, 2007):
Table 6: Summary of Results Concerning the Mediator Variable

<table>
<thead>
<tr>
<th>Variables</th>
<th>Point of Estimate (Est.)</th>
<th>Product of Coefficients</th>
<th>Bootstrapping Bias-Corrected 95% CI</th>
<th>Percentile 95% CI</th>
<th>MacKinnon 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SE</td>
<td>Z</td>
<td>Lower</td>
<td>Upper</td>
<td>Lower</td>
</tr>
<tr>
<td>X→Me</td>
<td>.82</td>
<td>.16</td>
<td>5.13</td>
<td>.56</td>
<td>.98</td>
</tr>
<tr>
<td>Me→Y</td>
<td>.89</td>
<td>.17</td>
<td>5.24</td>
<td>.16</td>
<td>.85</td>
</tr>
<tr>
<td>X→Y</td>
<td>.21</td>
<td>.12</td>
<td>1.75</td>
<td>-.14</td>
<td>.72</td>
</tr>
</tbody>
</table>

The following conclusions were derived from Table 6:
1. BSC implementation affects the IC accumulation of Taiwan-based electronics SMEs in a significantly positive way, with an estimated 0.82 standardized path coefficient (H₁ substantiated);
2. IC accumulation affects the financial performance of Taiwan-based electronics SMEs in a significantly positive way, with an estimated 0.89 standardized path coefficient (H₂ substantiated);
3. BSC implementation affects the financial performance of Taiwan-based electronics SMEs in a positive yet insignificant way, with an estimated 0.21 standardized path coefficient (H₃ partially substantiated);
4. The three conclusions suggest a satisfactory goodness-of-fit of the model established in the present study, with IC of Taiwan-based electronics SMEs exerting a full mediator effect.

Conclusion and Suggestions
According to the afore-mentioned analyses and results, this chapter specifies the conclusions and contributions of the present study. The research limitations and suggestions for future research are mentioned in the last passages.

CONCLUSIONS

In summary, the present study verified topics of interest using a SEM-based survey of section chiefs and managers at Taiwan-based electronics SMEs. The conclusions are detailed as follows:

The effects of BSC implementation on IC accumulation

The research results proved H₁ is substantiated (i.e., BSC implementation affects the IC accumulation of Taiwan-based electronics SMEs in a significantly positive way), which echoes theoretical statements proposed by Allee (1999), Wu (2002), Bukh, Johansen and Mouritsen (2002) and Tseng (2006).

The effects of IC accumulation on financial performance

The research results proved H₂ is substantiated (i.e., IC accumulation affects the financial performance of Taiwan-based electronics SMEs in a significantly positive way), which echoes theoretical statements proposed by Chen (2006), Wang (2008), Chen (2011) and Dang (2011).

The effects of BSC implementation on financial performance

The research results proved H₃ is substantiated (i.e., BSC implementation affects the financial performance of Taiwan-based electronics SMEs only insignificantly). The finding is partially supported by the theoretical statements proposed by Yu (2003), Tsao (2006) and Cho (2011) probably because these studies examined companies of different sizes or industries from the present one.
Contributions of the present study
1. While previous studies of how BSC implementation/introduction affects a company’s financial performance mostly were focused on large-scale electronics firms, financial service providers, and EFA, this study’s author not only performed modeling according to the summary of literature review, but also verified the model for goodness-of-fit effects. In other words, the present study is a CFA-based one on topics important and innovative with regard to business practices; it provides a reference for further research in relevant fields.
2. Results of this study provide advice for electronics SMEs worldwide with regard to strategies about introducing the BSC and/or IC accumulation.

Limitations
This study’s author completed each stage of the research process with limited resources and the greatest caution possible, despite the limitation of a relatively low rate of valid responses resulted from stratified random sampling and questionnaire copies sent via mail (both due to the inadequate resources). The greatest limitation of this study, therefore, is the small sample size that might leave the population poorly represented.

Recommendations for Future Research
Since the present study is focused solely on section chiefs and managers at Taiwan-based electronics SMEs, future researchers seeking extensive data collection or innovations/breakthroughs may conduct comparative analyses of companies in non-electronics sectors or electronics firms of larger scales (i.e., mid- to large-sized firms).

REFERENCES


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