An Empirical Study on the Impacts of Human Resources Management System on Organizational Performance at Taiwan-listed LED Manufacturers with a Mediator of Intellectual Capital

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ABSTRACT

The purpose of this study is to verify and understand, with intellectual capital being the mediating variable, how the implementation of Human Resource Management System (HRMS) affects the organizational performance of LED manufacturers publicly traded on the Taiwan Stock Exchange. While convenience sampling was used to yield knowledge from the population, the linear Structural Equation Modeling (SEM) was adopted to verify the goodness-of-fit effects among the overall model, structural model and measurement model. Findings from this study show that 1. The implementation of HRMS has a positive and significant influence on organizational performance 2. A well-implemented HRMS has a positive and significant influence on intellectual capital; and 3. The accumulated intellectual capital has a positive and significant influence on organizational performance. The three findings indicate that intellectual capital has a partially mediating effect. Results of the research enable Taiwanese LED manufacturers to understand the importance and benefits of satisfactory HRMS implementation industry-wise; they also offer helpful information to relevant companies when making decisions regarding business operations.

Keywords: Human Resource Management System, Organizational performance, Intellectual capital

RESEARCH BACKGROUND AND PURPOSES

The rapid growth of optoelectronics industry in recent years has widened the range of applications for many optoelectronic products. The LEDs that emit high-intensity visible light, for example, are used in mobile phones, traffic signs, outdoor signage, lighting fixtures and automobiles; those emitting invisible light are showing stable growth and mostly used in remote-controlled receiver modules, sensors, wirelessly connected IrDA modules, interrupters, photo links, photo couplers and fiber-optical transceiver modules (Strategies Unlimited, PIDA, MIC).

Corporate success in the 21st century depends on four elements, namely abundant natural resources, sufficient funding, advanced technologies, and competent human resources (Lester C. Thurow, 1992). The era dominated by knowledge-based economy and Internet, nevertheless, led to the emergence of knowledge-intensive organizations, which in turn eroded the competitiveness of organizations that rely on a massive amount of natural resources and funding. The fact that a growing number of organizations shifted their attention to knowledge integration and intellectual capital management shows many companies have come to realize that knowledge in the information-dominated era will eventually replace labor, capital, land and the other tangible assets as a major source of corporate competitiveness (Durcker, 1993; Jun-Long Hong, 2002).

The creation, accumulation, sharing and application of intellectual capital are inseparable from the corporate internal procedures. In other words, management initiatives inside an organization combined with the organizational culture plays a critical role in how the organization generates and uses its intellectual capital (Lynn, 1999; Tovstiga, 1999). Literally an important part of an organization’s internal procedures, the human resource managerial initiatives directly affect how the organizational culture is shaped and therefore have become a determinant factor in not only the effective management of intellectual capital (Boudreau and Ramstad, 1997) but also the attempt to improve corporate operating performance/EV. As the awareness of “strategic human resource management” has been raised in recent years, human resource managerial initiatives” are considered a magical weapon that enables an organization to increase/nurture intangible assets and subsequently build a sustainable competitiveness advantage (Barney and Wright,
A company is able to better manage its intellectual capital and improve organizational performance by properly implementing a Human Resources Management System (HRMS) (Youndt, 1998). The advent of “knowledge-intensive era” has turned human resources into a company’s most important core resource, and an appropriately implemented HRMS helps an organization develop internal human resources, build competitiveness intellectual capital, and eventually bolster its operating performance and Enterprise Value (EV).

A company wishing to stay competitive in a treacherous business environment, therefore, has to ensure satisfying Knowledge Management (KM) both inside and outside the organization, to establish an appropriate HRMS, and to bolster organizational performance with accumulated intellectual capital. In other words, a company should enhance corporate performance by introducing an appropriate HRMS while accumulating intellectual capital. Such an enhanced performance will in turn strengthen the company’s Enterprise Value (EV) and potential of sustainable corporate growth/development. This present study is intended to verify and understand how HRMS affects the performance of Taiwan-listed LED manufacturers, using intellectual capital as the mediating variable. The four purposes of this study are stated as follows:

1. To verify whether the HRMS appropriately implemented at Taiwan-listed LED manufacturers affects organizational performance in a positive and significant manner;
2. To verify whether the HRMS appropriately implemented at Taiwan-listed LED manufacturers affects intellectual capital in a positive and significant manner;
3. To verify whether the intellectual capital accumulated by Taiwan-listed LED manufacturers affects organizational performance in a positive and significant manner;
4. To present findings that not only enable Taiwanese LED manufacturers to understand the importance and benefits of appropriate HRMS implementation industry-wise, but also offer helpful information to relevant companies when making decisions regarding business operations.

LITERATURE REVIEW

Literature review regarding the major dimensions of this study (e.g., HRMS, intellectual capital and marketing performance) is discussed in the followed sections:

Literature Concerning HRMS

1. Definitions of Human Resource Management

Beer et al. (1985) defined the human resource management as any management-related decision/conduct that may affect the nature of the employee-organization relationship. The notion of human resource management has its roots in the erstwhile “personnel management” system. Given the recent trends toward knowledge-based economy, the Internet and globalization that triggered changes, the typical personnel management system that focuses solely on controlling the internal staff appears inadequate for an organization to survive the fierce competitions. Human resource management nowadays has shifted its focus to the complementarities among human resource managerial initiatives, which would hopefully bolster an organization’s overall operating performance through beneficial interactions in an ongoing effort toward innovative- and value-oriented goals (Jun-Long Hong, 2002).

The strategic human resource management model presented by Milkovich and Boudreau (1994) requires that, for maximized organizational performance, a strategy of human resource management shall achieve the best fit with the organization that adopts it.

Martell and Carroll (1995) insisted in a similar study concerning “strategic human resource management” that the interaction between human resource management and the organization that implements it shall be examined from a holistic point of view. They urge companies implementing human resource management to actively respond to changes in the internal/external environment while taking strategic goals into consideration. That is, the strategic human resource management focuses on how an organization effectively applies human resources in order to meet its strategic demand as a corporate entity (Jun-Long Hong, 2002).
This present study adopts the *conceptual definition* of HRMS proposed by Jun-Long Hong (2002): “the complementarities among human resource managerial initiatives that hopefully will bolster an organization’s overall operating performance through beneficial interactions in an ongoing effort toward innovative- and value-oriented goals”.

2. **Range of Human Resource Management**

Martell and Carroll (1995) stated that there are two types of human resource management: strategic and operative. They went on to say that human resource managerial initiatives have four characteristics: (1) They are long-term oriented; (2) They are connected with the corporate strategies; (3) They are connected with the organizational performance; and (4) The line managers are involved in the details of decisions regarding human resource management.

Paauwe (1994) put forth a model to illustrate the process of how an organization establishes a human resource management system and how that system affects the organizational performance. The model indicates that the establishment of human resource management system is affected by factors in three dimensions simultaneously: (1) the product/ market /technological dimension; (2) the organizational/managerial/cultural dimension; (3) political/cultural/legal dimension (Jun-Long Hong, 2002).

Meanwhile, Jun-Long Hong (2002) noted that HRMS involves (1) Equal employee status; (2) Employee recruitment/selection; (3) Training and investments; and (4) Organizational-capital management. This present study adopted the proposal of Jun-Long Hong (2002) and divided HRMS into these four dimensions.

**Intellectual Capital**


Stewart (1997) argued that intellectual capital includes human capital, structural capital and customer capital, with *human capital* being the sum of innovations, employees’ mindsets, seniority, turnover rate, experiences, and status of learning; *structural capital* being the existing knowledge collected using a highly efficient method and tested, organized, integrated, with the irrelevant part sifted out for diffusion; *customer capital* being the relationships a specific organization forges with all those who deal with it, which involves customer satisfaction, customer retention rate, and customer loyalty.

Sveiby (1998) noted that intellectual capital comprises individual competence, internal structure and external structure, with the *individual competence* being an employee’s ability to take actions under various situations, which involves explicit knowledge, skills, experiences, value-related judgments, and social network; *internal structure* being the sum of patents, concepts, patterns, computer and management systems; *external structure* being relationships with customers and suppliers, which involves the brand, reputation and trademark.

Johnson (1999) argued that intellect, or wisdom, is made of human capital, structural capital and relationship capital, with *human capital* being the idea capital (i.e., the human resources for knowledge-based duties and employees’ gifts/attitude) combined with leadership capital (i.e., the personal qualities of an expert and manager); *structural capital* being the innovation capital (i.e., patents, trademark, copyright and knowledge database) combined with process capital (i.e., work procedures and trade secrets); *relationship capital* being the sum of relationships with customers, suppliers and network-community members.

As defined by Knight (1999), intellectual capital is made of human capital, structural capital, external capital and financial performance, with *human capital* involving the employee turnover rate, employee satisfaction, the quantity of new products/ideas, and the recommended quantity of delivery/reception; *structural capital* being the turnover rate of operating capital, the ratio of sales staff to general and administrative staff, and the launch time of a new product; *external capital* being the customer persistency, customer satisfaction, the most lucrative customer list, the indicators of suppliers’ product quality/ reliability; *financial performance* being the sum of Economic Value Added (EVA), 90-day accounts receivable, and the value added by each employee.
Mei-Chun Chen (2001) said not only is intangible intellectual capital an important reference indicator for evaluating the corporate values; it also consists of human capital, structural capital and relationship capital. Chen went on to define intellectual capital as “all the skills, knowledge, information, experiences, problem-solving ability and wisdom displayed by a company as a whole and incorporated into the human capital, structural capital and relationship capital”. The so-called human capital, according to Chen, is “the knowledge, skills and experiences of a company’s entire staff and managers”; the structural capital is “the overall system and procedures adopted by a company to solve problems and create values”; the relationship capital is “the initiation, maintenance and development of an organization’s external relationships, including the relationships with customers, suppliers and business partners”.

Edvinsson (2003) gave a simple description of intellectual capital, saying it would become what supports any company in the future and also an indicator of whether a company can be operated effectively. It is impossible for a company to gain momentum for corporate reforms unless it invests in intangible assets (Shu-Hsiao Tsen and Hsiang-ling Hu, 2010). Edvinsson & Malone (1997) said intellectual capital consists of human capital, structural capital and customer capital, with the human capital being the sum of personal competencies, knowledge, technologies, and experiences of a company’s entire staff and managers, including the creativity and innovation capability of the organization/company. The structural capital, as they noted, is a supportive framework that gives human capital a physical form and power, as well as an organized capacity that includes the tangible system used to communicate/store intellectual materials. They also defined customer capital as the sum of customer satisfaction, durability, price sensitivity, and the customers’ long-term financial conditions.

To sum up, this present study adopted the conceptual definition of intellectual capital proposed by Mei-Chun Chen (2001): “all the skills, knowledge, information, experiences, problem-solving ability and wisdom/intellect displayed by a company as a whole and incorporated into the human capital, structural capital and relationship capital”. The operational definition is briefly described as follows:

A. Human capital: The knowledge, skills and experiences of a company’s entire staff and management;
B. Structural capital: The overall system and procedures adopted by a company to solve problems and create values;
C. Relationship capital: The initiation, maintenance and development of an organization’s external relationships, including the relationships with customers, suppliers and business partners.

Organizational Performance

Bonomo & Clark (1988) said the financial aspect of a company is often measured using such indicators as profitability, sales growth, market share and cash flow.

Vorhies & Morgan (2005) mentioned that, when a company determines if its organizational marketing capacity adds to the competitiveness, it can use performance-measuring indicators in three categories. To effectively measure its competitiveness marketing-wise, a company should base all of the three indicators on comparisons against its archrivals. The three measurement indicators along with their distinctive qualities are detailed as follows:

1. Customer satisfaction: Indicators in this category measure various capabilities to improve customer satisfaction, including the capability to satisfy customers, to convey values to customers, to meet customers’ needs, and to retain valuable customers.

2. Market effectiveness: Indicators in this category mostly measure a company’s capability to reach market-related goals. They include the growth in market share, growth in sales figures, growth in the number of new customers, and growth in sales generated from the existing customer base.

3. Projected/actual profitability: Indicators in this category mostly measure a company’s profits in the past year and profitability projections for the next year. They include the profitability of business operations department, return on investment (ROI), return on sales, and the ability to meet financial goals. Clark (2000) concluded in his study that sales growth, profitability and market share are the measurement indicators used the most often by companies.

Atkinson et al. (1997) believed there is a trend toward creating a performance appraisal system that not only features a joint effort to improve the existing financial indicators (e.g., the economic value added) but also contains non-financial indicators that provide guidance for an organization to reflect on its past performances (e.g., customer
According to Tatikonda (1998), a performance management system focused solely on short-term financial goals in a reform-oriented environment will end up wasting the already limited company resources. In other words, what a company needs is a dynamic performance-measuring system, or a vision beyond the usually emphasized financial performance.

There is an overwhelming amount of previous studies addressing the measurement dimensions of organizational performance. Since the benefits of organizational performance will eventually be fed back to the financial dimension, most scholars in this field adopt financial performance as one of the measurement indicators. In an environment characterized by convenient ways of information delivery and rapid-changing markets, nevertheless, a company nowadays shall never solely rely on financial performance to achieve survival and competitiveness. That is to say, it is impossible to sufficiently gauge the organizational performance using financial performance as the single indicator (Ya-Hui Ling and Ling Hong, 2010).

Moreover, Ya-Hui Ling and Ling Hong (2010) argued that organizational performance is the sum of accomplishments attained by all businesses/departments involved with an organizational goal during a given period of time, with the goal either meant for a specific stage or on the overall extent.

Kaplan & Norton (1996) noted that a company shall refrain from excessively focusing on corporate finance for reaching its strategic goals. Instead, they are advised to make financial and non-financial efforts at the same time. In other words, a company’s financial performance should be measured in both financial and non-financial dimensions, the latter including (1) the Customer Perspective; (2) the Internal Process Perspective; (3) the Learning and Growth Perspective. In summary, this present study adopted the conceptual definition of organizational performance proposed by Ya-Hui Ling and Ling Hong (2010), with corporate performance measured in the financial and non-financial perspectives mentioned by Kaplan & Norton from their Balanced Score Card (BSC) point of view.

**Literature Concerning HRMS and Organizational Performance**

According to Jun-Long Hong (2002), most of the previous studies that examined how HRMS affects organizational performance either focused on a specific HRMS or discussed the influence of a specific HRMS on organizational performance after combining it with corporate strategies. Huselid and Becker (1998) proved in their empirical study that a high-performance system is one that ensures the best human resource managerial practices. No matter what strategic goal(s) a company has, such a high-performance system always improves its financial performance, they noted.

Delery & Doty (1996) said the relationship between the best human resource managerial practices and organizational performance must always involve an appropriate HRMS and appropriate corporate strategies as well.

Jia-Chi Huang (2000) pointed out the significantly positive relationship between HRMS and organizational performance.

Foss et al. (2000) noted that a single management system that consists of all the human resource managerial initiatives exerts a significantly positive influence on a company’s performance innovation-wise. If we look at the influence of each specific human resource managerial initiative, the “human resource managerial initiatives that determine remunerations by the performance achieved” and “human resource managerial initiatives for in-company training” would be the only two factors positively correlated with a company’s innovation performance. Due to their complementarities, human resource managerial initiatives prove effective in bolstering a company’s innovation performance.

Jun-Long Hong (2002) mentioned a company carrying out the best human resource managerial initiatives may see its organizational performance improved. Likewise, a company with an excellent strategy portfolio will enjoy a bolstered organizational performance.

We may derive the following hypothesis from the studies mentioned above even if they did not address Taiwan-listed LED companies:

**Hypothesis 1 (H1):** The appropriate HRMS implementation has a significantly positive influence on the organizational performance of Taiwan-listed LED manufacturers.
Literature Concerning HRMS and Intellectual Capital

Mark A. Youndt (1998) said in his study that HRMS exerts a significant influence on all aspects of intellectual capital, with the insignificant influence of “organizational-capital management” on “organizational capital” being the only exception.

Jun-Long Hong (2002) said the human resource system affects intellectual capital in a significantly positive way. The components of human-resource capital, which is the core resource of intellectual capital, interact dynamically with one another.

Using an expert questionnaire, Shu-Wen Xia (2007) built Taiwan’s first “innovative human resource management” model in combination with an empirical study to verify the target industry’s growth prospects. Xia explored the potential of an innovative HRMS to improve the efficacy of human resource managerial practices by accumulating the human-resource capital.

We may derive the following hypothesis from the studies mentioned above even they did not address Taiwan-listed LED companies:

Hypothesis 2 (H2): The appropriate HRMS implementation has a significantly positive influence on the intellectual capital of Taiwan-listed LED manufacturers.

Literature Concerning Intellectual Capital and Organizational Performance

Mei-Chun Chen (2001) believes that intellectual capital affects the organizational performance in a significantly positive manner.

Young Chaur-Shiuh (2006) examined 211 listed companies (including OTC-listed ones) and found that intellectual capital contributes substantially to an organization’s attempt to create values and competitive advantages. That contribution, he noted, would be enhanced by interactions among human, structural and customer capitals.

In their study Rudez and Mihalic (2007) said it is imperative that the hotel industry enhance its intellectual capital development in order to stay competitive. They also mentioned that the interaction between human capital and Information Technologies (IT) has the potential of bolstering the organization’s financial performance. Intellectual capital significantly influences the performance of organizations in IT, bio-tech, high-tech, or emerging industries (Chang, Chen & Lai, 2008). Among others, international tourist hotels and the other service providers offer both tangible products and intangible services that constitute the organization’s intellectual capital, including employees’ knowledge and the organization’s management procedures.

I-Chen Lee (2007) mentioned a research finding that high-quality human capital brings high performance to schools, with the relationship capital functioning as a mediator between human capital and organizational performance.

Yan-Ming Chen (2008) argued in his study that intellectual capital and organizational performance are correlated in a significantly positive way.

Using the approach of case study, Tzu-Ling Peng (2009) delved into the relationship between KM-stimulating factors and KM, and further examined how an organization accumulates intellectual capital in the KM process, and how it enhances performances by accumulating the intellectual capital.

According to Ching-Fang Chang (2009), intellectual capital affects organizational performance in a significantly positive way: a larger amount of intellectual capital leads to improved organizational performance.

According to Shu-Hsiao Tsen et al. (2010), intellectual capital is made of human capital, structural capital and social capital. Therefore it is imperative that an organization develop a human capital hardly replicable by competitors, transform the accumulated wisdom and capacity into its core capability, utilize the functions of structural capital to establish distinctiveness, and forge irreplacable external relationships to reinforce its social capital. Moreover, Tsen noted that the synergy resulting from interactions among human, structural and social capitals is crucial to an organization’s competitiveness-building efforts.

Guang-You Liu (2010) noted that human capital not only affects corporate performance directly, it also exerts an indirect influence on corporate performance through the process capital, innovation capital and customer capital.

We may derive the following hypothesis from the above-mentioned analyses even if they did not address Taiwan-listed LED companies:
Hypothesis 3 (H3): *Accumulated intellectual capital has a positive and significant influence on the organizational performance of Taiwan-listed LED manufacturers.*

Based on the research purposes, hypotheses and literature review described above, we may obtain the research framework in Figure 1:

![Figure 1: Research Framework](image)

**METHODOLOGY**

**Targets and the Design of Questionnaire**

Copies of questionnaire were given to presidents at Taiwan-listed LED manufacturers selected using convenience sampling. To improve the content validity and reliability, copies of expert questionnaire were given out before the pilot-test. After revising or removing inappropriate items, a post-test was conducted by giving copies of the questionnaire to presidents at Taiwan-listed LED manufacturers. Out of the 250 copies given out, 212 were returned with a valid return rate of 84.8%. Table 3.1 shows the total number of items under each variable from the major dimensions (or conceptual dimensions) and sub-dimensions (or operational measurement dimensions), along with the questionnaire structure. To gain a clearer picture of the organizational performance of Taiwan-listed LED companies, this study adopts EPS figures posted by the surveyed companies between 2001 and 2011 as the measurement indicator. All indicators were obtained from the database of Taiwan Economic Journal (TEJ). The questionnaire for non-financial performance was designed in accordance with each of the non-financial performance perspectives proposed by Kaplan & Norton (1996), namely (1) the Customer Perspective; (2) the Internal Process Perspective and (3) the Learning and Growth Perspective.

**Processing Data Obtained from the Questionnaire and the Measurement Model**

To verify the research framework proposed, this study applied linear SEM to a Confirmatory Factor Analysis (CFA) of the framework of research model. It divides the questionnaire into three implicit/law latent variables (i.e., HRMS,
intellectual capital and organizational performance), each containing observable/explicit variables as stated below. The survey was conducted using these observable/explicit variables, with several questionnaire items categorized under them each. After processing data collected in the survey, files were created for the primary data. Although the questionnaire design was based on Multi-Dimension Measurement, either “Dual Measurement” or “Single Measurement” was adopted to make sure the computer software-aided data processing goes as expected (Shun-Yu Chen, 2010). Table 1 shows the number of questionnaire items under each implicit/explicit variable in this study, along with their reference resources.

Table 1: Total Number of Question Items and Structure of Questionnaire

<table>
<thead>
<tr>
<th>Main Dimensions</th>
<th>Sub-Dimensions/ Measurement Indicators</th>
<th>Number of Items</th>
<th>Reference for the Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRMS</td>
<td>Training and Investments</td>
<td>8</td>
<td>Jun-Long Hong (2002)</td>
</tr>
<tr>
<td></td>
<td>Employee Recruitment/Selection</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Equal Employee Status</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Organizational-capital Management</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Intellectual Capital</td>
<td>Human-resource Capital</td>
<td>4</td>
<td>Shu-Hsiao Tsen and Hsiang-ling Hu (2010)</td>
</tr>
<tr>
<td></td>
<td>Structural Capital</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Relationship Capital</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Organizational Performance</td>
<td>EPS</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Customer Perspective</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Internal Process Perspective</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Learning and Growth Perspective</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

Linear Structure Model

The CFA is an analytical approach opposite to the Exploratory Factor Analysis (EFA). This study conducted a CFA by pairing two of three major dimensions (i.e., HRMS, intellectual capital and organizational performance). Consisting of the Structural Model and Measurement Model, the SEM provides an effective solution to the cause-effect relation between implicit/latent variables. Besides, the models verified in this study contain three parts: (1) verifying the overall model’s goodness-of-fit to make sure it conforms to the goodness-of-fit indices; (2) verifying the goodness-of-fit of Measurement Model and (3) verifying the goodness-of-fit of Structural Model.

ANALYSES AND RESULTS

Test Results Concerning Fit of the Overall Model

We may construct a framework for the overall model after a literature review and factor analysis conducted on the collected sample data. Following the advice of Hari et al. (1998), the measurement of the fit of the overall model was divided into three aspects, namely the Measures of Absolute Fit, Incremental Fit Measures and Parsimonious Fit Measures. Table 2 shows the test results concerning fit of the overall model (Fu-Chiang Chen, Hsien-Kuang Fang, Guo-Jia Chen and An-Jan Chien, 2008).

Table 2: Analysis of Fit of the Overall Model

<table>
<thead>
<tr>
<th>Goodness-of-fit Indices</th>
<th>Standards for Evaluation</th>
<th>Results Obtained</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>0.914</td>
</tr>
<tr>
<td>AGFI</td>
<td>&gt;0.8</td>
<td>0.901</td>
</tr>
<tr>
<td>RMR</td>
<td>&lt;0.05</td>
<td>0.024</td>
</tr>
<tr>
<td>Incremental Fit Measures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NFI</td>
<td>&gt;0.9</td>
<td>0.924</td>
</tr>
<tr>
<td>CFI</td>
<td>&gt;0.9</td>
<td>0.913</td>
</tr>
<tr>
<td>Parsimonious Fit Measures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PNFI</td>
<td>&gt;0.5</td>
<td>0.743</td>
</tr>
<tr>
<td>PGFI</td>
<td>&gt;0.5</td>
<td>0.722</td>
</tr>
</tbody>
</table>
Measurement Model

The factor loading of each item under the latent/implicit variables (i.e., the major dimensions) and manifest/explicit variables (i.e., the sub-dimensions) mainly measures the intensity of linear correlation between each item under the explicit variables and latent/implicit variables. A factor loading close to 1 indicates the measurement variable, or sub-dimension, is relatively capable of measuring the major dimensions. In this study, all sub-dimensions’ factor loading exceed 0.7, hence the satisfying reliability. All sub-dimensions (or explicit variables) in the model’s measurement system are therefore capable of appropriately measuring the major dimensions (i.e., all implicit variables). Moreover, the Average Variance Extracted (AVE) is used to calculate the explanatory power of variance between implicit variables versus each measurement variable; the higher the VE value, the greater reliability and convergent validity of the implicit variables. Usually the VE value must be larger than 0.5 to indicate that the explanatory variance of dimensions is larger than measurement error (Fornell and Larcker, 1981). In this study, all AVEs are larger than 0.5, hence the latent/implicit variables’ excellent reliability and convergent validity (See Table 3 and Figure 2).

<table>
<thead>
<tr>
<th>Main Dimensions</th>
<th>Double Measurement Indicators</th>
<th>Factor loading</th>
<th>Cronbach’s α</th>
<th>Average Variance Extracted</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRMS</td>
<td>X1</td>
<td>.81</td>
<td>.82</td>
<td>.66</td>
</tr>
<tr>
<td></td>
<td>X2</td>
<td>.83</td>
<td>.83</td>
<td>.63</td>
</tr>
<tr>
<td>Intellectual Capital</td>
<td>ME1</td>
<td>.85</td>
<td>.85</td>
<td>.66</td>
</tr>
<tr>
<td></td>
<td>ME2</td>
<td>.83</td>
<td>.83</td>
<td>.67</td>
</tr>
<tr>
<td>Organizational Performance</td>
<td>Y1</td>
<td>.89</td>
<td>.88</td>
<td>.73</td>
</tr>
<tr>
<td></td>
<td>Y2</td>
<td>.87</td>
<td>.86</td>
<td>.69</td>
</tr>
</tbody>
</table>

Coefficient of Determination

Also known as Squared Multiple Correlation (SMC), the Coefficient of Determination is the degree of explanatory power of “independent variable” regarding “dependent variable” under each implicit variable. In other words, the R2 value shown in Table 4 indicates that the implicit independent variable has adequate explaining ability on the implicit dependent variable respectively.

<table>
<thead>
<tr>
<th>Coefficients of Determination</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRMS (X)→ Organizational Performance (Y)</td>
<td>0.73</td>
</tr>
<tr>
<td>HRMS (X)→ Intellectual Capital (ME)</td>
<td>0.72</td>
</tr>
<tr>
<td>Intellectual Capital (ME)→ Organizational Performance (Y)</td>
<td>0.78</td>
</tr>
</tbody>
</table>

Path Coefficient of Implicit Variables in the Model

After the overall model passed an internal goodness-of-fit test, Table 5 shows the estimates of standardized path coefficient and Critical Ratio (C.R.) between latent/implicit variables. Figure 2 illustrates the results of path analysis.

<table>
<thead>
<tr>
<th>Parameter Estimates for Implicit Variables</th>
<th>Estimate</th>
<th>S.E.</th>
<th>C.R. value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRMS Organizational Performance</td>
<td>.524</td>
<td>.132</td>
<td>3.970</td>
<td>***</td>
</tr>
<tr>
<td>HRMS Intellectual Capital</td>
<td>.782</td>
<td>.133</td>
<td>5.880</td>
<td>***</td>
</tr>
<tr>
<td>Intellectual Capital Organizational Performance</td>
<td>.773</td>
<td>.124</td>
<td>6.234</td>
<td>***</td>
</tr>
</tbody>
</table>

Note: ***indicates a statistically significant C.R. value (α=0.001)
Analytical Testing of Path Effect for the Structural Model

Focused on the path coefficients between “implicit variables” (or unobservable variables) in the structural model, this study used Bayesian Estimation to conduct an analytical test of the path effect of structural model, with intellectual capital (ME) as the mediating factor, as shown in Table 6.

1. Since the path coefficient of HRMS (X) versus intellectual capital (ME) is $a_1 = 0.78$ with a 95% confidence interval (0.766, 0.799), the two variables have a significant linkage and a significant first-order efficacy.

2. Since the path coefficient of intellectual capital (ME) versus organizational performance (Y) is $b_1 = 0.77$ with a 95% confidence interval (0.761, 0.785), the two variables have a significant linkage and a significant second-order efficacy.

3. Since the path coefficient of HRMS (X) versus organizational performance (Y) is $c = 0.52$ with a 95% confidence interval (0.500, 0.547), the two variables have a significant linkage and a significant third-order efficacy.

Table 6: Bayesian Estimation

<table>
<thead>
<tr>
<th>Regression weights</th>
<th>Mean</th>
<th>S.D.</th>
<th>95% Lower bound</th>
<th>95% Upper bound</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRMS (X)→Intellectual Capital (ME)</td>
<td>0.782</td>
<td>0.378</td>
<td>0.766</td>
<td>0.799</td>
<td>$a_1$</td>
</tr>
<tr>
<td>Intellectual Capital (ME)→Organizational Performance (Y)</td>
<td>0.773</td>
<td>0.264</td>
<td>0.761</td>
<td>0.785</td>
<td>$b_1$</td>
</tr>
<tr>
<td>HRMS (X)→Organizational Performance (Y)</td>
<td>0.524</td>
<td>1.045</td>
<td>0.500</td>
<td>0.547</td>
<td>$c$</td>
</tr>
</tbody>
</table>

Table 7: Custom estimands

<table>
<thead>
<tr>
<th>Numeric Estimands</th>
<th>Mean</th>
<th>S.D.</th>
<th>95% Lower bound</th>
<th>95% Upper bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Efficacy $a_1$</td>
<td>0.782</td>
<td>0.378</td>
<td>0.766</td>
<td>0.799</td>
</tr>
<tr>
<td>Direct Efficacy $b_1$</td>
<td>0.773</td>
<td>0.264</td>
<td>0.761</td>
<td>0.785</td>
</tr>
<tr>
<td>Direct Efficacy $c$</td>
<td>0.524</td>
<td>1.045</td>
<td>0.500</td>
<td>0.547</td>
</tr>
<tr>
<td>Indirect Efficacy ($a_1*b_1$)</td>
<td>0.604</td>
<td>1.028</td>
<td>0.557</td>
<td>0.651</td>
</tr>
<tr>
<td>Total Efficacy ($c+a_1*b_1$)</td>
<td>1.128</td>
<td>1.037</td>
<td>1.083</td>
<td>1.173</td>
</tr>
<tr>
<td>The Ratio of Indirect Efficacy to Total Efficacy</td>
<td>0.535</td>
<td>0.046</td>
<td>0.533</td>
<td>0.537</td>
</tr>
</tbody>
</table>

We know from Table 7 that:

1. The estimand of Indirect Efficacy ($a_1*b_1$) is 0.604 with a 95% confidence interval (0.557, 0.651), indicating a significant linkage and significant indirect efficacy, which accounts for an estimated 53.5% of the total efficacy.
(2) Considering the significance of indirect efficacy and positive significance of direct efficacy, “intellectual capital” proves to be a partial mediator in HRMS’s influence on organizational performance.

Conclusions derived from the analysis above are:

1. As for whether there is a positive and significant influence of satisfactory HRMS implementation on the organizational performance of Taiwan-listed LED manufacturers, we found H1 supported with an estimated 0.52 standardized path coefficient (Hypothesis substantiated);
2. The satisfactory HRMS implementation has a positive and significant influence on intellectual capital at Taiwan-listed LED manufacturers, with an estimated 0.78 standardized path coefficient that supports H2 (Hypothesis substantiated); The accumulation of intellectual capital has a positive and significant influence on organizational performance at Taiwan-listed LED manufacturers, with an estimated 0.77 standardized path coefficient that supports H3 (Hypothesis substantiated);

**CONCLUSIONS AND SUGGESTIONS**

Based on the above-mentioned analyses and results, this chapter specifies the conclusions and contributions of this present study, followed by limitations facing the author during the research process and advice for future research.

**Conclusions**

In summary, this study surveyed presidents at Taiwan-listed LED manufacturers and adopted SEM to verify the influence of HRMS on organizational performance, using primary data obtained from the TEJ database. With intellectual capital adopted as the mediating variable, this study generated some conclusions that are specified as below.

1. **The influence of HRMS implementation on organizational performance**

The research findings show that H 1 is substantiated (i.e., an appropriate HRMS implementation affects the organizational performance in a significantly positive manner). That matches the arguments proposed by Delery & Doty (1996), Jia-Chi Huang (2000), Foss et al. (2000) and Jun-Long Hong (2002).

2. **The influence of HRMS implementation on intellectual capital**

The research findings show that H 2 is substantiated (i.e., an appropriate HRMS implementation affects intellectual capital in a significantly positive manner). That matches the arguments proposed by Mark A. Youndt (1998), Jun-Long Hong (2002) and Shu-Wen Xia (2007).

3. **The influence of intellectual capital on organizational performance**

The research findings show that H 3 is substantiated (i.e., intellectual capital affects organizational performance in a significantly positive manner). That matches the arguments proposed by Mei-Chun Chen (2001), Chaur-Shiuh Young (2006), Rudez and Mihalic (2007) and Shu-Hsiao Tsen et al. (2010).

The three conclusions above indicate a satisfying goodness-of-fit of the model established in this present study, with the accumulated intellectual capital at Taiwan-listed LED manufacturers being a partial mediator. The finding matches the argument of Baron and Kenny (1986) that “the partially mediating effect means that, when a mediating variable is added, the relationship between independent and dependent variables becomes weaker or less significant”.

**Contributions of This Present Study**

1. Findings from this study encourage, and inspire businesses to enhance corporate performance by implementing HRMS and accumulating intellectual capital, so as to ensure their continuous growth while boosting the potential of sustainable development.
2. While previous studies of appropriate HRMS implementation at Taiwan-listed LED manufacturers and organizational performance tend to focus on EFA, this present study performed modeling on the summarized results of previous literature in related fields. It also verified the model’s goodness-of-fit to find out if it has satisfying fit-of-goodness effects. Consequently, this study not only is a CFA-based one that addresses a crucial topic regarding business practices but also is worthy of further research in relevant fields.
3. Since this study built and verified dimensions/indices that are crucial factors for a company to create competitive advantages that last, it offers corporate managers/operators valuable information when making important decisions.

**Limitations**

Despite the limited resources, the author of this study managed to complete every stage of the research project carefully. But there still were some limitations, as stated below:

1. Given the limited amount of research resources, this study adopted convenience sampling to select from the population samples that may not fully reflect reality, which is the greatest limitation facing the study.
2. This study adopts both sales growth and EPS as indicators to measure the organizational performance. These indicators, however, were derived from the secondary data in TEJ database and cannot guarantee the accuracy; hence the potential failure to correctly reflect a company’s operating performance.

**Suggestions for Future Researches**

As a matter of fact, studies of relations among HRMS, intellectual capital and organizational performance are not only applicable to Taiwan-listed LED firms. Since opinions varied in previous researches over the definitions of HRMS and intellectual capital, and also over the measurement indicators for organizational performance, the author of this study decided to focus solely on the managers at Taiwan-listed LED manufacturers. To ensure extensive data collection or innovations/breakthroughs, future researches may as well conduct similar studies on companies of various natures or non-LED manufacturers, so as to find out qualities of a well-performing company and conduct cross-industry analyses/comparisons.

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