Relationships between Intellectual Capital and Enterprise Performance: Evidence from the Gambling and Tourism of Macau

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Abstract. In our developing economy intellectual capital has become an important issue. Taking full advantage of intellectual capital has become a focus for research. This paper discusses the relationship between the Value Added Intellectual Capital coefficient (VAIC) and enterprise value by using regression analysis based on the data from the listed casinos and hotels of Macau. The results confirm that increasing the VAIC creates value for enterprises. From the results, we believe that human capital is the core and foundation of intellectual capital.

Introduction

Intellectual capital is a new concept that has emerged recently. It has become an important factor in the development of core competencies for many companies. Capitalizing on intangible assets like intellectual capital has become a focus (Edvinsson, 2002). Prahalad & Hamel (1990) were the first to identify the close relationship between intellectual capital and core competitiveness. Sarvary (1999) looked into building intellectual capital management systems. Secundo et al., (2016) argued that the ability to manage intellectual capital is essential to maintaining competitive advantage. Karami & Torabi (2015) indicated that adoption of specific intellectual management strategies would create core competitive advantages. Edvinsson & Malone (1997) proposed that the gap between market value and book value could be attributable to intellectual capital and intangible assets. They believed that intellectual capital enables companies to develop their true value, maintain competitive advantage and achieve goals. They argued that intellectual capital could be divided into human capital and structural capital. Structural capital could be further divided into customer and organizational capital. Then organizational capital finally could be subdivided into innovation and process capital. This paper will discuss the Value Added Intellectual Coefficient (VAIC) and its worth to the company. We will present the background of the gambling and tourism of Macau in Section 2, literature review in Section 3, research design in Section 4, results in Section 5, and conclusions in the last section.

Literature Review

Value Added Intellectual Coefficient (VAICTM)

Pulic(1998) brought forward VAICTM, which was applied by Austria Research Center for Intellectual Capital (AICRC) as a model to evaluate the intellectual capital. The model cites concept of Skandia model, with the formula as follows: VAICTM=VACA+VAHU+STVA

Where, VACA= value added capital assets coefficient
VAHU= value added human capital coefficient
STVA= structure capital value added
According to added value created by VAICTM, Pulic(1998) advanced to differentiate the parts created by VACA and the parts created by intellectual potential(VAIP), of which the former was divided into real and financial assets, while the latter was the salary of employees. Both VACA and VAIP are results of service or labor provision by employees and have to rely on creation and maintenance of employees. Thus, employees are important elements to create an enterprise's VAIP. But, not all VAIPs are created by employees, as the enterprise itself will accumulate its own value. Such self-equipped enterprise value will not be derogated due to leaving or staying of employees. Problems including subjective judgments and inappropriate precise measurement happen to the indicators that are used in the past to evaluate intellectual capital. In addition, in the current knowledge-based economy, enterprises stress financial returns, and the evaluation of capital market against an economic behavior is finally subject to investors' rate of return and enterprises' market value. The past measurement indicators are not applicable to intellectual capital of all companies. Thus, measurement of intellectual capital should be based on the most fundamental financial information of an enterprise, as well as use efficiency of resources when it comes to measurement of intellectual capital of different enterprises. This also means that an enterprise's intellectual capital tends to be more highly praised, as long as its added value created with same resources is higher. Thus, the efficiency that facilitates to create the added value should be added into evaluation model of intellectual capital, so that Pulic(1998) improved the past measurement methods of intellectual capital by adding the factor of VAICTM.

According to Skandia's intellectual capital classification, Pulic(2000) modified its VAICTM proposed in 1998, and added STVA in the previous model. Thus, he classified use efficiency of added value created into: VACA, VAHU and STVA. He also categorized intellectual capital except the human resources into structure capital, thus STVA = intellectual capital (total added value) - human capital, which meant that the structure capital was negatively and symmetrically correlated to the human capital. In addition, the bigger those added value coefficients were, the better an enterprise's smart power became. By modifying the model of intellectual capital and adding the structure capital, Pulic (2000) provided sufficient basis for enterprises' management to evaluate use efficiency of their internal resources. VAIC proposed by Pulic & Bornemann (1999) is a standard and consistent measurement basis, which is applicable to any industry because its indicators are designed to evaluate use efficiency of enterprises' resources. Those indicators are relatively objective, with materials easily obtained. Schneider (2008) believed that as the information used in the course of VAIC calculation were information related to financial statements, an enterprise's external investors, debtors or other interested parties could obtain information related to measurement indicators within the lowest cost. The VAIC calculation method is easy to understand.

This paper cites the VAICTM proposed by Pulic(2000), which can reflect efficiency of added value created by an enterprise with the same resources. An enterprise which has higher VAICTM will have better ability to more efficiently use its resources. Such ability is intellectual capital. In addition, such measurement method can direct the investors to measure their intellectual capital with the simplest method. Thus, this paper uses the VAICTM to measure the intellectual capital of enterprises.

Research Method

Hypotheses

Intellectual capital components are Value Added Capital Assets (VACA), Value Added Human Capital (VAHU) and Structural Capital Value Added (STVA) according to Edvinsson and Malone (1997). VAIC is used as a proxy variable for intellectual capital to measure performance relevance. This paper makes the following assumptions with respect to enterprise performance:

Hypothesis 1: VAIC has a significantly positive correlation.

I. Hypothesis 1-1: VACA has a significantly positive correlation.
II. Hypothesis 1-2: VAHU has a significantly positive correlation.
III. Hypothesis 1-3: STVA has a significantly positive correlation.
Modelling

Correlation among intellectual capital and enterprise performance.

The influence of intellectual capital on ROA is measured. The model is constructed as follows:

\[ ROA_{it} = \alpha_0 + \alpha_1 CPI_{it} + \alpha_2 R_{it} + \alpha_3 DA_{it} + \alpha_4 VAIC_{it} + \alpha_5 LD_{it} + \alpha_6 OP_{it} + \alpha_7 TA_{it} + \varepsilon \]  \hspace{1cm} (1)

\[ ROA_{it} = \alpha_0 + \alpha_1 CPI_{it} + \alpha_2 R_{it} + \alpha_3 DA_{it} + \alpha_4 VACA_{it} + \alpha_5 LD_{it} + \alpha_6 OP_{it} + \alpha_7 TA_{it} + \varepsilon \]  \hspace{1cm} (2)

\[ ROA_{it} = \alpha_0 + \alpha_1 CPI_{it} + \alpha_2 R_{it} + \alpha_3 DA_{it} + \alpha_4 VAHU_{it} + \alpha_5 LD_{it} + \alpha_6 OP_{it} + \alpha_7 TA_{it} + \varepsilon \]  \hspace{1cm} (3)

\[ ROA_{it} = \alpha_0 + \alpha_1 CPI_{it} + \alpha_2 R_{it} + \alpha_3 DA_{it} + \alpha_4 STVA_{it} + \alpha_5 LD_{it} + \alpha_6 OP_{it} + \alpha_7 TA_{it} + \varepsilon \]  \hspace{1cm} (4)

ROA: Return On Assets; VAIC: Value Added Intellectual Capital; VACA: Value Added Capital Assets; VAHU: Value Added Human Capital; STVA: Structure Capital Value Added; OP: Operating Profit; DA: Debt-Asset Ratio; LD: Loan-Deposit Ratio; CPI: growth rate of local Consumer Price Index; TA: Total Assets; R: change rate of interest rate of the deposit with a term of 3 months; i: casino and hotel number; t: year; \( \varepsilon \): residual error of the model.

Results

Data sources are semi-annual reports during 2010 through 2015 from 10 listed casinos and hotels of Macau, Monetary Authority of Macau, and Government Printing Bureau of Macau. Pearson correlation analysis found from analysis of coefficients. ROA displays a statistically significant positive correlation coefficient with respect to: VAIC 0.315 (P<0.01), VACA 0.715 (P<0.01), VAHU 0.209 (P<0.05), STVA 0.331 (P<0.1). ROA is negatively correlated to: the growth rate of local consumer price index (coefficient = -0.156, P<0.1), the local change rate of interest rate of the deposit with a term of 3 months (R) (coefficient = -0.013, P<0.1), the debt-asset ratio (coefficient = -0.255, P<0.1), the loan-deposit ratio (coefficient = -0.125, P<0.1), the total assets (coefficient = -0.082, P<0.1).

It has a positive correlation with operating profit with a value of 0.154 (P<0.1) and can be used to represent the enterprise performance. The Hausman Test was applied to determine whether to use a fixed effect model or random effect model. P values of all models are significantly greater than 0.1, the random effect model was adopted. The generalized least square method (P=0) was used to correct for the heteroscedasticity and auto correlation. From Table 1, in the Ohlson model, VAIC displays a regression coefficient with a value of 1.8 at a significant level of 10% and has a positive relation with ROA.

i. For companies with quantile of 25, VAIC is positively correlated with ROA at a significant level of 10%, with a value of 1.77 (P<0.1) for Regression Coefficient. In the original Ohlson model 1, VAIC’s influence is weakened.

ii. For companies with a quantile of 50, VAIC is positively correlated with ROA at a significant level of 1%, with a value of 4.33 (P<0.01) for Regression Coefficient (RC).

iii. For companies with a quantile of 75, VAIC is not significantly correlated with ROA, with a value of 0.85 for Regression Coefficient. The adjusted R-squared is 56.77%, which means that VAIC can create value for a company. Hypothesis 1 stands.

In quantiles cases, hypothesis 1 is partially valid.

i. Adj R^2 of model 2 (VACA) in the Ohlson model is 71.33%, indicating that VACA can create value for a company. Hypothesis 1-1 stands. In the quantile case, hypothesis 1-1 is wholly valid.
ii. Adj $R^2$ of model 3 (VAHU) is 57.27%, confirming that VAHU can create value for a company and hypothesis 1-2 stands. In the quantiles cases, hypothesis 1-2 is partially valid.

iii. Adj $R^2$ of model 4 (STVA) is 55.97%, which means that STVA cannot create value for a company so that hypothesis 1-3 does not stand; in the quantiles cases, hypothesis 1-3 is also invalid.

Analysis
The emergence of intellectual capital has changed the ways and approaches of value creation. The relationship between intellectual capital and performance has been also a favorite topic of academia. In recent years, lots of literatures are involved in this topic. But most of them focus on the high-tech field, which indicates that the current studies on intellectual capital are still very narrow. In this paper, we try to explore the relationship between performance and components of intellectual capital at Macau gambling and tourism enterprises.

According to the resource-based view, the competitive advantage comes from own resources or disposable resources, such as land, equipment, capital, human resource and so on. Enterprises at different sizes and with various combinations of resources produce different operating efficiency (Wernerfelt, 1984). However, since the market tends to be more mature, some tangible components, such as land, equipment, and even human resource, could be obtained through equivalent exchange in market. Therefore, there is no direct cause-and-effect relationship between competitive advantage and tangible resources. In fact, it is the capacity of distributing and utilizing resources that brings about the competitive advantage. This capacity is the core competency of enterprise. The knowledge-based theory believes that the enterprise’s core competency depends on corporate knowledge and cognitive learning. Accordingly, knowledge eventually becomes the source of competitive advantage (Demsetz, 1988). The concept of intellectual capital has basically absorbed the core of these theories. And the classification of intellectual capital is the concrete manifestation of these theories in practice. Therefore, intellectual capital can be considered as the source of competitive advantage.

Conclusions and Suggestions
It has become a common recognition that intellectual capital is the ultimate resource of corporate value. Even though it is a known fact, enterprises with same intellectual capital may possess different market positions as well as market values. The problem is attributable to intellectual capital management. At present, the current intellectual capital management is not very optimistic. Only few enterprises implement special intellectual capital management system, and most of them are industrial leading enterprises. Besides, even fewer enterprises set up professional positions for intellectual capital management or knowledge management. In order to manage and acquire the value of intellectual capital, an enterprise must understand the context of its operations and defines its own values. Context is the basis of all intellectual capital management activities. It may come from the outside of enterprise, such as the length of product life cycle, competition, stability of operating environment, legal restriction and so on, and may also come from the inside, such as the enterprise’s development stage, and corporate values (Subramaniam & Youndt, 2005). Only by completely knowing the context, can an enterprise assess its intellectual capital and make full use of them. For a newly established enterprise and a mature enterprise, they undoubtedly have different management strategies and tactics. Similarly, for an enterprise in a changeable market and an enterprise in a stable market, they must take different approaches to manage their intellectual capital. It is undeniable fact. If we neglect this fact, it may lead to serious waste of materials and human resources.

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References


Tables

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Note: VAIC: value added intellectual capital; VACA: value added capital assets; VAHU: value added human capital; STVA: structure capital value added. * means p-value <10%; ** means p-value <5%; and *** means p-value <1%.