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Readiness of Intellectual Capital Measurement: A Review of the Property Development and Investment Industry

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***Abstract*—**In the knowledge economy, the financial indicator is not the unique instrument to gauge the performance of a company. The role of intellectual capital contributing to the company performance is increasing. To measure the company performance due to intellectual capital, the value-added intellectual capital (VAIC) model is adopted to measure the intellectual capital utilization efficiency of the subject companies. The purpose of this study is to review the readiness of measuring intellectual capital for the Hong Kong listed companies in the property development and property investment industry by using VAIC model. This study covers the financial reports from the representative Hong Kong listed property development companies and property investment companies in the period 2014-2019. The findings from this study indicated the industry is ready for IC measurement employing VAIC framework but not yet ready for using the extended VAIC model.

***Keywords*—**Intellectual capital, intellectual capital measurement, property development, property investment, Skandia Navigator, VAIC.

I. Introduction

THE increments of knowledge level in the regional economic operation and company operation are driving the growth of the knowledge economy. The input of intellectual elements to company operation is crucial to the company performance nowadays. In the Hong Kong stock market, the proportion of intangible assets contributing to the market valuation of listed companies are increasing, which reflect that the valuation of intellectual capital has been accepted by the industries and investors.

The role of property development companies is to provide continuous development and supply of properties in the real estate market. Meanwhile, the role of property investment companies is to make use of investment properties for revenue generation purposes. According to the data disclosed by the Hong Kong Exchanges (HKEX), the market capitalization of the property and construction industry ranked second highest amongst the 11 industries in the Hong Kong stock market between 2014 and 2018 [14], and ranked third highest amongst the 12 industries in the same stock market in 2019 [15]. The Hong Kong listed companies in the property and construction industry are running their property-related business focus primarily in either Hong Kong or Mainland China.

The income source of the companies primarily comes from physical properties, albeit the majority of the costs for property development and property investment are the land premium, acquisition of real estate properties, construction process and long-term property management. There are substantial intellectual inputs in the planning, design, construction and operation process of properties. However, the market value of the listed companies in this industry is dominated by its physical capital whilst the contribution by the intellectual capital (IC) is usually ignored. The measurement of intellectual capital is one of the possible ways to gauge the company performance. Hence, this is beneficial to the industry if the relationship between the intellectual capital performance and company financial performance of the listed companies can be determined. The pre-requisite for such research is the availability of relevant data from the company's financial reporting in the public domain.

This study aims to review the readiness of IC measurement in the property development and investment industry using VAIC model or its extended model with the further elaborated structural capital efficiency indicators. The financial reporting data disclosed from representative Hong Kong listed property development and investment companies in the period of 2014-2019 are adopted for this review.

II. Literature Review

Intellectual capital is an important factor for company survival and upkeep their competitive strength amongst the market players [9]. An evaluation system focusing on financial perspective is not sufficient for holistic evaluation of a company including intangible asset perspective. Sveiby [28] identified "Scorecard Approach" and "Analysis Approach" for measuring intangibles.

The scorecard approach is a strategic planning and management framework that aims to identify and improve the overall company performance through multiple performance aspects. Skandia Navigator developed by Leif Edvinsson, is one of the scorecard approaches formulated specifically for the measurement of intellectual capital. The system enables visualizing and developing intellectual, intangible and organizational business assets. Intellectual capital is acting as the balancing item between the difference of market value and

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financial capital [10]. The Skandia Navigator consists of five areas of focus, which are the aspect reporting the past results - financial focus; aspects illustrating the current status – customer focus, human focus and process focus; aspect for the future – renewal and development focus. The navigator aims to help a company navigate into the future and by means of fostering business renewal and development [19], [27]. The hierarchy of the multiple levels Skandia value framework enables different levels of IC measurement but depends on the data availability. Market value is located at the top level of the framework. The second level of the framework consists of capital employed and intellectual employed. The commonly understandable IC categories: human, relational and organizational capitals, are all inside the navigator and applicable for measuring the IC of a company. Customer capital and organizational capital form part of structural capital, whilst the spectrum of customer capital is expandable to other external relational capitals. The human capital and structural capital are the constituents of the third level of the framework. At the lowest level of the framework, innovation capital and process capital are the constituents of organizational capital.

The Direct Intellectual Capital Method is an analysis approach and focuses on the monetary value of the intangible assets and other value-added or value-creation factors. This method aims to convert various IC elements to monetary interpretation. Pulic [24], [25] first introduced the value-added intellectual coefficient (VAIC™) model in 1993. The primary objective of VAIC is to measure the efficiency of an organization's intellectual capital utilizing the financial data commonly found in the international accounting system and listed company's financial reports. The VAIC method is transparent and provides a solid foundation for the standardized measurement of IC. The efficiency indicators in terms of Human Capital Efficiency (HCE), Structural Capital Efficiency (SCE) and Capital Employment Efficiency (CEE), are the key components of the VAIC model. Some researchers described the VAIC model as a simple and effective approach for measuring the IC of a company [2], [16]. Besides, this is a standardized and consistent IC measurement method that enables the comparison across companies in an industry or across industries [17], [26]. All data used in the VAIC calculation are referenced to the information originating from the audited financial statements, the calculations are considered objective and verifiable.

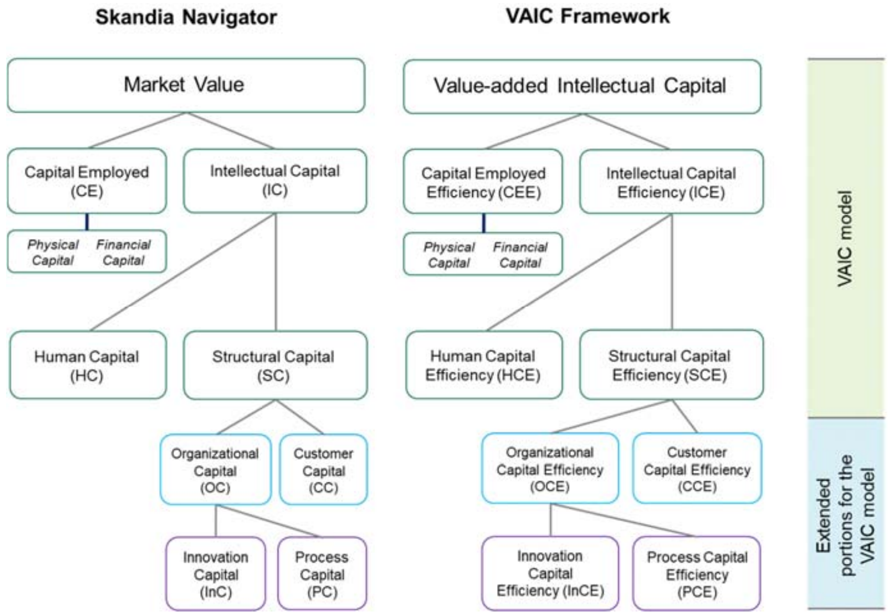

Fig. 1 Comparison of Skandia Value Framework and Extended VAIC Framework

Some researchers modified the VAIC model by looking into the details of elements embedded in the original efficiency indicators. The extended model, namely extended-VAIC model (eVAIC) as proposed by Nazari and Herremans [21] divided the Structural Capital Efficiency into Customer Capital Efficiency (CCE) and Organizational Capital Efficiency (OCE). The conceptual eVAIC model was inspired by a former study by Bontis [4] and makes use of the Skandia value framework to develop the national IC index. The extended VAIC model was developed regarding the Skandia Navigator's conceptual framework. The comparison of Skandia value framework and the extended VAIC framework is illustrated in the Fig. 1. Customer capital and organizational capital are the sub-sets of structural capital, and the organizational capital efficiency is further expandable and divided into Innovation Capital Efficiency (or namely as Renewal Capital Efficiency) (InCE) and Process Capital Efficiency (PCE) [11], [21].

III. Methodology

To determine the relationship between intellectual capital and company performance, IC efficiency indicators are adopted as the independent variables. Company performance indicators are dependent variables. The purpose of dependent variables is to measure the change in response to the change in independent variables and control variables during empirical analysis. Due to the operational and profit-making models are varying from different industries, there are more financial metrics may be required to evaluate the business landscape of a specific industry. For the listed companies, the data required for such analysis may be obtained from the public domain, particularly the company financial report. The annual financial reports of the sample companies in the defined period are adopted in the IC measurement readiness review and using content analysis method. There are a number of possible IC measurement levels under the VAIC framework. The level of readiness depends on the availability of the required data from the sample companies' annual financial reports.

A. Independent Variables

The VAIC model developed by Ante Pulic [24] is an objective and scalable method. The data used for the VAIC framework are all coming from the financial data reported from companies' financial reports, which making this method scalable.

i. 1st Level of IC Measurement – VAIC

The equation of VAIC as developed by Pulic [23] consisting of three efficiency ratios: CEE, HCE and SCE [3], [5], [7], [11], [22], and illustrated in (1). The three efficiency components are measuring the total value being created by value-added physical and intellectual components of an enterprise.

$$\text{VAIC} = \text{CEE} + \text{HCE} + \text{SCE} \tag{1}$$

Value Added (VA) is representing the value-added of a company and is the core element in the VAIC framework. This indicator is equivalent to the difference between Output and Input. Output is representing of the entire income in form of revenue from all the deliverables sold from the company, to the users in the market [5], [7], [8], [24]. Input is the entire expenses from a company but does not include employee and staff costs. The VAIC equation tells how much new value is added to the invested resources. Structural capital is equivalent to the difference between the value added component and human capital, as illustrated in (2) [3], [29]:

$$\text{VA} = \text{HC} + \text{SC} \tag{2}$$

Value-added can be further developed as the aggregation of employee cost and gross margin but minus the expenses due to sales, general and administration [3], [6]. The equation of VA is further defined in (3):

$$\text{VA} = \text{Employee Cost} + (\text{Gross Margin} - \text{Sales, general \& admin expenses}) \tag{3}$$

CEE represents the efficiency of a company that creates value by using its own capital, and can be calculated by the ratio of Value Added (VA) and Capital Employed (CE) [3], [5], [8], [11], as illustrated in (4). CE is technically equivalent to the Book Value (BV) or Total Equity of a company.

$$\text{CEE} = \text{VA}/\text{CE} = \text{VA}/\text{BV} \tag{4}$$

HCE can be determined by the ratio of the Value Added component and Human Capital (HC) [3], [5], [8], [11]. HC value is obtainable from the company's financial report, is equivalent to the Employee Cost (EC) of a company and as illustrated in (5). In the industry, there are many similar terms are describing the employee cost in some companies' financial reports, such as "Salaries and related expenses", "Staff Cost including directors' emoluments and retirement schemes contributions", "Employee benefit expenses", "Total salary of employees", "Total employee expenses", "salaries, bonus, pension costs, staff welfare, medical benefits, employee share option schemes, less capitalized in properties under development and construction in progress".

$$\text{HCE} = \text{VA}/\text{HC} = \text{VA}/\text{EC} \tag{5}$$

SCE can be determined by the ratio of Structural Capital (SC) and VA [3], [5], [8], [11], in which SC is equivalent to the Earnings before Interest, Taxes, Depreciation and Amortization (EBITDA) of a company, as illustrated in (6) [5], [11]. Earning, or, Net Income (NI) is synonymous with the Profit for the Year of a company as described in some financial reports. Some companies reported individual depreciation and amortization values, but some of them reported the combined depreciation and amortization value.

$$\text{SCE} = \text{SC}/\text{VA} = \text{EBITDA}/\text{VA} \tag{6}$$

ii. 2nd Level of IC Measurement – Extended VAIC with Customer Capital and Organizational Capital

VAIC method is a straightforward approach for measuring the intellectual coefficient of a company. Some arguments criticized the VAIC method addresses two elements of intellectual capital only, i.e., human and structural capitals. However, further elaboration on relational capital does not explicitly exist in the framework. The feasibility of the extension of VAIC is entirely depending on the availability of individual financial data disclosed from the company's financial report. The extended-VAIC (eVAIC) model as conceptualized by Nazari and Herremans [21], modified the classical VAIC framework and incorporated with two important value-creating elements from the Structural Capital Efficiency (SCE), which are (i) CCE, as well as (ii) OCE, as illustrated in (7):

$$\text{SCE} = \text{CCE} + \text{OCE} \tag{7}$$

Bayraktaroglu et al. [3] described that the extended version of VAIC model has higher explanatory power. Through this extension, the total number of efficiency indicators in the eVAIC model is increased to four indicators: CEE, HCE, CCE and OCE [21], as illustrated in (8).

$$eVAIC = CEE + HCE + CCE + OCE \quad (8)$$

CEE can be calculated by the ratio of Customer Capital (CC) and VA as illustrated in (9), in which CC is equivalent to the Marketing Cost (MC) [3], [11], [21]. The term Marketing Cost may not be used in all companies' financial reports, but MC is equivalent to other similar terms such as "Selling and Marketing Expenses", "Sales and Marketing Expenses". CCE, is also named Relational Capital Efficiency because its focuses on the relationship between a company his customers.

$$CCE = CC/VA = MC/VA \quad (9)$$

OCE can be calculated by the ratio of Organizational Capital (OC) and VA [11], [21], in which OC is equivalent to the similar terms "Operating Cost" or "Administrative Expenses" of a company as described in the financial report. OCE can be calculated by (10):

$$OCE = OC/VA \quad (10)$$

iii.3rd Level of IC Measurement – Extended VAIC with Innovation Capital and Process Capital

To further investigate the key elements of OC, it consists of Innovation Capital and Process Capital, which are equivalent to the Skandia Navigator context of Renewal and Development Focus and Process Focus respectively. Innovation Capital could be in form of the investment or expenditure to research and development activities, whilst Process Capital is the cost internal process. The process and internal practice activities are forming part of the OC. The extended VAIC formula with consideration of InCE and PCE [11], [21], as illustrated in (11):

$$eVAIC = CEE + HCE + CCE + (InCE + PCE) \quad (11)$$

B. Dependent Variables and Control Variables

Suitable financial performance indicators are important metrics to explain a company's progress towards its objectives and goals. When the indicators are reported externally, the readers, including investors and analysts, will review the company's performance through similar metrics. to compare the IC performance and company performance, the dependent variables selected are the widely recognized company financial indicators on market valuation, profitability and productivity perspectives, and adopted in a number of earlier intellectual capital and firm performance-related studies [3], [5], [8], [11]. The selected dependent variables for this study are (i) Market-to-Book Value Ratio (MV/BV), (ii) Return of Total Assets (ROA), (iii) Return of Equity (ROE), and (iv) Assets Turnover Ratio (ATO).

Due to the operational and profit-making models are varying from different industries, there are more financial indicators may be required to evaluate and explain the business landscape of a specific industry. Four control variables are selected for this study and relating to the solvency, liquidity, inventory and intangible assets perspectives. The indicator relating to Solvency (LEV) is commonly adopted as one of the control variables in earlier research on intellectual capital and company performance [5], [8], [11], [18], [20]. There are three possible solvency indicators, which are: (i) Debt to Equity Ratio, (ii) Equity Ratio, and (iii) Debt Ratio. The operation of the Property Development and Property Investment industry is demanding in both financial and physical capital input. Healthy cash flow is important in business operation. There are two possible liquidity indicators, which are: (i) Current Ratio and (ii) Quick Ratio. The valuation of inventory is determined by the costs incurred for the sake of acquiring and producing the inventory, and the cost of converting the inventory into the condition that is ready for sales. The administrative cost and sales cost is not included in the valuation. There are five possible inventory-related indicators, which are: (i) Inventory Turnover Ratio, (ii) Inventory to Total Assets Ratio, (iii) Inventory to Total Equity Ratio, (iv) Inventory to Total Turnover Ratio, and (v) Inventory to Total Earnings Ratio. Investigations of intangible assets in this industry is less common. The intangible assets, such as goodwill, license, patent, etc., are considered as part of the intellectual capital. Intangible Assets related indicators are selected for this study, such as: (i) Intangible Asset to Total Assets Ratio, (ii) Intangible Asset to Total Equity Ratio, (iii) Intangible Asset to Total Turnover Ratio, and (iv) Intangible Asset to Total Earnings Ratio.

C. Variables and Indicators Selected for Readiness Analysis

In summary, there are nine value-added efficiency indicators being reviewed for IC measurement, four company financial indicators to gauge the company performance, and four control variables to address the industry characteristics. The compositions of the variables are shown in Fig. 2.

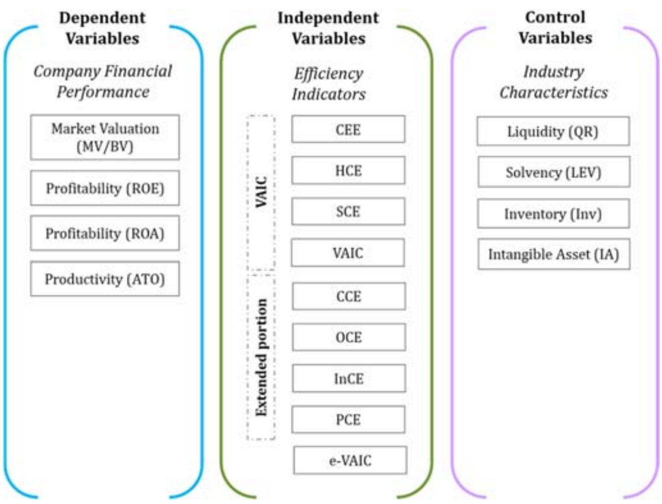

Fig. 2 Composition of independent variables, dependent and control variables

D. Sample Size

The total market capitalization of the property development and property investment industry is HK$5,039,263 million (i.e. US$646,059.36 Million approximately) at the reference date, 3 April 2019. The company with the largest market capitalization has its market value at HK$410,240 million, which is equivalent to 8.1% of the total market capitalization of the industry. The sample size in this study is 31 Hong Kong listed companies, consisting of 21 companies from the property development sub-sector and 10 companies from the property investment sub-sector. The total market capitalization of the 31 companies is HK$4,009,610 million, equivalent to 79.6% of the total capitalization of the industry. Amongst the 31 sample companies, 13 companies have their business focus in Hong Kong. The remaining 18 companies have their business focus in Mainland China.

E. Period of Data Set and Source of Data

Six fiscal years of data set obtained from the sample companies are used for the readiness review. If the companies with their financial year-end date on 31 December, the annual financial data obtained means the data from 1 January to 31 December of a year. If the companies with their financial year-end date on 30 June, annual financial data obtained means the data from 1 July to 30 June of a year. Hence, the period of data set is either from 2014 to 2018 or from 2014/2015 to 2018/2019. The data required for this readiness analysis are tentatively extracted from the public domain. The company's annual financial report is the source of the data for company performance indicators. All the published and official annual financial reports have been audited by independent auditors before being released to the public domain. The market valuation data is obtained from a prevalent online stock financial information platform in Hong Kong [1]. The platform offers real-time and comprehensive financial information and analytical tools on both websites and mobile platforms, etc.

IV. Results

There are around 22 financial parameters are connecting with the independent, dependent and control variables. The variables could be determined by the financial parameters directly, or obtained by the calculation from a number of financial parameters indirectly. Table I summarizes the data availability of all selected sample property development companies and sample property investment companies from the public domain.

The majority of the required financial indicators were disclosed from the sample companies. Seven out of 31 companies without disclosing marketing cost throughout the data collection period, such that customer capital or relational capital cannot be determined, whilst all those companies are operating property investment business. One property development company disclosed the cost of R&D in 2019 and another property development company disclosed the cost from 2017 to 2019 fiscal years. No such disclosure happened amongst the rest of the sample companies, such that InCE of the industry cannot be determined. There is no property development and property investment company that disclosed the cost of process such that PCE cannot be determined.

TABLE I
Summary of Financial Data Availability for Determining the Values of Independent, Dependent and Control Variables

	Financial Indicators	Data availability from all samples		Source of Data
		property development companies	property investment companies	
1	Market Capitalization (MV)	YES	YES	AASTOCKS.com
2	Revenue (Total Turnover)	YES	YES	Companies' Financial Reports
3	Net Income (Earnings)	YES	YES	Companies' Financial Reports
4	Total Assets	YES	YES	Companies' Financial Reports
5	Non-current Assets	YES	YES	Companies' Financial Reports
6	Current Assets	YES	YES	Companies' Financial Reports
7	Non-current Liabilities	YES	YES	Companies' Financial Reports
8	Current Liabilities	YES	YES	Companies' Financial Reports
9	Total Liabilities (debt)	YES	YES	Obtained by calculation
10	Total Equity	YES	YES	Companies' Financial Reports
11	Intangible Assets	YES	YES	Companies' Financial Reports
12	Inventory	YES	YES	Companies' Financial Reports
13	Employee Cost	YES	YES	Companies' Financial Reports
14	Marketing Cost	YES	NO	Companies' Financial Reports
15	Organizational Cost	YES	YES	Companies' Financial Reports
16	Cost of R&D	NO	NO	Not available in the publicly disclosed information
17	Cost of Process	NO	NO	
18	Taxation	YES	YES	Companies' Financial Reports
19	Interest	YES	YES	Companies' Financial Reports
20	Depreciation	YES	YES	Companies' Financial Reports
21	Amortization	YES	YES	Companies' Financial Reports
22	EBITDA	YES	YES	Obtained by calculation

The primary objective of disclosing annual financial data from listed companies' financial reports are for compliance with the listing rule of the Hong Kong Stock Exchange and for providing commonly interesting financial information for both investors and analysts. Hence, the data disclosed from the listed company's financial report may not tally with the requirements for IC measurement. Table II summarizes the data readiness for determining efficiency indicators of VAIC model. The data required from the representative sample companies are available for the VAIC model with three primary efficiency indicators – CEE, HCE and SCE.

TABLE II
DATA READINESS OF THE VAIC EFFICIENCY INDICATORS

VAIC Efficiency Indicators	Data availability from all samples	
	property development companies	property investment companies
Value Added (VA)	YES	YES
Capital Employed (CE)	YES	YES
Human Capital (HC)	YES	YES
Structural Capital (SC)	YES	YES
Capital Employed Efficiency (CEE)	YES	YES
Human Capital Efficiency (HCE)	YES	YES
Structural Capital Efficiency (SCE)	YES	YES
Value Added Intellectual Coefficient (VAIC)	YES	YES
Sufficient data for VAIC Model?	**YES**	**YES**

Table III summarizes the data readiness for determining efficiency indicators for the extended portion of VAIC model. Amongst the sample property development companies, the data required for organizational capital and customer capital are available, however, the data for the rest of extended indicators InCE and PCE are not available. Hence, eVAIC value of the property development sector cannot be determined. In the property investment sector, relevant financial data are available for the organizational capital only such that the extended portion of VAIC model cannot be determined as well.

TABLE III
DATA READINESS OF THE EXTENDED PORTION OF VAIC EFFICIENCY INDICATORS

eVAIC Efficiency Indicators	Data availability from all samples	
	property development companies	property investment companies
Organizational Capital (OC)	YES	YES
Customer Capital (CC)	YES	NO
Innovation Capital (InC)	NO	NO
Process Capital (PC)	NO	NO
Organizational Capital Efficiency (OCE)	YES	YES
Customer Capital Efficiency (CCE)	YES	NO
Innovation Capital Efficiency (InCE)	NO	NO
Process Capital Efficiency (PCE)	NO	NO
Extended VAIC (eVAIC)	NO	NO
Sufficient data for eVAIC Model?	**NO**	**NO**

Table IV illustrates the matrix of the availability of corresponding financial data used for determining the values of dependent and control variables, for the property development sector and property investment sector. The review disclosed that the parameters required for determining the variables can be calculated from individual financial data and available from the companies' financial reports.

TABLE IV
DATA READINESS OF THE DEPENDENT AND CONTROL VARIABLES FOR DETERMINING RELATIONSHIP BETWEEN INTELLECTUAL CAPITAL AND COMPANY PERFORMANCE

	Financial Indicators	Dependent Variables				Control Variables			
		MV/BV	ROE	ROA	ATO	Liquidity	Solvency	IA related ratio	Inventory related ratio
	Relevant Data obtained from the Market								
1	Market Capitalization	Yes	-	-	-	-	-	-	-
	Relevant Data obtained or calculated from Company Financial Report								
2	Revenue (Total Turnover)	-	-	-	Yes	-	-	Yes	Yes
3	Net Income (Earnings)	-	Yes	Yes	-	-	-	Yes	Yes
4	Total Assets	-	-	Yes	Yes	-	Yes	Yes	Yes
5	Non-current Assets	-	Yes	Yes	Yes	-	Yes	Yes	Yes
6	Current Assets	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes
7	Non-current Liabilities	-	Yes	-	-	-	Yes	Yes	Yes
8	Current Liabilities	-	Yes	-	-	Yes	Yes	Yes	Yes
9	Total Liabilities (Debt)	-	-	-	-	-	Yes	-	-
10	Total Equity (Book Value)	Yes	Yes	-	-	-	Yes	Yes	Yes
11	Intangible Assets	-	-	-	-	-	-	Yes	-
12	Inventory	-	-	-	-	Yes	-	-	Yes

V. CONCLUSION

The VAIC model is an objective and a direct intellectual capital method to measure the utilization efficiency of a company's intellectual capital. A certain level of financial data reporting is required for the listed companies according to the international or regional accounting system. Hence, industry-wise study on the relationship between IC performance and company performance becomes possible.

The review results disclose the readiness for various levels of IC measurement using VAIC model. In the property development sector and property investment sector, the basic financial data required for VAIC measurement are commonly found in listed company annual financial reports such that the 1st level of VAIC measurement is feasible. The 2nd level of IC measurement with the inclusion of extended efficiency indicators OCE and CCE is feasible for the property development sector but not ready for the property investment sector. The 3rd level of IC measurement with the inclusion of the sub-set of OCE, i.e., InCE and PCE, is not feasible for both the property development sector and property investment sector due to a heavy shortage of the required data.

The HKEX Listing Rules [12] set out the mandatory disclosure requirements on financial reporting, and also set out the mandatory Environment, Society and Governance (ESG) disclosure requirements on specified aspects [13]. However, the parameters of the disclosure are not tally with the VAIC measurement framework. Therefore, this is suggested to encourage voluntary disclosure of IC related financial data, particularly the expenses on research and development, innovation and renewal activities, cost on internal process and process enhancement, expense on customer relationship building. Through the measurement of the relationship between a company's IC status and company financial performance, the high impact IC factors towards better company performance specific for the property development and property investment industry could be determined.

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