

A BALANCE SHEET FOR KNOWLEDGE EVALUATION AND REPORTING

Ju-Chuan Wu

National Penghu University of Science and Technology, Taiwan
katejcwu@gmail.com

Chinho Lin

Institute of Information Management, National Cheng Kung University, Taiwan
linn@mail.ncku.edu.tw

Abstract:

Academics and practitioners working in the field of knowledge management (KM) have reached a consensus that knowledge is valuable and can benefit to organizations' long-term development and competitiveness. However, to believe knowledge is valuable that is no longer to satisfy the expectations and needs of top managers about the continue investment and implementation of KM since there is a difference between believing knowledge is valuable and "being able to assess this value and manage knowledge appropriately and this is one of critical challenges of KM. This study adopts the resource-based view (RBV) to evaluate and report knowledge assets using a balance sheet format, and attempts to provide a new perspective on the value of knowledge, and demonstrate the possible benefits of using financial statements to evaluate and report knowledge assets.

Keywords: Knowledge Management (KM), Knowledge Asset, Intellectual Capital, Resource-based View (RBV), Balance Sheet-based model

1. INTRODUCTION

In the past few decades, there has been growing interest in knowledge management (KM), and the related implementations have become increasingly sophisticated. It is also rapidly becoming an integral business function for many organizations, as they realize that competitiveness hinges on the effective management of intellectual resources, and the concept of KM has thus penetrated into many different business processes (V. Grover & T.H. Davenport, 2001).

Efficiently understanding and handling the distribution of valuable knowledge resources, a process that is connected to the allocation and source of assets in a business, best accomplishes the management of knowledge. However, how valuable is knowledge, and how can an organization assess its knowledge assets and their value? As many knowledge transactions do not use a common currency (Varun Grover & Thomas H. Davenport, 2001), it is necessary to modify current beliefs about knowledge assets, and to clarify how they can be evaluated.

Since the spread of knowledge within an organization can be considered as one type of organizational resource allocations, this study uses the resource-based view (RBV) (Barney & Hesterly, 2006) to observe the sources and allocations of assets within an organization, and proposes a conceptual format for knowledge evaluation and presentation. This study attempts to actualize knowledge evaluation on a balance sheet with a resource-based perspective, in order to better allocate resources allocations within an organization, and thus achieve better performance.

2. THEORETICAL BACKGROUND

2.1. Resource-Based View (RBV)

The resource-based view (RBV) is the dominant theoretical perspective in management science. It attributes superior financial performance to resources and skills that are firm-specific, rare, and difficult to imitate or substitute, and the RBV also has an organizational orientation, known as the VRIN framework (Barney, 2002). In contrast to traditional approaches that focus on the external analysis of industrial-organization economics, the RBV emphasizes the internal analysis of the differences in resource endowments across firms, and assumes that outstanding performance comes from the rents accruing to the owners of scarce firm-specific resources, rather than the economic profits from product market positioning. It also explains how having many different resources can be a source of sustainable competitive advantages (Wernerfelt, 1984), which in turn lead to sustainable superior performance.

The central premise of the RBV addresses the fundamental question of why firms are different and how they can achieve and sustain competitive advantages. RBV theorists have identified a number of important resource attributes (Newbert, 2007), and the key to the RBV is that sustainable competitive advantage can be achieved by appropriate allocation of resources and capabilities that are VRIN (value, rareness, inimitability, and non-substitutability) (Barney, 2002). In VRIN, value refers to the extent to which the firm's combination of resources fits the external environment, so that the firm is able to exploit opportunities and/or neutralize threats. Resources are thus valuable when they help to improve the firm's efficiency and effectiveness. Rareness refers to the physical or perceived physical rareness of the resources in the market. Resources need to be rare to provide a competitive advantage, otherwise valuable resources only provide competitive parity (Barney, 1991). Further, to the extent that the resource is difficult to imitate, a valuable and rare resource can help sustain a firm's competitive advantage (Barney, 1991). The sources of inimitability include (1) unique historical conditions under which resource bundles are created, (2) a causally ambiguous relationship between the resources and the resulting competitive advantage, and (3) the social complexity of the resources (Mata, Fuerst, & Barney, 1995). Finally, valuable, rare, and difficult-to-imitate resources can be a source of sustained competitive advantage to the extent that there are no substitutable resources (Barney, 1991). The VRIN attributes are thus adopted in this study to develop criteria to assess the value of knowledge, as will be explained in more detail below.

2.2. Knowledge Asset, Intellectual Capital, and Intangible Asset

Knowledge assets can be considered as “knowledge that exists in an organization that can be used to create differential advantage”. Knowledge management (KM) is a systematic method for managing individual, group and organizational knowledge using the appropriate means and technology. At its root it is to do with managing people, what they know, their social interactions in performing tasks, their decision making, the way information flows and the enterprise’s work culture (Abdullah, Kimble, Benest, & Paige, 2006). Indeed, knowledge has long been important to organizations as they strive to gain and maintain a competitive advantage (Wu, Ong, & Hsu, 2008).

As we trace the evolution of computing technologies in business, we can observe the changes of data, information, knowledge, and their levels of organizational impact. Knowledge has the highest value, the most human contribution, the greatest relevance to decision and actions, and the greatest dependence on a specific situation or context. It is also the most difficult of content types to manage, because it originates and is applied in the minds of human beings. People who are knowledgeable not only have information, but have the ability to integrate and frame the information within the context of their experience, expertise, and judgment. The practice of KM has benefited from several key concepts, which include tacit vs. explicit knowledge, knowledge process, codification vs. personalization, knowledge markets, communities of practice, intangible assets (Varun Grover & Thomas H. Davenport, 2001). Meanwhile, many observers have pointed out that formal accounting systems do not measure the valuable knowledge, intellectual capital, and other “intangible” assets of a corporation (Varun Grover & Thomas H. Davenport, 2001; Sveiby, 1997b).

Different from common tangible assets, knowledge is complex, dynamic, and intangible. In general, as Wilkins et al (1997) notes, a knowledge asset consists of facts (statements whose validity is accepted), assumptions, and heuristics which provide economic value to its possessor (Wilkins, van Wegen, & de Hoog, 1997) [12] (Wilkins, van Wegen, & de Hoog, 1997) (Wilkins, van Wegen, & de Hoog, 1997) (Wilkins, van Wegen, & de Hoog, 1997) [12] (Wilkins, van Wegen and de Hoog 1997) (Wilkins, van Wegen and de Hoog 1997) (Wilkins, van Wegen et al. 1997) (Wilkins, van Wegen et al. 1997). Knowledge is considered to be one of the most important assets for a firm to create a sustainable competitive advantage, and can be classified into four main types, as shown in Figure 1 (Nonaka, Toyama, & Konno, 2000).

Figure 1: Four Types of Knowledge Assets

Experiential Knowledge Assets Tacit Knowledge Shared through common experiences Skills and know-how of individuals Care, love, trust, and security Energy, passion, and tension	Conceptual Knowledge Assets Explicit Knowledge articulated through images, symbols, and language Product concepts Design Brand equity
Routine Knowledge Assets Tacit knowledge routinized and embedded in actions and practice Know-how in daily operations Organizational routines Organizational culture	Systemic Knowledge Assets Systemized and packaged explicit knowledge Documents, specifications, manuals Database Patents and licenses

Source: Nonaka, et al. 2000

A typical intangible asset cannot be bought or sold in an organized market, the verification of its existence may be impossible, it may not have a finite life, its value can fluctuate (which means that it should be submitted to the impairment analysis) and sometimes it is strongly inter-linked with a specific activity, product/ service or business. Intangible assets are thus commonly development expenditures, patents and trademarks, brand names, databases, human know-how, strategic alliances and processes. Despite that, individuals and companies have an expected future return and benefits based on the intangibles management (Lopes & Rodrigues, 2007). From the perspective of accounting, the term ‘intangible assets’ means identifiable assets that do not exist physically (Leitner, 2005). In the literature, intangible assets are sometimes also labeled as intellectual capital. Johanson and Skoog (2001) define intellectual capital as the way in which different intangible and tangible resources interact to produce an organization’s output.

To support the life cycle management of a virtual enterprise, the partner companies are not only required to provide resources and equipment for their part of the business, but are also required to bring along knowledge and technologies that are appropriate to the enterprise. These knowledge and technologies are often known as intangible assets, because they usually come with a team of people assigned to the virtual enterprise and will vary if a different group of people are involved (Mo & Zhou, 2003).

2.3. Knowledge Asset Evaluation and Reporting

Organizations require a way to value knowledge assets in order to make the best use of them, and Table 1 presents some of the approaches that have been used for this, using both financial and non-financial measures.

Table 1: Various Knowledge Asset Evaluation Approaches

Category	Evaluation
Financial	NPV, IRR, MIRR, WACC, market-to-book value, Tobin's Q cost methods, market methods, income methods, option-pricing methods, normalization earnings methods,
Non-Financial	Decision support system, CBR (case-based reasoning), ontology methodology, EIP (enterprise information portals), intellectual capital management system, intellectual capital value added, knowledge value added, balance scorecard, calculated intangible value, total value creation method,

Source: this research

However, traditional methods are inadequate when valuing knowledge-based organizations, in which most assets are intangible. High-tech companies, in particular, derive their value primarily from such assets, and it is very difficult to attach a value to things like R&D, because of their dynamic nature. Therefore, intangible assets are normally excluded from financial statements (Lopes & Rodrigues, 2007).

The Initiative for Managing Knowledge Assets (MKA) defines knowledge as “the experience and wisdom employees have (mostly in their heads) about such varied things as making decisions when faced with incomplete information, forming judgments based on learning and experience, policies and procedures, complex organizational relationships, rules of thumb used in different situations, theories and reasoning about past or present business success”. There have been many different attempts to evaluate and reporting intellectual capital, as shown in Table 2.

Table 2: Different Evaluations of Intellectual Capital

Year	Intellectual capital Evaluation
1980~	Human Resources Cost Accounting (Flamholtz, Das, & Tsui, 1985)
1990~	Balanced Scorecard (Kaplan & Norton, 1992) Dow's chemical value platform (Petrash, 1996) Tobin's Q (Lewellen & Badrinath, 1997) Market-to-book value (Chakravarthy, 1986); Knowledge capital earnings, KCE (Lev, 1997); Economic Value Added, EVA (Biddle, Bowen, & Wallace, 1997; Stewart III, 1994); Calculated intangible value (Stewart, 1997) Intellectual Capital Index, IC – Index (Roos, Roos, & (1997) . Long Range Planning, 1997); Skandia Navigator (Edvinsson & Malone, 1997); Intangible asset monitor (Sveiby, 1997a); Danish guidelines (Dati, 1997, 2000) Investor assigned market value – IAMV (Standfield, 1998); IC audit model (IFAC, 1998)
2000~	Total value creation, TVC (Anderson & Mclean, 2000); The value explorer (Andriessen & Tiessen, 2000); Intellectual asset valuation (Sullivan, 2000); Inclusive valuation methodology – IVM Value Chain Scoreboard (Lev, 2001)

Source: this research

2.4. The Balance Sheet Approach

The Financial Accounting Standard Board (FASB) adopted a balance sheet-based model of financial reporting about thirty years ago, and this model has been gradually been applied in many countries around the world (McGregor, 2007; Samuelson, 1965; Storey, 1998). FASB considers the concept of an “asset” as the most fundamental one in accounting, with other concepts being derivative and secondary. In a balance sheet, “liabilities” are essentially the converse of “assets”, “equity” is the residual of assets and liabilities; “revenues” are increases in assets or decreases in liabilities, and “expenses” are decreases in assets or increases in liabilities. The results of business operations can be summarized into a balance sheet, income statement, statement of cash flows, and statement of change in stockholder’s equity, which are the main elements of a financial statement.

The balance sheet approach would make sense if firms were “asset greenhouses,” where the primary mission of the firm is to earn money by acquiring, storing, and growing assets, and earnings represents the realized or unrealized growth in these assets (Dichev, 2008). The balance sheet approach views assets as the store of value and earnings as “changes in net assets,” which implies low persistence and predictability of earnings. Balance sheet accounting is pure mark-to-market accounting, where every asset and liability is updated to market or fair value each period, and it is well-known that market values changes are unpredictable.

3. PROPOSED CONCEPTUAL FORMAT OF KNOWLEDGE EVALUATION AND REPORTING

Six basic conceptual assumptions are adopted in this study from work, as follows:

- (1) Knowledge is part of a firm’s resources, and sustainable competitive advantages can be achieved by the appropriate allocation of resources and capabilities
- (2) Knowledge is demand-oriented and with VRIN attributes, and the value of a knowledge asset depends on the needs of the business
- (3) The value of a knowledge asset is relative, rather than an absolute number in common currency
- (4) The value of a knowledge asset can be calculated and accumulated
- (5) The value of knowledge value is very liquid

A conceptual format was developed to quickly check the value of knowledge assets within an organization using VRIN criteria and a balance sheet approach as shown in Figure 2.

The debit side shows the allocation of knowledge assets within an organization, and it priority by the liquidity of knowledge asset as well as the possibility of converting common currency and the frequency. The credit side describes the sources of knowledge assets, which can be external or internal.

Figure 2: Proposed knowledge asset balance sheet of Knowledge

ABC Company		
Balance Sheet of Knowledge		
Date:		
Debit	Knowledge Asset	Credit
(Allocations of Resource)		External
		Internal
	Sum of Assets	Sum of Extranal and Internal Resources
		(Sources of Resouces)

Source: this research

4. APPLING THE PROPOSED FORMAT TO REPORT KNOWLEDGE ASSETS

We interviewed some managers of high-tech companies face-to-face at the end of 2010, and asked for their opinions of our conceptual format, and most of them stated that it would be an example balance sheet is shown in Figure 3. For clarify, we only focus on patents, and examine how many patents they hold on hand, using the VRIN criteria to assess the relevance of each patent to the firm's, with details of their liquidity on the debit side, and whether they are external or internal on the credit side.

Figure 3: An Example Knowledge Asset Balance Sheet

ABC Company			
Balance Sheet of Knowledge			
2010/12/31			
Knowledge Asset	External		
Patent 1	1.00	Patent 1	0.3
Patent 2	1.00	Patent 2	0.4
Patent 3	1.00	Patent 3	0.5
		sub-total	1.2
		Internal	
		Patent 1	0.7
		Patent 2	0.6
		Patent 3	0.5
		sub-total	1.8
Total Knowledge Assets	3.00	Total External and Internal Sources	3.00

Source: this research

5. CONCLUSIONS

The initial findings in this study suggested that: (1) the respondents agreed that knowledge asset's are important to their firm to sustain competitive advantage; (2) the participants agreed that assumptions used in this work about knowledge assets are reasonable; (3) instead of converting knowledge asset into a common currency, it is necessary to provide a simple and easy evaluation approach to assess knowledge assets; and (4) most respondents agreed that the proposed evaluation and reporting approach is helpful for checking and managing their knowledge assets, using the resource-based view and a balance sheet model.

Based on the results of this study, academics may gain insights into the role and value of knowledge assets in a business, and can make use of the evaluation process presented in this work to re-think the definition of knowledge assets. For practitioners, this study provides a simple and easy to understand approach to evaluate and manage knowledge assets within an organization, thus enabling better KM practices.

Future research could be conducted to verify the model and knowledge asset evaluation method presented in this work.

REFERENCE LIST

1. Abdullah, Mohd Syazwan, Kimble, Chris, Benest, Ian, & Paige, Richard. (2006). Knowledge-based systems: a re-evaluation. *JOURNAL OF KNOWLEDGE MANAGEMENT*, 10(3), 127-142.
2. Anderson, R., & Mclean, R. (2000). Accounting for the creation value. Retrived from <http://cpri.matrixlinks.ca/tvc/Pressentations/TVCPresent/index.htm>
3. Andriessen, D., & Tiessen, R. (2000). *Weightless Weight -Find Your Real Value in a Future of Intangible Assets*. London: Pearson Education.
4. Barney, J. B. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99-120.

5. Barney, J. B. (2002). *Gaining and Sustaining Competitive Advantage*. Upper Saddle River, NJ: Prentice-Hall.
6. Barney, J. B., & Hesterly, W. S. (2006). *Strategic Management and Competitive Advantage*. New Jersey: Pearson Prentice Hall.
7. Biddle, Gary C., Bowen, Robert M., & Wallace, James S. (1997). Does EVA® beat earnings? Evidence on associations with stock returns and firm values. [doi: DOI: 10.1016/S0165-4101(98)00010-X]. *Journal of Accounting and Economics*, 24(3), 301-336.
8. Chakravarthy, Balaji S. (1986). Measuring Strategic Performance. *Strategic Management Journal*, 7, 22.
9. Dichev, Iliia D. (2008). On the Balance Sheet-Based Model of Financial Reporting. *Accounting Horizons*, 22(4), 453-470.
10. Edvinsson, Leif , & Malone, Michael S. (1997). *Intellectual Capital: Realizing Your Company's True Value by Finding its Hidden Roots*. New York: HarperCollins Publishers, Inc.
11. Flamholtz, Eric G., Das, T. K., & Tsui, Anne S. (1985). Toward an integrative framework of organizational control. [doi: DOI: 10.1016/0361-3682(85)90030-3]. *Accounting, Organizations and Society*, 10(1), 35-50.
12. Grover, V., & Davenport, T.H. (2001). General Perspectives on Knowledge Management: Fostering a Research Agenda. *Journal of Management Information Systems*, 18(1), 5-21.
13. Grover, Varun, & Davenport, Thomas H. (2001). General Perspectives on Knowledge Management: Fostering a Research Agenda. *J. Manage. Inf. Syst.*, 18(1), 5-21.
14. The Measurement and Management of Intellectual Capital: An Introduction (1998).
15. Kaplan, Robert S., & Norton, David P. (1992). The Balanced Scorecard Measures That Drive Performance. *Harvard Business Review*.
16. Leitner, K.H. (2005). *Managing and reporting intangible assets in research technology organisations*. *R & D Management*, 35(2), 12.
17. Lev, Baruch. (1997). The boundaries of financial reporting and how to extend them Industrial Competitiveness in the Knowledge-Bsed Economy, OECD, Stockholm.
18. Lev, Baruch. (2001). *Intangibles: management, measurement, and reporting* Washington, D.C.: The Brookings Institution.
19. Lewellen, Wilbur G., & Badrinath, S. G. (1997). On the measurement of Tobin's q. [doi: DOI: 10.1016/S0304-405X(96)00013-X]. *Journal of Financial Economics*, 44(1), 77-122.
20. Lopes, Ilídio Tomás, & Rodrigues, Ana Maria Gomes. (2007). Intangible Assets Identification and Valuation – a Theoretical Framework Approach to the Portuguese Airlines Companies. *Electronic Journal of Knowledge Management*, 5(2), 193 - 202.
21. Mata, F. J., Fuerst, W. L., & Barney, J. B. (1995). Information technology and sustained competitive advantage: a resource-based analysis. *MIS Quarterly*, 19(4), 487-505.
22. McGregor, W. , and D. L. Street. (2007). IASB and FASB face challenges in pursuit of joint conceptual framework. *Journal of International Financial Management & Accounting*, 18(1), 39-51.
23. Mo, J.P.T., & Zhou, M. (2003). Tools and methods for managing intangible assets of virtual enterprise. *Computers in Industry*, 51(2), 14.
24. Newbert, S. L. (2007). Empirical research on the resource-based view of the firm: an assessment and suggestions for future research. *Strategic Management Journal*, 28(2), 121-146.
25. Nonaka, Ikujiro, Toyama, Ryoko, & Konno, Noboru. (2000). SECI, Ba and Leadership: a Unified Model of Dynamic Knowledge Creation. [doi: DOI: 10.1016/S0024-6301(99)00115-6]. *Long Range Planning*, 33(1), 5-34.
26. Petrash, G. (1996). Dow's journey to a knowledge value management culture", , Vol. 14 No. 8, pp. 365-73. *European Management Journal*, 14(8), 9.
27. Roos, G., Roos, J. , & (1997) . Long Range Planning, 30(3), 413-426. (1997). Measuring your Company's Intellectual Performances. *Long Range Planning*, 30(3), 14.
28. Samuelson, P. (1965). Proof that properly anticipated prices fluctuate randomly *Industrial Management Review*, 6, 41-69.
29. Standfield, K. (1998). Extending the intellectual capital framework. Retrived from www.knowcorp.com/article075.com
30. Stewart III, G.B. (1994). EVA: Fast or Fantasy? . *Journal of Applied Corporate Finance*, 7, 7.
31. Stewart, T.A. (1997). *Intellectual Capital: The New Wealth of Organizations*. London: Nicholas Brealey.

32. Storey, R., and S. Storey. (1998). *The Framework of Financial Accounting Concepts and Standards*. Norwalk, CT: FASB.
33. Sullivan, Patrick H. (2000). Valuing intangibles companies –An intellectual capital approach *Journal of Intellectual Capital*, 1(4), 13.
34. Sveiby, K. E. (1997a). The Intangible asset monitor. *Journal of Human Resource Costing and Accounting*, 2(1), 25.
35. Sveiby, K. E. (Ed.). (1997b). *The New Organizational Wealth: Managing and Measuring Knowledge-Based Assets*. San Francisco: Berrett-Koehler.
36. Wernerfelt, B. (1984). A resource based view of the firm. *Strategic Management Journal*, 5(2), 171-180.
37. Wilkins, Jeff, van Wegen, Bert, & de Hoog, Robert. (1997). Understanding and valuing knowledge assets: Overview and method. [doi: DOI: 10.1016/S0957-4174(97)00022-5]. *Expert Systems with Applications*, 13(1), 55-72.
38. Wu, L. C., Ong, C. S., & Hsu, Y. W. (2008). Knowledge-based organization evaluation. *Decision Support Systems*, 45(3), 541-549. doi: 10.1016/j.dss.2007.06.013