

INTELLECTUAL CAPITAL AND ITS MEASUREMENT

By

David H. Luthy
Professor of Accounting

College of Business
Utah State University
Logan, Utah USA 84322-3500

E-mail: luthy@b202.usu.edu
Phone: 1-435-797-2429
Fax: 1-435-797-3929

Theme: New Forms of Accounting and Auditing

Key Words: Intellectual Capital, Intangible Assets, Measurement

INTELLECTUAL CAPITAL AND ITS MEASUREMENT

ABSTRACT

Intellectual capital is becoming the preeminent resource for creating economic wealth. Tangible assets such as property, plant, and equipment continue to be important factors in the production of both goods and services. However, their relative importance has decreased through time as the importance of intangible, knowledge-based assets has increased. This shift in importance has raised a number of accounting questions critical for managing assets such as brand names, trade secrets, production processes, distribution channels, and work-related competencies.

This paper develops a working definition of intellectual capital and a framework for identifying and classifying the various components of intellectual capital. In addition, methods of measuring intellectual capital at both the individual-component and organization levels are presented. This provides an exploratory foundation for accounting systems and processes useful for meaningful management of intellectual assets.

INTELLECTUAL CAPITAL AND ITS MEASUREMENT

INTRODUCTION

Intellectual capital is becoming the preeminent resource for creating economic wealth. Tangible assets such as property, plant, and equipment continue to be important factors in the production of both goods and services. However, their relative importance has decreased through time as the importance of intangible, knowledge-based assets has increased. This shift in importance has raised a number of questions critical for managing intellectual capital. How does an organization assess the value of such things as brand names, trade secrets, production processes, distribution channels, and work-related competencies? What are the most effective management processes for maximizing the yield from intellectual assets?

Virtually every sector of the economy has felt the impact of increased intellectual capital. In the steel industry the labor cost per ton of steel has been reduced significantly. In the airline industry reservation systems have become a major source of revenue. In manufacturing, product design is handled on computers without the need for drawings or markups. The list goes on and on. In addition, intellectual capital has contributed to the creation of whole new types of businesses and ways of doing business. In fact, many companies rely almost completely on intellectual assets for generating revenues. For example, the software industry is primarily knowledge based with most products never taking a tangible form; being created and delivered electronically.

The critical competitive importance of intellectual capital in today's economy indicates a need for high performance systems to manage them. Recent advances associated with total quality management, reengineering, learning organizations, and other initiatives have accomplished much. However, the management of intellectual capital is, at best, ad hoc in most organizations. One reason is that traditional accounting systems are not well equipped to measure or monitor most elements of intellectual capital. Another reason is that the management of intellectual capital is considered by many as synonymous with workforce management. However, intellectual capital encompasses more than people and, therefore, requires a more comprehensive approach.

The objective of this paper is to develop a working definition of intellectual capital and a framework for identifying and classifying the various components of intellectual capital. In addition, methods of measuring intellectual capital at both the component and organization levels are presented. The intent is to provide an exploratory foundation for the development of systems and processes useful for meaningful management of intellectual assets. The coming preeminence of intellectual capital as a value-adding element in modern organizations requires this attention.

DEFINITION OF INTELLECTUAL CAPITAL

There is no generally accepted definition of intellectual capital. However, many have offered views that provide a general concept. One of the most succinct definitions of

intellectual capital is given by Stewart (1997, p. 67) as “packaged useful knowledge.” He explains that this includes an organization’s processes, technologies, patents, employees’ skills, and information about customers, suppliers, and stakeholders. Various other definitions use concepts such as ability, skill, expertise, and other forms of knowledge that are useful in organizations. A comprehensive definition of intellectual capital is offered by Brooking (1996, p. 12). “Intellectual capital is the term given to the combined intangible assets which enable the company to function.”

Important underlying concepts in these definitions include the notion that intellectual capital is something that is knowledge based, captured in an identifiable form, and useful in organizations. Intellectual capital is not simply available, free-floating human brainpower.

These definitions and underlying concepts provide a useful foundation for understanding intellectual capital. However, they lack the specificity necessary to identify, classify, and measure individual assets. To assist in these tasks, several researchers have provided classification schemes that help in understanding the components of intellectual capital.

COMPONENTS OF INTELLECTUAL CAPITAL

Edvinsson and Malone (1997) and Brooking (1996) are pioneers in working with intellectual capital. Their views are complementary even though not identical. Differences in their views are easily reconciled when the objectives of the writers are understood. Edvinsson and Malone’s objective was to explain the importance of intellectual capital in organizations including its key features, measures, and management approaches. They view management of intellectual capital as a vital step in building a wealth-enhancing and value-sustaining organization.

Brooking has many of the same objectives in writing as Edvinsson and Malone except that she views the components of intellectual capital for audit purposes. Brooking emphasizes the processes of identifying, documenting, and measuring intellectual capital. She describes an audit methodology for helping organizations achieve their goals through proper management of intellectual assets.

The remainder of this section contains a more detailed discussion of the components of intellectual capital as viewed by these writers. Figure 1 contains a brief outline of their views.

Take in Figure 1.

According to Edvinsson and Malone, intellectual capital takes three basic forms: human capital, structural capital, and customer capital. Human capital includes knowledge, skills, and abilities of employees. Human capital is an organization’s combined human capability for solving business problems. Human capital is inherent in people and cannot be owned by organizations. Therefore, human capital can leave an organization when

people leave. Human capital also encompasses how effectively an organization uses its people resources as measured by creativity and innovation.

Structural capital is everything in an organization that supports employees (human capital) in their work. Structural capital is the supportive infrastructure that enables human capital to function. Structural capital is owned by an organization and remains with an organization even when people leave. Structural capital includes such traditional things as buildings, hardware, software, processes, patents, and trademarks. In addition, structural capital includes such things as the organization's image, organization, information system, and proprietary databases.

Because of its diverse components, Edvinsson and Malone classify structural capital further into organizational, process and innovation capital. Organizational capital includes the organization philosophy and systems for leveraging the organization's capability. Process capital includes the techniques, procedures, and programs that implement and enhance the delivery of goods and services. Innovation capital includes intellectual properties and intangible assets. Intellectual properties are protected commercial rights such as copyrights and trademarks. Intangible assets are all of the other talents and theory by which an organization is run.

Customer capital is the strength and loyalty of customer relations. Customer satisfaction, repeat business, financial well-being, and price sensitivity may be used as indicators of customer capital. The notion that customer capital is separate from human and structural capital indicates its central importance to an organization's worth. The relationship with customers is distinct from other relationships either within or outside an organization.

Brooking (1996, p. 13) suggests that intellectual capital is comprised of four types of assets: (1) market assets, (2) intellectual property assets, (3) human-centered assets, and (4) infrastructure assets. Market assets consist of such things as brands, customers, distribution channels, and business collaborations. Intellectual property assets include patents, copyrights, and trade secrets. Human-centered assets include education and work-related knowledge and competencies. Infrastructure assets include management processes, information technology systems, networking, and financial systems. A listing of the assets in each of these categories is provided in Appendix A.

MEASURING INTELLECTUAL CAPITAL

There are two general methods for measuring intellectual capital. The first method is to do a component-by-component evaluation. This includes using units of measure appropriate for each component. For example, market share, the value of patents, and the number of work-related competencies each have unique units of measure. In addition, different measures have different relevance and usefulness at different levels in an organization. For example, quantity measures are usually more relevant at the work unit level and financial measures are usually more relevant at the organization level. To be effective, all of these measures, whatever the unit of measure or where ever used in an

organization, must be aligned so they reflect a common understanding of purpose and direction when looking at the organization as a whole.

The second method is to measure the value of intellectual assets in financial terms at the organization level without reference to individual components of intellectual capital. Shareholder value is a key indicator in today's economy of how effectively managers employ intellectual and other assets. Therefore, measures expressed in financial terms that take into account the synergistic effect of intellectual assets at the organization level provide a key measure of progress and value.

Component-by-component Measurement

Explored previously in this paper are two ways to classify the components of intellectual capital. These classification models are the basis for two component-by-component measurement approaches discussed in this section of the paper. The Edvinsson/Malone model is the basis for the Skandia "Navigator" approach to measurement. This approach is illustrated with information published in a supplement to Skandia's annual report to shareholders. The Brooking model is the basis for the "Dream Ticket" and Target approach that is illustrated as part of an intellectual capital audit.

The business literature contains several other performance evaluation models that relate to the measurement of intellectual capital. These models include the "balanced scorecard" developed by Kaplan and Norton (1996) and the "dashboard" reported by the Conference Board (1997). Discussion of these and other approaches to performance evaluation as they relate to intellectual capital is beyond the scope of this paper.

Edvinsson/Malone Approach – Skandia "Navigator" Example. Skandia, a Swedish insurance and financial services company, published a supplement to its 1994 annual report entitled "Visualizing Intellectual Capital in Skandia" (Skandia, 1995). Leif Edvinsson is the corporate director of intellectual capital for Skandia.

The philosophy behind the report was that traditional financial statements represent only past financial information about an organization. Additional information about intellectual capital is needed to understand both an organization's current and future capabilities. To fill this void, Skandia developed a framework for reporting that combined traditional financial reporting with measures of intellectual capital. This reporting framework is called a "navigator" for two reasons. First, it is intended to guide an organization in managing intellectual assets. Second, it is intended to guide people through a comprehensive set of measures that represent the true resources, capabilities, and future potential of an organization. A diagram of the Skandia Navigator is shown in Figure 2 (Edvinsson and Malone, 1997, p. 68).

Take in Figure 2.

The navigator includes five areas of focus. Each area relates to a component of intellectual capital in the Edvinsson/Malone approach. A financial focus is added to the

broader intellectual capital focus to provide the historical financial perspective. Note how the Human Focus is placed at the center of the navigator indicating its key role as the active intelligence of an organization.

The Renewal & Development Focus does not have an exact counterpart in the Edvinsson/Malone approach but includes Innovation Capital and other measures that indicate how well an organization is preparing itself for the future. For example, Renewal & Development includes such things as the rate of new product design, efforts in developing new markets, and a description of new management practices that will help the organization operate more effectively in the future.

Figure 3 provides a partial listing of Customer Focus measures contained in the 1994 “Visualizing Intellectual Capital in Skandia” report. A complete listing of measures along with other Customer Focus metrics that might be applicable in various organizations can be found in Edvinsson and Malone (1997, pp. 96-99).

Take in Figure 3.

Brooking Approach – “Dream Ticket”/Intellectual Capital Audit Example. Brooking et al (1997) present a methodology for auditing intellectual capital and two case studies where the method is used to evaluate the ability of these organizations in meeting their goals. The audit methodology identifies and measures attributes of an organization that do not appear on traditional financial statements. The attributes emphasized in the intellectual capital audit are the components described in Brooking (1996) as listed in Appendix A.

The audit model consists of seven elements: the goal, intellectual capital, “dream ticket,” audit, index, target, and measures. The goal provides the context for the audit and the reason why the intellectual assets are being measured. Intellectual assets are those components listed in the Brooking approach. The “dream ticket” describes the set of intellectual assets that must be present for the organization’s goal to be met. The audit is the activity of gathering information about the strengths and weaknesses of the intellectual assets that make up the “dream ticket.”

Using data from the audit, an index is constructed by comparing audit results with the “dream ticket” for each intellectual asset. If the status of the intellectual asset matches the “dream ticket,” it is given a high score. If the asset is very weak in relationship to the “dream ticket,” the asset may be given a score as low as zero. A partial “dream ticket” showing intellectual capital audit results is shown in Figure 4. Importance levels and audit results are shown for Market Assets only. “Dream ticket” descriptions for the Market Assets are abbreviated. Hypothetical information about the other intellectual capital assets is not shown.

Take In Figure 4.

Scores for each intellectual asset are then plotted on a target that is used to represent the status of all intellectual assets. The target is divided into four quadrants, each representing a category of intellectual assets. An example of a target is provided in Figure 5 using the information about Market Assets in Figure 4 plus other hypothetical information to make the presentation complete.

Take In Figure 5.

The size of each quadrant in the target is not representative of the relative importance of that intellectual asset group. However, the larger the bullet hole representing an individual asset, the more important the asset is to accomplishing an organization's goals. A bullet hole with a larger outline surrounding it represents an asset with growing importance. Directional arrows show whether the asset is becoming stronger (moving toward the center of the target) or weaker (moving away from the center of the target). Coupling of assets is shown by connecting lines to indicate interdependence or the need for intellectual assets to move together toward the target.

The target provides a quick view of the strengths and weaknesses in intellectual assets along with an assessment whether the situation is expected to become better or worse. Audit results for each intellectual asset provide the basis for actions to improve their value.

Organization Level/Financial Basis Measurement

Stewart (1997, p. 224-29) suggests three measures of intellectual capital at the organization level: market-to-book ratio, Tobin's q, and calculated intangible value. The general idea with these measures is to determine what value the stock market gives a company compared with the value given the company as indicated on the company's balance sheet. Any difference is ascribed to the intangible value of intellectual capital not captured by traditional accounting systems. Each of these measures is described briefly below along with an example of how calculated intangible value is determined.

Market-to-book Ratio. The market-to-book ratio assumes that a company's approximate worth (tangible assets plus intangible assets) is indicated by its market value – the market price per share of common stock multiplied by the number of shares outstanding. Therefore, the difference between book value shown on the company's balance sheet and market value gives an approximate measure of the intellectual capital that is part of total company worth that does not appear on the balance sheet.

This measure by itself has limited value for several reasons. First, stock prices are affected by many economic factors not associated with a company's tangible or intangible assets. Second, book values represent depreciated historical costs that rarely coincide with the "true" value of revenue-generating tangible assets. A better number, especially for company-to-company comparisons, is the ratio between market and book values. This number is felt to be a more reliable and useful because factors such as interest rates and general economic cycles affect all companies more or less equally.

Therefore, some extraneous factors get filtered out when using a ratio and a more reliable comparison between companies is provided.

Tobin's q. James Tobin, a Nobel prizewinning economist, developed a measure, q, to help predict investment decisions. Tobin's q is essentially the same as the market-to-book ratio except that Tobin used replacement cost of tangible assets rather than book value of tangible assets in the calculation. The theory is that if q is greater than 1 and greater than competitors' q then the company has the ability to produce higher profits than other similar companies. The company has something intangible – intellectual capital – that gives it an advantage.

Tobin's q can be calculated by taking the book value of a company, adding back accumulated depreciation, and making appropriate adjustments for price changes in different classes of assets from the time of purchase. This procedure neutralizes many of the difficulties with the market-to-book ratio.

Calculated Intangible Value. An Internal Revenue Service (IRS) Ruling describes a process for calculating the fair value of intangible assets for tax purposes. Breweries and distilleries first used this method to calculate the value of goodwill and other intangible assets lost as the result of Prohibition. A revised procedure is contained in Revenue Ruling 68-609 is in effect today. Researchers have refined this process and Stewart (1995) discusses how it can be applied to the measurement of intellectual capital. He provides a seven-step process that is illustrated below for ADAK Laboratories (ADAK), a Malcolm Baldrige National Quality Award winning company. ADAK is used in this illustration because it is assumed that a Baldrige Award-winning company has measurable intellectual capital that contributed to its award-winning status. ADAK's annual financial reports and Robert Morris Associates' Annual Statement Studies are the sources of data in support of the following calculations. Dollar amounts are in millions of dollars. The date of the calculations is December 31, 1996.

“Step One: Calculate average pretax earnings for the past three years.” For ADAK that is \$18,033.

“Step Two: Go the balance sheet and get the average year-end tangible assets for the same three years.” For ADAK that is \$148,245.

“Step Three: Divide earnings by assets to get the return on assets.” For ADAK that is 12.2 percent.

“Step Four: For the same three years, find the industry's average return on assets (ROA).” For the X-ray apparatus industry (SIC Code 3844) the industry average is 8.9 percent. ADAK's ROA is above the industry average indicating the presence of excess earnings power.

“Step Five: Calculate the ‘excess return.’ Multiply the industry-average ROA by the company’s average tangible assets. Subtract that from the pre-tax earnings in step one.” For ADAK the calculation is: $\$18,033 - (.089 \times \$148,245) = \$4,840$.

“Step Six: Calculate the three-year-average income tax rate and multiply this by the excess return. Subtract the result from the excess return to get an after-tax number – the premium attributable to intangible assets.” For ADAK the calculation is: $\$4,840 - (.34 \times \$4,840) = \$3,194$.

“Step Seven: Calculate the present value of the premium. You do this by dividing the premium by an appropriate discount rate, such as the company’s cost of capital.” For ADAK the weighted average cost of capital of 7.5 percent is used as the discount rate. The present value calculation is $\$3,194 / .075 = \$42,587$. This is ADAK’s calculated intangible value, the value of intangible assets that do not appear on the balance sheet.

Calculated intangible value does not have the precision of other balance sheet numbers, but it is useful in a number of ways. As a benchmark measure, calculated intangible value can help judge whether an organization is fading or is one that has value not reflected in traditional financial measures. Management might view a strong or rising calculated intangible value as an indicator that their investment in knowledge assets is paying off.

A knowledge-based company with few tangible assets might take calculated intangible value to the bank along with their traditional financial statements as evidence of the company’s true value. Intellectual capital isn’t collateral in the traditional sense, but its value in creating future cash flows may be more valuable than any other asset shown on the balance sheet.

SUMMARY AND CONCLUSION

There is a growing awareness that intellectual capital is a key asset for success in today’s economic environment. Intellectual capital is not just data or information in files and databases. It comprises all useful knowledge in whatever form in the organization.

Intellectual capital is critically important in knowledge-based organizations and is becoming increasingly important in every other type of organization. Therefore, it is critically important that intellectual assets be well understood and properly managed if organizations are to compete successfully in today’s world economy.

Effective management of intellectual capital begins with understanding. For this reason, this paper has provided a definition of intellectual capital to help managers understand the breadth of management requirements. Several models for classifying the components of intellectual capital were then presented so management might understand the depth of management requirements. Finally, several measurement schemes were presented showing how intellectual capital can be viewed at both the component-by-component and organization levels.

Management of intellectual capital is in its infancy, but interest is growing. Models and measurements are being developed with enthusiastic experimentation. The indication is that every organization should begin their quest for understanding and expertise in managing the preeminent asset for creating wealth in the future – intellectual capital.

Figure 1
Components of Intellectual Capital

According to Edvinsson and Malone (1997)

Human Capital
Structural Capital:
 Organizational Capital
 Process Capital
 Innovation Capital
Customer Capital

According to Brooking (1996)

Human-centered Assets
Infrastructure Assets
Intellectual Property Assets
Market Assets

Figure 2
Skandia Navigator

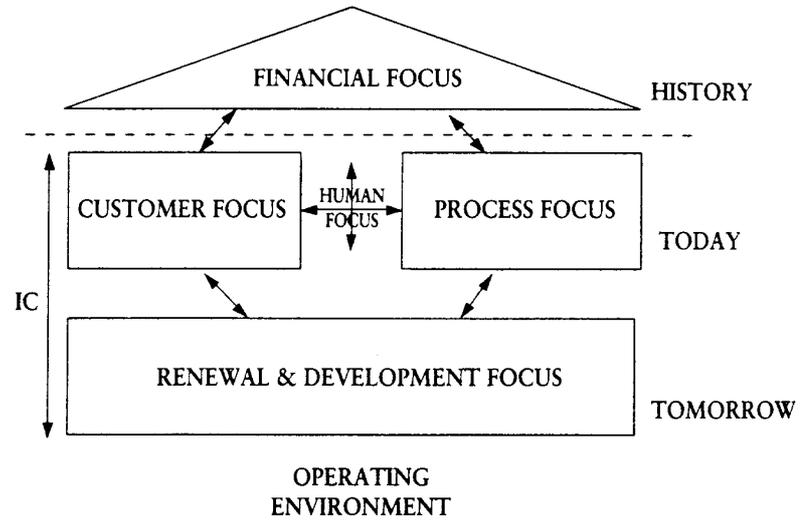


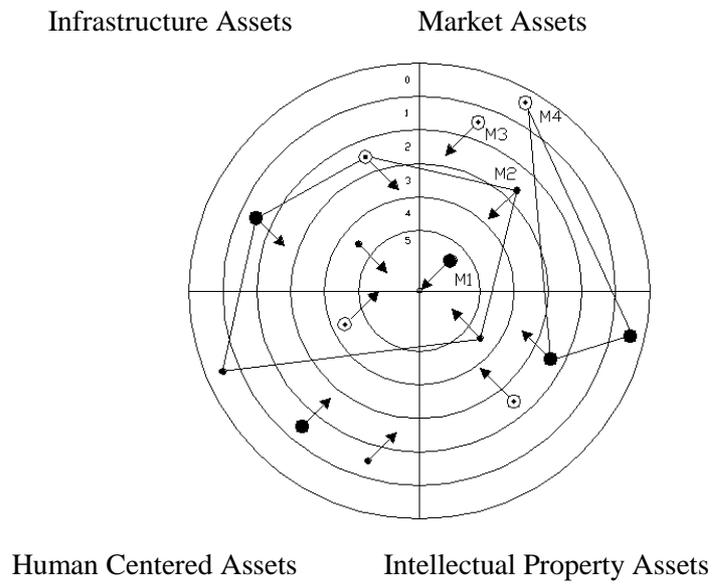
Figure 3
Customer Focus Metrics in the Skandia Navigator (Partial Listing)

Market Share (%)
Number of Accounts (#)
Customers Lost (#)
Telephone Accessibility (%)
Customer Rating (%)
Days Spent Visiting Customers (#)
Customer Visits to the Company (#)
Gross Income per Employee (\$)

Figure 4
Partial Dream Ticket and Intellectual Capital Audit Results

	<u>Importance</u>	<u>Audit Results</u>
Market Assets:		
M1: Distribution Channel – catalog sales ...	3	5.1
M2: Customers – equipment manufacturers ...	2	2.8
M3: Champions – consultants who advise ...	1	1.2
M4: Product Brand – brand is global within ...	1	.3
Intellectual Property Assets:		
Human-centered Assets:		
Infrastructure Assets:		

Figure 5
Example Target for an Intellectual Capital Audit



Appendix A
Components of Intellectual Capital
Brooking (1996)

Market assets

- Service brands
- Product brands
- Corporate brands
- Champions
- Customers
- Evangelists
- Customer loyalty
- Repeat business
- Company name
- Backlog
- Distribution channels
- Business collaborations
- Franchise agreements
- Licensing agreements
- Favorable contracts

Intellectual property assets

- Patent
- Copyright
- Design rights
- Trade secrets
- Know-how
- Trade marks
- Service marks

Human-centered assets

- Education
- Vocational qualifications
- Work-related knowledge
- Occupational assessments and psychometrics
- Work-related competencies

Infrastructure assets

- Management philosophy
- Corporate culture
- Management processes
- Information technology systems
- Networking systems
- Financial relations

Source: Intellectual Capital: Core Asset for the Third Millennium Enterprise by Annie Brooking, International Thomson Business Press, New York, 1996.

REFERENCES

- Brooking, Annie (1996), Intellectual Capital: Core Asset for the Third Millennium Enterprise, International Thomson Business Press, New York.
- Brooking, Annie, Peter Board, and Sue Jones (1997), "The Predictive Potential of Intellectual Capital," National Business Conference, Hamilton, Ontario.
- Conference Board (1995), New Corporate Performance Measures, The Conference Board Report Number 1118-95-RR, New York.
- _____ (1997), Case Studies in Strategic Performance Measurement, The Conference Board Report 1176-08-CR.
- Edvinsson, Leif and Michael S. Malone (1997), Intellectual Capital: Realizing Your Company's True Value by Finding Its Hidden Roots, HarperCollins Publishers, Inc., New York.
- Kaplan, Robert S. and David P. Norton (1996), The Balanced Scorecard, Harvard Business School Press, Boston.
- Skandia (1994), Visualizing Intellectual Capital in Skandia, Supplement to Skandia's 1994 Annual Report.
- Stewart, Thomas A. (1995), "Trying to Grasp the Intangible," Fortune, October 2, 1995, pp. 157-61.
- _____ (1997), Intellectual Capital, Doubleday, New York.

Intellectual capital is the intangible value of a business, covering its people (human capital), the value relating to its relationships (relational capital), and everything that is left when the employees go home (structural capital), of which intellectual property (IP) is but one component. It is the sum of everything everybody in a company knows that gives it a competitive edge. The term is used in academia in an attempt to account for the value of intangible assets not listed explicitly on a