Intellectual Capital Management as Part of Knowledge Management Initiatives at Institutions of Higher Learning

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Abstract: Aspects such as human capital, structural capital and customer capital are important variables of the whole intellectual capital management programme, which forms part of the knowledge management initiatives of institutes of higher learning. The skills and expertise of university staff as part of its human capital are discussed. Structural capital will encompass aspects such as the role of innovation and intellectual property rights. Customer capital of the university and the knowledge of stakeholders in the field of tertiary education are becoming more important. The results of a study done at a South African university are used to indicate which of these aspects needs to be measured and a new framework for measurement and management of IC is discussed.

Keywords: knowledge management, intellectual capital management, higher education

1. Background

Bringing intellectual capital, knowledge management and enabling technologies together is an exciting challenge to leaders wishing to create an information age institution. When a university becomes a learning organisation with shared vision and shared institutional awareness, with participation by all, a dynamic interactive environment emerges where the lines between teaching and learning, and education and training, are blurred and lifelong education is the norm (Childs 2001). In view of the realities of the present funding system in higher education and the need to exploit alternative forms of income, specifically the "third money stream" (where funds are earned from other sources than students and government). South African higher educational institutions will be required to exploit their intellectual property rights to a far higher level than has been the case in the past. South African industry will, likewise, have to realise that research results emanating from tertiary educational institutions are no longer regarded as being in the public domain, to be exploited free of charge. Institutions themselves will have to implement

- Measures to protect, safeguard and market the intellectual property produced by staff and students; and
- Policies to ensure that all participants share in the income derived from intellectual property on a basis that is fair, equitable and of a nature that encourages disclosure of inventions and discoveries.

Universities are under an obligation to strike a balance between their obligations internally to their employee and student inventors, and externally to their potential commercial partners. The latter could be business organisations, government and semi-government departments, or statutory organisations. As an employer the university is bound to be fair and reasonable in its dealings with its employees. A complication is the fact that it is also a guardian of the welfare of its students, assuming an in loco parentis role. On the other hand a university must be accountable and prudent (especially with regard to state subsidies), and commercially astute and realistic (particularly when dealing with the corporate world). The greatest challenge is to strike a balance between these very different considerations to ensure that, ultimately, the university stays true to its ideal of searching for truth and knowledge in the spirit of academic freedom, and to applying such knowledge to the benefit of mankind. The question thus arises how universities can manage and measure intellectual capital as part of their knowledge management initiatives. To address this question the following issues will be discussed:

- The role of knowledge management at institutions of higher learning
- Intellectual capital
- Existing frameworks for managing Intellectual capital
- Existing models for measuring Intellectual capital
- Models that may be applied to South African Universities and the variables that should be included in a proposed framework for intellectual capital management at these universities.

2. The role of knowledge management at institutions of higher learning?

For the best part of four decades it has been a dictum among economists that developing countries should target national investment at the basic education level since this offers the highest

Reference this paper as:
Kok, A (2007) "Intellectual Capital Management as Part of Knowledge Management Initiatives at Institutions of Higher Learning" *The Electronic Journal of Knowledge Management* Volume 5 Issue 2, pp 181 - 192 , available online at www.ejkm.com

social returns. The orthodoxy has been eloquently challenged in a recent World Bank study (2003) that argues for new investment in higher education. This asserts that participation in the Knowledge Economy requires the ability to renew economic and social systems constantly; to extend knowledge and specialist skills; to engage effectively in knowledge production and a higher education system; to be socially responsive; to be in close contact with industry; and to produce top quality graduates (Asmal 2000). The development of academic research capacities carries within itself the seeds of future economic and social development in the form of human capital, tacit knowledge and intellectual property. Channelling knowledge flows into new sources of technological innovation has become an academic task, changing the structure and function of the university. Realisation of the benefits of this potential resource occurs through organisational innovations such as technology transfer offices, incubator facilities and research centres with industrial participation. The change in emphasis from sole concentration on the production and dissemination of knowledge to technology transfer and the formation of firms places the university in a new alignment with the productive sector (Etzkowitz and Leydesdorff 1997:1).

The cultural functions of teaching and research have been the primary function of universities, whereas the human capital function of preparing trained persons has played a secondary role. In the late twentieth century, universities received attention for their inputs to economic and social development. This is not an entirely new phenomenon: academic institutions contributed to agricultural innovation during the Experiment Station movement of the mid-nineteenth century in the USA and were instrumental in the foundation of the chemical industry in Germany during the same period. Nevertheless, the advancement of knowledge was formerly primarily the concern of the university, whereas capitalisation of knowledge was the concern of industry. However, the growing interest of the university and its faculty members, often encouraged by government policies, in reaping capital from knowledge is moving academic institutions closer in spirit to the corporation, a type of organisation whose interest in knowledge has always been closely tied to economic utility (Etzkowitz 1997:141).

Knowledge management is often seen as an alternative to, or complementing, other organisational initiatives such as the Total Quality Management (TQM) and Business Process Re-engineering (BPR) programmes of the 1980s (Newman, 1996). The view that knowledge management is vital to achieving business success is a general theme in literature on the subject. Sveiby (2001) defines knowledge management as "the art of creating value from an organisation's intangible assets". Prusak (1996:6) said: "The only thing that gives an organisation a competitive edge… is what it knows, how it uses what it knows, and how fast it can know something new." In other words, how it applies knowledge management. For Koulopoulos (1997), knowledge management is "rooted in the idea that mobilising an enterprise's intellectual resources is essential in breaking free from the enterprise's rigidly held … suppositions about its competitive touchstones… exposing it to compete based on Y

3. Intellectual capital

It may be said that intellectual capital deals with articular, reasonable, knowledgeable and substantial fruits of the mind. It claims intangible (tacit) and tangible (explicit) dimensions, which do not mutually exclude, but actually complement each other. The conversion of knowledge into a valuable asset has come to be known as an intellectual asset or intellectual capital. In 1994, Klein and Prusak forwarded what has become to be the standard definition of intellectual capital, popularised by Stewart in Fortune magazine (1994) and in his book Intellectual capital: the new wealth of organisations (Stewart 1997). According to Klein and Prusak (1994), one can define intellectual capital operationally as intellectual material that has been formalised, captured and leveraged to produce a higher valued asset. While many authors use the terms "intellectual asset" and "intellectual capital" interchangeably, there are subtle differences between the meanings of the two. In balance sheet terms, intellectual assets are those knowledge-based items that the organisation owns that will produce a future stream of benefits for the organisation. They are the "debits" or individual items that comprise intellectual assets on the balance sheet, whereas intellectual capital is the total stock of balancing "capital" or knowledge-based equity ("credits") that the organisation possesses. Ideally, the total value of intellectual assets should be equal to the total intellectual capital (Lynn 1998). The distinction between the terms is subtle but not unimportant. Intellectual assets are often intangible assets. They do not have a hard shape like property, for example, or plants and equipment, nor do they have obvious financial value, as do receivables and short-term investments. Indeed, intellectual assets have been characterised as hidden assets because they are sometimes difficult to identify and to assign an economic value to. One way that has

been used to uncover and derive the value of this hidden, intangible intellectual capital is to compare the market value of stock to its book value. In fact, the difference between a firm's market value and the replacement value of its physical and financial assets has been used as a definition of intellectual capital. This market premium has also been used to measure Intellectual capital.

3.1 Elements of Intellectual capital

Many practitioners suggest that Intellectual capital consists of three elements. [See for example Sveiby (1997), Saint Onge (1996), and Bontis (1998).]

- Human capital, which includes experience, the know-how, capabilities, skills, and expertise of the human members of the organisation
- Structural capital (or organisational capital), which includes the systems, networks, policies, culture, distribution channels, and other "organisational capabilities" developed to meet market requirements as well as intellectual property
- Relational (customer) capital, which includes the connections that people outside the organisation have with it, their loyalty, the market share, the level of back orders, and similar issues.

3.2 Models for managing intellectual capital

Various models exist for managing intellectual capital. Some of the most well-known models are Sullivan's Model (Van den Berg 2002); the Skandia Intellectual Capital Value Scheme (Roos, Roos, Dragonetti and Edvinsson 1997); the Brooking's Model (Brooking 1996); Roos and Roos's Categorisation (Roos and Roos 1997); St Onge's Model (Westberg and Sullivan 1998:71); Sveiby's Model (Sveiby 1997); and Wiig's Model (Wiig 1997). For the purpose of this study, only the Skandia Intellectual Capital Value Scheme will be discussed.

3.2.1 Skandia intellectual capital value scheme

Leif Edvinsson is widely acknowledged as one of the world's leading experts on intellectual capital. He was appointed as the first Director of Intellectual capital at Skandia, an internationally operating Swedish insurance company. Skandia propagated an alternative taxonomy. Thus, Edvinsson's approach seems to be motivated by a practical orientation, similar to that of Saint-Onge. Edvinsson considers intellectual capital primarily as the hidden values constituting the gap between market value and book value. Hence the equation

Market value = Book value + Intellectual capital

In 1992, when Skandia started stock-taking of the hidden values of intellectual capital, a list consisting of more than 50 valuable items such as trade marks, concessions, customer databases, IT systems, or key persons was compiled. Since the list was perceived as too long and unmanageable, items had to be grouped into fewer but decisive categories, the human dimensions, and the structural dimension, which led to a simplified definition of intellectual capital:

Intellectual capital = Human capital + Structural capital

The dimensions that are "left behind when the staff has gone home," according to Edvinsson (Roos et.al. 1997), are referred to as structural capital. He emphasised the fact that human capital cannot be owned, it can only be rented. Structural capital, on the other hand, may be owned or traded from a shareholder's point of view. Skandia then create an initial model for defining the different categories of intellectual capital (Figure 1). In this model, market value is divided into financial capital and intellectual capital. The latter is further subdivided into human capital and structural capital. Structural capital encompasses customer capital and organisational capital, and the latter encompasses process capital and innovation capital. However, at Skandia Edvinsson provided a more detailed perspective and divided organisational capital further into two additional building blocks. Within organisational capital the value of process capital (intangible assets) could be deducted, resulting in innovation capital (intellectual property) as the balancing item. The model is illustrated by using the following constituent parts:

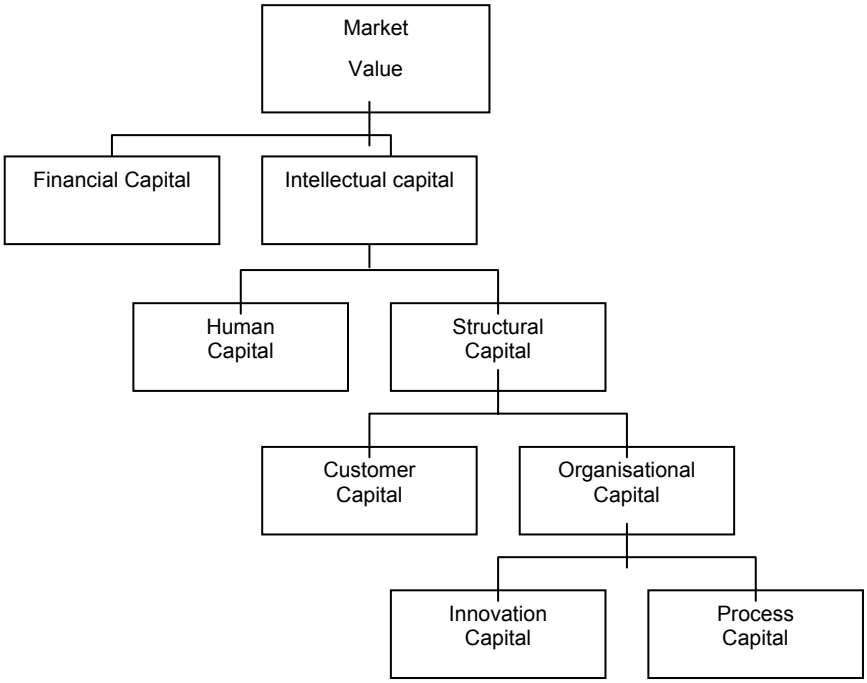

Figure 1: The Skandia Intellectual capital Value Scheme. Source: Roos, Roos, Dragonetti and Edvinsson, 1997

3.3 Intellectual capital management at institutions of higher learning

It became clear that intellectual capital is by definition intangible and that the only possible measurements are proxy variables, or indicators. These indicators are expressed in the most diverse units of measurement (Roos et. al. 1997:78). In the next section, existing measurement models, and how they can be used in compiling a new model for implementation at institutions of higher education will be discussed.

4. Existing frameworks for measuring Intellectual capital

Models, frameworks and methodologies for measuring knowledge assets and intellectual capital exist in the domains of accounting, economics, human resource accounting and intellectual property. Such models have focused at the firm level analysis with an accounting, economic, or strategic focus. None of these have been applied in the public sector or, more specifically, in the tertiary environment. The objective of this section is to determine what can be learned from the available frameworks/models and how their key components may be adapted to measure intellectual capital management practices at tertiary institutions.

According to Edvinsson (2002:7), intellectual capital management is not a management technique but rather a fundamental approach to the management of resources and assets in an organisation. Klein (1998) therefore states that institutions that adopt a strategic approach to the management of their intellectual capital see this as an opportunity to enhance their market position. Brennan and Connell (2000:213) support this view and state that successful organisations manage their intellectual capital better than the less successful firms. This may also be true for institutions of higher learning.

Institutions of higher learning that manage their intellectual capital effectively are strategically focused on managing the following aspects:

- Human capital management and measurement
- Intellectual capital asset systems and competitive technology assessments
- Intellectual property systems.

Intellectual capital is of substantial and growing importance in innovation and productivity growth, organisational competitiveness and economic performance. Intellectual capital, which may, include aspects such as RandD, human resources, organisational structure and processes, and customer relations, is often poorly identified and measured. Information on intellectual assets is collected in widely different ways, and financial accounting and reporting practices generally fail to recognise these assets. Where this information is available, it is ad hoc, difficult to verify, and not comparable across the

institution. The gaps in transparent, reliable and accurate information interfere with the effective management of intellectual capital, and between intellectual and other forms of capital (OECD 1996).

According to Lank (1997:408), the interest in intangible assets provides an opportunity to develop new and creative business measures that are much more likely to be indicators of future business success than the traditional snapshot of historically focused measures. Institutions may use information on intellectual assets in various management processes. Consequently, the growth and decline of, intellectual capital in an institution is increasingly interpreted as an early warning system of subsequent financial performance. Thus it is important that appropriate measures of performance, other than balance sheets, are developed (Roos and Roos 1997:417).

Leibowitz and Wright (1999:99) are of the opinion that there are two schools of thought with regard to, measuring knowledge assets. Researchers try to find appropriate metric ways to measure knowledge or they look for indicators of knowledge because knowledge in itself cannot be measured. They support the latter way of thinking since they believe that only the outcomes of knowledge activities can be measured. According to Roos and Roos (1997), one of the aspects of managing intellectual capital is measuring it. The vehicle for measuring this performance is the set of indicators used for each intellectual capital category. As these indicators permit measurement, it is important to investigate these models further.

4.1 Classification of Intellectual capital measurement models

According to Sveiby (2004) and Malhotra (2003), there are four basic methods to classify measurement models for intellectual capital:

- Market capitalisation method – The difference between market capitalisation and stockholders' equity is calculated.
- Return on assets method – Tangible assets and the annual financial figures are compared to the industry average. Above-average earnings are then used to estimate the value of intangible assets.
- Direct intellectual capital method – Components are identified and valued.
- Scorecard method – Various components of intellectual capital are identified and reflected in terms of scorecards and graphs.

4.1.1 Market capitalisation method

In the market capitalisation method intellectual capital is computed as the difference between the firm's market capitalisation and stockholder equity. This method is useful for illustrating the financial value of intellectual capital and for inter-firm benchmarking within the same industry. One of the disadvantages of this method is that it does not provide information on the components contributing to intellectual capital. The exclusive monetary focus provides only a partial perspective, which is not suitable for the holistic socio-economic and human development approaches often sought by an organisation (Malhotra 2003:12).

4.1.2 Return on assets method

With the return-on-assets (ROA) method, the ROA is computed by dividing the pre-tax earnings of the firm by the average tangible asset and then comparing the result with the industry average. The difference is then multiplied by the organisation's average tangible asset to calculate an annual earning from the intangibles. Dividing this average earning by the organisations' average cost of capital or an interest rate gives the value of the organisation's intellectual capital (Malhotra 2003:12).

Malhotra (2003:12) is of the opinion that this model is not very relevant to government and public sector organisations, it is of relevance for industry benchmarking and for illustrating the financial value of intellectual capital. Because it is built on traditional accounting rules it is easily communicated between accountants. The disadvantage of this model is it does not contain information about the components that contribute to intellectual capital. It also has an exclusively monetary focus and is unsuitable for holistic socio-economic and human development approaches.

4.1.3 Direct intellectual capital measurement model

With the direct intellectual capital measurement model the monetary value of the intangible assets is estimated by identifying the various components. This model may be used in conjunction with the scorecard method, as it has limited use for assessing and analysing specific aspects of intellectual capital. If it is used to derive standard indicators, these standards must be valid and reliable.

This model allows for the valuation of separate components of intellectual capital. It also allows for combinations of monetary and non-monetary

valuations. The model provides a comprehensive overview of all the intellectual capital in the organisation. It is event-based and therefore better for relating cause-and-effect compared to financial metrics. The biggest disadvantage is that it is difficult to compare and benchmark (Malhotra 2003:10).

4.1.4 Scorecard model

In the scorecard model various components of intangible assets or intellectual capital is identified and indicators and indices are generated and reported in scorecards. Composite indices based upon the synthesis of all components of intellectual capital can be created. This model allows for measurement closer to actual inputs, processes, and outcomes. Reporting can therefore be faster. It is also particularly suitable for detection and correction of errors in aligning inputs and processes with the outputs and outcomes. The indicators capture contextual nuances, which result in rich data analyses that can provide useful insights for policy making. However, contextual influences that facilitate more corrective policy responses make comparison across different contexts somewhat challenging (Malhotra 2003:10). The scorecard model is one of the most widely used models in knowledge management.

This model is also the most applicable for measuring the intellectual capital of institutions of higher learning. It measures currently unmeasured intangible assets. An adaptation of the Skandia Navigator and the Skandia Value Scheme seems to be the most appropriate for this study as the scheme focuses on the present, past and future of an organisation. Although the past of the organisation (financial reporting) is not relevant to this study, it will be a major component of future reporting by the university, as the financial willingness to increase intellectual capital will be directly influence by the availability of financial resources. With the Skandia Navigator the different areas that comprise intellectual capital are placed within the same framework as financial capital.

5. A South African case study: variables for measurement

A framework for measuring the success of reaching organisation goals through the management of intellectual capital was developed for the former Rand Afrikaans University (RAU), Johannesburg, South Africa (now known as the University of Johannesburg). If RAU is placed within the context of its intellectual capital and its intention to grow and increase this intellectual capital, the following may be said about the institution (RAU 2000b):

Human capital: RAU prides itself on striving to equip men and women to make an impact on the South African labour market. The University caters for the needs of employees from various walks of life in order to address all the needs of the employee. The University strives to ensure that all training is focused on “training for competence.” Training helps employees to attain the necessary knowledge and skills to perform their tasks according to required standards without undue fatigue, preferably within the shortest possible time and with the minimum use of training resources. In order to reach its goals RAU places a high premium on research and staff members are encouraged to engage in relevant quality research.

Structural capital: The University is structured into six faculties, vis. Arts, Natural Sciences, Law, Economic and Management Sciences, Education and Nursing, and Engineering. The major infrastructural support system for teaching and research activities at the University includes the traditional facilities such as the library, information technology, and laboratories.

Customer capital: The University places its resources at the disposal of external stakeholders who can benefit from its expertise and is involved in various community development initiatives and outreach programmes. This is based on the principle that university teaching comprises a dynamic interaction between lecture halls, laboratories and society. The emphasis is on sustainable, holistic development, which is beneficial not only to the current communities, but will also serve as a heritage for future communities.

With this in mind, certain variables, which need to be measured, can be identified. These indicators should have the following characteristics:

- They must promote a visualisation that allows actions to be translated into a system of indicators.
- They must have an array of indicators that describe the University’s value creation process.
- They must include indicators from all three components of intellectual capital.
- They may contain a mix of financial and non-financial indicators.
- All indicators must be verifiable (Meritum Project 2005:25-6).

The point of departure for the evaluation of the intellectual capital variables at RAU was reached

by dividing the twelve key success factors set out in RAU's the strategic planning into the major areas according to the Skandia Intellectual Capital Management Model.

- Human capital
  - The ability to attract and retain staff of good calibre
  - Dedicated staff
  - Implementation of effective staff and student equity measures
- Structural capital (customer capital)
  - Projecting a highly visible positive image
  - Ability to attract good students
- Structural capital (organisational capital: innovation capital - intangible assets)
  - Technological support
  - Quality research
  - Relevant tuition programmes
- Structural capital (organisational capital: innovation capital - intellectual property)
  - Quality research
  - Internationalisation
- Structural capital: process capital
  - Visionary participative strategic management
  - Adherence to mission
- Financial capital
  - Financial health of the institution

For this new framework to be successful, all of the critical success factors must be measured in terms of some variables, which will indicate the contribution that each will make to the management of intellectual capital at the University. A set of 67 variables for measuring intellectual capital was used to determine the success of measuring different aspects of the components. The most important measurable variables of each component of intellectual capital included in this study will be discussed in the next section.

5.1 Human capital

In this section on Human Capital, variables were chosen which would indicate the staff component of the university and indicators, which highlighted the flow of knowledge in the institution, were used. The following indicators were used:

Human Resources
Number of staff
Full-time
Part-time
Proportion of instructional/research staff to total number of staff (%)
Proportion of non-professional/administrative staff to total number of staff (%)
Total staff influx
Total of academic and research staff influx
Rookie ratio (% of employees with less than two years experience)
Average term of employment in years
Executive/managerial
Instructional/research
Total staff resignation
Within two years (%)
Total of academic and research staff
Aged 25 – 35 years (%)
Aged 35 – 59 years (%)
Median age of instructional/ research staff
Leadership index
Motivation index
Empowerment index
Equity index
Further training and education
Number of employees who received training
Total training expenditure per employee (ZAR)
Percentage of budgeted payroll spent on training

5.2 Structural capital

In this group of indicators attention were paid to Customer Capital and Organisational Capital and it associated indicators.

5.2.1 Customer capital

In Customer Capital attention were paid to knowledge about the customers of the university. The focus was on the student as customer as well as on government as stakeholder for whom universities do their research. Important indicators were as follows:

Customers, image and stakeholders
Curricular contact students
Curricular distance students
Extra-curricular students
Total number of students
Growth in student numbers
Students per employee
Per academic and research staff
Per non-academic staff
Market share
Customer satisfaction
Marketing expenses
Image of RAU
Project cooperation and networking
Number of researchers per category
Number of National Research Foundation categories
Percentage of grants received

5.2.2 Organisational capital (intangible assets)

The intangible assets such as the Information Technology Department and the Library and Information Service as infrastructure for knowledge support were taken into account. The research output of students and staff also indicated the level of knowledge flows at the university. The following indicators were used:

Technological support
Number of PC's per employee
Number of individuals linked to the network
Volume of IT use
Cost of IT per student
Satisfaction with IT service
Total IT expenditure
IT expenditure per employee
Reliability of hardware and software
Library and Information Services
Total cost of LIS
Expenditure per employee
Total number of book volumes
Total number of book titles in stock
Total number of journal volumes
Total number of current journal titles
Diffusion and networking per academic and research staff
Total number of international events attended
Total number of national events attended
Total number of contributions at international events
Total number of contributions at national events
Total number of chapters/contributions to books
Total number of A and B type research articles published
Total number of C type (non-peer-reviewed) articles published
Total number of master's students
Total number of doctoral students
Total number of staff on management committees of professional societies
Total number of staff on editorial committees
Internationalisation
Overseas visitors received
Overseas research visits

5.2.3 Organisational capital (intellectual property)

Intellectual Property plays an important role in the distribution of knowledge, but also needs to be safeguarded. The intellectual property of the organisation was measured as follows:

Intellectual Property
Number of patents registered in the name of the RAU
Income from patents
Income from copyright

5.2.4 Organisational capital (process capital)

Process Capital involves the satisfaction of stakeholders and how they perceive knowledge flows in the organisation. The following indicators were used:

Structural Capital - Process Capital:
Satisfied employee index
Direct communications to customer/year
Community involvement

6. Conclusion

The management of intellectual capital by institutions of higher learning is becoming more important day by day. In the study on existing intellectual capital management and measurement frameworks, it has become clear that specific models are needed to be developed for these institutions. As a result, a framework was developed which was used to manage and measure Intellectual capital at an institutions of higher education. The testing of this model at the Rand Afrikaans University clearly indicates that it can be used with great success in reaching the organisational goals. From the empirical work done at this institution, it is clear that the effective management of the institution's intellectual capital can indicate problem areas and determine gaps that need to be addressed. As this institution has gone through a process of merging with other similar institutions, this framework could be used with great success at the University of Johannesburg as well as other institutions of higher education that wish to measure their intellectual capital. A follow-up study at the University of Johannesburg may be useful for determining what the influence of the merger was on the management of knowledge, and more specifically intellectual capital.

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