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Framework for Managing and Measuring Intellectual Capital

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Abstract:

Human capital is an important variable of intellectual capital management agenda, which is responsible for the part of the knowledge management initiatives of institutions in higher education. The skills and expertise of university staff as part of its human capital are highly valued for the proper growth of a university. The populations of most third world countries are above average than rest of the world, which create opportunities to convert this number into intellectual capital through proper guidance, which a university can provide. Combining resource, effort, technology only a university can convert knowledge into assets thus can help overall economy. Since the mid-1990 Bangladesh started to experience the economic transformation towards the knowledge-based economy, driven by knowledge, Intellectual capital and Information technology. The pace of this transformation accelerated since the Y2K issue, when many universities made significant investments into intellectual property, the information and communications technology. No enterprise, large or small, are safe or can be protected from the onslaught of this change. Throughout the paper various aspects of intellectual capital is discussed through which a framework for managing and measuring Intellectual Capital could be established.

Keywords: knowledge**,** knowledge management, intellectual capital, human capital, higher education

1. Introduction:

A university always strives to make a proper blend of intellectual capital, knowledge management and technology. An accurate combination of above areas creates skilled individuals which is becoming a solid demand in the workplace. The graduates are not only graduating for the sake of graduating anymore, they realize the need and want of a dynamic individual who are valued based on their skills and capabilities. So it is clear to the 21st century graduates, to sell them properly in the job market they need Knowledge, Know-How, Capabilities, and Personality. Considering the market demand universities in 21st century are combining and contrasting above concepts to produce better individuals who are not only sellable but also have the courage to negotiate their options in the job market.

It is observed that most of the universities in Bangladesh have organizational vision and mission and it's only fruitful when a university becomes a learning organization with shared vision and shared institutional awareness. This is the age of interaction, students and faculty interaction is desired more than ever and this share of knowledge can only bring desirable results when creating human resources.

Present universities in Bangladesh are funding their activities through government subsidiary and students tuition which seems adequate but in the long run these funding will no longer be avail if not the sources are created through research funding (third money stream). The products (students) of the education system need to be utilized to their maximum to allure research from developed countries and findings should not be regarded as private property anymore, in fact the findings should be exploited free of charge to businesses and other relevant organizations, through which (the acquired knowledge) information could be shared and organization can take proper steps to flourish themselves thus forward the economy.

In 21st century universities are in obligation of intellectual property and its usage. Balancing internal and external (commercial use) knowledge are not easy. In the days of law suits it is quite relevant to consider and satisfy everyone related to intellectual capital process. So it is the institute which should implement measures of protection for the intellectual property produced by its people and also ensure the income should be generated accordingly. A university is responsible for the welfare of its students as well as its community thus making decision on intellectual property and the best way to stay safe and true is to ensure its thrust for knowledge through which it can serve 21st century challenges.

Evolving frame work for managing intellectual capital by the universities raises the question of measurement. The dimensionality of measurement and eventual management can be categorized in to aspects of knowledge and capital, intellectual capital, knowledge management and review of different approaches and models of intellectual capital. An application of the framework has been made in the case of one of the universities in Bangladesh through identification of variables for measurement and strategic indicators.

2.Knowledge and Capital

To understand the human capital and its role in guiding an university type of organization it is necessary to have a clear concept on knowledge and capital. Unlike physical labor, knowledge is Expandable and self generating with use (as a faculty get more experience, their knowledge base will increase, as will their endowment of Human Capital) and Transportable and shareable (when teaching a class, knowledge that is shared to students qualifies for this clause). So by definition knowledge can be moved and shared. This transfer does not prevent its use by the original holder. However, the transfer of knowledge may reduce its scarcity-value to its original possessor.

3. Intellectual capital

The value of a university is made of **physical** assets, various **financial** assets and, finally, **intangible** assets also now as intellectual capital (IC). This term refers to different strength of a university which ultimately turns into competencies. The intangible assets are not easy to transfer to financial assets but nevertheless universities across the globe are mastering the transfer through different techniques. For a university its employee's knowledge and its faculties know how to transfer knowledge to students are considered the vital key factors for it growth.

3.1Elements of IC

In all definitions of IC, the following taxonomy dominates:

- **Relational capital**: All relations an organization entertains with external subjects, such as suppliers, partners, clients (brands, ...), research centers, etc.;
- **Human capital**: Knowledge and competences residing with the university's employees;
- **Organizational capital**: Collective know-how, beyond the capabilities of individual employees. E.g.: information systems; policies; intellectual property.

3.2Models for managing IC

Various models exist for measuring and 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).

From the list the "Skandia Intellectual Value Scheme" will be imposed in the case study for identifying IC management and measures in a university in Bangladesh. Based on the chart that is available in **-Electronic Journal of Knowledge Management Volume 5 Issue 2 2007 (181-192) -** the Skandia Intellectual capital Value Scheme portraits: Market value is divided in to two sub groups, Financial Capital and Intellectual Capital, where Intellectual Capital is divided further in to two segments Human Capital and Structural Capital. Customer Capital and Organizational Capital are two sections of Structural Capital and at the end Organizational Capital is divided in to Innovation Capital and Process Capital.
There are varied approaches to measurement of IC and idea on contemporary approaches can be obtain from the table and diagram below:

Methods for Measuring Intangibles in Chronological Order in this decade

Approx. year	Label	Major Proponent	Category	Description of Measure
2004	National Intellectual Capital Index	*Bontis (2004)*	SC	A modified version of the Skandia Navigator for nations: National Wealth is comprised by Financial Wealth and Intellectual Capital (Human Capital + Structural Capital)
2004	Topplinjen/ Business IQ	*Sandvik (2004)*	SC	A combination of four indices; Identity Index, Human Capital Index, Knowledge Capital Index, Reputation Index. Developed in Norway by consulting firm Humankapitalgruppen. http://www.humankapitalgruppen.no
2004 (?)	MAGIC	*EU research project*	SC	A project partly funded by the European Commission. The method follows the Skandia model with Human Capital, Organizational Capital, Market Capital and Innovation Capital. MAGIC
2003	Danish guidelines	*Mouritzen, Bukh & al. (2003)*	SC	A recommendation by government-sponsored research project for how Danish firms should report their intangibles publicly. Intellectual capital statements consist of 1) a knowledge narrative, 2) a set of management challenges, 3) a number of initiatives and 4) relevant indicators. http://www.handels.gu.se/epc/archive/00003701/

2003	IC-dVAL	*Bonfour (2003)*	SC	Dynamic Valuation of Intellectual Capital? Indicators from four dimensions of competitiveness are computed: Resources & Competencies, Processes, Outputs and Intangible Assets (Structural Capital and Human Capital indices). In French
2002	FiMIAM	*Rodov & Leliaert (2002)*	DIC/MCM	Assesses monetary values of IC components. a combination both tangible and Intangible assets measurement. The method seeks to link the IC value to market valuation over and above book value.
2002	IC Rating?	*Edvinsson (2002)*	SC	An extension of the Skandia Navigator framework incorporating ideas from the Intangible Assets Monitor; rating *efficiency*, *renewal* and *risk*. http://www.intellectualcapital.se/rating.htm
2002	Value Chain Scoreboard?	*Lev B. (2002)*	SC	A matrix of non-financial indicators arranged in three categories according to the cycle of development: Discovery/Learning, Implementation, Commercialization. Descibed in book Lev (2005): Intangibles.
2002	Meritum guidelines	*Meritum Guidelines (2002)*	SC	An EU-sponsored research project, which yielded a framework for management and disclosure of Intangible Assets in 3 steps: 1) define strategic objectives, 2) identify the intangible resources, 3) actions to develop intangible resources. Three classes of intangibles: Human Capital, Structural Capital and Relationship Capital. Meritum final

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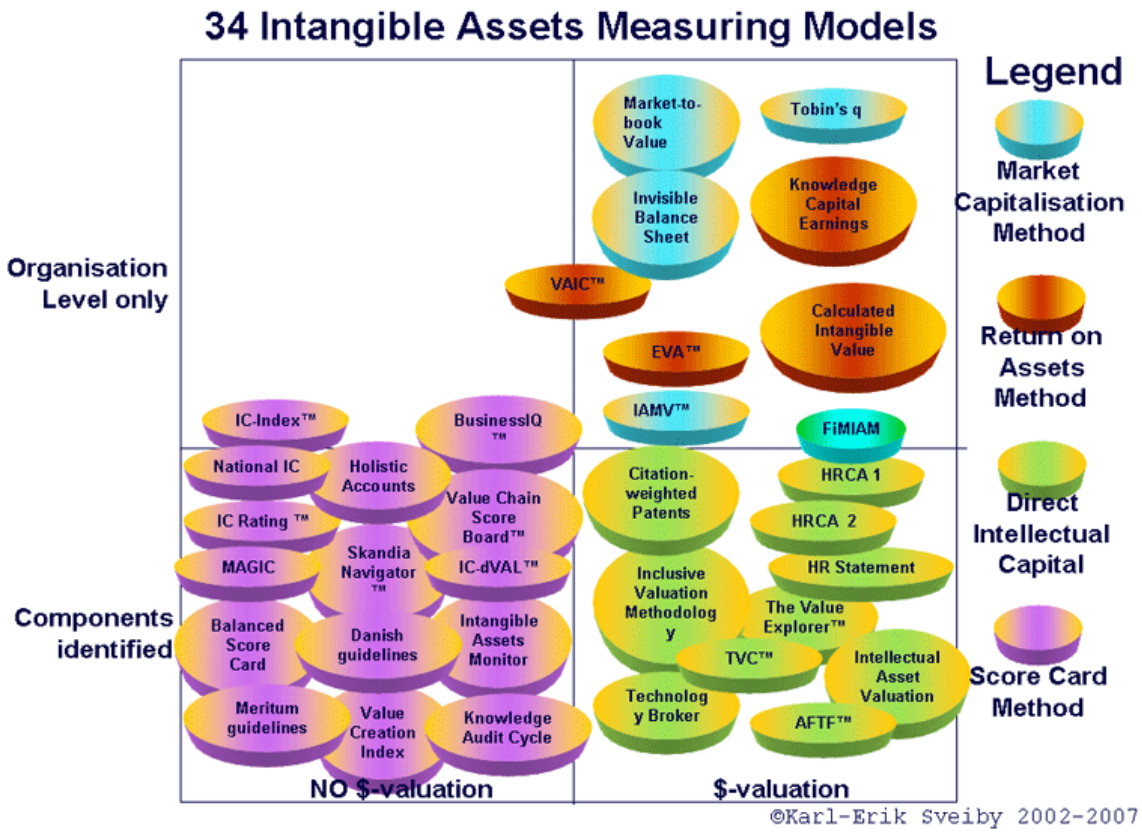
2001	Knowledge Audit Cycle	*Schiuma & Marr (2001)*	SC	A method for assessing six knowledge dimensions of an organisation?s capabilities in four steps. 1) Define key knowledge assets. 2) Identify key knowledge processes. 3) Plan actions on knowledge processes. 4) Implement and monitor improvement, then return to 1). Described in Book (2002). Profit with People by Deloitte & Touche.
2000	Value Creation Index (VCI)	*Baum, Ittner, Larcker, Low, Siesfeld, and Malone (2000)*	SC	Developed by Wharton Business School, together with Cap Gemini Ernst & Young Center for Business Innovation and Forbes. They estimate the importance of different nonfinancial metrics in explaining the market value of companies. Different factors for different industries. The VCI focuses on the factors that markets consider important rather than on what managers say is important. http://members.forbes.com/asap/2000/0403/140.html
2000	The Value Explorer?	*Andriessen & Tiessen (2000)*	DIC	Accounting methodology proposed by KMPG for calculating and allocating value to 5 types of intangibles: (1) Assets and endowments, (2) Skills & tacit knowledge, (3) Collective values and norms, (4) Technology and explicit knowledge, (5) Primary and management processes.
2000	Intellectual Asset Valuation	*Sullivan (2000)*	DIC	Methodology for assessing the value of Intellectual Property.
2000	Total Value Creation, TVC?	*Anderson & McLean (2000)*	DIC	A project initiated by the Canadian Institute of Chartered Accountants. TVC uses discounted projected cash-flows to re-examine how events affect planned activities.

				http://www.insight-mag.com/insight/03/09/col-2-pt-1-AcquiringMinds.asp



4. Knowledge Management in University

To meet the context of the new economy with lifelong learning requires that graduates should have skills and knowledge. The education system in Bangladesh in general has proved that their graduates are not capable of rewarding themselves with a job. In new economy it is hard to say that a job will be guaranteed but at the same time it also true that in new economy jobs are continuingly being created. Job security in this era is close to none and the word is replaced with new word “employability”. So it is a great responsibility for university to provide knowledge and skills to their graduates to overcome barriers in the job market. In the past developed countries have spent great deal of fund in basic education which seemed worked but not at the rate they expected, in a recent World Bank Study (2003), new investment was proposed for higher education. It is high time for the government in Bangladesh to invest heavily on university education. The country is to work for knowledge economy where knowledge and special skills will be the power to drive success. If one look at India we can see that there IT sector is booming and all IT related business in the world taking advantages of India’s IC.

The primary function of a university is always been teaching and research but now a secondary functions is added –creating IC through generating human capital. Human capital is nothing but trained individuals, who some time get trained in related fields. History says that this practice is not that new. In mid-nineteenth

century in the USA we have seen agriculture movement. In the past industries were only interested into capitalization of the product of a university but we see a hybrid picture where IC is used to benefit both sector.

Knowledge management is a great tool for boosting up the TQM or other business tool. So it is in universities best interest to handle with proper care to attract more investors and make the stakeholder happy. Knowledge should be generated and also should be protected through appropriate measures. The required knowledge also needs to be in practice to eliminate experience curve, thus learning curve for any element could be minimize.

5. Existing approaches to Measure IC:

For accounting, economics, HR and IC there are models, frameworks and methodologies for measuring knowledge assets and intellectual capital exist. In the past these models were used to be applied to everywhere else except universities. So what we will be focusing on in this section is to determine how available approaches could be used to measure intellectual capital.

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 organization. **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 Connel** (2000.213) support this view and stat that successful organization manages IC more successfully than less successful organizations. A university that manages their IC effectively is strategically focused on managing following aspects:

- Human Capital Management and Measure
- Intellectual capital and competitive technology assessment
- Intellectual property system

These above aspects will be discussed further in our university case study. There are various approaches to measure IC. At this stage it is relevant to reflect on the different methods of IC measurement for analysis as well as adaptation for the case study of a university in Bangladesh.

According to Karl-Erik Sveiby (Karl-Erik Sveiby Jan 2001, latest update April 2007) there are four basic methods to classify measurement models for intellectual capital:

Direct Intellectual Capital methods (DIC). Estimate value of intangible assets by identifying its various components

Market Capitalization Methods (MCM). Measures the difference between a company's market capitalization and its stockholders' equity as the value of its intellectual capital or intangible assets.

Return on Assets methods (ROA). Average pre-tax earnings of a company for a period of time are divided by the average tangible assets of the company. The result is a company ROA that is then compared with its industry average. The difference is multiplied by the company's average tangible assets to calculate an average annual earning from the Intangibles. Dividing the above-average earnings by the company's average cost of capital or an interest rate, one can derive an estimate of the value of its intangible assets or intellectual capital.

Scorecard Methods (SC). The various components of intangible assets or intellectual capital are identified and indicators and indices are generated and reported in scorecards or as graphs.

6. Evolving IC framework for IUBAT

IUBAT—International University of Business Agriculture and Technology in Bangladesh is providing education to create IC through human resource development and has been taken-up as a case application of framework in reality. IUBAT started its degree program in 1992. IUBAT's mission is to create human resources and placing them in the world job market. The university is geared to effectively contribute to agro-economic, technology and social development of Bangladesh. The aim to promote higher professional education with relevance to those growth areas of the economy with required qualified human resources. The framework that IUBAT has and continuous improvement of the existing framework will sure help the university to shine. To find out how IUBAT is managing IC we can reflect on the following aspects.

Human capital: IUBAT prides itself on producing well equipped graduates who are not only knowledgeable but also smart individuals. Beside subject knowledge job market in Bangladesh requires one to have personalities, well mannerism, proper etiquette and sharpness. IUBAT course curriculum provides for all of the above. The faculties of IUBAT are always encouraged to act on different types of research and sharing the knowledge within. IUBAT believes in "Andragogy" which simply defines the learning through interaction.

Structural capital: IUBAT is running on some very demanding majors in today's world they are as follows: Agriculture, Business, Economics, Nursing, Tourism and Hospitality Management, Engineering (electrical, civil, and Mechanical) and Computer Science. Most of the faculties are exposed in foreign educational system by which they can combine traditional and recent educational technique when teaching students. The campus is well equipped with library, Computer and other labs, Playing field and cafeteria.

Customer capital: IUBAT is involved in various community development initiatives. KBAD-Knowledge Based Area Development project developed by Vice chancellor and Founder of IUBAT Prof Dr M Alimullah Miyan and its goal is to provide education at least to one of the individual from each village (87000 villages in Bangladesh) of Bangladesh and thus spread knowledge.

With a goal as vast as IUBAT we need to study if IUBAT is capable of managing its capital or not. Keeping this in consideration certain variable needs to be measured. These indicators should have the following characteristics:

1. They must promote visualization for translating system of indicators.
2. They must have an array of indicators that describe the University's value creation process.
3. They must include indicators from all three components of intellectual capital.
4. They may contain a mix of financial and nonfinancial indicators.

The key strategic factors for IUBAT are divided into several segments with the major areas according to Skandia Intellectual Capital Managing Model, and those are as follows

Human capital

1. The capability to attract and retain staff (Training, Good pay)

2. Dedication of staff (skill base appointment)

Structural capital (customer capital)

1. Projecting positive image (Advertisemnet,community projects)
2. Capability of attracting good students (Foreign faculty, highly skilled faculty)

Structural capital (organizational capital: intangible assets)

1. IT support (Latest IT usage)
2. Research (International Research)
3. Relevant program (BBA, MBA, BSAg, BSEE, BSME, BSN etc)

Structural capital (organizational capital: intellectual property)

1. Quality research
2. Internationalization (Collaboration with 63 foreign universities around the globe)

Structural capital: process capital

1. Strategic management
2. Adherence to mission

Financial capital

1. Financial leverage of the institution

For realization of **human capital** the following indicators are to be considered:
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, Leadership index, Motivation index, Empowerment index, Equity index, Further training and education, Number of employees who received training, Total training expenditure per employee

For realization of **structure capital (Customer capital)** the following indicators are to be considered:
Customers, image and stakeholders, curricular contact students, Extra-curricular students Total number of students, Growth in student numbers, Students per employee, Market share, Customer satisfaction, Marketing expenses, Project cooperation and networking Number of researchers per category, Number of National Research, Foundation categories, Percentage of grants received

For realization of **organizational capital (Customer capital)** the following indicators are to be considered:
Technological support, Number of PC's per employee, Number of individuals ,inked 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 master's students, Total number of staff on management, committees of professional societies,

Total number of staff on editorial committees, Internationalization, Overseas visitors received, Overseas research visits

For realization of **organizational capital (intellectual capital)** the following indicators are to be considered:
Intellectual Property, Income from patents, Income from copyright

For realization of **organizational capital (process capital)** the following indicators are to be adopted considered:
Structural Capital - Process Capital, Satisfied employee index, direct communications to customer/year, Community involvement

7. Conclusion

Human resource and intellectual capital has accelerated globalization in all aspects - free movement of information, people, enterprises, and jobs. Since there is free flow of information and the internet has empowered the individuals to access, create and disseminate knowledge and information, it is important and crucial for higher educational institutions to mange and protects its information and its intellectual property. In today's world the IC is valued around the world. Through the discussion we have realized the importance of preserving our knowledge and also use them properly for greater results. For universities in Bangladesh to embrace this concept of IC each university needs to ensure that all graduates have achieved the basics of knowledge management and have the potentiality of being dynamic human resource.

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