

Intellectual capital and its measurement

Brahmi Samira, Aitouche Samia and Mouss Mohamed Djamel

Industrial Engineering Department

Batna 2 University

Shahid Boukhlof Avenue, 05000, Batna, Algeria

brahmi.samira@gmail.com , samiaaitouche@yahoo.fr, d_mouss@yahoo.fr

Abstract

Intellectual Capital is gaining importance in today's knowledge economy and plays a vital role in innovation, productivity growth, performance and competitiveness of organizations. The Intellectual Capital may include the following areas: human resources, organizational structure and processes, research and development, technology and rights related to intellectual property, and consumer networks and software providers.

The purpose of this work is to measure the intellectual capital in an Algerian organization (or production system) using the Weightless Wealth Tool Kit "WWTK". The results of the intellectual capital measurement are supplemented by traditional financial ratios.

The measurement was applied to the National Company of wells Services (ENSP) in Hassi Messaoud city, in south of Algeria. We calculated the intellectual capital (intangible resources) of the ENSP to help the organization to better capitalize on its potential of workers and their know-how. The intangible value of the ENSP is evaluated at 16,936,173,345 DA in 2015.

Keywords

Intellectual capital, Intellectual capital measurement, Intangible assets, Company

1. Introduction

The Intellectual Capital is gaining importance in today's knowledge economy and plays a vital role in innovation, productivity growth, performance and competitiveness of organizations. The Intellectual Capital may include the following areas: human resources, organizational structure and processes, research and development, technology and rights related to intellectual property, and consumer networks and software providers. The intellectual capital management is a field that involves the creativity and intelligence of the people, new management methods, new information technologies, and new ways of thinking about the post-industrial organization the new knowledge economy.

Since 1980, the performance of the company was not limited to physical assets or resources (material, tangible, real as equipment, machines), instead of different types of non-physical resources (immaterial, intangible or intellectual capital (abbreviated as IC) such as human resources, environment, talent, patents, information, brand awareness, or knowledge,...) will play a key role in the company's performance .

2. Problem

The traditional accounting does not appear in its balance sheets that the materials and tangible assets of the company. Or, intangible or immaterial assets are of great importance, because they clearly explain the difference between the market value of a company and its book value. In some cases, the book value represents only 20% of its market value. It is time to give the human its fair value, as it is intelligent, competent, create value and intelligence in the enterprise.

Knowledge creates value and in an economy based on knowledge, measuring of this created capital is crucial. It is assumed that an intangible asset in an organization and cannot be calculated by the traditional formulas that are used to assessing the tangible and physical assets. The main related field that has been explored in the literature to evaluate the intangible assets is the domain of intellectual capital. [1]

Measuring this value leads us to measuring of intellectual capital and its impact on the company's performance which is the aim of our work.

3. Purpose of work

Our purpose of this paper is the application of Weightless Wealth Tool Kit « WWTK » for the measurement of intellectual capital, it is a method for the financial valuation of intangible resources on the National Company of wells Services (ENSP) at Hassi Messaoud belongs to Sonatrach group.

The underlying purpose of this study is to attract the attention of the leaders of Algerian companies on the importance of intellectual capital of a manufacturing company or service provider and how to enhance its capital and different types namely; human, structural and relational to face national competitiveness and / or international.

4. Intellectual capital

4.1. Capital

The word capital is derived directly from the Latin *capitale*, with the adjective corresponding to the noun *caput*, meaning head. It originally referred to the head part of a debt.

Over the centuries, the meaning of the word broadened until not only interest-bearing sums of money were considered capital, but all sorts of other collections of wealth were considered capital.

Capital is a term from the economy: it is a factor of production. It is with this idea that was developed the concept of 'human capital' own Gary Becker by analogy to physical capital or financial capital. [2]

4.2. Immaterial, incorporeal, intellectual, intangible

Let us consider the term "immortal", "incorporeal", "intellectual" or "intangible". Use of the term "immortal" is a way of opposing the "hardware", while the use of the term "intellectual" seems to give high priority to human capital, knowledge and expertise. [2]

4.3. Intellectual capital

Most authors use the term intellectual capital. Stewart defines it as "packaged useful knowledge. Roos & al. define intellectual capital as "the sum of the knowledge of its members and the practical translation of this knowledge into brands, trademarks and processes". Edvinsson and Malone define it as "the possession of the knowledge, applied experience, organizational technology, customer relationships and professional skills that provide a company with a competitive edge in the market". [2]

Andriessen define intellectual capital as a subset of intangible resources that includes all resources that are based on the capabilities and intellectual activities. [3]

5. Intellectual capital classification

According to the field's authors, there are several classifications of intellectual capital. According to Zadjabbari in [1], intellectual capital includes three types of capital: social capital, human capital and market capital. Human capital is related to individuals, social capital is related to employee relations within an organization and the capital market is linked to external customers.

Thus Edvinsson and Malone in [4] decompose intellectual capital into human capital and structural capital, the latter being itself composed of organizational capital and customer capital.

Edvinsson and Brünig in [5] still differentiate between human capital and structural capital. Structural capital consists of customer capital and organizational capital. This again distinguishes between capital and innovation capital process.

Andriessen in [3] divides intellectual capital into three categories: structural capital, relational capital and human capital as the three basic dimensions of intellectual capital.

5.1. Humain capital

The term human capital has its origins in the work of economists Schultz in 1961 and Becker in 1964, which designated by this term all abilities, physical and intellectual, of the labor force available for economic production, [4] for example:

- Know how;
- Professional qualification;
- Tacit Knowledge;
- Skills;

5.2. Structural capital

The structural capital comprises all non-human warehouses of knowledge in organizations. Edvinsson and Malone in [6] define structural capital such as equipment, software, databases, organizational structure, patents, trademarks, and all organizational capacities that support employee productivity.

- Intellectual property;
- Explicit Knowledge;
- Infrastructure assets;
- Process capital;

5.3. Relational capital

Relational capital is defined as all the resources related to external relations of the company. It is the value of the relationship with the customer, suppliers, strategic partners, employees and the perceptions they hold on the company. [3], [7]

- Reputation and corporate image
- Faithfulness and Customer Satisfaction
- Network capital

We opt for the classification of intellectual capital Andriessen, the author of the toolbox used in our work.

6. Intellectual capital difficult

The first reason is historical. The accounting rules are initially designed for tangible assets and not to intangible assets. Second, some intangible assets are difficult to measure. Creativity, for example, is at the heart of a knowledge generation process, unpredictable process with unpredictable results. Third, the idiosyncratic nature of intellectual capital. What is valuable for a company may be worthless to another. This has led to the various measurement systems. [8]

7. Survey on intellectual capital measurement

Recently, several research works were carried on the measurement and evaluation of intellectual capital in a company. Sundac and Krmpotic measured the intellectual capital with CIV method (Calculated Intangible Value) in four major companies in Croatia. [9] The intellectual capital report provides actual development prospects in the competitive advantage of some companies.

Cappelletti proposed a socio-economic assessment of management skills over time. His experimentation on a French company of 700 employees. [4] The socio-economic model only measure human capital

Hormiga & al measured the intellectual capital (financial and statistical methods) in 130 companies. [10] They measured only the human capital that is of importance to company performance.

8. Methods for measuring intellectual capital

There are several groups of methods for measuring intellectual capital that can be used to assess these resources. Some of these methods were attempts by various companies for their internal use rather than developing a method of universal measure, but they still exist and are the basis for creating new methods.

According to Sveiby measuring approaches for intangibles fall into four categories of measurement approaches. [7], [9], [11]

- *Direct Intellectual Capital methods (DIC)* where components are identified and valued;
- *Market Capitalization Methods (MCM)* where the difference between market capitalization and stockholders' equity is calculated;
- Return on Assets methods (ROA) where tangible assets and the annual financial growth figures are compared to the industry average. Above average earnings are then utilized to estimate the value of intangible assets;
- Scorecard Methods (SC) where the various components of intellectual capital are indentified and reflected in terms of scorecards and graphs.

9. Weightless Wealth Tool Kit “WWTK” METHOD

WWTK is a method for the financial valuation of intangible resources, classified in the category of methods ROA. Created in 2004 by Daniel Andriessen. WWTK, based on a survey of 25 existing methods of measurement and evaluation in the literature.

WWTK assists managers operating successfully in the intangible economy, given the strategy analysis and a quantitative evaluation of intangible assets. It consists of 20 steps grouped into the following six phases (each phase is completed by a checklist, suggestions and practices).

10. Application and results

We Applied the Weightless Wealth Tool Kit for the measurement of intellectual capital in the National Company of wells Services (ENSP) in Hassi Messaoud city, in south of Algeria. For this application, we: [12], [13]

- Follow two models for the 20 steps:
 - Structural (present the components in connection of the method)
 - Behavioral (which presents the progress of the method);
- Use of a spreadsheet like Microsoft Excel for the Financial evaluation

As a result, We obtain the Dashboard which is in graphic form that is useful to show the relative value of each core competency presented in Figure 1.

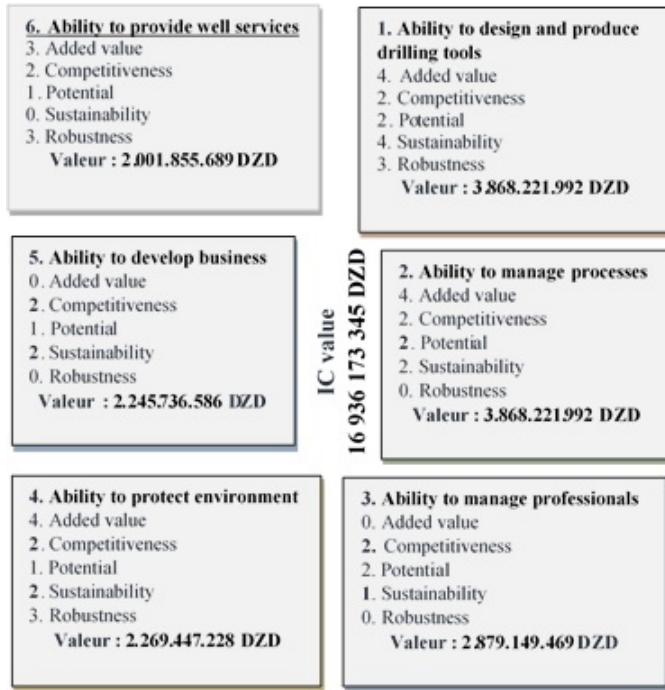


Figure 1. Financial value Dashboard of the ENSP

11. Conclusion and future work

We arrived to calculate the intellectual capital (all intangible resources) of the enterprise ENSP at 16 936 173 345 DZD. It is a positive value. The intellectual capital is a competitive advantage and benchmarking.

This work has opened the following perspectives:

- Perform the measurement of intellectual capital by other Existing methods of measurement to compare and certify the results of the "WWTK";
- Perform intellectual capital measuring on other Algerian companies by "WWTK";

References

- [1] B. ZADJABBARIOCHTAPEH, «Knowledge Sharing Framework for Sustainability of Knowledge Capital» Curtin University of Technology, Perth, Australia, pp. 143 – 160, 2010.
- [2] D. ANDRIESSEN, Making Sense of intellectual capital, Designing a Method for the Valuation of Intangibles, USA: Elsevier Butterworth Heinemann, pp. 376 – 398, 2004.
- [3] D. DUPARC, «The impact of the different situations of exchange value creation. A literature review through the theories of networks, social capital and intellectual capital» Paris 1 Pantheon-Sorbonne University, Paris, France, pp. 01- 06, 2012.
- [4] L. CAPPELLETTI, «Toward a measure of socio-economic model of human capital? » French Edition Management Journal, vol. 08, n° 207, pp. 01- 04, October 2010.
- [5] S. BISCHOFF, S. JESCHKE et V. Gergana, «Measuring Intellectual Capital» Springer-Verlag, pp. 18- 23, 2013.
- [6] T. E. ENGSTROOM , P. WESTNES et S. FURDAL, «Evaluating intellectual capital in the hotel industry,» chez *the 6th World Congress on Intellectual Capital*, Bradford, Royaume-Uni, pp 287- 315, 2003.
- [7] J. JURCZAK, «Intellectual capital. Measurement methods» *Institute of Organization and Management in Industry, ORGMASZ*, vol. 1, n° 1, pp. 37 - 45, 2008.
- [8] D. STAROVIC, B. MARR, «Understanding corporate value : managing and reporting intellectual capital», Chartered Institute of Management Accountants, Cranfield University, London, UK, pp. 6 - 9, 2003.

- [9] D. SUNDAC, I. FATUR KRMPOTIC, «Measurement and management of intellectual capital» *Tourism and Hospitality Management*, vol. 15, n° 2, pp. 279-290, 2009.
- [10] A. SANCHEZ MEDINA, E. HORMIGA, R. M. BATISTA-CANINO, «The role of intellectual capital in the success of new ventures,» *International Entrepreneurship and Management Journal, Edition Springer*, vol. 7, n° 1, pp. 71–92, March 2011.
- [11] C. MULLER, «The 3 MS of intellectual capital – Masuring, Monitoring and Managing,» chez *The Fifth European Conference on Organizational Knowledge, Learning, and Capabilities*, Université d'Innsbruck, Autriche, pp. 5 – 10, 2-3 Avril 2004.
- [12] E. Group, «Revue Oilfield services» Hassi Messaoud- Ouargula, Algérie, 2014.
- [13] G. ENSP, «"Presentation"» [En ligne]. Available: <http://www.enspgroup.com/>, 2016

Biography

Brahmi Samira is student in post-graduation in Industrial Engineering Department, Batna 2 University

Aitouche Samia is a Doctor in Industrial Engineering Department, Batna 2 University

Mouss Mohamed Djamel is a Professor and Director of Industrial Engineering Department, Batna 2 University