

# The Relationship between Human Capital Efficiency and Financial Performance of Dutch Production Companies

Shohreh Parham<sup>1\*</sup> Geert W.J. Heling<sup>2</sup>

1- Maastricht School of Management , PO box 1203, 6201 BE Maastricht, The Netherlands

2- Maastricht School of Management , PO box 1203, 6201 BE Maastricht, The Netherlands

\*E-mail of the corresponding author : [sparham79@gmail.com](mailto:sparham79@gmail.com)

## Abstract

Nowadays, Human Capital is recognized as the key factor in enhancing corporate performance of companies. However, very little is known about the efficiency of human capital in value creation for organizations and the key factors that can improve Human Capital Efficiency (HCE). This research aims to investigate the efficiency of Human Capital and its impact on the financial performance of Dutch production companies. Using data from 33 Dutch production companies for a period of 6 years (2007-2012) and applying the human capital component of the VAIC methodology the monetary value created by the companies' knowledge workers is measured. Multiple linear regression models are used for analyzing the relationship between the performance of Human Capital and organizational performance measures including ROTA, ROE and EP. The study results revealed that there is positive relationship between HCE and all three corporate performance measures, amongst which it should be referred to the strongly statistically significant relationship between HCE and Employee Productivity (EP). This study contributes to the existing human capital theories by revealing the HCE of Dutch production companies and its impact on companies' financial performance. Furthermore, it is significant in the sense that it will provide the companies' managers with vital information required for making decisions on proper deployment of their human capital and investment in this strategic asset.

**Keywords:** Human Capital Efficiency, Return on Total Asset, Return on Equity ,Employee Productivity, Value Added Intellectual Coefficient, Corporate Performance, Dutch production companies

## 1. Introduction

Today's organizational activities have considerably changed on the global market due to the evolution of economy (Jurczak 2008). The importance of knowledge workers has significantly increased and human capital is considered as an effective tool for achieving sustainable competitive advantage. Fitz-enz (2000) considers people as the most powerful factor in value creation. He argues that tangible assets are only able to add value when some human being put them into process. According to Bontis (1998) the dominance of intangibles and knowledge workers is the distinguishing characteristic of the emerging economy and has developed as a consequence of global competition. Nonetheless, against the importance of Human Capital (HC), acknowledgement of this intangible asset is relatively underappreciated particularly from the accountants' viewpoints (Fitz-enz 2000; Gan & Saleh 2008). Becker, Huselid. & Ulrich (2002) stated that human capital in the organization should be valued based on its performance. Yusuf (2013) pointed out that the primary goal of any business is maximizing shareholders value by proper capital investment. He argued that successful implementation of business strategies depends on the efficient use of intangibles, particularly human capital; therefore proper investment in human capital is of a significant importance.

The structure of the traditional economy with primary activities according to Naude and Szirmai (2012) has turned into the modern economy with high-productivity activities in manufacturing which is a determinant in economic development. The largest economy in the Benelux group according to Weaver (2006) belongs to the Netherlands. Chemical, pharmaceuticals production and manufacturing industry play a very important role in the economy of the Netherlands (Weaver 2006). A large average proportion of high-skilled employees is a prominent feature of manufacturing industry in the Netherlands, where employees mostly possess college or university degree (Bartelsman, Dobbelaere & Peters 2013). In today's knowledge based economy, many companies claim that "People are our greatest asset". However, it can still be observed that in most of companies including large companies such as the Fortune 500<sup>TM</sup>, human capital represents almost 70% of total operating expenses (Human Capital Management Institute 2013). The question that comes to mind is why "our greatest asset" should represent the highest expenses of our companies?

The importance of human capital and its measurement has been increasingly considered in order to manage this intangible asset and reduce its costs while improving its benefits (Yusuf 2013). Becker et al. (2002) stated that human capital performance is the extent to which employees contribute to effective implementation of the organization strategy. They believed that human capital performance is indeed performance behaviors that affect customers buying experience and therefore it is the basis of the company's financial performance. Using balanced scorecard terminology, Kaplan and Norton (2004) assert that human capital is a leading indicator and the main source of value creation for companies. Improvement in human capital performance will positively affect internal process, customer and financial results of the companies. In other words, human capital influence on the strategy drivers in the firm will affect financial performance of the firm which means it has an indirect impact on financial performance (Becker et al. 2002).

Measuring human capital performance has become an essential issue for companies in today's business world and may help them to get the right perspective on human capital in being valued based on its performance. Using a proper performance measurement tool could provide the firms with the necessary information for creating an action plan in order to improve human capital contribution to the organizational success.

## 2. Literature Review

### 2.1. Human Capital

Becker et al. (2002, p.3) defined human capital as 'the productive efforts of an organization's workforce'. According to Edvinsson and Malone (1997) human capital refers to the knowledge, expertise, innovative ideas and the capability of employees to solve problems in the organization and contribute to achievement of organizational goals.

Ahonen (2000), Fincham and Roslender (2003) stated that human capital is the only intangible property which generates value as employees bring their skills and competencies to the company and deal with customers. Chen, Zhu and Xie (2004) believe that human capital is the basis of intellectual capital and no value can be generated without that.

Stiles and Kulvisaechana (2003) argue that there is an increasing body of observations depicting a positive relationship between human capital development and high organizational performance. There are several organizational assets invested in a process such as knowledge workers, equipments, energy and material. The question that comes to mind is; to what extent does human capital affect corporate performance (Fitz-enz 2000)? To respond to the question Makki, Lodhi and Rahman (2008) pointed out that any outcome in the organizational process is mainly caused by the workforce activities and all other forms of assets in the process are obviously inert.

Human capital is ignored by some people as the key factor affecting the process but when structural capital investment does not meet the promises they directly accuse the operator as the main source of the problem (Fitz-enz 2000; Gan & Saleh 2008). Fitz-enz (2000) argues that under a different condition if the company outcome improves twice then managers will affirm that is caused by the combination of human capital and automation. The question then arises as to what extent did human efforts cause the change compared with other kinds of capitals? Makki et al. (2008, p.46) believed that 'Human capital is mainly responsible for overall performance of the firm'.

In a review of previous studies( Goh 2005; Makki et al. 2008; Gan & Saleh 2008; Ting & Lean 2009; Phusavant et al. 2011; Mondal & Gosh 2012; Komneninc & Pokrajcic 2012) it can be recognized that there is a significant relationship between Human Capital Efficiency and organizational performance. According to Plink & Barning (2010) human capital can generate significant value for companies and provide them with sustainable competitive advantage. However, it is difficult for HR managers to convince the Chief Financial Officer (CFO) to represent knowledge workers on the balance sheet (Fitz-enz 2000; Gan & Saleh 2008; Santoso 2011; Milost 2012). The question that comes to mind is; how can the financial performance of human capital be measured?

### 2.2. HR Metrics and Organizational Financial Performance

Grossman (2000) pointed out that the HR metrics that focused on Organizational Financial Performance (OFP) include financial measures such as profit, revenue, Return on Investment (ROI), Return on Asset (ROA), and/or human capital costs. Indeed the most important HR metrics are financial performance measures as follows:

- Revenue factor: Revenue / Total full-time employees
- Human Capital Value Added: Revenue – (Expenses-Pay and Benefits)/ FTEs

- Human Capital Return on Investment (HCROI):  $\text{Revenue} - (\text{Expenses-Pay and Benefits}) / \text{Pay and Benefits}$
- Total Compensation Revenue Percent:  $\text{Pay and Benefits} / \text{Revenue}$
- Total Labor Costs Revenue Percent:  $\text{Pay and Benefits and other labor} / \text{Revenue}$  (Fitz-enz 2000; Grossman 2000; Chhinzer & Ghatehorde 2009).

Human Capital Return on Investment is a measurement tool that is considered for calculating monetary return for one unit financial investment in human capital of an organization and assisting them in calculating the net profitability (Fitz-enz 2000; Verma 2013). Using this metric, companies can determine the value that is created as a result of investment in their workforce (Verma 2013).

### 2.3. Measuring the Value of Human Capital

Human Capital Return on Investment (HCROI), which represents Human Capital Efficiency, is a tool for measuring economic value of people's skills, experiences, knowledge and abilities (Becker 1964; Fitz-enz 2000; Heckman 2000; Jaw et al. 2006). According to Schultz (1961) human capital indicates the people's features that could create significant value by proper investment. Human capital is the source of future values and competitive advantages (Schultz 1971). Becker (1964) argued that human capital contains people characteristics that will increase the ongoing revenues of human resources and the activities affecting the investment in knowledge workers. In other words, any kind of equipment and all the activities which lead an individual or groups of knowledge workers to be economically more productive can be considered as human capital (Giziene et al. 2012). From an economic point of view, the importance of human capital depends on how it contributes to value creation and the economic growth of a country (Nehru et al. 1995; Porter 1998; Drucker 1999).

According to Van Deventer (2002) in the industrial age it was required that companies' balance sheets demonstrate their values to the investors. However, in the knowledge economy the balance sheet is no longer an appropriate tool to show that whether a proper investment in organizational capital is being made or not. This is due to the lack of information about the value created by intangibles.

There have been several methods for evaluating the value created by the organization's intellectual capital and the purpose has been representing the intangibles value in the balance sheet in order to simplify the process of managing these assets (Filius 1991; Lloyd & Joubert 1995; Stewart 1997; Yusuf 2013). Annie Brooking (1996) developed a method called "Technology Broker" in order to assess the value of a company's intellectual capital. According to Brooking (1996) the main components of intellectual capital include market assets, human centered assets, intellectual property assets and infrastructure assets. The main weakness of the method is the difficulty of extracting the actual financial value of the assets from the qualitative results of the questionnaire (Bontis 2000). Human Resource Costing and Accounting is a model introduced by Johansson and Nilson (1996) that calculates the unknown impact of costs related to human resource. Skandia introduced itself as the first company that provided its shareholder with IC values in addition to the traditional financial reports of the company (Bontis 2000). A holistic IC reporting model called "Navigator" was developed by Leif Edvinsson in 1992, which is a tool for measuring intellectual capital by analyzing up to 164 metric measures with focus on five areas, including process, renewal and development, financial, customer and human capital (Bontis 2000). Value Added Intellectual Coefficient (VAIC) is a method developed by Pulic in 1998. It contains three main components namely Human Capital Efficiency (HCE) which indicates the value added by human capital, Structural Capital Efficiency (SCE) which indicates the value added by structural capital and Capital Employed Efficiency (CEE) which refers to the value added by capital employed of the company (Rahim et al. 2010). As Kaes (1999) pointed out measuring intangibles is essential for managing them in an effective way.

## 3. Research Methodology

### 3.1. Research Hypothesis

In order to achieve the objectives of this study, the following hypotheses were developed:

H<sub>01</sub>: There is a positive relationship between Human Capital Efficiency (HCE) and ROTA of the Dutch production companies

H<sub>02</sub>: There is a positive relationship between Human Capital Efficiency (HCE) and ROE of the Dutch production companies

H<sub>03</sub>: There is a positive relationship between Human Capital Efficiency (HCE) and EP of the Dutch production companies

### 3.2. Research Method

This research aims to analyze the contribution of human capital to the high financial performance of production companies; therefore the human capital component of Value Added Intellectual Coefficient (VAIC) is the center of attention in this study.

According to Nazari & Herremans (2007) the more appropriate way compared with other measurement tools is VAIC in order to measure the efficiency of intellectual capital components for statistical analysis. The main reason is that the required data could be simply found in organizations' financial reports (Laing, Dunn & Hughes-Lucas 2010).

To analyze the efficiency of intellectual capital in general and human capital in particular, the Value Added Intellectual Coefficient (VAIC<sup>TM</sup>) method has been widely used by researchers (Chen et al. 2005; Kamath 2007; Nazari & Herremans 2007; Gan & Saleh 2008; Chan 2009; Ghosh & Mondal 2012; Rahim et al. 2010; Phusavant et al. 2011; Ul Rehman et al. 2012; Yusuf 2013). According to Santoso (2011, p.88) 'the VAIC method can be used with confidence to process financial data from annual reports, which are reliable source of data'.

### 3.3. Data Collection, Sample and Population

Required data for this study are gathered from annual reports of the companies for a period of six years (2007-2012). Balance sheets, cash flow statements, income statements in the annual reports are considered important sources for data gathering.

The population of this study consists of production/manufacturing companies that are active in diverse industries and headquartered in the Netherlands. There are 45 companies listed in Bloomberg (2013) with the mentioned categories. All the production/manufacturing companies headquartered in the Netherlands were approached with a request to participate in the research. In response to this 33 positive reactions were received. Therefore the sample of the research consists of 33 production/manufacturing companies headquartered in the Netherlands. In this research n=33 companies were observed for t=6 years. Therefore, the number of observations for the study is 33\*6=198.

Fincham (2008) cited in Draugalis and Plaza (2009, p.1), stated that:

*“Nonresponse bias theoretically can occur with anything less than a 100% response rate. A response rate of 50%-60% or greater is optimal because nonresponse bias is thought to be minimal with that high of a response rate”.*

According to Babbie (1990) a response rate more than 60% is acceptable.

In the current research the response rate is 73.3% which is considered as a good response rate according to the argumentation above.

### 3.4. Research Model

In order to find the relationship between human capital efficiency and corporate performance the following research models were formulated in line with the study hypotheses:

$$\text{ROTA} = \alpha + \beta_1 (\text{HCE}) + \beta_2 (\text{ATO}) + \varepsilon \quad (1)$$

$$\text{ROE} = \alpha + \beta_1 (\text{HCE}) + \beta_2 (\text{ATO}) + \varepsilon \quad (2)$$

$$\text{EP} = \alpha + \beta_1 (\text{HCE}) + \beta_2 (\text{ATO}) + \varepsilon \quad (3)$$

### 3.5. Variable Definition

#### 3.5.1. Dependent Variables

For the purpose of conducting the analysis in the current research, three dependent variables namely Return On Total Assets (ROTA), Return On Equity (ROE) and Employee Productivity (EP) were used separately:

- Return on Total Assets (ROTA): Return on Assets measured as the ratio of the pre-tax income to total assets and clarifies the extent to which a company's revenue exceeds over expenses (Firer & Williams 2003; Chen, Cheng & Hwang 2005).

- Return on Equity (ROE): Return on Equity measured as the ratio of net income to shareholders' equity and it clarifies the extent of company profitability through the invested money by shareholders (Syed Najibullah 2005).
- Employee Productivity (EP): Employee Productivity is measured by the following formula:  $EP = \text{Pre-tax income} / \text{Number of employees}$  (Phusavat et al. 2011).

### 3.5.2. Independent Variable

The independent variable used in this research is Human Capital Efficiency, which is a component of Value Added Intellectual Coefficient developed by Pulic (1998). Human Capital Efficiency (HCE) is computed as the ratio of Value Added to Human Costs (HC). The algebraic equation is as follows:

$$HCE_i = VA_i / HC_i$$

Where  $HCE_i$  stands for Human Capital Efficiency for company  $i$ ;  $VA_i$  represents Value Added for company  $i$  and  $HC_i$  indicates personnel expenses (salaries and benefits) for company  $i$ .

Value Added is computed as follows:

$$VA = \text{Total Revenue} - (\text{Operating Expenses} - \text{Salaries})$$

### 3.5.3. Control Variables

In defining the linear regression models the following control variable is considered to isolate the contribution of Human Capital to corporate performance of the companies:

- Asset Turnover Ratio (ATO): ATO refers to the ratio of sales revenue to total assets. ATO is used as a control variable to control for the effect of total assets on corporate performance (Mondal & Ghosh 2012).

## 4. Empirical Results

In presenting the results, table 1 (see appendix) shows the descriptive statistics. There are 198 observations and HCE has a minimum amount of 0.37 recorded by one of the Dutch production companies in the year 2011. On the other hand, the maximum amount of HCE recorded by another company in 2008 which is 37.97. The mean for Human Capital Efficiency (HCE) is 2.701061 and 8 companies out of 33 show an average HCE higher than the mean. This means that for 8 companies out of 33 the average return on 1 euro invested in their human capital is more than 2.70 euro.

From the regression results of table 2, it can be seen that there is a positive correlation between HCE and corporate performance measure ROTA. The P-value for ROTA regressed with HCE is 0.000 which is less than 0.05; therefore the hypothesis regarding a positive relationship between human capital efficiency and ROTA in Dutch production/manufacturing companies is supported. R-squared overall is 0.0978 which means only about 10% of the variation in ROTA is explained by HCE. Furthermore, looking at Asset Turnover ratio (ATO) and ROTA, P-value is 0.059 which means at 10% significance level ATO is useful for predicting ROTA.

Table 3 presents the regression results of HCE and corporate performance measure ROE. The empirical results show that Human Capital Efficiency and Return on Equity (ROE) are positively related as P-value is  $0.024 < 0.05$ . However, R-squared overall is 0.0239 which means the explanatory power of the regression model (model 2) is only about 2.4%.

From the data presented in table 4, it can be concluded that there is a strongly significant relationship between HCE and corporate performance measure "Employee Productivity" (EP). The P-value for EP regressed with HCE is 0.000 which is less than 0.05 and R-squared overall computed as 0.7653 which means 76.5% of the changes in Employee Productivity is explained by HCE.

Asset Turnover ratio (ATO) as the control variable shows no significant relationship with two financial performance measures; Return on Equity and Employee Productivity.



## 5. Conclusion

The study concluded that the corporate performance of Dutch production/manufacturing companies measured by ROTA, ROE and EP is positively influenced by efficient utilization of Human Capital. Human Capital Efficiency contributes to high organizational performance of the companies although there is not a highly significant association between HCE and ROE. HCE also explains only 10% of the changes in ROTA of the companies. However, the findings confirm that better utilization of human capital results in higher employee productivity. Therefore, all the three hypothesis of the study have been confirmed.

Considering the results, it may be concluded that Dutch production and manufacturing companies appear to be focused on their human capital as the main source of value creation and a strategic tool for enhancing financial performance. Therefore it is necessary to understand how human capital efficiency of these companies could be improved and what factors should be considered for managing this intangible asset. However, it was not the objective of this research to investigate those factors. Further research is needed to learn more about the factors that enhance human capital efficiency and consequently the financial performance of Dutch production companies. In line with what Becker et al. (2002) discussed it seems that companies with higher HCE employ people with more productive behavioral characteristics which ultimately enhance customer satisfaction. One might seek for key indicators to identify the reasons why knowledge workers show those behavioral characteristics. These indicators may include level of education, training courses considered for employees, job satisfaction and other factors. All this calls for further investigation in future research.

It is believed that the researchers may have put too much emphasis on measuring human capital efficiency while the main goal of measuring this intangible asset is to assist organizations in using this information for developing a strategic plan and employ their human capital in a way that brings them competitive advantages (Kaes 1999; Chhinzer & Ghatehorde 2009). Therefore, while it is essential to measure Human Capital Efficiency it should not be forgotten that the major purpose of this measurement is providing companies with an action plan to utilize human capital and lead organizations to be more profitable and productive. Indeed companies HR managers should identify the key factors/ strategies that can lead their human capital to generate more value in the data-to-value cycle.

## Acknowledgement

The authors thank Prof. Vincent Feltkamp for his kind support during the data analysis for this research.

## References

- Ahonen, G 2000, 'Generative and commercially exploitable intangible assets', *Classification of intangibles*, Gröjer, J.-E & Stolowy, H (ed.). Paris: HEC School of Management, pp. 206–214
- Babbie, E 1990, *Survey research method*, Wadsworth, Belmont, CA.
- Bartelsman, E., Dobbelaere, S. & Peters, B 2013 'Allocation of human capital and innovation at the frontier: Firm-level evidence on Germany and the Netherlands', Tinbergen Institute Discussion Paper, no. 7540. Viewed 20 December 2014, < [papers.tinbergen.nl/13095.pdf](http://papers.tinbergen.nl/13095.pdf) >.
- Becker, G 1964, *Human capital*, National Bureau of Economic Research, New York, NY.
- Becker, B., Huselid, M.A. & Ulrich, D 2002, Six key principles for measuring human capital performance in your organization, Viewed 14 October 2014, < <http://mgt.buffalo.edu/departments/ohr/becker/Publications/Six%20Key%20Principles.pdf> >.
- Bloomberg 2013, Companies listed in Netherlands, Viewed 16 October 2014, < <http://www.bloomberg.com/markets/companies/country/netherlands/> >
- Bontis, N 1998 'Intellectual capital : An exploratory study that develops measures and models', *Management Decision*, vol.36, no.2, pp.63-76.
- Bontis, N 2000 'CKO wanted – Evangelical skills necessary: A review of the chief knowledge officer position', *Knowledge and Process Management*, vol.,no.1, pp. 29-38.
- Brooking, A 1996, Intellectual capital-Core asset for the third millennium enterprise, [Cengage Learning EMEA](http://www.cengagelearning.com), London.
- Chan, H.K 2009 'Impact intellectual capital on organization performance', *Journal Intellectual Capital*, no.16.
- Chen, J, Zhu, Z & Xie, H 2004 'Measuring intellectual capital: a new model and empirical study', *Journal of Intellectual Capital*, vol.5,no.1, pp. 195-212.
- Chen, M, Cheng, S & Hwang, Y2005 'An empirical investigation of the relationship between intellectual capital and firms' market value and financial performance', *Journal of Intellectual Capital*, vol.6,no.2, pp.159-76.

- Chhinzer, N, Ghatehorde, G 2009 'Challenging relationships: HR metrics and organizational financial performance', *The Journal of Business Inquiry*, vol. 8, no1, pp.37-48.
- Drucker, P 1999, *Management challenges for the 21st Century*, Harper Collins Publishers, New York.
- Edvinsson, L, Malone, M.S 1997 , *Intellectual capital: Realizing your company's true value by finding its hidden brainpower*, Harper Business, New York.
- Filios, V. P 1991, 'Human resource accounting is social accounting: A' managerial reappraisal', *Human systems Management*, no.10, pp. 267-280.
- Fincham, R, Roslender, R 2003 'Intellectual capital as management fashion: a review and critique', *European Accounting Review*, vol.12,no.4, pp.781-795.
- Fincham, JE 2008 ' Response rates and responsiveness for surveys, standards, and the Journal', *Am J Pharm Educ*. Cited in: Darugalis, JR & Plaza, CM 2009 ' Best practices for survey research reports revisited: Implications of target population, probability sampling, and response Rate', *American Journal of Pharmaceutical Education*, vol.73, no.8, p.142.
- Firer, S & William S.M 2003,' Intellectual Capital and Traditional Measures of corporate performance', *Journal of Intellectual Capital*, vol. 4, no.3, pp. 348-360.
- Fitz-enz, J 2000, *Human Capital: The profit lever of a knowledge economy*, In: , *The ROI of Human Capital*, American Management Association, New York: 1-24.
- Gan, K & Saleh, Z 2008,' Intellectual capital and corporate performance of Technology-Intensive companies: Malaysia evidence' , *Asian Journal of Business and Accounting*, vol.1, no.1, pp. 113-130.
- Giziene, V, Cimanaviciene, Z & Palekiene, O 2012 , ' Evaluation of Investment in Human Capital Economical Effectiveness' , *Inzinerine Ekonomika-Engineering Economics*,vol. 23, no.2, pp. 106-116.
- Goh, P 2005 , ' Intellectual capital performance of commercial banks in Malaysia' , *Journal of Intellectual Capital*, vol.6, no.3,pp. 385-96.
- Grossman, R, J 2000, ' Measuring up: Appropriate metrics help HR prove its worth' , *HR Magazine*, vol. 45, no.1, pp. 28–35.
- Human Capital Management Institute 2013, ' Managing an organization's biggest cost' , *The Workforce*, viewed 26 January 2015, <[http://www.hcminst.com/files/OrgPlus\\_Total\\_Cost\\_Workforce\\_.pdf](http://www.hcminst.com/files/OrgPlus_Total_Cost_Workforce_.pdf)>.
- Heckman, J 2000, ' Policies to foster human capital' , *Research in Economics*, no.54,pp.3-56.
- Jaw, B, Yu Ping Wang, C & Chen, Y 2006, 'Knowledge flows and performance of multinational subsidiaries: The perspective of human capital' , *International Journal of Human Resource Management*,vol. 17, no.2, pp. 225-244.
- Johanson, U & Nilson, M 1996 , 'The usefulness of human resource costing and accounting' , *Journal of Human Resource Costing and Accounting*, vol.1, no.1,pp. 17-138.
- Jurczak, J 2008 , 'Intellectual capital measurement methods' , *Economics and Organization of Enterprise*, vol.1, no.1,pp. 37-45.
- Kaes, B 1999 , *Intellectual capital management: a critical analysis of conceptual approaches and tools* , Stellenbosch, Stellenbosch University, South Africa.
- Kamath, G.B 2007, ' The intellectual capital performance of Indian banking sector' , *Journal of Intellectual Capital*, vol.8, no.1,pp. 96-123.
- Kaplan, R S & Norton, D. P 2004, ' Strategy maps: Converting intangible assets into tangible outcomes' , *Harvard Business School Press*, Boston.
- Komnencic, B , Pokrajcic, D 2012, ' Intellectual capital and corporate performance of MNCs in Serbia' , *Journal of Intellectual Capital*,vol. 13, no.1,pp.106-119.
- Laing, G , Dunn, J & Hughes –Lucas, S 2010 , ' Applying the VAICTM model to Australian hotels' , *Journal of Intellectual Capital*, vol.11, no.3, pp. 269-283.
- Lloyd, C. & Joubert ,A 1995, Cited in: Van Deventer, M.J 2002 , ' Measuring Intellectual Capital' , viewed 17February2015,<<http://upetd.up.ac.za/thesis/available/etd-08012003-162454/unrestricted/04chapter4.pdf>>
- Makki, M.A , Lodhi, S.A &Rahman, R 2008 , ' Intellectual capital performance of Pakistani listed corporate sector' , *International Journal of Business and Management*,vol. 3, no.10,pp. 45-51.
- Milost, F 2012 , 'How to evaluate human capital?' , *Chinese Business Review*, vol.11, no.9,pp.830-838.
- Mondal, A , Ghosh, S.K. 2012 , 'Intellectual capital and financial performance of Indian banks' , *Journal of Intellectual Capital*, vol.13, no.4, pp. 515-530.

- Najibullah, S 2005 , ‘ An empirical investigation of the relationship between intellectual capital and firm’s market value and financial performance -In context of commercial banks of Bangladesh, An internship report presented in partial fulfillment of the requirements for the degree bachelor of business administration’ , *Independent University Bangladesh* , viewed 11 January 2015,< <http://www.sb.iub.edu.bd/Internship/autumn2005/0220175.pdf> >.
- Naude, W , Szirmai, A 2012, ‘ The importance of manufacturing in economic development: past, present and future perspectives’ , *Maastricht Economic and social Research institute on Innovation and Technology*, viewed 24 October 2013, <<http://www.merit.unu.edu/publications/wppdf/2012/wp2012-041.pdf> >.
- Nazari, J A & Herremans , I M 2007 , ‘ Extended VAIC model: Measuring intellectual capital components’ , *Journal of Intellectual Capital*, vol.8, no.1,pp. 595-609.
- Nehru, V , Swanson, E & Dubey, A 1995 , ‘ A new database on human capital stock in developing and industrial countries: sources, methodology, and result’ , *Journal of Development Economics*, no.46. pp. 379-401.
- Phusavat, K , Comepa, N , Sitko-Lutek, A & Ooi, K 2011, ‘ Interrelationships between intellectual capital and performance: Empirical examination’ , *Industrial Management & Data System*, vol.111, no.6,pp. 810-829.
- Plink, D , Barning, T 2010, ‘ The ROI of HR strategy is measured after all-practical tools to measure the output of HR’ , *The CRF Institute*.
- Porter, M 1998, *The competitive advantage of nations*, The Free Press, New York.
- Pulic, A1998 , ‘Measuring the performance of intellectual potential in the knowledge economy’ ,Viewed 15 December 2013, < <http://xa.yimg.com/kq/groups/21741988/1414311172/name/pulic+1998.pdf> >.
- Rahim, A , Atan, R & Kamaluddin, A 2010 , ‘ Intellectual capital efficiency in Malaysian public companies: A longitudinal study’ , *A paper presented in International Conference in Intellectual Capital and Knowledge Management*, Hong Kong Polytechnic University,pp.11-12.
- Santoso, E 2011, *Intellectual capital in Indonesia: The influence on financial performance of banking industry*, University of Phonix.
- Schultz, T 1961 , ‘ Investment in human capital’ , *The American Economic Review*, no.51,pp. 1-17.
- Schultz, T 1971 , *Investment in human capita*, The Free Press, New York: NY.
- Stewart, T A 1997, *Intellectual capital: The new wealth of organizations*, Bantam Doubleday Dell Publishing Group, New York.
- Stiles, P , Kulvisaechana, S 2003, ‘ Human capital and performance: A literature review’ ,*Task Force on Human Capital Management Reporting*, Cambridge: Cambridge University Judge Institute of Management., UK.
- Ting, I W , & Lean, H H 2009, ‘ Intellectual capital performance of financial institutions in Malaysia’ , *Journal of Intellectual Capital*, vol.10,no. 4 .pp.588-599.
- UlRehman, W , Ur Rehman, H , Usam, M & Asghar, N 2012, ‘ A link of intellectual capital performance with corporate performance: Comparative study from banking sector in Pakistan’ , *International Journal of Business and Social Science*, vol.3, no.12,pp. 313-321.
- Van Deventer, M J 2002, ‘ Measuring intellectual Capital’ , Viewed 18 February 2013, <[http://upetd.up.ac.za/thesis/available/etd-08012003\\_162454/unrestricted/04chapter4.pdf](http://upetd.up.ac.za/thesis/available/etd-08012003_162454/unrestricted/04chapter4.pdf) > .
- Verma, A 2013, ‘ Designing and measuring human capital key performance indicators: The balanced scorecard approach’ , *TATA Consultancy Service*, Viewed 15 January 2014 , <[http://www.tcs.com/resources/white\\_papers/Pages/Designing-Measuring-Human-Capital-Key-Performance-Indicators.aspx](http://www.tcs.com/resources/white_papers/Pages/Designing-Measuring-Human-Capital-Key-Performance-Indicators.aspx) >.
- Weaver, G 2006 , *Profile of the International Pump Industry- Market prospects to 2010*, 6<sup>th</sup> ed, PUMP INDUSTRY ANALYST. Elsevier Ltd.
- Yusuf, I 2013 , ‘ The relationship between human capital efficiency and financial performance: An empirical investigation of quoted Nigerian banks’ , *Research Journal of Finance and Accounting*,vol.4, no.4,pp. 148-154.



## Appendix

**Table 1-** Descriptive Statistics

	n	Mean	Minimum	Maximum	SD
HCE	198	2.701061	0.37	37.97	4.708573
ROTA	198	4.595455	-28.60	23.50	8.029358
ROE	198	6.746465	-169.00	84.60	26.6324
EP	198	27143.19	-293717.3	618000.40	92016.21
ATO	198	1.107626	0.40	2.67	0.4392713

**Table 2-** Regression Results-The relationship between HCE and ROTA

ROTA	Coef.	Z	p>  z
HCE	0.9607384**	5.26	0.000
ATO	3.657102***	1.89	0.059
_Cons	-2.05026	-0.86	0.389

**Notes:** R<sup>2</sup> overall =0.0978; Wald Chi2 (2)=34.32 , Prob> Chi2=0.0000 ; \*\* and \*\*\* presents significance level at 5% and 10% respectively.

**Table 3-**Regression Results- The relationship between HCE and ROE

ROE	Coef.	Z	p>  z
HCE	1.22523**	2.26	0.024
ATO	5.003504	0.86	0.388
-Cons	-2.104969	-0.30	0.764

**Notes:** R<sup>2</sup> overall=0.0239; Wald Chi2 (2)=6.15 , Prob> Chi2=0.0462 ; \*\* presents significance level at 5% .

**Table 4-**Regression Results- The relationship between HCE and EP

EP	Coef.	Z	p>  z
HCE	18206.16**	19.93	0.000
ATO	1259.71	0.13	0.897
_Cons	-23428.04	-1.98	0.047

**Notes:** R<sup>2</sup> overall=0.7653; Wald Chi2 (2)=399.45 , Prob> Chi2=0.0000 ; \*\* presents significance level at 5% .

**Table 5-** Financial data from Dutch Production companies covered in the study

Company	Year	HCE	ROTA	ROE	EP
1	2007	1.70	10.6	22.8	17,188.30
	2008	1.70	12.0	21.6	22,711.47
	2009	1.70	13.2	21.6	24,934.00
	2010	1.60	11.0	20.2	22,483.70
	2011	1.50	10.0	18.8	19,423.00
	2012	1.35	4.2	9.3	9,272.69
2	2007	1.50	3.1	84.6	14,249.00
	2008	1.00	-4.2	-14.5	-13,067.00
	2009	1.50	2.5	3.6	8,459.00
	2010	1.60	4.5	8.4	16,493.00

		2011	1.50	3.6	5.1	12,701.00
		2012	0.80	-8.3	-31.0	-29,599.00
3		2007	1.56	3.2	3.7	21,243.70
		2008	1.45	3.9	4.6	23,302.80
		2009	1.26	-3.5	-33.1	-15,809.60
		2010	1.38	1.5	1.0	6,611.30
		2011	1.46	2.9	2.3	12,330.40
		2012	1.32	1.1	1.0	3,564.20
4		2007	1.23	4.2	15.7	9,900.90
		2008	1.25	3.0	14.2	8,879.90
		2009	1.15	0.8	3.7	2,026.80
		2010	1.14	1.0	4.3	2,863.80
		2011	1.14	1.2	5.2	3,054.20
		2012	0.99	-4.3	-31.3	-9,847.10
5		2007	1.31	1.9	4.7	4,606.90
		2008	1.41	3.7	11.3	9,296.80
		2009	1.50	5.6	14.3	13,511.20
		2010	1.53	4.9	13.7	13,503.70
		2011	0.90	-7.4	-15.7	-18,215.90
		2012	1.07	-4.4	-8.5	-9,871.10
6		2007	1.89	10.2	8.1	44,844.60
		2008	1.93	8.2	12.4	34,460.40
		2009	1.54	2.6	6.8	11,214.70
		2010	1.78	6.3	9.2	30,304.40
		2011	1.80	8.8	14.0	44,501.40
		2012	1.62	2.9	4.9	14,852.30
7		2007	1.40	19.1	24.0	20,097.00
		2008	1.40	21.0	26.7	19,527.00
		2009	1.50	19.7	24.7	19,228.00
		2010	1.45	18.1	23.0	20,376.00
		2011	1.40	10.8	13.0	12,837.50
		2012	1.30	14.5	18.4	16,742.50
8		2007	1.45	7.7	20.8	6,543.90
		2008	1.45	8.0	22.1	7,441.40
		2009	1.40	4.6	12.1	4,068.50
		2010	1.43	2.7	10.9	2,519.50
		2011	1.23	-7.4	-61.5	-6,708.80
		2012	1.25	-3.1	-22.1	-2,877.90
9		2007	1.23	5.6	7.1	10,500.00
		2008	1.47	9.3	8.8	17,400.00
		2009	1.41	6.9	8.3	13,554.90
		2010	1.40	7.2	10.4	16,592.90
		2011	1.40	7.3	9.4	17,659.20
		2012	1.45	2.4	10.4	22,912.70

10	2007	5.50	3.5	12.2	7,849.80
	2008	5.25	-0.7	-9.2	-1,482.00
	2009	4.65	-2.4	-9.4	-4,642.50
	2010	4.44	1.9	3.4	3,842.47
	2011	4.26	-2.4	-9.0	-4,742.77
	2012	4.10	-6.8	-27.6	-11,912.12
11	2007	1.68	10.8	13.6	25,942.52
	2008	1.47	2.9	4.4	10,585.68
	2009	1.67	7.0	18.0	25,822.31
	2010	1.76	7.4	13.6	29,925.45
	2011	1.75	7.4	14.2	31,516.53
	2012	1.72	10.1	23.1	47,695.42
12	2007	3.30	10.7	15.7	17,653.81
	2008	2.93	-1.2	-2.7	-1,714.64
	2009	2.98	3.9	6.5	5,529.78
	2010	3.00	6.4	13.2	9,108.42
	2011	2.94	2.9	6.8	4,365.75
	2012	2.98	4.9	9.2	7,275.56
13	2007	1.18	5.2	4.1	6,337.74
	2008	1.14	2.4	13.8	4,794.99
	2009	0.97	-5.4	4.1	-7,427.05
	2010	1.31	11.1	14.5	14,389.53
	2011	0.77	-5.8	-21.9	-9,109.31
	2012	1.25	8.4	17.4	11,948.52
14	2007	0.80	-7.5	44.8	-8,552.08
	2008	0.57	-16.6	-152.7	-20,200.00
	2009	0.75	-13.1	-38.9	-14,794.64
	2010	0.98	-4.8	-14.3	-5,859.64
	2011	0.73	-11.7	-26.8	-17,623.85
	2012	0.85	-9.3	-24.9	-13,445.45
15	2007	3.70	16.3	29.6	8,662.21
	2008	1.00	-0.4	-1.1	-174.81
	2009	0.92	-7.1	-14.1	-3,657.87
	2010	1.11	6.8	11.0	3,711.39
	2011	1.07	5.8	7.6	3,063.59
	2012	1.03	1.4	-0.8	689.08
16	2007	1.30	7.0	17.5	17,632.21
	2008	1.32	6.5	16.2	15,156.33
	2009	1.26	6.0	12.7	14,002.20
	2010	1.29	6.4	13.8	15,864.54
	2011	1.40	6.7	14.3	18,358.83
	2012	1.44	7.5	16.1	21,858.59
17	2007	1.40	10.7	24.1	14,088.00
	2008	1.36	6.6	18.1	9,807.00

		2009	1.20	3.3	8.8	5,029.00
		2010	1.35	7.8	16.0	12,637.00
		2011	1.36	8.6	17.1	13,709.50
		2012	1.36	9.3	15.6	14,669.00
18		2007	3.38	16.1	33.9	12,187.00
		2008	2.50	8.4	5.7	5,387.00
		2009	2.11	-7.5	-27.9	-5,736.00
		2010	3.76	23.5	58.9	142,530.00
		2011	3.47	22.3	47.9	20,134.00
		2012	2.52	4.4	5.4	3,850.00
19		2007	2.71	21.1	36.0	130,482.80
		2008	1.71	7.8	16.2	44,681.60
		2009	1.30	-2.0	-4.6	-12,820.00
		2010	3.20	17.8	35.5	160,581.00
		2011	3.37	22.7	42.6	207,245.10
		2012	2.60	15.5	28.2	135,409.90
20		2007	1.07	-0.2	0.1	-181.81
		2008	1.01	-3.1	2.0	-3,648.00
		2009	1.12	-14.0	-55.9	-13,212.12
		2010	1.80	1.5	7.9	1,669.35
		2011	1.72	3.1	9.5	3,675.67
		2012	1.46	-3.8	-1.3	-4,922.33
21		2007	1.48	6.1	35.0	15,285.46
		2008	1.14	3.7	19.0	8,845.99
		2009	0.97	-0.8	3.5	-1,854.97
		2010	0.98	0.4	1.6	968.70
		2011	1.10	2.2	10.8	5,957.43
		2012	0.80	-4.3	-20.2	-12,550.54
22		2007	2.00	11.4	29.5	29,193.65
		2008	1.91	12.2	30.6	30,485.44
		2009	1.85	10.5	21.1	27,851.84
		2010	1.73	9.0	21.7	28,195.99
		2011	1.62	6.7	15.4	22,661.66
		2012	1.55	6.2	39.2	19,333.61
23		2007	1.16	6.6	24.8	6,919.47
		2008	1.17	6.2	28.4	6,873.47
		2009	1.17	6.6	25.2	7,451.92
		2010	1.18	6.2	17.2	7,577.26
		2011	1.17	5.5	16.1	7,566.02
		2012	0.90	-5.6	-41.8	-7,515.35
24		2007	3.35	12.3	19.2	36,065.94
		2008	2.98	0.3	-1.1	757.83
		2009	2.68	1.4	2.9	3,864.60
		2010	2.98	6.0	9.6	16,325.59

		2011	2.23	-1.7	-10.4	-4,064.16
		2012	2.32	2.7	2.0	6,639.17
25		2007	29.42	18.7	25.7	486,000.30
		2008	37.97	17.9	20.6	498,000.23
		2009	15.76	4.1	9.3	119,000.00
		2010	22.93	10.9	13.8	364,000.37
		2011	29.48	16.1	18.3	618,000.44
		2012	27.55	13.9	14.2	578,000.03
26		2007	1.39	8.0	14.9	14,452.73
		2008	1.44	7.8	13.9	15,798.96
		2009	1.18	2.6	6.3	5,256.24
		2010	1.39	7.2	10.6	15,125.26
		2011	1.43	7.8	12.6	17,987.59
		2012	1.11	2.7	4.8	5,702.73
27		2007	1.20	5.8	10.4	9,512.76
		2008	1.23	4.9	9.5	7,850.24
		2009	0.60	-10.0	-88.9	-28,438.74
		2010	1.04	-0.8	-1.8	-1,318.10
		2011	0.83	-6.1	-12.9	-10,311.64
		2012	0.63	-14.7	-52.6	-24,031.01
28		2007	5.42	7.7	19.9	88,170.51
		2008	4.92	5.4	18.3	61,804.10
		2009	4.78	5.0	12.6	56,119.21
		2010	4.77	5.5	13.0	62,545.81
		2011	4.55	-7.4	-34.3	-75,708.34
		2012	4.58	-0.6	-4.9	-5,862.02
29		2007	1.27	8.7	17.0	16,112.66
		2008	1.22	9.0	17.1	16,819.16
		2009	1.08	0.7	1.1	1,413.02
		2010	1.30	8.0	12.8	14,687.53
		2011	1.36	8.8	15.1	17,145.24
		2012	1.19	3.9	7.2	8,591.42
30		2007	9.98	21.9	23.4	400,149.35
		2008	0.42	-28.6	-169.0	-293,717.35
		2009	4.23	4.1	8.5	33,841.53
		2010	3.41	5.1	9.4	40,762.16
		2011	0.37	-24.5	-61.9	-119,218.49
		2012	2.02	3.5	15.4	17,409.54
31		2007	5.45	13.8	33.4	29,417.14
		2008	6.04	19.7	53.1	40,971.26
		2009	5.64	13.3	30.3	29,261.90
		2010	5.93	14.9	31.7	37,163.63
		2011	7.09	13.1	32.3	36,952.66
		2012	6.66	14.5	32.6	38,854.65



32		2007	0.52	-5.3	-2.8	-14,425.56
		2008	1.77	7.3	8.7	34,325.47
		2009	0.43	-5.6	-9.5	-34,496.74
		2010	1.59	3.1	2.7	19,411.89
		2011	1.80	4.4	3.9	27,421.42
		2012	1.81	4.9	4.8	33,219.94
33		2007	0.80	8.0	17.3	8,544.67
		2008	1.07	4.0	18.8	5,453.20
		2009	1.22	5.9	16.6	8,295.36
		2010	1.24	5.9	11.9	8,004.75
		2011	1.24	6.2	10.6	8,126.00
		2012	1.20	2.1	9.4	3,069.34

The IISTE is a pioneer in the Open-Access hosting service and academic event management. The aim of the firm is Accelerating Global Knowledge Sharing.

More information about the firm can be found on the homepage:

<http://www.iiste.org>

### CALL FOR JOURNAL PAPERS

There are more than 30 peer-reviewed academic journals hosted under the hosting platform.

**Prospective authors of journals can find the submission instruction on the following page:** <http://www.iiste.org/journals/> All the journals articles are available online to the readers all over the world without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. Paper version of the journals is also available upon request of readers and authors.

### MORE RESOURCES

Book publication information: <http://www.iiste.org/book/>

Academic conference: <http://www.iiste.org/conference/upcoming-conferences-call-for-paper/>

### IISTE Knowledge Sharing Partners

EBSCO, Index Copernicus, Ulrich's Periodicals Directory, JournalTOCS, PKP Open Archives Harvester, Bielefeld Academic Search Engine, Elektronische Zeitschriftenbibliothek EZB, Open J-Gate, OCLC WorldCat, Universe Digital Library, NewJour, Google Scholar

