

Global Advanced Research Journal of Economics, Accounting and Finance Vol. 2(4) pp. 086-092, May, 2013
Available online <http://garj.org/garjeaf/index.htm>
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Full Length Research Paper

Measurement models of human capital accounting: a case study

Pedro Andrade and Ana Maria Sotomayor

Higher Institute of Accounting and Administration of Lisbon
Higher Institute of Accounting and Administration of Lisbon

Accepted 03 April, 2013

For the American Accounting Association (AAA) the human capital accounting is the process of identifying and measuring data about human resources and communicating this information to interested parties. Will the data on the measurement of human resources that this article focuses, seeking to provide the existing measurement models, thus allowing the existence of means for making decisions, monitor the effective use of human assets and determine the value of people to organizations. Through analysis of several scientific journal articles and books in the area of accounting and management, we intend to group the various methods used in measuring human capital in order to provide the means for measuring the various users of information. On the other hand, presents a experimental case study of application of the original model of Lev and Schwartz to a service company, drawing its conclusions. The paper provides a clear integrated framework and measures of forms of human capital accounting to guide and inform future researchers.

Keywords: Human capital, human capital accounting and measurement of human capital.

INTRODUCTION

In the modern concept of organization employees are seen as valuable resource. Nevertheless, it has been given little importance to the measurement of the cost and value of human resources in the organization. Economists were the first group to show some interest in the measurement of human capital. They intent to develop measures of quantification of human resources at the macro level and not at a micro level such as the individual or the company. After economists show an interest in human capital, namely during the early and mid sixties, some accountants were concerned about the potential impact of ignoring such an important resource in financial decisions. Therefore their concerns led to the

development of a new field of research in accounting, which has been called human resource accounting (HRA) or human capital accounting (HCA).

For the American Accounting Association (1973) the objective of HCA is to improve the quality of financial decisions taken in the organization either internally or at external level.

According to Flamholtz (1974) and McRae (1974) one of the main objectives of the HCA is to develop methods of measuring human resource cost and value, which help provide means for making decisions such as those involving recruitment, development, salaries or replacement of human resources on a "value for money" basis. Those methods are designed to enabling management to monitor the effective use of human asset management, and evaluate the extent to which management was appreciated, preserved, or human

*Corresponding author Email: pn.andrade@netcabo.pt

resources are exhausted. On the other hand, we can mention another key objective of HCA, which is to develop a theory to explain the nature and the determinants of the value of people in the organization's perspective. This theory serves a dual purpose: it allows to identify the variables that must be considered in the development of value measures (either monetary or non monetary) of human resources, and may become the basis for a new paradigm of human resource management.

The concept of cost in the context of human capital

The concept of cost in the accounting system can be used in several ways, such as the historical cost, disbursement cost, replacement cost, current cost, direct and indirect cost, fixed and variable cost, standard cost, and opportunity cost.

By definition a cost is a sacrifice incurred to obtain some planned benefit or service and it may be incurred in the acquisition of physical assets or intangible benefits. Conceptually, all costs are components of expenditure and assets. An expense is a cost that is consumed during the current accounting period and an asset is the portion of costs that may be expected to generate economic benefits in future accounting periods. A major problem of accounting is the measurement and the distinction between expenses and costs.

In the context of human resource management the notion of cost of human resources is derived from the general concept of cost. Therefore, human resources costs are the sacrifices incurred for hire or replace employees and they could be direct costs or indirect costs. Moreover, the authors argue that is possible to account for the standard cost of human resources, as well as the actual cost.

The original (or accounting) cost of human resources refers to the sacrifice that is incurred to select, hire and develop people and this concept is similar to the notion of original cost for other assets. The original cost of human resources includes recruitment costs, selection costs, hiring costs, placement costs, orientation cost and on the job training costs. Some of these items are direct costs and others are indirect. For instance, the wage of a trainee is a direct cost (of training), while the time the supervisor spends during the training program is an indirect cost (of training).

In order to support management decisions it is advisable to include the opportunity costs incurred in the original cost of human resources. However, measuring the opportunity costs is a difficult task, and sometimes it is not possible to obtain accurate forecasts.

Flamholtz (1999) identified a set of labor costs, including hiring costs, recruitment costs, selection costs, recruitment and placement costs, learning costs, costs of formal training and guidance, on the job training costs

and cost due to lost productivity during training.

The hiring costs refer to the costs arising from hiring a new employee for a specific role in the organization. They include all direct costs of training, selection, recruitment and placement as well as some indirect costs as previously mentioned (for instance the time the supervisor spends during the selection programs, such as a selection interview).

The recruitment costs are those costs incurred to search within and outside the organization, the employee who best fits a given role.

The selection costs are the costs incurred to choose the best candidate for a role and include costs such as carrying out simulation tests, interviews or assessment centers. They include all costs incurred in the selection of individuals to be members of an organization.

Recruitment and placement costs are incurred to bring an individual to an organization and inform him about the tasks of his job.

The learning costs refer to all expenses incurred to train an employee and get him to have the level of expected performance for the function performed.

Costs of formal training and guidance are those related to standard education and training.

The job training costs are incurred in the formation of an individual in the workplace rather than using traditional training programs.

Finally the lost productivity during training is the cost associated with time spend by people/trainers who are giving training to new employees during the training programs.

According to Flamholtz (1999) the historical cost method involves the capitalization of all costs associated with recruitment, selection, hiring and training. These costs must be depreciated during the estimated life of the asset.

These measures have some limitations and we will mention some of the most significant. On the one hand, the economic value of an asset such as a human being does not necessarily correspond to their historical cost. On the other hand, any appreciation or depreciation can be subjective and have nothing to do with rises or decreases in productivity of human resources of the organization. Finally, the costs associated with recruitment, selection, hiring, training, placement and development of employees may differ from one person to another within a firm. Therefore, the historical cost does not result in comparable values of human resources.

Models for Measuring Human Capital

The authors often define three types of measurement models for the HCA (Bontis *et al.*, 1999; Sackmann *et al.*, 1989): cost models, value models and models that emphasize the monetary component.

Briefly we can say that cost models consider the

historical cost of acquisition, replacement and opportunity. On the other hand, value models combine human resource behaviour with non-monetary economic models of monetary value finally; monetary models are used to calculate discounted estimates of future income or wages.

Then we shall briefly examine the most relevant models of HCA, namely the Lev and Schwartz model, the stochastic model of Eric Flamholtz, the Morse model, the Hermanson model and the Hermanson model. However there are other models, such as the Lev and Friedman model, the Hekimian and Jones model and the Likert model that we are not going to address.

Recently emerged a series of new models for measuring human capital, such as the Boudreau model (1998), Cascio model (1996), Miller and Wurzburg model (1995), and Roslender and Dyson model (1992), among others, but we are not going to discuss them in this paper.

Lev and Schwartz Model

The Lev and Schwartz model (1971) seeks to determine the value of human capital held by an organization. To these authors the dichotomy in accounting between human and non-human capital is a crucial issue. Note that for Irving Fisher, one of the founders of the theory of human capital, there are no distinction between the human capital and the non-human capital.

According to Lev and Schwartz (1971) there is an important difference between human capital and the non-human capital: the ownership of human capital is nontransferable, but non-human capital is tradable in the market. In a context of certainty, where there is a perfect knowledge of future income, as well as the discount rate this differentiation has no impact in determining the value of capital. However, in a context of uncertainty, such as occurs in modern societies, it no longer applies. In the case of non-human capital one can deduce its value, by the observation of market values. For the entities dealing in the market those values reflect the current value of future outcomes. On the other hand for the human capital we can not apply the same procedures because it is not negotiable in the market. Therefore, in a world of uncertainty the distinction between human and non-human capital is very important.

In order to distinguish the human capital of non-human capital Lev and Schwartz propose that the value of human capital should be determined as follows:

- All employees are categorized into specific groups according to their age and skills.
- The average annual compensation is calculated for different age groups;
- The calculation of total remuneration for each group mentioned above will be made until the retirement age.

- The total remuneration mentioned above will be calculated at a rate discounted cost of capital. The value obtained is the value of the asset / human capital.

In Lev and Schwartz model the formula to calculate the expected value of human capital of an employee is as follows:

$$E(V_{\tau}) = \sum_{t=\tau}^T P_{\tau}(t+1) \sum_{i=\tau}^t \frac{I_{i\tau}}{(1+r)^{t-i}}$$

Where,

$E(V_{\tau})$ = The human capital value of a person with τ years old;

$I_{i\tau}$ = The person's annual earnings up to retirement. These values are plotted through the profiles of income;

r = Discount rate specific to the person;

t = Retirement age;

$P_{\tau}(t)$ = Conditional probability of an elderly person τ to die in year t .

The value of the organization's human capital is the sum of the values of human capital of all employees working in the organization. However this method does not give the correct value of human capital, and does not measure the contributions of human capital for the pursuit of organizational effectiveness.

The main disadvantages of this model are as follows:

- This model implies that the employee does not alter his contractual position, and its working condition remains unchanged over time.
- The approach does not consider the possibility of an employee leave the organization before his death or retirement.
- This model does not consider the variable of career management of the worker within the organization.
- This model does not take into consideration the changes in the functions of employees.

Stochastic Model of Eric Flamholtz

This model, suggested by Flamholtz (1972), represents an advance in relation to the model Lev and Schwartz (1971). In fact the model considers the hypothesis of an employee move around from one function to another in managing his career, and also leave the organization beforehand, namely by death or retirement.

According to Flamholtz model, the measure of the value of an individual to an organization is its expected value of achievement. The concept of expected value of achievement is based on the assumption that there is no direct relationship between the cost incurred by an individual and its value to the organization at a particular point in time, defined as the present value of all future services that is expected to provide during the period that remains in the organization. According to the Flamholtz, since it is impossible to predict with certainty the

expected service of an individual at a given point in time, we use the odds.

Formalizing the model we have:

$$E(S) = \sum_{i=1}^n S_i P(S_i) \quad (2.2.5.-1)$$

$$E(S) = S_1 P(S_1) + S_2 P(S_2) + S_3 P(S_3) \quad (2.2.5.-2)$$

where S_i represents the amount of service you would expect in each state and $P(S_i)$ is the probability of obtained those services.

According to Flamholtz the variables that affect the expected value of a person [E (CV)] are the conditional value of the person (which depends on the person's skills and the level of activity) and the probability of the person remain in the organization (which depends on several variables such as job satisfaction, commitment and motivation).

For Flamholtz, (1999) the [E(CV)] of an individual can be defined as:

$$E(CV) = \sum_{t=y}^T \frac{E(CV)_t}{(1+i)^{t-y}} = \sum_{t=y}^T \frac{\sum_{j=1}^{m-1} V_{jt} P(V_{jt})}{(1+i)^{t-y}}$$

Where:

$$P(V_{jt}) = \frac{P(V_{jt})}{\sum_{j=1}^{m-1} P(V_{jt})} \quad (2.2.5.-4)$$

$E(CV)$ é expected conditional value t;

V_{jt} is the value of the service state j in period t;

$P(V_{jt})$ is the probability of obtaining the value of the service state j in period t, where the odds are transformed as the expression (2.2.5.-4);

(V_{jt}) is the probability of obtaining the value of the service state j in period t;

$(1+i)^{t-y}$ is the discount rate, where i= interest rate; t is the time since y ;

According to Flamholtz (1999) the expected realizable value in period t of an individual can be defined as:

$$E(RV) = \sum_{t=y}^T \frac{\sum_{j=1}^M V_{jt} P(V_{jt})}{(1+i)^{t-y}} \quad (2.2.5.-5)$$

Where,

$E(RV)$ is the expected realizable value in period t;

$V_{jt} = 0$ (m is the exit status).

The main limitations of the model are as follows:

- The model suffers from all the disadvantages inherent in the present value of future earnings models.
- In this model is difficult to obtain reliable data to determine the value obtained by an organization during the period in which an employee occupies a specific position in the organization.
- The model ignores the fact that group work can have greater value to the organization, compared

- to the work of each member of the group taken individually.

- The application of the model becomes very expensive and time consuming, especially when trying to predict changes in the career of each employee and the probability of turnover of an employee in the organization.

- The predictions mentioned above may be unreliable, which reduces the usefulness of the model.

Morse Model

Morse (1973) considers that the value of human resources (human assets) of an organization is equal to the current value of the services hired by the organization to its employees, which can be expressed, in a context of certainty, by the following equation:

$$A = \sum_{i=1}^N \int_y^T \frac{I_i(t)}{(1+r)^{t-y}} dt + \int_y^T \frac{X(t)}{(1+r)^{t-y}} dt \quad (2.2.6.-1)$$

where:

A = value of human assets to a formal organization;

N = number of individuals currently employed by the organization;

y = current time;

T = highest time at which an individual currently employed leaves the organization;

$I_i(t)$ = net value of the services rendered by individual i at time t to the organization, $I_i(t) = G_i(t) - E_i(t)$;

$G_i(t)$ = gross value of services rendered by individual i at time t to the organization;

$E_i(t)$ = total direct and indirect compensation paid to individual i at time t by the organization;

X (t) = value of the services of all individuals currently employed working together in excess of the value of their individual services at time t;

r = value of money in the period of time.

Morse (1973) considers that the first part of equation (2.2.6.-1) represents the determination of the value of individuals to the organization and the second part of the equation reflects the additional value of employees to the organization, which depends on the capacity to work as a team.

Morse points out some limitations to the equation presented earlier. Thus, in the context of certainly the equation is not operational. Moreover, since the equation is based on analysis of the organization in the current period (time y) then if the organization hire more employees or make expenditures with the training of employees, the value of human assets (human resource) may change due to changes in I (t) and / or X (t).

Hermanson Model

Hermanson (1964) was the first author to refer to the HCA. He considers that the HCA is related to the balance sheet (Roslender and Dyson, 1992).

For Hermanson (1964) the definition of an asset is inadequate. So it is necessary to find a definition of an asset that considers the resources that are present in the company, but are not necessarily owned by it. Hermanson (1964: 4) defines an asset as follows:

"The assets are scarce resources (defined as services but grouped by and relating to agents) operating within the entity, capable of being transferred by the forces in the economy, and expressed in monetary terms that can be acquired as a result of current or past, which apparently has the ability to provide future economic benefits."

According to Hermanson (1964) the main advantages of inclusion of human resources in the financial statements are as follows: increases the comparability and the fullness of financial statements, generating a more efficient allocation of resources in the economy; produces a rejuvenation of the financial position; allows a tighter link between the financial statements; and facilitates the analysis of internal business.

Ogan Model

The model proposed by Organ (1976) is not intended to be a formal system of HCA. Its purpose is to provide an approach of quantification oriented to the value.

According to Morse (1973) this model is an extension of "net benefit approach".

Ogan (1976) considers that it is very important to distinguish between CCH and the quantification of human resources, since this represents a subset of the former.

Therefore the measurement and quantification in monetary values of human resources and their integration in the financial statements does not mean that we have an accounting system of human resources.

A system of accounting for human resources should be richer than the simple quantification of human resources. It should be a system that allows users to have a repeated access to information on human resources of the organization in which this information is quantified and can be controlled

According to Organ the value of human resources can be expressed by the following equation:

$$\hat{R}_{kj} = \sum_{j=1}^n \sum_{k=t}^{L-t} \frac{1}{(1+r)^k} \bar{V}_{qj}$$

where:

\hat{R}_{kj} = total adjusted net present values of human resources in a professional service organization;

\bar{V}_{qj} = certainty-equivalent net benefits;

L = end of estimated useful life of the employee for the organization;

j = jth individual; j = 1,2, ..., n;

r = a discount rate external to the organization (risk-free);

k = time periods in the future. Revenues and costs are assumed to occur at the end of kth time period;

t = some time period from 1 to L which is a point in the useful life of the employee to which the certainty-equivalent net benefits that occur after t are discounted.

q=k+t.

According to Organ (1976) the model is not intended to be the answer for the measurement of human capital. The model aims to provide conceptual tools that serve as guidelines for measuring the value of the individual to the organization. Its main limitation is that it can not be applied to organizations that provide professional services.

CASE STUDY

METHODOLOGY

This research uses the method proposed by Lev and Schwartz (1971) in the measurement of human capital. This method is used by a wide range of entities, namely, India. Within these, we highlight the Bharat Heavy Electrical Ltd. (BHEL) public company, Oil and Natural Gas Commission (ONGC), Minerals and Metal Trading Corporation of India (MMTC), Steel Authority of India Ltd. (SAIL) National Thermal Power Corporation (NTPC), Engineers India Ltd. (EIL), Hindustan Machine Tools Ltd. (HMTL), Cochin Refineries Ltd. (CRL), Madras Refineries Ltd. (MRL) and Infosys Technologies Ltd., among other (Seth, 2009). The method will be based on the original formulation made by Lev and Schwartz (1971). Unlike other authors such as Frantzreb, Landau and Lundberg (1974), Gupta (1991), Prabhakara (1993) and Seth (2009), the model used is the closest recommended by the original authors.

Data were obtained by collecting direct and indirect documentation. Thus, obtaining the documentation was carried out directly by the investigator in person, in the company under study. In addition, direct observations were also made in an unsystematic manner, ie, the researcher obtained information from a historical and updated without the use of special technical means. Since the documentation was obtained from indirect to constitute the theoretical framework on the subject in question. Thus, data were obtained from bibliographical research into articles, dissertations and theses, books and internet sites, which underlie the CCH and related topics, providing a broad overview of the concepts of the study area. The study by Lev and Schwartz (1971)

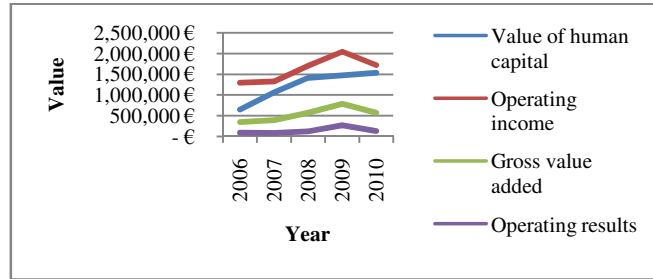


Figure 1 Relationship of four variables
Source: own elaboration

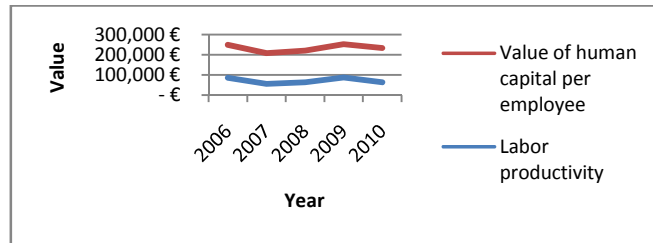


Figure 2 Relative value of HC per employee and Labor productivity
Source: own elaboration

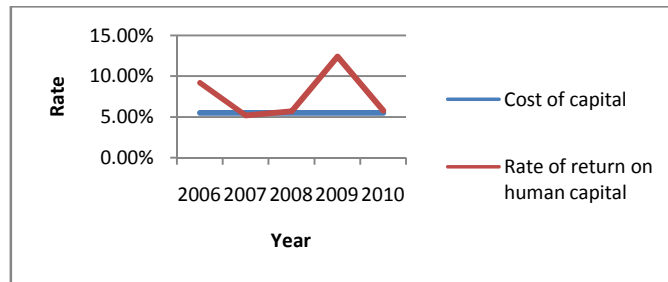


Figure 3 Relative cost of capital/rate of return on human capital
Source: own elaboration

served as a theoretical framework for the development component of the experimental case study, having taken into account Frantzreb applied studies carried out by Landau and Lundberg (1974), Gupta (1991), Prabhakara (1993) and Seth (2009) that form the basis of the theoretical study on experimental component.

The Firm

The Grupitel began operations in 1974 in Algés. Initially dedicated to the installation of cathodic protection systems (Morgan, Berkeley and Co. Ltd.), which are used to prevent corrosion of buried or submerged metal structures. In the late 80s, decided to start the business of rental generator sets. Rapidly expanded the range of products and services, yet always connected with the supply of electricity, is today a benchmark in the rental of power equipment. From the beginning, the Grupitel

decided to focus on the quality of their equipment and services and its mission is, in addition to rent, the constant search for solutions to their customers. The revitalization of its fleet and equipment development, increasingly, technical skills have helped consolidate the capacity of temporary power solutions. The Grupitel is a Group company Turbomar.

The Study

After the calculations are made based on the Lev and Schwartz model, were developed several frameworks.

Figure 1. shows the relationship between four indicators, namely: i) the value of human capital, ii) operating income; iii) gross value added and iv) the operating results. The survey was concluded that all indicators have an upward trend, having, however, a decline from 2009 to 2010. The exception is the value of

human capital that does not suffer from this reduction, but has a rather modest growth from 2009 to 2010. It follows that there is a relationship between the amount of human and other indicators, ie, in general, vary in the same way.

Figure 2. shows the relation between the value of human capital per employee and labor productivity. There is a relationship between the value of human capital and productivity at work, visible in the parallelism of the indicators. Thus, we can deduce that human capital is being used at an optimal level, meaning also that the level of remuneration is appropriate to labor productivity.

The relationship between the rate of return on human capital and cost of capital allows, as in the previous measure of how the organization's management uses the human capital to generate results. Figure 3. the rate of return is human, in general, higher than the cost of capital, and we can conclude that the human resources management use in an optimum manner.

CONCLUSIONS

In this paper, we proceeded to the presentation of the main models for measuring the HCA. From the literature review carried out, there is only evidence of application of the Lev and Schwartz model (1971). This method is used by a wide range of entities, namely, in India. Within these we highlight the *Bharat Heavy Electrical Ltd. (BHEL)* public company, *Oil and Natural Gas Commission (ONGC)*, *Minerals and Metal Trading Corporation of India (MMTC)*, *Steel Authority of India Ltd. (SAIL)*, *National Thermal Power Corporation (NTPC)*, *Engineers India Ltd. (EIL)*, *Hindustan Machine Tools Ltd. (HMTL)*, *Cochin Refineries Ltd. (CRL)*, *Madras Refineries Ltd. (MRL)* and *Infosys Technologies Ltd.*, among others (Seth, 2009).

However, in the past and as an experimental study, the Flamholtz model (1999) was applied to several companies, both industrial and service.

Regarding this study the interpretation and analysis of quantitative data Grupitel, Inc. can be concluded that on the one hand, the Lev and Schwartz model can pass the value of human capital of the company and, secondly, that the administration is making a correct human capital management.

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