

Measuring Human Capital with Activity Based-costing and Economic Value Added

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Abstract

It is a big problem how to measure human capital accurately, which has puzzled economists for a long time. There is not an effective way to calculate the cost of human capital until now. In recent years, activity based-costing (ABC) and economic value added (EVA) have been well developed and applied in many industries in western countries. They are advanced theory of cost calculation and may provide us useful tools to measure human capital. The paper examined the cost characteristics of human capital with the theory of ABC. Key activities in the process of human capital's development were defined. Resource costs were allocated accurately and the procedure of human capital's calculation was proposed. It provides us a new idea to measure and manage human capital and will do some help in further studies.

Keywords: Human capital, Activity based costing, Economic value added, Cost pool

1. Introduction

With twenty year's reform and opening-up, China has made a lot of progress in economy and technology. Especially in the time of new economy, the development of science, technology, and capital accumulation urgently require innovations in the management of human resource. But until now there is not significant progress in the measurement of human capital. In fact, there are no effective methods to calculate human capital stock (J. Wang, 2001). This has influenced the research on the relationship between human capital and economic growth.

How to measure human capital more accurately? How to reflect the real value of human capital and well manage it? These have become an important question. In this paper, human capital was effectively analyzed with the principles of activity based costing (ABC). Human capital stock was well calculated and a new idea of management was brought up.

2. Methods of human capital measurement

2.1 Concept of human capital

"Human capital" was first introduced by T.W. Schultz, a famous economist, in 1960. Becker, Gary (1987) thought that human capital not only meant ability, knowledge, skill, but also meant time, health, and life. The definition given by Doctor Li Zhongmin (1999) was that human capital was a kind of value that existed in the body, could act on goods or service to increase their utilities, and then shared benefit from it. Wang Jinying(2001) also thought that human capital was composed of knowledge, ability, health and so on. It existed in human bodies, could be factored into goods or service to increase their utilities, and then obtained earnings from it.

These definitions described human capital from its content, function, and utility. Some even specified the components. Wang Jinying summarized human capital into five parts: general education capital, specialty capital, experience capital learning by doing, health capital, capital of migration and job-selection. These are the bases of our measurement.

2.2 Methods of human capital measurement

The measurement of human capital is a problem which has puzzled economists for a long time. According to the

need of research and the acquisition of data, people studied it from different points of view. Schultz used indirect estimating method to measure the ability of farm workers, the change of children's quality stock, and the change of quality stock in education and health. This method showed the change of human capital from different sides, but it could not measure the change of total stock (Yan, Duan, 2001, p.100-103.). Doctor Li Zhongmin (1999) suggested using output method that is to measure human capital by means of salary. He believed that human capital could be measured indirectly by practical results (that is absolute salary in market economy) in a certain system environment and by efficiency principle. He established a model to calculate human capital:

$$Z = \sum_{j=1}^n Z_j = \sum_{j=1}^n \left[\sum_{i=1}^m \omega_i / (1+r)^i \right]_j \quad (1)$$

Here, Z is the discount value of human capital stock. ω_i stands for the expected income in the year i , and r is the discount rate.

There are many strict hypotheses in this model. For example, each person invests in human capital only once a life and other capitals are learned by doing. The measurement is based on one country that doesn't trade with other ones. Human capital before 16 years old and after 60 is regarded as zero. These hypotheses could not be met completely in real life, so he modified some of them. But even so, the human capital hidden in bodies is always not consistent with supplies of it. And this method does not consider differences between different workers. So output method does not get widely used.

Educational year method is another way to measure human capital. According to this method, labor force is classified first, and then sums them on a weighted basis of human capital characteristics of different labors. The model is as follows (Wang, 2001):

$$H_t = \sum_{i=1}^6 HE_{it} \times h_i \quad (2)$$

Here, H_t stands for total stock of human capital in the year t . HE_{it} is the amount of labors with educational level i . h_i is the years of education of the people with level i , and $i=1,2,3,4,5,6$ stands separately for college, academy, senior high school, junior high school, elementary school education, and illiterate or semiliterate.

People using this method believe that there is positive correlation between years of education and investment in human capital, cumulative capital learning by doing (Yoram, 1967, p.352-365), and labor's income (Jacob, 1958, p.281-302). So they think the year of education is one of the most representative factors in human capital stock. But this method treats marginal efficiency of different education equivalently. It couldn't recognize the different educational attainment.

All these methods calculate human capital as a whole. They do not make a thorough analysis about its components. We believe that the components that build human capital have many differences in characteristics. So the accuracy of results will be affected if calculating it in this way. Here we try to use the principles of ABC to analyze and manage human capital.

3. Managing human capital with ABC

3.1 The basic principle

Activity based costing is a new management concept and approach developed in the late 1980s in the west and first applied in advanced manufacturing businesses in the early 1990s. It is an activity-focused costing and management system which provides relatively accurate information on product cost and increases the scientific nature, effectiveness of decision-making and planning through the identification, accounting of activity cost and choice of cost drivers. At the same time, the following up of product-related activities provides valuable information for the elimination of "non-value-added activity", improvement of "value-added activity", optimization of "activity chains" and "value chains", and increase "customer value". As a result, loss and waste are minimized, and the management of a business is improved (Wang, Jin, Ke, 2000, p.121-155). Here, "activity" means resource-consuming activity that companies carry out for certain purpose. It builds a bridge over resource and cost objective. And it is the basic element of activity chains.

We can measure human capital in the same way as we calculate product cost.

When measuring human capital with ABC, the basic principle is that products (i.e. human capital) consume activities and activities consume resources. Different from conventional methods, the method's focus is on the activity. It first pools resource cost to activities based on the consumption of resource. Then it allocates activity cost to human capital based on activity drivers. Figure 1 shows the principle of measuring human capital with ABC.

The basic procedure is as follows (Wang, 2001):

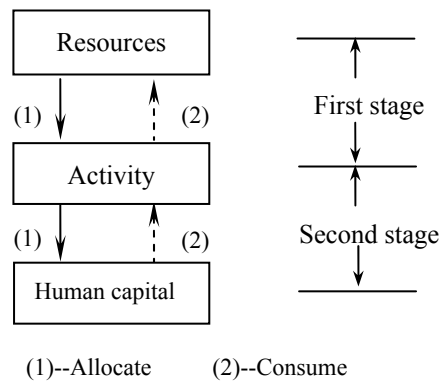


Figure 1. Principle of measuring human capital with ABC

- 1) Set up each activity and judge what the important activities are, which need to be further subdivided and which not, which can be combined into other activities.
- 2) Collect resource cost, and pay attention to the resources associated with product variety and those having low relevance to traditional assignment benchmark. Then, allocate resource cost to each activity.
- 3) Identify key activities and set up activity centers to develop a homogeneous cost pool.
- 4) Select representative activities for centers to determine the allocation rates of cost pools.
- 5) Allocate cost to products to obtain the cost of human capital.

3.2 Identifying key activities in human capital's development

When identifying and pooling activities according to the flow of production, we may find that there are several dozen, hundred, or even thousand activities. This seems too complicated for ABC. So it is very necessary to identify key activities and pool small activities. Simultaneously, two points need to be paid attention to:

- 1) Avoid definition with too much restriction, for this definition not only couldn't help us obtain useful information, but also would bring us a more complex analysis.
- 2) Avoid too broad definition, for this definition couldn't clearly tell us the opportunity of improvement.

In term of these principles, we should identify and define key activities first when calculating the human capital. From above we know that human capital can be divided into general education capital, specialty capital, experience capital learning by doing, health capital, and capital of migration and job-selection according to the forms of investment. We also find that general education capital and specialty capital are both education capital from analyzing the characteristic of these parts. If we regard these five parts as five separate activities, we can combine two small activities — (general education capital and specialty capital) — into a big one, i.e. education capital.

Thus four key activities are identified in the process of human capital measurement. They are education, learning by doing, health, migration and job-selection.

3.3 Allocating resource costs to human capital

Activity "education" is closely related with years of education. So we may consider using educational year method to measure the cost of this activity that labors consume, and then build cost pool 1.

As for experience capital learning by doing, we are considering using economic value added (EVA) method to solve this problem. Experience capital is the ability and experience which people accumulate in the course of learning and working. It is very abstract and can not be measured accurately with traditional quantitative method. So we want to use economic value added to calculate it.

EVA, developed by Stern Stewart and Co., is viewed as an estimation of a company's true economic profit that differs from accounting profits (Lokanandha, Raghunatha, 2006, p.1-7). Based on residual income (RI), Stern Stewart made some adjustments on net operating profits after tax (NOPAT) and invested capital to eliminate the accounting distortions caused by GAAP (Stewart, 1995, p.117), and then put forward EVA:

$$EVA = (NOPAT + Adj_{NOPAT}) - k \cdot (Capital + Adj_{Capital}) \quad (1)$$

It shows that EVA equals to net operating profits minus a charge for cost of invested capital. Adj_{NOPAT} and $Adj_{Capital}$ represent the adjustments made by Stern Stewart on NOPAT and capital, and k refers to the rate of capital cost. Here, capital cost refers to opportunity cost.

In fact, EVA measures the company's value creation from the point of view of economics. It is believed that EVA is the real method to capture the true economic profit of the company (Dodd, Johns, 1999, p.13-18). Some researches showed that EVA had more explanation on the company value and stock returns than traditional accounting indices (Chen, Dodd, James, 2001, p.65-86; Dodd, Chen, 1996, p.26-28; O'byrne, 1996, p.116-125). Some proved with economics that incentive scheme based on RI or EVA can effectively eliminate financial risk and reducing agency cost, then optimizing incentive contract (Reichelstein, 1997, p.157-180; Dutta, Reichelstein, 1999, p.235-258).

EVA created by labors can well reflect one's ability and experience accumulated in the work. And through the concept of EVA, people realize that all the resources are not free. So they must make best use of them to maximize the utility of these resources and capitals. So we consider using the increment of EVA to reflect changes in labor's ability and experience in a certain period and get cost pool 2.

Health capital is the basis of other types of human capital. It means a person's physical force, energy, and health condition. Always a person's health condition will have direct effect on the efficiency of capital investment. And health capital mainly relies on people's investment in this item. So we can get the cost due to this activity through gathering the information about people's investment in health. Thus cost pool 3 forms.

Capital of migration and job-selection is the capital occurring in the course of people's migration and job-selection. Total costs of this activity, i.e. cost pool 4, consist of direct cost and opportunity cost of this item.

Finally, we can calculate human capital according to activity cost consumed in the development of human capital. The basic procedure is shown in figure 2.

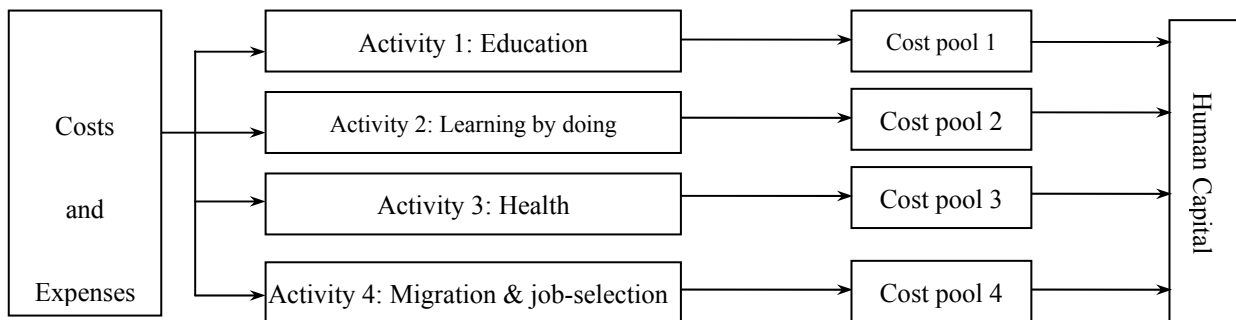


Figure 2. Procedure of human capital's calculation

Measuring human capital in this way solves the problem that traditional methods couldn't distinguish cost characteristics of human capital and provides relatively accurate information about it. It also improves the process of costing and analyzing, and further reveals the role that resource and activity play in the development of human capital.

4. Conclusion

Human capital's measurement and management were analyzed from a new angle—activity based costing. ABC provides valuable information for all kinds of decisions such as product pricing, human capital investment, and market entry or exit through relatively accurate costing. The paper used the theory of ABC to analyze the cost characteristics of human capital. It identified key activities in the development of human capital, allocated resource costs to activities and human capital according to respectively resource drivers and activity drivers.

It helps to analyze the flow of resources, provide bases for the division of cost control, and find ways to improve human capital. It provides us a new idea to measure and manage human capital. But it is only a preliminary idea. The following questions should be observed:

- 1) EVA is a western concept and successfully used in western companies. But in China, enterprises seldom take it into account, for there are many differences between western and oriental business in culture, law, degree of automation, management tools, concepts, and skills. These differences have given rise to a number of special difficulties in implementing EVA in Chinese enterprises.
- 2) Limited by time, we didn't prepare a real case. But this method provides relatively accurate information on

human capital and gives some advice on how to well manage human resource. It will support people's decision of human capital investment.

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