Valuation of Human Capital
Measure What Matters

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Background

Scientific financial management and treatment of assets as it relates to operating large complex enterprises has been refined to a high level of sophistication with the exception of its treatment of human capital assets. This leaves a gap in any unified financial view of an organization when one considers the fact that costs associated with human capital often account for upwards of 60% of overall costs.

Given the diversity / complexity of issues that need to taken into consideration when developing a financially based Human Capital Valuation (HCV) model, it is not surprising that the most successful attempts have been those that limit the scope of applicability. This discussion will focus on the development of a model that is useful in the valuation of human capital assets in a task oriented / hourly workplace.

Supporting Employee Asset Decision Making

We create a financial model not for the sake of the model itself, but to use it to support decision making. In organizations with a workforce that is mostly hourly, there are few decisions that do not involve the employees. Understanding of the value of the employees and how investment in the workforce may enhance that value is important in making these decisions. Sound decisions will have the result of the company being able to provide superior customer service.

Ideally, individual operating units of the company take responsibility for making decisions affecting their unit, with support from the finance department. For example the selection of delivery vehicles is best made within the department responsible for the operation of those vehicles. However, the finance department can provide a simple model that considers operational costs, such as fuel efficiency, repair costs, and expected life span. In much the same way, it should be the responsibility of the Human Resources (HR) department to provide the framework and tools for valuing human capital and supporting and applying critical decision-making. This push to develop a model for human capital assets coincides with the current impetus in HR for new and better metrics (Boudreau and Ramstad, 2000). Historically much of the focus on metrics in HR has been on that track the time to hire and cost of hire. While this data shows the efficiency of one of the central processes in HR and supports decisions internal to HR (such as sourcing choices and process improvements) and the approach often appears to be an ongoing effort to justify HR (Boudreau and Ramstad, 2000), and has little visibility or relevance to the rest of the organization.

I am not suggesting that time/cost of hire metrics not be developed and used in an effort to optimize the staffing process. However when taken as a percentage component of the overall cost realized by a typical organization, staffing is a small portion. There are many human capital related investment decisions outside of the staffing process that have a much larger impact on the firm's financial well being. Companies should continue to optimize the staffing process but look outside the HR department for opportunities to truly leverage the application of Human capital Metrics in an organization.

An Employee Asset Model

Adopting an asset valuation model for human capital requires an understanding of employees as assets rather than as an expense. To develop the model, realize that any financial models developed around the optimization of human capital must focus on asset based modeling.

To illustrate, let's describe a simplified employee asset model using a call center as an example environment (drawn from an actual case study). Employees are paid hourly with a well-defined and understandable set of tasks in their job description. Their role in the process of the call center is understood, their productivity can be measured, as can the length of time they have been with the organization. We also have an estimate of the cost of acquisition. This information, including a few assumptions, allows us to build a simple but robust model.

The foundation of the employee asset model, as with any asset-based model, includes the following important concepts (Glantz, 2000):

- An employee asset is acquired at some definable (though not necessarily measurable) cost.
- An employee asset has a measurable life cycle from acquisition to divestiture.
- An employee asset engaged in a process requires inputs in the form of cash or value flows and provides a series of cash or value flows over time in return.

In addition there are some unique aspects to employee assets that prevent us from simply adapting a simple fixed asset modeling methodology. Some of these differences include the following:

- The value of an employee asset changes over its lifecycle in ways far more complex than those of typical "fixed" assets.
- An employee must generally learn the processes in which they are engaged.
- Interactions between employees, their managers, and other aspects of the organization have a profound effect on the value of a particular employee.
- Post–employee acquisition investments in employee assets (for example: training, promotions and incentives) have a larger relative effect on the value and performance than can be described in the typical fixed asset model.

One way to model employee value is to use typical decision-support tools common to conventional financial modeling, two of which are:

- Net Present Value (NPV) Analysis: Related to cash flow analysis, this approach views the cost of acquiring an asset, with inflows and outflows of value supporting the ongoing engagement of that asset in the processes essential to the operation of the organization. While the term NVP sounds complex, the techniques behind it are really quite simple and is based on the concept that a dollar acquired or spent today is worth more than one acquired/spent tomorrow.

- Temporal Break-Even Analysis: The classic break-even analysis that you may be familiar with, looks at the relationship between fixed / variable costs and volume of production. Temporal break-even recasts the analysis from a volume basis to one related to time; that is, the time when a process become profitable. In this case, the time span we will examine is the employee life cycle.

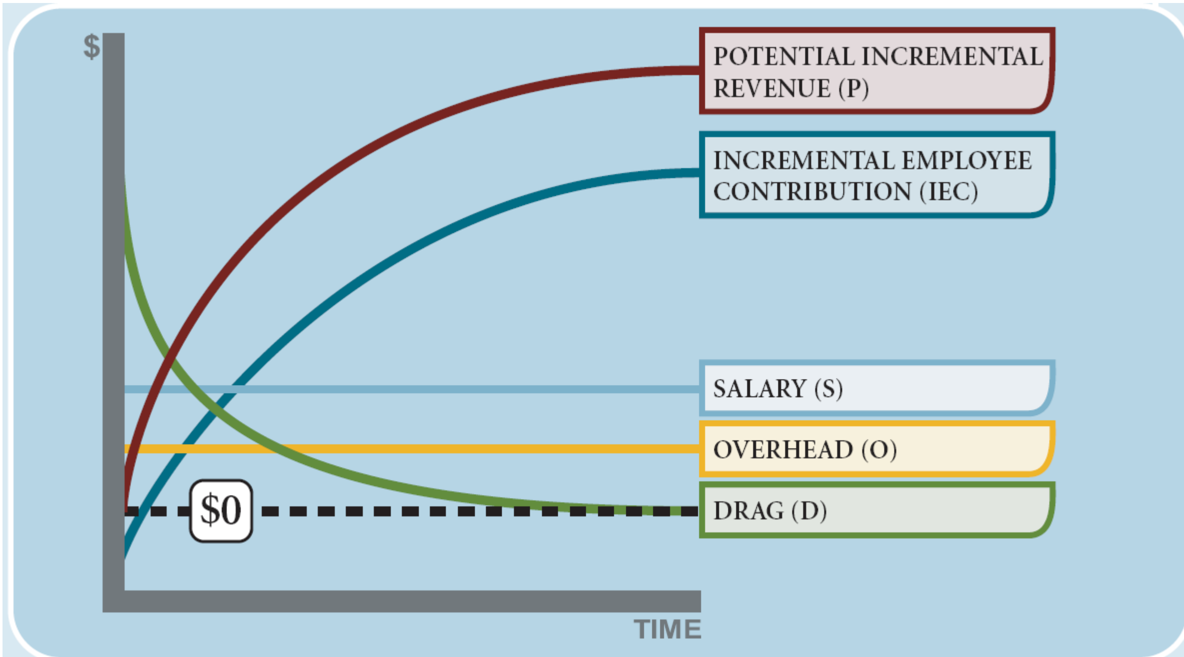
Combining these concepts is a simplified version called the *Incremental Employee Contribution,* or IEC model.

Mathematically, the incremental value that an employee provides within the system can be described as:

$$IEC_t = P_t - (S_t + D_t + O_t)$$

P_t	Potential incremental revenue on day t attributable to this employee
S_t	Salary Cost on day t for this employee
D_t	Drag cost on day t (this is value of other incremental costs such as a managers time to train.
O_t	Allocated overhead cost on day t
U	Total up-front acquisition cost for this employee

Graphically these relationships can be shown as:



Incremental Employee Contribution (IEC)

Descriptively this model is a statement of the following inputs, effects, links, and simplifying assumptions:

- The longer an employee is on the job, the more productive they become. *Learning Theory* supports this idea and allows for the quantification of a *Learning Curve*, which relates the level of productivity, skill, capacity, or capability, to length of time on the job.
- System resources in the form of such things as training materials, additional management oversight, and so on.
- Overhead costs are constant over time.
- Salary stays steady over time.
- The incremental value of an employee is negative on their first day, becomes positive over time, and then eventually levels out at a steady rate of productivity (asymptotic).

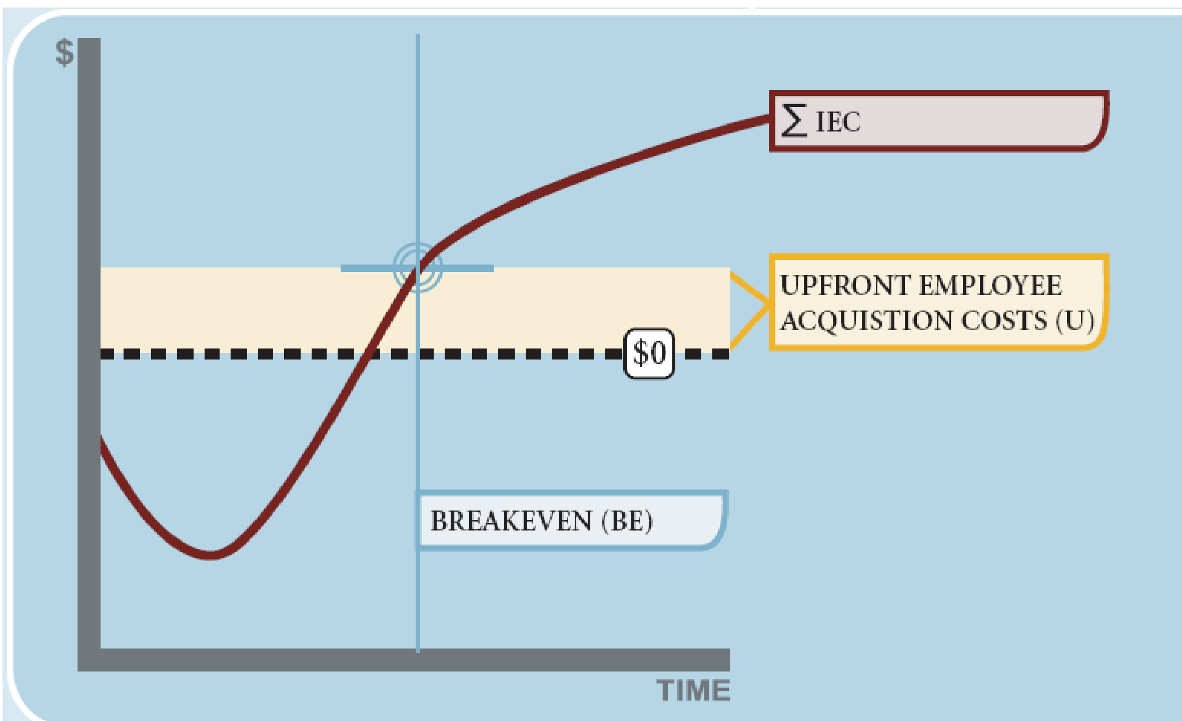
Each of these statements involves some implicit and explicit set of assumptions and beliefs. These points are oversimplified for illustration purposes (for example, one would not realistically expect that the salary level would remain constant over time).

Each individual employee tracks to a different trajectory along these curves. However it is not necessary to quantify the exact trajectory for each and every employee. The goal is to build a robust enough model that allows us to weigh broader issues such as, "Should we increase the training of call center agents?"

Keeping in mind the specific support decision (that of additional training investment), and using the asset-based model, the next step is to adapt a break-even technique. The question becomes, "At what point in time has a new employee *broken-even* in terms of investment?" Alternatively, "What is the *payback* period?" One detail worth mentioning is the scale of the *Y* access. We are not interested in the absolute value of the productive output, but rather the relative value to other employees in the system.

The key concept is the *Fully Effective Employee*, one who is up to speed and performing their job within established quality and productivity guidelines. While it may be possible to determine the exact dollar value of production from an employee at a given time (probably only in the simplest job categories) it is not necessary in order to support the decision framework and would require a great deal more work. There will be many situations where we do not know the value of the efforts the employee makes but we do have an idea of their *relative productivity*.

Using the model, we can accumulate the incremental value over time and account for the initial outlay required to acquire the asset. Graphically this can be represented as:



Cumulative IEC

This graph of the cumulative IEC shows information that was not easily deduced from either the mathematical model, or the non-accumulated IEC graph. This is the essence of modeling, abstracting from the real world system to something more cognitively tractable when making our decision. From the graph, the cumulative value of an employee decreases over an initial period and then increases. At some point it becomes greater than zero and at another it rises above the acquisition cost to achieve break-even status, the date that defines the end of the payback period. The graph also shows that the worst time to lose an employee is at the bottom of that initial trough, the point at which the cumulative value is the lowest.

Metrics / Measures / Parameters / Outputs

In order to build this model, we needed to establish values for:

- Productivity
- Salary
- Overhead
- Length of Service
- Time To Fully Effective Employee
- Value of Retention

Time to fully effective employee status is an output from the model and is a critical metric as it is one we assume will be affected by additional training up front. *Value of retention* is also an output from the model. When building a model to answer a particular question (around the value of additional investment in training) and during the process on building the model we have uncovered something else of interest, specifically the value of retention.

Applying the Model to Solve a Practical Problem

Our hypothesis (and that if the Director of Training) is that eight hours of additional training will return value in excess of the cost (both direct and indirect). The additional training will allow new hires to reach Fully Effective Employee status sooner as well as result in them staying longer. The quantified model allows us to test some theories immediately. The first step is to build the *Objective Function,* which describes the overall net value under the various *Courses of Action*. In this situation there are just two courses of action so the objective function can be simplified to state the net value of going from 24 (the current standard amount of training for new hires) to 32 hours of training.

As cost components, all direct costs such as training materials and instructor time should be included as well as the cost of the hours of non-productive time. For example, if a new employee is in training for eight additional hours, the employee cannot be answering support calls. There are two value components, the added value of having the call center agents come up to speed faster, as well as the value of longer length of service with the firm. One approach is to view this as a capacity optimization problem. To support a given number of incoming calls, the call center has to be staffed to a certain level. At any given time the population of call agents is at different points along their productivity curves and therefore has different capacity fulfillment values. Employees are entering and leaving the population over time, with the most recent hires at a lower level of productivity than those leaving. Fewer agents will be needed if the relative capacity of each is higher at a given point in time.

Mathematically this is a complex to represent, but it is possible to quantify the value in gained capacity, and the concurrent reduced head count requirement for a shift in the productivity curve. The other value component is inherent in having employees stay longer, which has already included the value of higher productivity for longer term employees in the previous described component. What additional value is there from having employees stay longer?

In concept, to maintain a given capacity with a longer average length of service, it is necessary to hire fewer employees in a given period of time. Since each employment and termination transaction carries with it direct and indirect costs, the reduction in those costs can be factored into the model[i].

Supporting the Decision

At this point, there are a couple of ways to make the decision. From a purely empirical point of view we may want to determine what the actual reduction in time to FEE is and increase in length of service before making a decision to adopt more training. However, if we do not adopt more training how can we measure the effects? In the example upon which this discussion is based, the Director could choose to role out additional training to a few call center sites but not all. This is essentially creating an experiment and measuring the results. Without going into the details of this process, this is one effective way to proceed.

Another approach, while much less scientifically rigorous, is applicable within a decision model that involves uncertainty. The approach is similar to that of general what-if scenario testing. For example:

- If time to FEE was reduced by one day, what is the value in increased capacity per agent?
- If average length of service increases by two days, what is the value in terms of reduced hiring costs?
- (More generically.) What combinations of increased average length of service and reduced time to Fully Effective Employee give a positive value to the objective function?

Using this approach shifts the decision as follows. Assume that an increase in average length of service of two days coupled with a reduction in time to FEE of one day will give a positive value to the objective function (of net positive value) after accounting for time value of money and the other financially-related issues.

We have come full circle; based on the model and the data that has been gathered and analyzed, the training investment decision can be made on a much more informed basis. If the costs and or risks of a negative outcome are high, the Director of CCO may well proceed with the limited test model to gather data and then re-evaluate.

Supporting Related Decisions

Beginning with a specific decision-support requirement, during the decision-support process, another model was developed with wider-ranging potential. With some adjustments, this IEC model can be used in other departments for other decisions. From the shape of the IEC and cumulative-IEC curves, an employee's value to the firm changes over time. Now, we have a way to quantify that and we can answer a range of questions such as:

- What percentage of our new employees reach FEE status?
- What percentage make it to break-even status?
- What would be the value in terms of reduced hiring costs of increasing the average length of service by one day?

This metric is the average length of service. When viewing employee retention numbers, most organizations use turnover as the relevant metric. Turnover is inherently an expense model metric as it ascribes no value to retention but simply counts the number of separations – such as an employee who quits after three days is given exactly the same value as an employee who leaves after three years. This is an example of defining the wrong metric to address a particular decision-support issue.

Summary

Human capital asset-based modeling provides the core of the decision-making process, that enables a *decision-maker* to select between *alternative courses of action* while seeking to maximize some *objective function*. This process is carried out in the context of a *causal model*, which explicitly or implicitly infers *causal relationships* or *links* between observable and unobservable aspects of the real world system from which the model is built. The combination of models, measures, metrics, and methodologies used to help support the decision-maker is called a *framework*.

Once your decision-support framework is in place, your organization can follow these steps: (1) ascertain the alternative actions, (2) express a hypothesis, (3) develop a methodology, (4) identify appropriate metrics, and (5) Identify appropriate decisions and take actions. Through this process and rich knowledge base thus created, the utility of HCM is fully realized. New insights in corporate productivity and confidence in decision making are enabled.

The author is a member of the board of the Workforce Institute.

References

Boudreau, J. W. & Ramstad, P. M. (2000) From "Professional Business Partner" to "Strategic Talent Leader": "What's Next" for Human Resource Management, CAHRS Working Paper Series, Working Paper 02-10

Boudreau, J. W. & Ramstad, P. M., "Strategic HRM Measurement in the 21st Century: From Justifying HR to Strategic Talent Leadership", *CAHRS Working Paper Series, Working Paper 02-15,* 2002.

Glantz, M.,"Scientific Financial Management: Advances in Financial Intelligence Capabilities for Corporate Valuation and Risk Assessment", AMACOM, Boston, MA, 2000.

Teplitz, C. J.,The Learning Curve Deskbook: A Reference Guide to Theory, Calculations, and Applications, Quorum Books, Westport, CT, 1991.