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Human Resource Accounting: An Aid to Managerial Decision Making

Stephen H. Vanderver

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HUMAN RESOURCE ACCOUNTING:
An Aid to Managerial Decision Making

by

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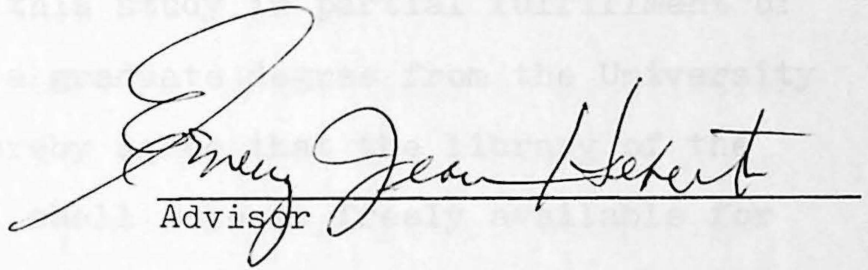
Fort Collins, Colorado

An Independent Study
Submitted to the Faculty
of the
University of North Dakota
in partial fulfillment of the requirements
for the Degree of
Master of Business Administration

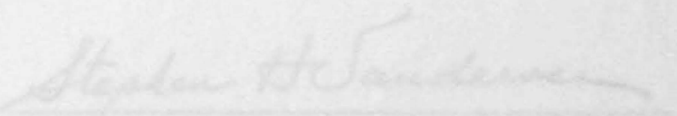
Minot Air Force Base, North Dakota

November, 1975

This independent study submitted by Stephen H. Vanderver in partial fulfillment of the requirements for the Degree of Master of Business Administration from the University of North Dakota is hereby approved by the Faculty Advisor under whom the work has been done.


Erney Jean Hebert
Advisor

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Stephen H. Vanderveer

November 28, 1975

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ABSTRACT

Human Resource Accounting, although not entirely new to the field of accounting, is finding resistance in becoming established. Certain problems must be settled before HRA can be completely accepted by accountants and managers alike.

The many proposals that have emerged, both the traditional approaches and those departing from traditional accounting, have not been fully tested. Only a few instances are reported wherein Human Resource Accounting applications have been attempted. However, much more research and testing will be needed in order to make HRA a fully acceptable form of accounting. Until such time, Human Resource Accounting can be effectively used as an aid to managerial decision making.

CHAPTER I
INTRODUCTION

Human Resource Accounting (HRA), although it is not yet a "household word" among accountants, is rapidly becoming an often discussed topic. Known by such names as human asset accounting and human capital accounting, HRA is a relatively new concept being introduced into the field of accounting.

DEFINITION

Just what is Human Resource Accounting? Although it can take any of several forms, it is merely some method of establishing value and accounting for a firm's investment in its people--its human resources. Whether or not managers or accountants of an organization realize it, they are accounting for their people in some way even though the figures may never be published in a financial statement or used by anyone at all. Every expenditure made by a firm on its people (in some cases even salaries and wages) has an effect on the firm's human resource investment. The definition of accounting, as stated by the American Accounting Association, is the "process of identifying, measuring and communicating economic information to permit informed judgements and decisions by users of the information."¹ Human Resource Accounting is merely the inclusion of the "economic information" about a firm's human resources--its people.

¹American Accounting Association, A Statement of Basic Accounting Theory, 1966.

ACCEPTANCE

Since accounting is traditionally a quite conservative field, a new concept, such as accounting for people, is finding difficulty in being fully accepted. The views on Human Resource Accounting range from those who are totally against it, to those who cannot understand how business has survived thus far without it.

One of the primary reasons for lack of acceptance is the insufficiency of empirical research and experience concerning the subject. To date, there have been very few reports of experiments using any type of a Human Resource Accounting system. This may account for the general tendency on the part of business firms to shy away from trying any of the proposed methods. It is possible that many firms, which might otherwise be willing to at least "give it a try," are sitting back and waiting to see some concrete evidence of success. Even though at least one firm has been using an HRA system for their internal financial reporting for some time now,² there has been little evidence of other firms taking that first step. Some firms are using various types of HRA on a limited basis, such as for turnover costing, as is indicated later in this paper, but still, for the length of time Human Resource Accounting proposals and methods have been around, there has been little actual use reported.

²Annual Reports, R. G. Barry Corporation, Columbus, Ohio, 1969 and later.

Friedman, the noted economist, has this to say:

From the broadest and most general point of view, total wealth includes all sources of "income" or consumable services. One such source is the productive capacity of human beings, and accordingly this is one form in which wealth can be held.⁵

The need for recognition of an organization's human resources certainly exists. However, up to now there has been little acceptance. "The dichotomy in accounting between human and non-human capital is fundamental; the latter is recognized as an asset and therefore is recorded in the books and reported in the financial statements, whereas, the former is totally ignored by accountants."⁶

There are, however, certain problems that must be overcome before Human Resource Accounting can be accepted on a wide scale.

One of the basic controversies that has evolved in discussions of HRA is that of the definition of the term "asset" in an accounting sense. Generally, an asset must be owned or controlled by the firm. It may be tangible, such as a building or a machine, or it can, in some instances, be intangible, such as good will. An asset can also be non-physical, as in the case of rights to something of value (i.e., a patent or an option to purchase). However, some feel that since humans are not "owned" as such (slavery having been abolished some time ago) firms cannot rightfully claim their employees as assets of the firm.⁷ In certain

⁵Ibid.

⁶Ibid.

⁷G. E. Newell, "Should Humans be Reported as Assets? Management Accounting, LIV, No. 6 (December, 1972) 13.

instances, employees under exclusive contract (professional sports is a prime example) might be controlled by the firm. However, technically, it is the contract that could be considered an asset rather than the employee himself.⁸

Another aspect of the "human asset" controversy to be considered is that employees can be and are replaced from time-to-time. In this instance it is felt that it is not the particular employee that is of value to the firm, but, the set of services that employee provides to the organization.⁹

All in all, the arguments against classifying employees as assets would become a moot point in regard to various proposals that suggest Human Resource Accounting for management decision making purposes only, and not for inclusion in the firm's financial statements. If the only purpose of collecting human resources data is to provide information to users (decision makers) it should not matter whether there is agreement as to the classification of such employees. The only agreement necessary would be that the human element is of value to the firm and decisions concerning that element can become more meaningful and profitable when they (employees) are treated as a resource of the firm. On this point there is little disagreement.

⁸Philip E. Meyer, "Human Assets Accounting in the Professional Sports Industry," The CPA Journal, May, 1973, p. 417.

⁹Eric G. Flamholtz, "Human Resources Accounting: Measuring Positional Replacement Costs," Human Resource Management, 12, No. 1 (Spring, 1973) 10.

ASPECTS TO CONSIDER

If and when a firm were to decide to implement a Human Resource Accounting system, several aspects of the system must be considered.¹⁰ As with any type of data gathered for decision making purposes, the more complete the information base, the more sound the proposed alternatives will be. With complete data, the necessary elements for selecting the best (most in accordance with objectives) decision are present.

Primarily, a Human Resource Accounting proposal must consider the types of costs being measured and the methods used to measure those costs. Although many of the types of costs associated with various HRA proposals can readily be equated to accounting for physical (non-human) assets, there are some categories of costs that have no counterpart in traditional accounting methods. Measurement methods used for physical asset valuation (usually cost or appraisal value) also can be equated to some of the elements of HRA, but not all. Selecting methods for valuation measurement of "human assets" should be consistent with those used for the measurement of physical assets within the same company where possible and practical.

Secondly, the method of accumulating costs must be considered. Only a few alternatives for accumulating costs are possible. Human resource costs can be gathered for

¹⁰The following was taken, in part, from the article: Thomas W. McRae, "Human Resource Accounting as a Management Tool," Journal of Accountancy, 138, No. 2 (August, 1974) 33.

individual employees, by groups of employees or for the firm's total work force. In selecting the method to be used, the company's Human Resource Accounting objectives should be considered.

Other aspects to be considered in selecting an HRA proposal include the assignment of common costs and the cut-off between costs to be capitalized and those to be expensed during the current period. Common costs can be assigned on some type of pro-rata basis where accounting for individuals is used. The problem of assigning common costs would be less acute in a system that accumulates costs for groups of employees. Cut-offs for capital outlays and current expenses involves determining which costs are to be of future benefit and which relate only to the current period.

Finally, an HRA proposal should address the method and period of amortization of capitalized costs and the means to dispose of unamortized costs related to termination of an employee. Generally, amortization can be a systematic write-off of predetermined amounts or by a method whereby human resource values are re-calculated at various points in time and the applicable adjustments are made in the accounts. For terminated employees, in a system wherein costs are grouped into a single human resource account, the accounting for termination of individuals may not be a factor to be considered (unless it is determined that termination of a particular employee might have a significant impact on the total human resource value of the firm.)

In selecting a Human Resource Accounting proposal, consideration of all of the above aspects is essential in order to properly fulfill the objectives of any accounting procedures. To provide decision makers with as much information as is practical will result in a much improved decision base.

OBJECTIVE

The primary objective of this paper is to gather and report on many of the Human Resource Accounting proposals that have emerged in the last few years. By doing so, it is also felt that, to the extent possible, certain conclusions can be reached concerning the feasibility of the entire concept of Human Resource Accounting and the adaptability of the proposed methods to various types of firms. Although there has been little reported on the actual use of HRA in practice, a secondary objective will be to report the efforts of those firms that have tried or are currently trying some of the proposed methods.

By looking at the various proposals and the few firms that are trying Human Resource Accounting, it is hoped that one might be able to say that Human Resource Accounting, in whatever form it may take, can be of value to management in making decisions concerning the organization's human resources as well as in other investment decisions.

OVERVIEW

In order to discuss the Human Resource Accounting proposals, I have divided them into two categories: those

using traditional accounting methods of valuation (Chapter II), and those that depart from the traditional methods (Chapter III). Further, Chapter IV reports on some applications of HRA and some of the firms that have experimented with forms of HRA. The final chapter is devoted to an analysis of the proposals, some of the impacts of HRA a firm should consider and conclusions reached from the reported data.

Accounting has generally been based on historical cost or some other basis of valuation that is readily ascertainable and easily verifiable for audit purposes. When confronted with the concept of accounting for human assets, it would seem that one would naturally turn in the direction of "generally accepted accounting principles" and apply the known, accepted method of accounting.

Of the methods presented in this chapter, the first, historical cost, would probably be the most readily acceptable to business managers, since it represents no departure at all from current accounting procedures other than the fact that the firm would be reporting on humans instead of only the traditional assets. The other methods presented represent approaches that deviate somewhat from the historical cost concept, but still fall within what could be considered "traditional" methods.

CHAPTER II

HRA: TRADITIONAL APPROACHES

If a new classification of asset were to be introduced into a firm it would only be logical to apply one of the traditional accounting approaches to accumulate the necessary financial data for that asset. Such has been the case in most of the early proposals for Human Resource Accounting. Accounting has generally been based on historical cost or some other basis of valuation that is readily obtainable and easily verifiable for audit purposes. When confronted with the concept of accounting for human assets, it would seem that one would naturally turn in the direction of "generally accepted accounting principles" and apply a known, accepted method of accounting.

Of the methods presented in this chapter, the first, historical cost, would probably be the most readily acceptable to business managers, since it represents no departure at all from current accounting procedures other than the fact that the firm would be reporting on humans instead of only the traditional assets. The other methods presented represent approaches that deviate somewhat from the historical cost concept, but still fall within what could be considered "traditional" methods.

HISTORICAL COST

Conventional accounting for assets usually starts with the cost data associated with the acquisition and start-up of an asset. All costs related to the purchase, transportation, installation, set-up, trial-runs and other start-up costs are accumulated into a single account. Like assets may have their costs accumulated separately or merged into a single account, depending on the method the firm may choose. Once costs are accumulated, the useful life of the asset is determined. This is merely an estimate, based on industry guidelines, Internal Revenue Service guidelines or past experience. Having gathered this information, the firm can then decide on a depreciation method to use to amortize the costs associated with the asset (that is, to match costs to the asset's revenue producing ability over its useful life). In this matching process the cost of the asset is spread over the period during which the company is benefiting from it.

Much the same process is used when applying a historical cost type of accounting method to human resources. All of the costs associated with the acquisition of an employee are accumulated into an account. These relevant costs can be such things as the cost of advertising for, interviewing, testing, screening and hiring an employee. Also included might be such "start-up" costs as formal or informal on-the-job training.

Most of these costs are usually figured each time a new employee or group of employees is hired. The main difference with Human Resource Accounting is that the costs are then accumulated into an account, whereas, conventional accounting practice would have all of the costs charged to current operating expenses and matched to the revenue of the current period. With HRA, the accumulated costs are amortized over the "life" of the employee (i.e., expected tenure). If additional costs are incurred, such as further training, they can be added to the "book value" and amortized. Changes in the estimated tenure of the individual would require an adjustment in the amortization rate or schedule. If, for some reason, the asset (person) were retired early (quit, fired, lost because of retirement or death) it would be necessary to write-off the remaining unamortized costs as a loss of the period.¹¹

REPLACEMENT COST (TURNOVER COST)

Of the proposed alternatives to historical cost accounting for human resources, replacement cost is high on the list. Such a system would be quite similar to using acquisition or historical cost. The main difference is that instead of basing human resource valuation on the cost to acquire, the cost to replace those resources (individuals) would be used. This method, as with the historical cost

¹¹William C. Pyle, "Implementation of Human Resource Accounting in Industry," Human Resource Accounting Development and Implementation in Industry, Foundation for Research in Human Behavior (Ann Arbor, Michigan, 1966) p. 41.

method, can be used to value either individuals or groups of employees. The anticipated costs for recruiting, hiring, training and development of replacements to the level of proficiency and familiarity now existing in the firm would be used.¹²

Although the use of current replacement costs in financial statements is a departure from the traditional historical cost basis, the practice is not unheard of.¹³ Replacement costs would probably change from time-to-time, thereby necessitating adjustments in the "book values" of the human resources. One such adjustment procedure is being used at the R. G. Barry Corporation. Using the replacement cost as the starting basis or "book value" of the asset, periodic adjustments are made based on the assessment of changes in the factors that might affect employee tenure. (The rationale is that an employee with more expected remaining tenure is potentially more valuable to the firm.) Some of the factors that are considered are age and present tenure. Other factors that could change are degree of job satisfaction and organizational level. Periodic revision of the "book value" is based on changes in these factors using the following formula:¹⁴

$$\frac{\text{HUMAN RESOURCE}}{\text{("Book Value")}} = \frac{\text{Present Tenure} + \frac{\text{Expected Remaining Tenure}}{\text{Expected Remaining Tenure}}}{\text{Present Tenure}} \times \text{Current Replacement Costs}$$

¹²Report of the Committee on Human Resource Accounting, The Accounting Review, Suppl. to Vol. XLVIII (American Accounting Association, Sarasota, Florida, 1973) p. 172.

¹³James C. McKeown, "An Empirical Test of A Model Proposed by Chambers," The Accounting Review, XLVI, No. 1, (January 1972) 12.

¹⁴William E. Pyle, "Monitoring Human Resources--'On Line,'" Michigan Business Review, 22, No. 4 (July, 1970) 31.

A variation of replacement cost, positional replacement cost, has also been proposed:

'Positional replacement cost' refers to the sacrifice that would have to be incurred today to replace an individual in a specified position with a substitute capable of providing an equivalent set of services in the given position. It refers not to the cost of replacing an individual but to the cost of replacing the set of services required of any incumbent in a specified position.¹⁵

In order to differentiate among the various costs involved with employees, the model in Figure 1 was developed.

Closely related to positional replacement cost is the concept of turnover cost. The general definition of turnover refers to employee movement out and through a business organization. In this proposal it is suggested that only "position turnover" be used and not "payroll turnover," and only when turnover becomes excessive. Excessive turnover is defined as "that turnover which results in enough jobs being either empty or being filled with untrained, unreliable performers that productivity is noticeably impaired."¹⁶

OPPORTUNITY COST

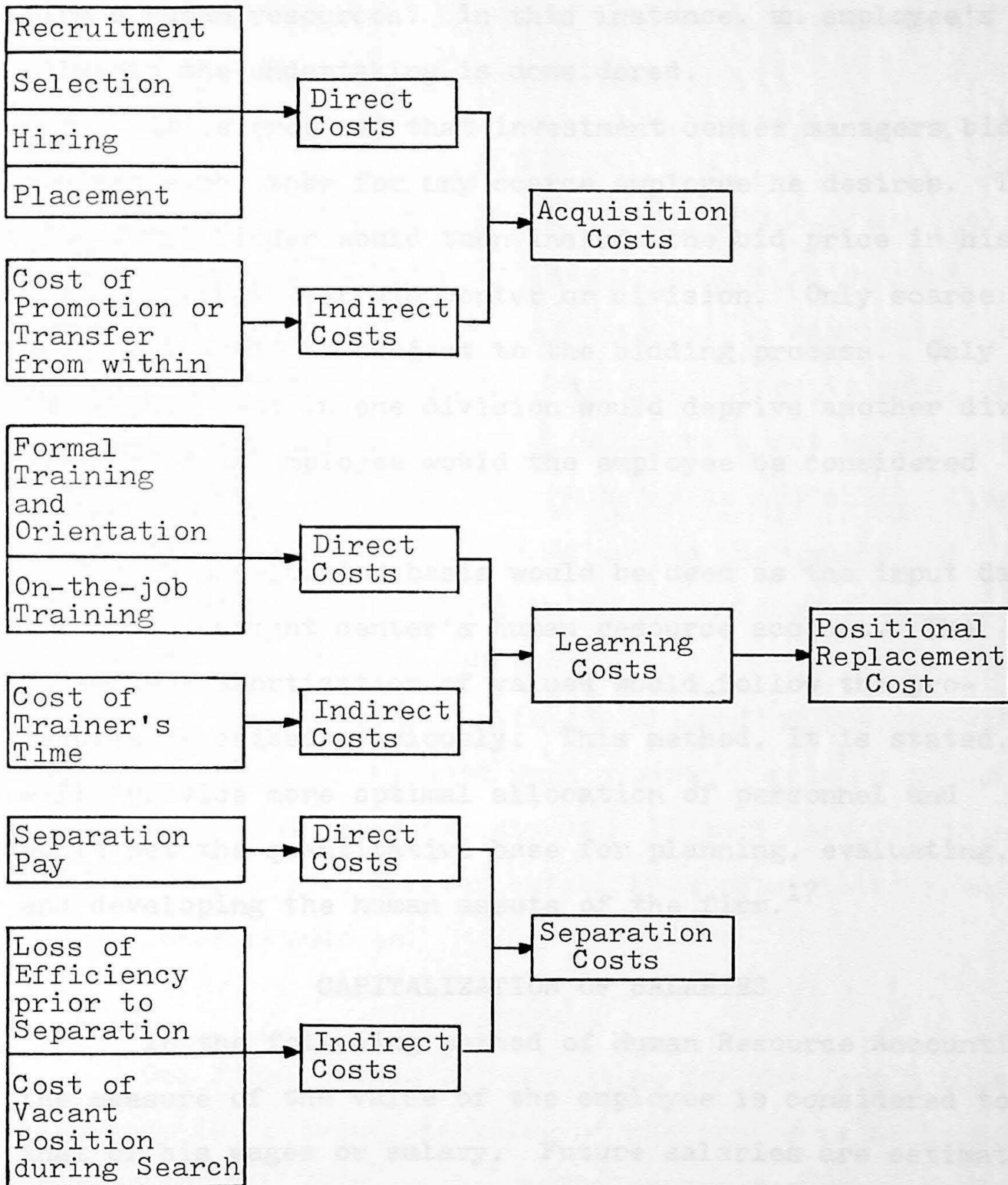
Using the economic concept of opportunity cost has

¹⁵Flamholtz, op cit., p. 10.

¹⁶Glenn A. Bassett, "Employee Turnover Measurement and Human Resource Accounting," Human Resource Management, 11, No. 3 (Fall, 1972) 28.

15
Figure 1

MODEL FOR MEASUREMENT OF HUMAN RESOURCE REPLACEMENT COSTS



Source: E. G. Flamholtz, "Human Resource Accounting: Measuring Positional Replacement Costs," Human Resource Management, 12, No. 1, (Spring, 1973) 11.

These figures are then discounted at the firm's "normal" rate of return and may be modified by a weighted average of effectiveness and performance measures.¹⁸

GOODWILL

Some proponents of Human Resource Accounting feel that at least part of the difference in a firm's "book value" and its market value (as a whole) is attributable to the human organization.¹⁹ Whenever a firm is sold, any difference in the book value of the firm's net assets and the purchase price is usually recorded as goodwill. Those who feel that this difference is due to the quality of the firm's personnel would like to see an amount recognized as a value of the human resources.

One such proposal calls for allocating the goodwill figure to the human element on a pro-rata basis in proportion to the human and non-human assets. If such were the case, the firm would then have an established value to attribute to its human resources.

LEASEHOLD

One final method of accounting for the firm's human resources is to treat the value of the employees as leasehold assets.²⁰ In this accounting method the human capital

¹⁸Roger Jauch and Michael Skigen, "Human Resource Accounting: A Critical View," Management Accounting, LV No. 11 (May, 1974) 34.

¹⁹Ibid.

²⁰Lev and Schwartz, op cit., p. 110.

values are reported as assets on the firm's balance sheet. The present value of the firm's liability for employee wages is recorded as a liability. Any changes in the value of the human capital are not recognized as income, but are reflected in changes in the liability.

Although many of the previously described methods and proposals for Human Resource Accounting may depart somewhat from "generally accepted accounting principles," they do use previously established measures for assigning asset values. Perhaps, since human beings are quite different than any other type of asset previously included in a financial statement, a quite different method of establishing asset value might be in order.

Rensis Likert, founder of the Institute for Social Research at the University of Michigan, has developed a proposal for Human Resource Accounting that follows from his basic research concerning human behavior and the effect different types of management styles can have on the firm's human organization.²¹

Likert's basic premise concerning the accounting for a firm's human investment is contained in the following statement:

²¹Rensis Likert, "Human Resource Accounting: Building and Assessing Productive Organizations," *Personnel*, 50, No. 3 (May-June, 1973) 8-20.

CHAPTER III

HRA: DEPARTURES FROM TRADITION

In the section that follows, various theories and proposals for Human Resource Accounting are presented. These proposals, as opposed to those presented in the previous chapter, deal with methods that represent a departure from the traditional approaches to accounting for a firm's resources. In some cases the proposed data to be gathered and used for reporting on the firm's human organization are non-monetary in nature. Others use a combination of monetary and non-monetary measures. But, in all cases, the data can be of use to managers in arriving at decisions concerning the firm's human organization--its people.

LIKERT

Rensis Likert, founder of the Institute for Social Research at the University of Michigan, has developed a proposal for Human Resource Accounting that follows from his basic research concerning human behavior and the effect different types of management styles can have on the firm's human organization.²¹

Likert's basic premise concerning the accounting for a firm's human investment is contained in the following statement:

²¹Rensis Likert, "Human Resource Accounting: Building and Assessing Productive Organizations," Personnel, 50, No. 3 (May-June, 1973) 8-24.

The major source of the present-day apathetic and hostile attitudes of not only blue-collar workers, but also white-collar employees and supervisors, is the kind of management that focuses on short-range results--the kind of management that commonly used accounting methods encourage and reward. But when current financial reports are accompanied by dollar estimates of the change in the value of the human organization for the same reporting period, the kind of management that builds more productive human organizations will be fostered, because such management creates the will to work and at the same time contributes to employee health and satisfaction.

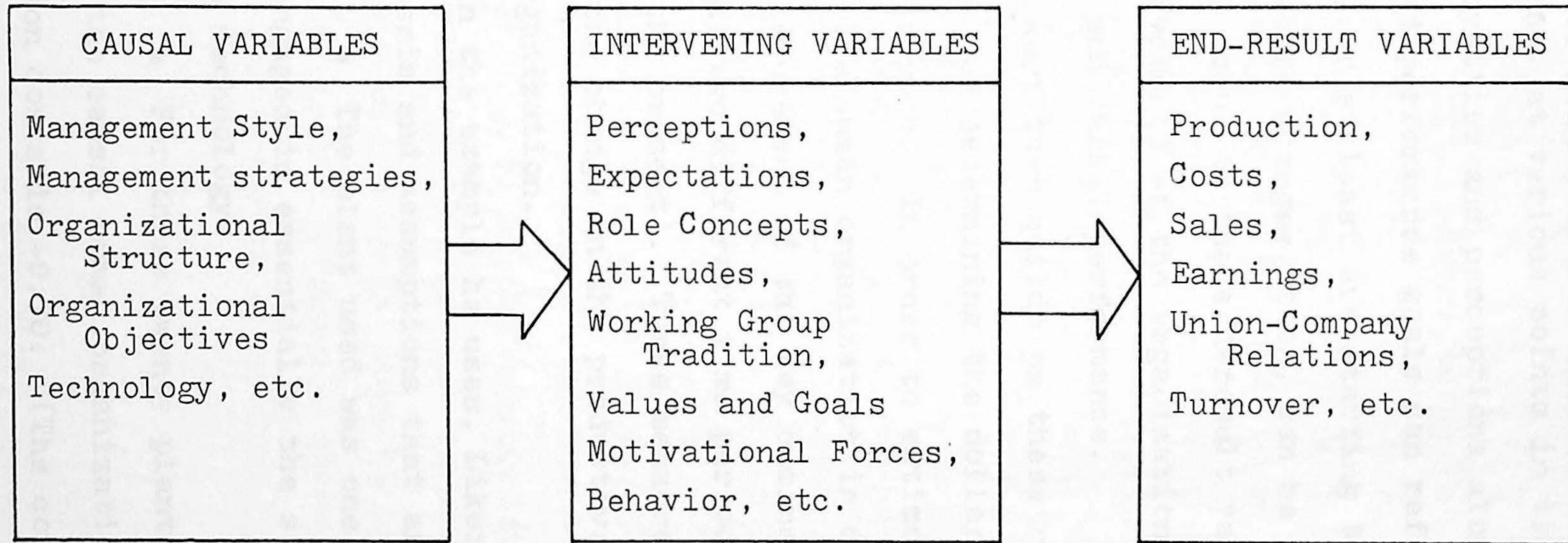
The research Likert has done has shown that a relationship exists between the behavioral aspects of the workers employed and the system of management that is used. What he calls "causal variables" (organizational structure and patterns of management style) affect the "intervening variables," employee attitudes, perceptions and motivations, which in turn affect the "end-result variables"--productivity and earnings. (See Figure 2)

The measurement of the causal and intervening variables and the recognition of changes, Likert feels, can be used to provide valuable information for management to use in making decisions that will have an effect on the human resources and, in turn, on the end-result variables.

The causal variables are subject to change through the action of management and the firm. Positive changes will have a positive effect on the changes that occur in the intervening variables. The intervening variables reflect the internal state and health of the organization.

Figure 2

RELATIONSHIP BETWEEN CAUSAL, INTERVENING AND
OUTPUT (END-RESULT) VARIABLES



Source: Paul Hersey and Kenneth H. Blanchard, Management of Organizational Behavior, 2nd Ed., (Prentice-Hall, Inc., Englewood Cliffs, N.J., 1972) p. 97.

Measurement, at various points in time, of employee attitudes, loyalties and perceptions along with their motivations and performance goals can reflect changes that have occurred, or at least are starting to occur. The measurement of these changes, then, can be used to predict changes that will occur in the end-result variables which reflect the achievements of the organization such as productivity, earnings and market performance.

Likert then builds on these relationships to develop his model for determining the dollar value of the firm's human resources. In order to estimate the changes in the value of the human organization in dollars, Likert starts with a measurement of the key dimensions of the human organization at two different time periods (T_1 --one year ago, and T_2 --the present). These measurements then are used to predict the change in the productive capability of the human organization.

In the example he uses, Likert starts by explaining the criteria and assumptions that are used.

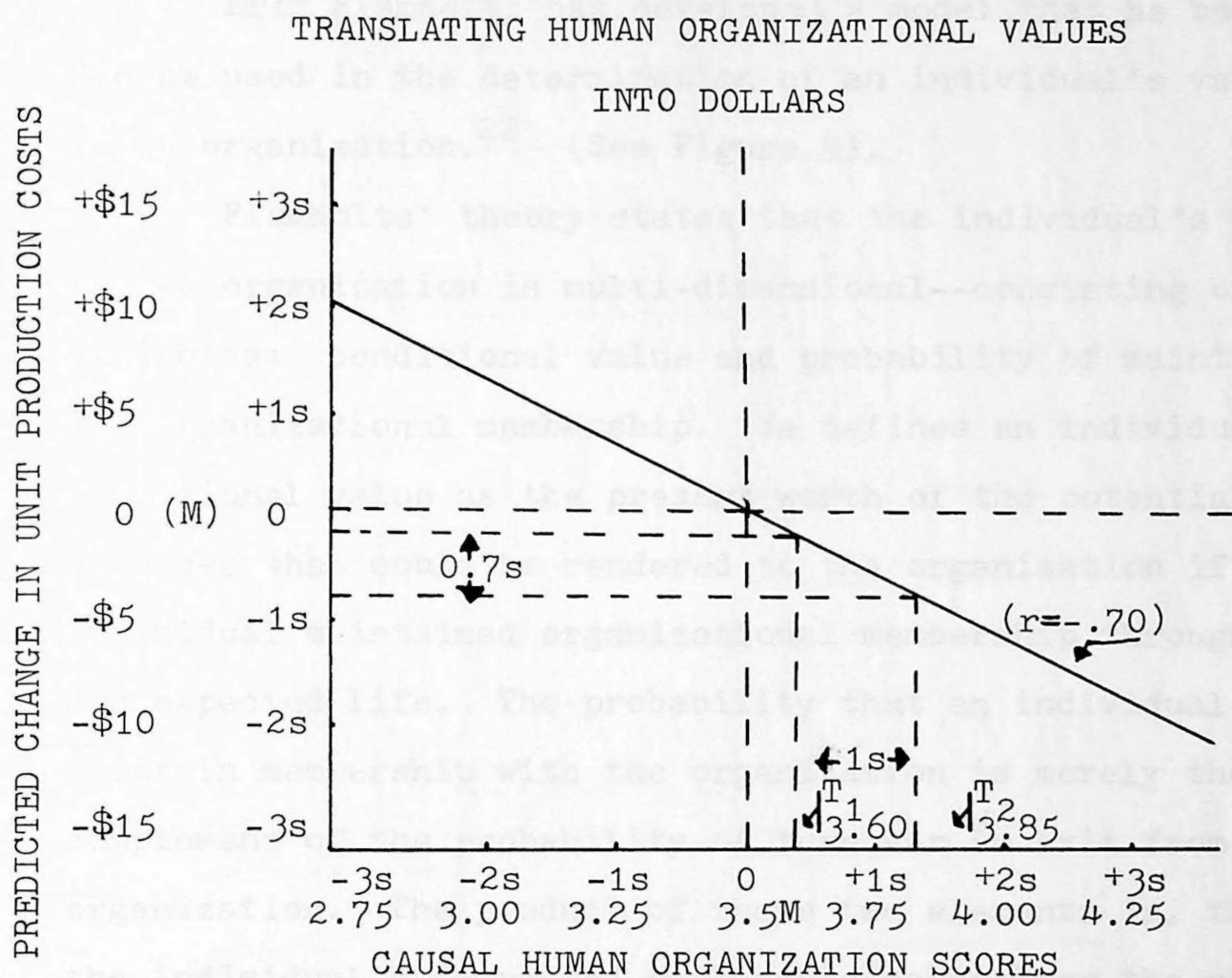
- The plant used was one of twenty comparable plants engaged in essentially the same operation and using the same technology.

- For these twenty plants, the correlation between the causal human organizational scores and unit production costs is -0.70. (The correlation is negative, since the better the causal scores are, the lower are the unit costs.)

- The standard deviation of the human organizational scores is 0.25.
- The standard deviation of unit production costs is \$5.00.
- The plant has an annual production of 100,000 units; it had at T_1 a causal human organizational score of 3.60 and it had at T_2 a causal human organizational score of 3.85. (The human organizational variables range from 1 to 5, with 5 being the most favorable.)

If, from the calculations, each unit of gain or loss in causal scores is known to produce a corresponding shift in the productivity of the human organization that alters unit cost by \$3.50, then improvement in the causal scores by one unit would yield a predicted improvement in the total costs of \$350,000, for a total production of 100,000 units. This estimate can then be used to compute the estimated increase in the human organizational assets by capitalizing it at the appropriate rate. If 20% were used, the \$1,750,000 increase in value can be treated as an increase in the asset value of the profit center's human organization. Figure 3 shows a graphic representation of the foregoing analysis.

Figure 3



Notes:

1. Improvement shown is +0.25 (3.60 to 3.85).
2. Converting to a standard score (human organizational) (gain/standard deviation) = $.25/.25 = +1.00$.
3. Determine estimated gain in standard score of unit production costs by multiplying by coefficient of correlation ($-0.70 \times +1.00 = -0.70$)
4. Convert to standard scores by multiplying by standard deviation of unit production costs. ($-0.70 \times \$5,00 = -\$3,50$)
5. Total annual production cost reduction is \$350,000. (100,000 units x \$3.50)

Source: Rensis Likert, "Human Resource Accounting: Building and Assessing Productive Organizations," Personnel, 50, No. 3 (May-June, 1973) 14.

FLAMHOLTZ

Eric Flamholtz has developed a model that he believes can be used in the determination of an individual's value to an organization.²² (See Figure 4).

Flamholtz' theory states that the individual's value to the organization is multi-dimensional--consisting of two variables: conditional value and probability of maintaining organizational membership. He defines an individual's conditional value as the present worth of the potential services that could be rendered to the organization if the individual maintained organizational membership throughout his expected life. The probability that an individual will maintain membership with the organization is merely the complement of the probability of turnover or exit from the organization. The product of these two elements is, then, the individual's "expected realizable value," or the present worth of services actually expected to be derived during the employee's expected tenure.

The model is further broken down by Flamholtz. The individual's conditional value is again a multi-dimensional element consisting of productivity, transferability and promotability. These, the author calls subsets of the set of "services" which a person is expected to render to the firm.

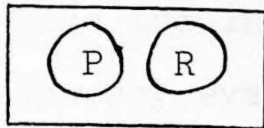
²²Eric G. Flamholtz, "Toward a Theory of Human Resource Value," The Accounting Review, XLVII, No. 4 (October, 1972) 666-78.

Productivity is defined as the set of services an individual is expected to provide while occupying his present position. This (the employee's performance) he considers the central or causal variable that influences both promotability and transferability. Transferability is the set of services the individual is expected to provide if and when he transfers to other positions at the same position level in a different promotion channel. The third factor of the individual's conditional value is his promotability--the set of services he is expected to provide if and when he occupies a higher level position in his present or in a different promotion channel.

The elements of an individual's conditional value are determined, according to Flamholtz, by his skills and his activation level. His skills consist of his currently developed potential to provide services to the organization (technical, administrative and human interaction skills). The author explains activation level as the extent of motivation. These determinants of conditional value interact to determine a person's potential for rendering services to the organization.

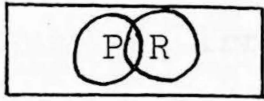
To be considered with the individual's determinants of conditional value are the organizational determinants. These two elements, role and rewards, interact with individual determinants of conditional value. An individual's skills and motivation opportunity may be limited by the individual's role or place in the organizational structure.

The role, in this case, is the set of behaviors expected from all persons occupying a specified position in an organization. Flamholtz sees an individual's role as depicted in the following diagrams:

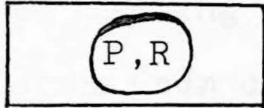


P = Person R = Role

$P \cap R = E$ (Empty set) No overlap or intersection between a person and his role (skills available not required by the role.)



$P \cap R \neq E$ Individual is partially included in the role.



$P = R$ The set of behaviors required by the role exactly match those of the individual.

The second determinant, rewards, are what the people expect to derive from different aspects of their membership in an organization.

The individual's probability of maintaining organizational membership is affected by his satisfaction. According to Flamholtz, studies have shown an inverse relationship between need satisfaction and the likelihood of a person exiting the organization. In his model, he shows that satisfaction is a result of interaction between the determinants of an individual's conditional value.

In studying Flamholtz' model, one can readily see that there are many factors that must be considered before attempting to establish a value for an individual. Any Human Resource Accounting proposal should take these factors into consideration.

FRIEDMAN AND LEV

Abraham Friedman and Baruch Lev have developed what they call a "surrogate measure" for the human resource investment of a firm.²³ They feel that "current accounting practices based on expensing (i.e., charging to income) all outlays concerning the firm's human resources, obviously do not provide the information required for decision making and efficiency evaluation." Further, they state that the current accounting methods (for non-human assets) fall short on two accounts: irrelevance of historical cost and the problems of estimating future service potential. Their proposal departs from conventional methods by incorporating both actual and market values in the measurement process.

In their method, investment in human resources is measured by discounting the stream of cost savings resulting from the firm's specific personnel policies (e.g., training, health care, etc.). They are quick to point out, however, that their proposed measure is merely a surrogate and does not fully reflect the benefits of human resource investment. It does provide new information for accountants and therefore, should be of value.

The surrogate measure proposed is based on the firm-versus-market wage relationships. Differences between a given firm's actual wage structure and the average wages prevailing in the relevant labor market are analyzed. These

²³Abraham Friedman and Baruch Lev, "A Surrogate Measure for the Firm's Investment in Human Resources," Journal of Accounting Research, 12, No. 2 (Autumn, 1974) 235-50.

differences are assumed to be mainly caused by the firm's personnel policies and the extent of its training and indirect compensation systems. These actions, say Friedman and Lev, represent a firm's investment in human resources. The differences between the firm's actual wages and average market wages can be viewed as returns on the firm's investment in human resources. Had the firm not engaged in the specific training and compensation programs different from other firms in its group, its wage structure would be very close to the market average. Market wages, they feel, can be regarded as a measure of the opportunity cost to the firm. Differences between actual and market (opportunity) wages constitute, then, the returns on the firm's investment in human resources.

The investment in human resources, under this proposal, is measured by the difference between what they call the external and internal human resource values. They define the external values as the discounted value of the hypothetical (opportunity) wage bills based on average wages that prevail in the labor market. The internal human resource value is defined as the discounted value of actual wages to be paid to the current employees over their expected service lives. The actual computations are based on a Markov chains model and incorporate employee turnover rates and mobility. These surrogate measures would be, then, the reflection of management's specific policies in hiring, developing and maintaining the work force and the resultant wage scale.

LEV AND SCHWARTZ

Baruch Lev and Aba Schwartz state their purpose as: "To provide a practical procedure for incorporating the economic concept and measurement of human capital in the financial statements of a business firm." They feel that the suggested method will provide decision makers with information hitherto not reported by accountants.²⁴

They start by first discussing the average worker's earnings profile. A typical profile, they say, first increases with age, reflecting the learning of the worker, thus increasing productivity. As a person ages, productivity declines because of technological obsolescence and health deterioration, a fact expressed by a decrease in annual earnings. Since the profile reflects only earnings from employment and not from capital assets, it terminates upon retirement or termination. (Data for this proposal is taken from U. S. Census figures.)

Using an actual income stream to determine the value of human capital is not practical since the computation of the series would not be known until the employee is terminated. The authors, however, use current salary figures as a point of departure. Using current census data for estimates, they replace the observed values of the income stream with estimates of future annual earnings.

Certain other estimates should also be considered, according to Lev and Schwartz. These would include

²⁴Lev and Schwartz, op cit., pp. 103-12.

reflections of future technological changes, changes in demand for specific skills, government intervention, and most important--the person's subjective evaluation of his own capabilities relative to others in the same professional group. However, this information would simply be too difficult to obtain.

The estimated future income stream is next adjusted for the probability of a person of that age dying (taken from actuarial tables). The summation of the income stream is then discounted using the appropriate rate. They feel the appropriate rate should be the firm's cost of capital. This is the rate used in capital budgeting decisions and also the opportunity cost of the firm's resources.

The value of the firm's human resources, under this concept, can be calculated for individuals, homogeneous groups of employees, skilled, un-skilled workers and so on. Census data can be adjusted in cases where a firm's pay scales are generally higher or lower than industrial averages. In large firms, the firm's own pay scales may even be used instead of national averages.

The authors feel that by using the above procedure a firm can increase its body of knowledge about its human resources and thereby produce better information for its managers.

MYERS AND FLOWERS

M. Scott Myers and Vincent S. Flowers present a Human Resource Accounting proposal that incorporates the attitudes of workers in determination of their value to the organization.²⁵ They start by explaining their view of human assets. When a firm hires a person, it is hiring a set of skills. This set of skills, then, according to the authors, is the asset, not the person himself.

In order for this asset (the set of skills) to be applied constructively, the person must meet minimal requirements in terms of four other assets: knowledge, health, availability and attitudes. Their theory assumes a flow-process leading to job performance as follows:

KNOWLEDGE+SKILLS+HEALTH→AVAILABILITY→ATTITUDES→PERFORMANCE

They feel knowledge should match the requirements of the job. Knowledge in the sense used includes not only the specific technical knowledge required by the work, but also knowledge of the organization's policies, procedures and practices, and the relationship of the job to other jobs in the organization. The skills a person possesses should be assessed and increased where necessary to match the job. A person's health is assessed to determine what effect it may have on his job performance.

²⁵M. Scott Myers and Vincent S. Flowers, "A Framework for Developing Human Assets," California Management Review, XVI, No. 4 (Summer, 1974) 5-15.

These assets of a person, knowledge, skills, and health, lead to his availability. The authors explain that studies have shown that employees remain with an organization because of inertia. They stay until some force pulls them or pushes them outside the firm. The amount of force necessary depends on the strength of inertia, which in turn is influenced by other factors. The other factors include those from within the company, the work and the work environment, and those outside, other job opportunities, home, community and other factors.

The authors go on to divide workers into four groups in terms of their availability: "turnovers, turn-ons, turn-ons-plus and turn-offs." These are defined as follows:

Turnovers--derive little satisfaction from the work itself, nor are they locked in by non-work factors, hence, they leave at the first opportunity.

Turn-ons--presently finding job satisfaction, but because their inertia is not strengthened by non-work factors, will require continual job satisfaction.

Turn-ons-plus--stay for a balance of job satisfaction and non-work reasons.

Turn-offs--lack job satisfaction, but must stay because they are "locked in" by non-work factors within or outside the organization.

A person's category of availability, as explained by the authors, influences the attitudes. The attitudes, then, have the greatest potential for directing the other four assets toward productive or counter-productive effort.

Following up on this hypothesis, the authors state

that a "reliable and quantitative measure of attitudes is probably the best single measure of how effectively all five assets are being utilized."

They have gone on to develop attitude surveys to determine the category into which a person falls. Scores are adjusted so 1.00 becomes the dividing line between "turn-offs" and "turn-ons." Scores below 1.00 are potential "turn-offs" or "turnovers" and scores above 1.00 are most likely to be "turn-ons" or "turn-ons-plus." These attitude measures are then dollarized to determine how employees are affecting the productivity of the firm. They show how the attitude scores can be used to determine gain or loss in the value of the firm's resources and also how the information can be used in budgeting and other financial analysis. (See Figures 5, 6, 7 and 8.) By noting changes in employee attitudes and trying to produce positive changes where possible, the authors feel that companies can improve their productivity and thereby increase profitability.

Figure 5

DOLLARIZED ATTITUDES

	Individual	Annual Salary	Job Grade	Tenure	Attitude Weight	Attitude Score	Weighted Attitude Score
1.	John Doe	\$14,000	28	5	5	1.05	5.25
2.	Mary Brown	7,000	57	11	5	1.12	5.60
3.	Harry Smith	9,000	12	22	7	1.21	8.47
4.	Bill Jones	6,500	72	3	3	1.26	3.78
5.	Jim Johnson	<u>18,500</u>	30	4	<u>6</u>	1.15	<u>6.90</u>
		\$55,000			26		30.00

36

$$\text{Attitude Index} = \frac{(\text{Weighted A-Score})}{(\text{Attitude Weight})} = \frac{30.00}{26} = \boxed{1.15}$$

$$\text{Dollarized Attitudes} = \text{Attitude Index}(\text{Annual Payroll}) = 1.15(\$55,000) = \$63,250$$

$$\text{Gain} = \$63,250 - 55,000 = \$8,250 \quad \text{Gain Per Person} = \frac{\$8,250}{5} = \boxed{\$1,650}$$

Source: M. Scott Myers and Vincent S. Flowers, "A Framework for Developing Human Assets," California Management Review, XVI, No. 4 (Summer, 1974) 12.

Figure 6

DOLLARIZED ATTITUDES (Very Favorable)

Individual	Annual Salary	Job Grade	Tenure	Attitude Weight	Attitude Score	Weighted Attitude Score
1. John Doe	\$14,000	28	5	5	1.50	7.50
2. Mary Brown	7,000	57	11	5	1.45	7.25
3. Harry Smith	9,000	12	22	7	1.68	11.76
4. Bill Jones	6,500	72	3	3	1.55	4.65
5. Jim Johnson	<u>18,500</u>	30	4	<u>6</u>	1.72	<u>10.32</u>
	\$55,000			26		41.48

$$\text{Attitude Index} = \frac{41.48}{26} = \boxed{1.60}$$

$$\text{Dollarized Attitude} = 1.60(\$55,000) = \$88,000$$

$$\text{Gain} = \$33,000 \quad \text{Gain Per Person} = \boxed{\$6,000}$$

Source: M. Scott Myers and Vincent S. Flowers, "A Framework for Developing Human Assets," California Management Review, XVI, No. 4 (Summer, 1974) 12.

Figure 7

DOLLARIZED ATTITUDES (Very Unfavorable)

Individual	Annual Salary	Job Grade	Tenure	Attitude Weight	Attitude Score	Weighted Attitude Score
1. John Doe	\$14,000	28	5	5	.51	2.55
2. Mary Brown	7,000	57	11	5	.73	3.65
3. Harry Smith	9,000	12	22	7	.65	4.55
4. Bill Jones	6,500	72	3	3	.45	1.35
5. Jim Johnson	<u>18,500</u>	30	4	<u>6</u>	.75	<u>4.50</u>
	\$55,000			26		16.60

$$\text{Attitude Index} = \frac{16.60}{26} = \boxed{.64}$$

$$\text{Dollarized Attitudes} = .64(\$55,000) = \$32,500$$

$$\text{Deficit} = \$19,800 \quad \text{Deficit Per Person} = \boxed{\$3,960}$$

Source: M. Scott Myers and Vincent S. Flowers, "A Framework for Developing Human Assets," California Management Review, XVI, No. 4 (Summer, 1974) 13.

Figure 8

ANNUAL PLANNING DATA

People and asset effectiveness statement, Department 128

	Actual		Plan
	1972	1973	1974
Sales	\$1,500,000	\$2,000,000	\$2,200,000
Cost of Sales	800,000	1,000,000	1,050,000
Gross Margin	<u>\$700,000</u>	<u>\$1,000,000</u>	<u>\$1,150,000</u>
% Sales	47.0%	50.0%	52.2%
Other Department Costs	<u>\$319,000</u>	<u>\$334,000</u>	<u>\$350,000</u>
Department Profit	<u>\$381,000</u>	<u>\$666,000</u>	<u>\$800,000</u>
% Sales	25.4%	33.3%	36.4%
Asset Effectiveness Measures			
Total Assets	\$4,500,000	\$4,800,000	\$5,000,000
Sales/Assets	33.3%	41.7%	44.4%
Profit/Assets	8.3%	13.9%	16.0%
People Effectiveness Measures			
Number of People	80	75	86
Attitude Index	1.21	0.91	1.10
Total Payroll	\$640,000	\$600,000	\$700,000
Turnover %	25%	12%	10%
Sales/Person	\$18,500	\$26,667	\$25,581
Profit/Person	\$4,762	\$8,890	\$9,302
Attitude gain/person	\$1,680	(\$720)	\$895

Source: M. Scott Myers and Vincent S. Flowers, "A Framework for Developing Human Assets," California Management Review, XVI, No. 4 (Summer, 1974) 15.

LIAO

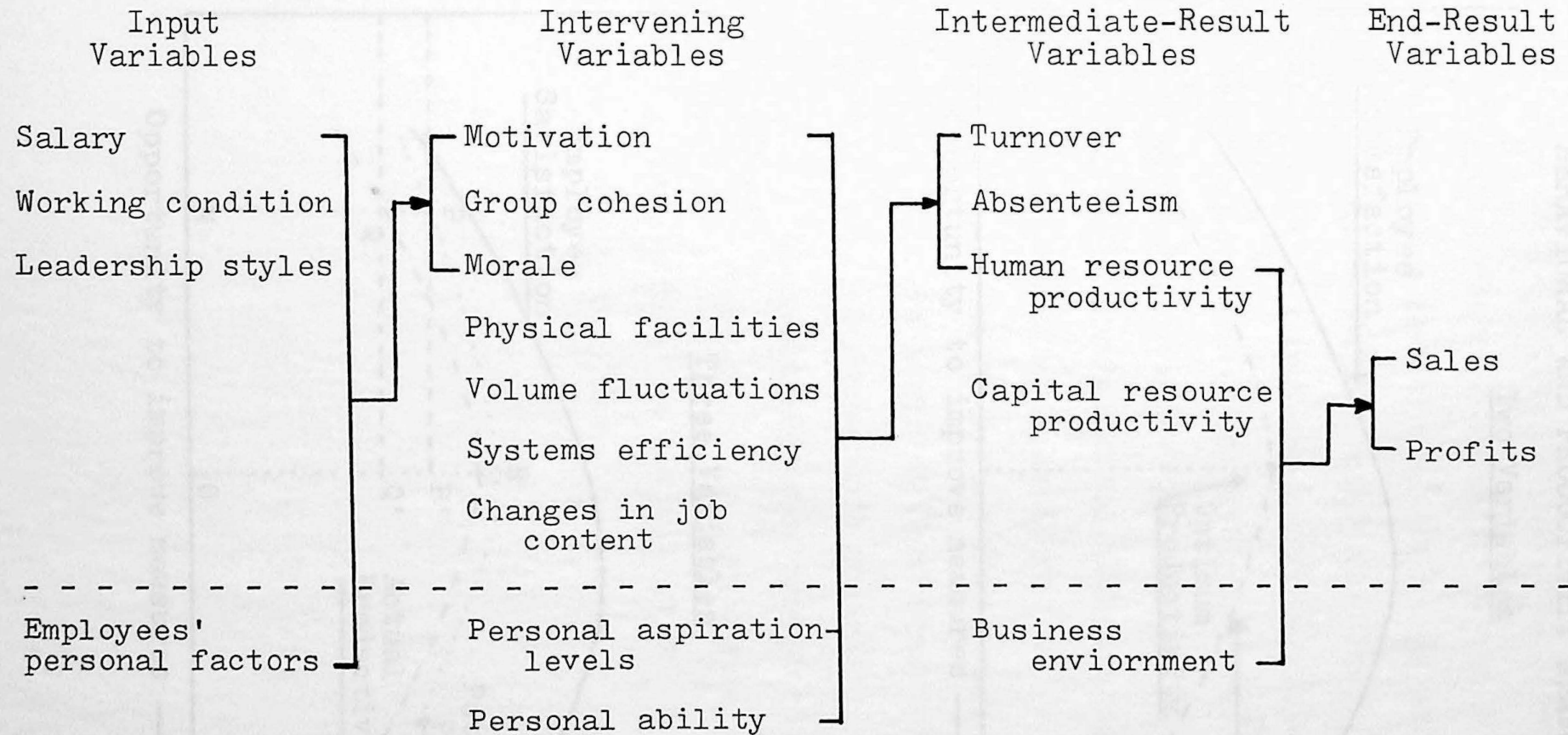
In the following proposal for measuring the value of the human resources in a firm, Shu S. Liao states: "behavioral measurement is based on the premise that behavioral variables such as motivation, group cohesion, and morale determine the productive capacity of human resources and consequently their value to the firm."²⁶ Figure 9 shows his concept of the relationship between the behavioral variables and end-result variables--sales and profits. Liao feels that a more proper measurement to assess value of human resources is a measure of productivity.

Liao explains that there is clearly a direct relationship between productivity and end-result variables. Measurement of productivity and directions for management to move in order to improve productivity are explained in Figure 10. In his explanation, the author shows where emphasis is needed for improving productivity. Using first two variables, employee satisfaction and productivity, he shows the general relationship. By adding a third variable, potential productivity, additional effects are shown and provide management with a realistic objective against which to measure productivity.

²⁶Shu S. Liao, "Human Assets, Human Resources and Managerial Decision," Management Accounting, LVI, No. 5 (November, 1974) 19-22.

Figure 9

RELATIONSHIP BETWEEN BEHAVIORAL AND END-RESULT VARIABLES



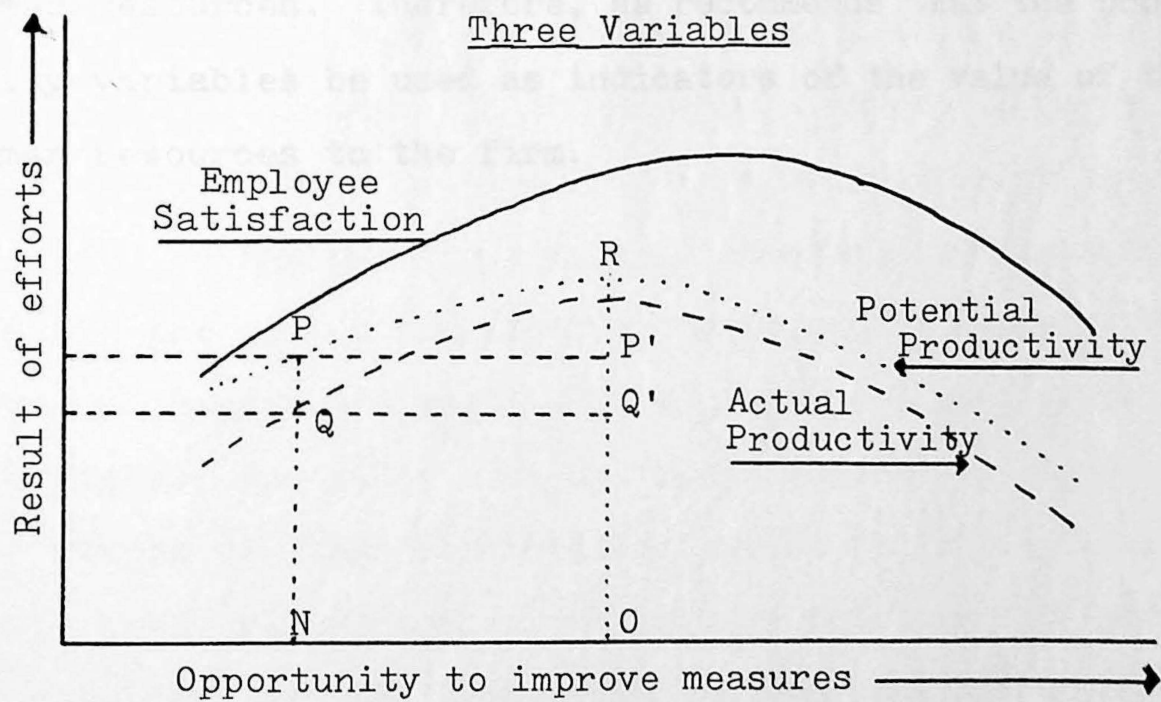
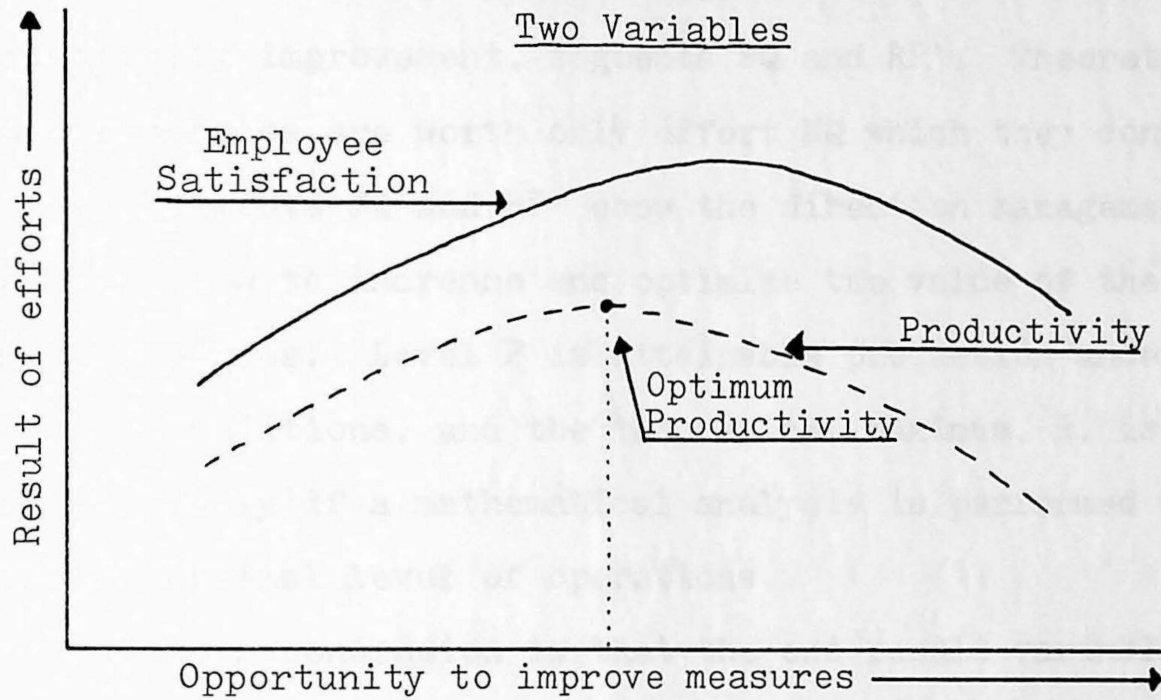
Notes:

1. Variables appearing below the dotted line are recognized as being beyond the control of company management.
2. The variables listed are by no means exhaustive. Only those needed to show the causal relationship are given.

Source: Shu S. Liao, "Human Assets, Human Resources and Managerial Decisions," Management Accounting, LVI, No. 5 (November, 1974) 21.

Figure 10

BEHAVIORAL AND PRODUCTIVITY MEASURES



Source: Shu S. Liao, "Human Assets, Human Resources and Managerial Decisions," Management Accounting, LVI, No. 5 (November, 1974) 22.

In the first graph, two opportunities are shown for productivity improvement, segments PQ and RP'. Theoretically, human resources are worth only effort NQ which they contributed. Segments PQ and RP' show the direction management should follow to increase and optimize the value of the human resources. Level P is attainable production under existing conditions, and the theoretical maximum, R, is available only if a mathematical analysis is performed to plan the optimal level of operations.

Liao's conclusion is that the end-result variables, such as profits, have a direct relationship with productivity, but productivity does not generally have positive or negative correlations with the behavioral variables of human resources. Therefore, he recommends that the productivity variables be used as indicators of the value of the human resources to the firm.

CHAPTER IV
APPLICATIONS AND PRACTICE

APPLICATIONS

The range of possible applications of Human Resource Accounting is quite extensive. Depending on the specific objectives of the firm deciding to implement an HRA system, the applications could be simply capitalization of employee training and development costs to a "full-blown" accounting system covering all possible aspects of personnel costs. Following are a few possible applications that might prove useful to a firm considering the development of a system of accounting for its human resources.

Dollar measurement of cost of turnover.

The most immediate area of benefit to a company is the cost of turnover of its personnel. Where turnover is considered to be a problem, most companies develop ratios in order to analyze the problem. However, few firms actually compute the cost of turnover in an objective manner. When physical assets are wasted, or at least not used effectively, the figures generally turn up in the company financial reports. The misuse of human resources is seldom reflected in dollar cost, however. At American Telephone and Telegraph their "force-loss" project illustrates a reporting system to determine the cost of telephone-operator turnover.²⁷

²⁷Marvin Weiss, "Human Capital: Asset or Liability?" Financial Executive, September, 1975, p. 31-2.

Divisional performance measurement.

Development of an HRA method to monitor personnel costs, by division, within a company would provide a basis for comparison of personnel management effectiveness among divisions.²⁸ Such procedures now exist for comparison of such things as sales, productivity and other factors. Specific costs of hiring and training can be measured and treated as investment-type expenditures. Inclusion of HRA for divisional personnel would provide still another basis for comparison.

Capital budgeting.

Much consideration has been given to techniques to measure productivity and profitability of capital assets.²⁹ However, little attention has been paid to the human element in this regard. There may be cases where additional investment in the human capital resource might be more advantageous than increased outlays for capital equipment. Without the appropriate data to use for comparison of alternatives, such a decision would even be considered.

Budgeting and cost control.

By accounting for employee training and development costs, standards could be developed.³⁰ As with the "standard cost" concept used in manufacturing accounting, personnel costs could be better controlled. One example would be the

²⁸Ibid, p. 32.

²⁹Ibid, p. 37.

³⁰Ibid.

development of standard outlays for specific positions within the firm. Another by-product would be financial controls throughout the personnel function.

Valuation of manpower inventory.

Along with money and materials, the manpower element is one of the basic resources of the firm.³¹ Management of a firm would not consider disregarding the "inventory" figures for its cash and other liquid assets. Nor would it feel that determination of the amount of raw materials used in a product was not important. The manpower inventory is an important measure of the firm's health and profit making potential.

New financial ratios.

An example of a financial ratio that could be developed through Human Resource Accounting methods is the degree of labor intensiveness.³² This is described as the ratio of human capital to non-human capital. Further breakdown of the human capital values could also be used to show the ratio of scientific staff to the total value of human capital, or "skill intensity." Analysis of this information could prove valuable to decision makers by showing changes from time-to-time in the structure of the labor force.

Investment decisions by prospective investors.

Once completely developed methods of Human Resource

³¹Homer R. Figler, "Accounting for Human Assets," Management Accounting, LVII, No. 5 (November, 1975) 24.

³²Lev and Schwartz, op cit., p. 107.

Accounting have been implemented, potential investors could use the data concerning the firm's human resources much in the same way they study the data on the other resources. Investment decisions could be enhanced by having information that reveals a company's investment in its human element and how it is using that investment.

PRACTICE

Actual practice of Human Resource Accounting is very limited. As mentioned earlier, firms and managers are reluctant to step into "something new" without more convincing research and experience. There are several firms using HRA to some extent. These range from one firm that has installed a "complete" system for accounting for its human resources, to firms that use only limited aspects of Human Resource Accounting.

R. G. Barry Corporation

The R. G. Barry Corporation is perhaps the most notable example of a firm that has installed a "complete" Human Resource Accounting system. The company is a "people oriented" firm, a great deal of emphasis being placed on its employees. The company first implemented HRA on a limited basis, collecting data on only its top level managers. The program has been expanded to include most of the employees. The "historical cost" concept is used primarily to establish dollar amounts of the company's investment in human resources. Costs for interviewing, hiring and developing employees are

accumulated and those costs capitalized. Although the data is not published in its form in financial statements, the company does include its "Total Concept" statements in its annual reports.³³ (See Figure 11.)

American Telephone and Telegraph.

AT&T has developed what they call "Force-Loss Cost Analysis."³⁴ This method of accounting for its human resource investment uses the concept of turnover costs. In its study, AT&T is trying to determine how much to invest in its training programs and recruiting programs.

The study involves determination of replacement costs for telephone operators, with the primary emphasis on accumulating empirical replacement cost data. It is the first step in evaluating the organization's return on human investments. On-the-job training costs, the largest single cost, are amortized over a projected job lifetime of a new operator. Expected tenure and productivity are checked from time-to-time and adjustments are made in the amortization rate. The people at AT&T feel that this data will show payoff on specific personnel programs and help to evaluate alternative programs.

³³Weiss, op cit., pp. 38-9.

³⁴Florence Stone, "Investment in Human Resources at AT&T," Management Review, October, 1972, pp. 23-7.

Figure 11

"TOTAL CONCEPT"

R. G. Barry Corporation and Subsidiaries

Pro-Forma (Conventional and Human Resource Accounting)

Balance Sheet

	1970 Conventional and Human Resource	1970 Conventional Only
Assets		
Total Current Assets	\$10,944,693	\$10,944,693
Net Property, Plant, Equipment	1,682,357	1,682,357
Excess of Purchase Price of Subsidiaries over Net Assets	1,188,704	1,188,704
Net Investment in Human Resources	942,194	-
Other Assets	166,417	166,417
	<u>\$14,924,365</u>	<u>\$13,982,171</u>
Liabilities and Stockholders' Equity		
Total Current Liabilities	\$ 3,651,573	\$ 3,651,573
Long Term Debt, Excluding Current Installments	2,179,000	2,179,000
Deferred Compenstation	77,491	77,491
Deferred Federal Income Taxes Based Upon Full Tax Deduction for Human Resource Costs	471,097	-
Stockholders' Equity:		
Capital Stock	1,087,211	1,087,211
Additional Capital in Excess of Par Value	3,951,843	3,951,843
Retained Earnings:		
Financial	3,035,053	3,035,053
Human Resources	471,097	-
Total Stockholders' Equity	<u>8,545,204</u>	<u>8,074,107</u>
	<u>\$14,924,365</u>	<u>\$13,982,171</u>

Source: Marvin Weiss, "Human Capital: Asset or Liability?"
Financial Executive, September, 1975, p. 39.

Electronic Data Systems (EDS).

EDS operates a specialized training program for certain of its employees. Since this is quite expensive and important training, the company feels justified in capitalizing the costs. The amount to be capitalized is determined by the amount of time it takes a student to become productive in the firm. Usually this takes about two years (including training time and on-the-job training). All of the costs associated with this development are capitalized and then amortized over the training period, using a reverse sum-of-the-years digits method. The rationale being that the student is more productive in the second year and more of the cost should be absorbed then. If a student does not complete the training, the costs incurred are written-off during the current period. This treatment has been incorporated in the company's financial reports and has even been certified and approved by the Securities and Exchange Commission.³⁵

Labor intensive firms.

It would seem that labor intensive firms, service organizations and such, would be the primary candidates for Human Resource Accounting. The people of the organization are the primary "assets" and therefore, are quite important to the success of the firm. Although not overwhelmingly in use in this area, there are such organizations

³⁵Weiss, op cit., p. 39.

that are using HRA on a limited basis. Several Certified Public Accounting firms and a management consulting firm are attempting to develop HRA measurement systems.³⁶

Professional sports is another area where the people of the organization are the most important resource (i.e., the players). A research study was undertaken to determine the extent of HRA used by teams in professional sports.³⁷ The data showed that only half of the respondents capitalized player bonus contracts. Less than one-fourth indicated that "multi-year" player contracts were disclosed on the company (team) balance sheet. Deferred payment contracts were, however, disclosed on balance sheets in nineteen of the twenty-seven cases where such contracts were applicable. Other than the foregoing applications, little is being done in the professional sports industry in the form of Human Resource Accounting.

³⁶Ibid.

³⁷Meyer, op cit., pp. 417-9.

have emerged. The strongest objection, as was indicated in Chapter I, was the fact that humans cannot be considered assets since they are not owned by the firm, and therefore, do not represent stored value for future services. When looked at in the light of the "set of services" point of view, an employee provides the firm with something of value. This view makes the argument less impressive. True, an individual employee can quit. In order to regain that "set of services" the firm must hire another employee to take his place or train someone within the firm. If this sort of happening represents a problem to the firm, then Human Resource Accounting can be of a great value. Those added costs can be considered part of turnover cost, which can be more effectively controlled through an HRA system. A firm is more likely to be aware of the full impact of turnover cost or "positional replacement cost" through an HRA program designed to show just that sort of thing.

Another objection that has been made concerns the diversity of the many proposals. Critics feel that with such diversity, selection of a method that would be standardized throughout the business community would be impossible. Perhaps this argument has some basis. However, if HRA were to be implemented (at least in the early stages) merely as a management tool for decision making, this objection loses its impact. A firm should consider only those aspects of an HRA system that they feel would be of benefit to that

firm. Most of the proposals presented are suggested for use as aids in managerial decision making and not as an addition to the firm's financial statements. As practice continues and expands, the strong points of various systems, as well as the limitations, will make themselves evident. At that time it will be proper to assess each proposal for its good and bad points and attempt to establish a somewhat standardized procedure for Human Resource Accounting.

CONCLUSION

The basic objective of financial statements is to provide information useful for making economic decisions. If information is to be useful it follows that it should be used. It would also follow that if the information contained in financial statements is deemed useful, it is worthwhile to gather the data and formulate the various reports. Whether the financial statements are for stockholder viewing or merely the internal reports generated for management should not make any difference. There is a multitude of financial data generated that may never reach the Annual Report financial statements. But, that is not to say that that information is not useful. The data is sifted and combined with other data along the way, changed in form from one level to the next. But it is used at each level it passes through, in one form or another. Perhaps those opposed to Human Resource Accounting are not looking at the entire scope of the firm's

operation, but merely at the (financial) end product--- the formal financial statements. To be useful, financial data does not have to be limited to that found on the formal financial statements, Usefulness is determined by the user.

Most reluctance to implementation of an HRA system does not rest with the objections to HRA, but to the lack of experience and research connected with it. There is widespread agreement that the firm's human resources are, indeed, one of the most important resources of the firm. There is also general agreement that more information should be available to aid in the decision making process when the human organization is involved. As practice continues and success is found and reported, more and more firms will be willing to establish Human Resource Accounting as an aid to managerial decision making.

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