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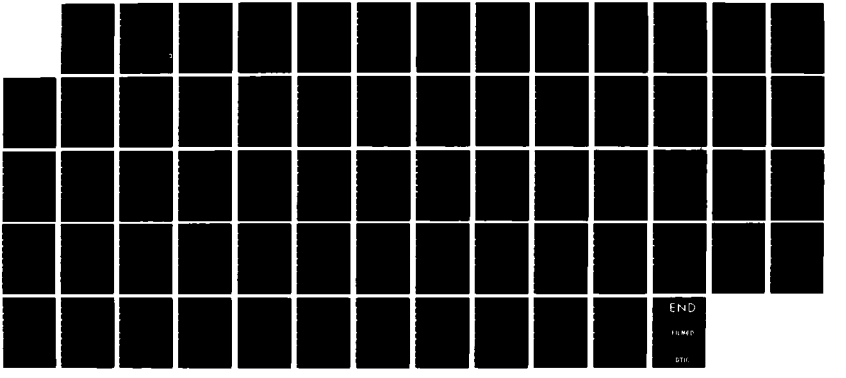

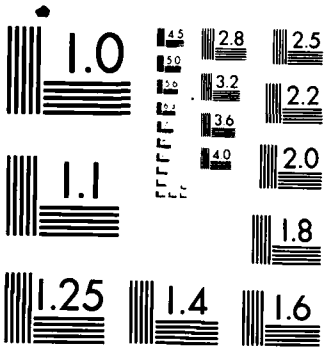

RETENTION AND VALUE OF USAF COST ANALYSTS

THESIS

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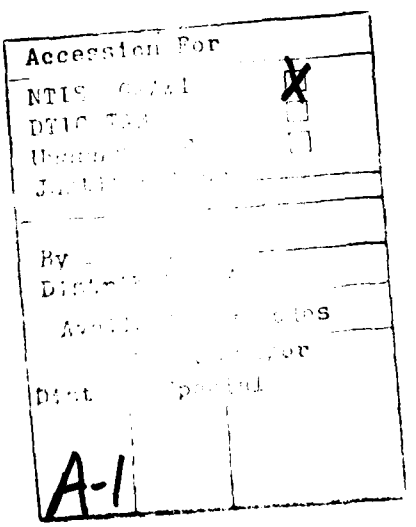

AFIT/GSM/LSB/85S-22

RETENTION AND VALUE OF USAF COST ANALYSTS

THESIS

Presented to the Faculty of the School of Systems and
Logistics of the Air Force Institute of Technology
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In Partial Fulfillment of the
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Master of Science in Systems Management

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Charles F. McNitt, Jr.

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Abstract

The questions of retention and value of USAF cost analysts were examined in this thesis. The literature review covered meta-analysis, utility analysis, and human resource accounting to establish the method and validity of quantifying the value of an individual in the language of business, the dollar. The method is applicable to any career field. Published pay surveys and employment agencies were consulted to determine salary information, leading to the determination of the individual's value. The basic formula is S (separation costs) + R (replacement costs) + T (training costs) + IV (individual value) = TV (total value). There did not appear to be a problem with retention of USAF cost analysts at this time. The value (loss to the Air Force) of a cost analyst varies greatly, but can be significant in absolute dollar terms.

RETENTION AND VALUE OF USAF COST ANALYSTS

I. INTRODUCTION

The Situation

Cost analysts in the Air Force seem to believe there is a retention problem in their career field. Often one hears that an individual in cost analysis has been offered a job with a civilian company and it is always for more money. Wright (1984) states there is a "growing exodus of experienced personnel into private industry" (43:32). He further states that companies receiving large allocations from the Department of Defense frequently offer high salaries to attract and employ experienced military personnel to assist with defense contracts and procedures (43:32). This raises two major questions. They are: first, is there a significant number of officers in cost analysis leaving the Air Force; and second, what is the loss to the Air Force when a cost analysis officer leaves?

This information should be of concern to management and to the Manpower and Personnel Center. If there is a retention problem, these people certainly need to be aware of it. Management can make more informed decisions about people and policy by understanding the financial loss associated with an officer who leaves the Air Force. As Cascio stated, "Unfortunately many organizations are unaware

of the actual cost of turnover, and unless this cost is known, management may be unaware of the need for action to prevent controllable turnover..." (11:19).

The research presented is an attempt to clarify and answer the two major questions stated earlier. It had not been determined if there is a significant problem in the retention of cost analysis officers at this time and their value, in terms of dollars, had not been determined.

An understanding of what situation constitutes a loss to the Air Force is important. For the purposes of this thesis, a loss will have occurred when an individual voluntarily leaves the direct employment of the United States Government.

Losses can be categorized into two major groups. They are: first, leaving the Air Force but joining the civil service and performing similar work; and secondly, leaving the direct employment of the Government.

Those people who join the Air Force civil service ranks are not a loss. In fact, they may be a greater asset than the military member. It has been said that it takes five to six years to become a good cost analyst. A civil service employee tends to have much greater stability than his/her military counterpart. Since the individual who makes this type of move basically only changes uniforms, not jobs, there should be no real loss in system performance. This is consistent with Boudreau's concept of internal employee

movement (5:4).

There are two sub-categories of individuals who leave the direct employment of the Government: those who work for defense contractors and those who do not. It can be debated whether or not the Air Force gains when an individual leaves the Air Force and performs a similar job for a defense contractor. With the expertise and "inside knowledge," it could help the contractor negotiate more money. In the second sub-category, there is the complete separation of the individual from the Air Force. However, both will be considered to be losses to the government.

Scope

Cost analysts were examined by this study, but the method certainly should be applicable to any specialty code. It merely becomes a matter of determining what jobs in the private sector are comparable and what their salaries are. Also, only the last two years were considered to examine the retention question since that was the limit on the information available.

Hypothesis

The situation presented leads to the following two hypotheses:

1. There is not a significant retention problem at this time.
2. Cost analysis officers have a high dollar value to the

United States Air Force in an absolute sense.

Investigative Questions

Some of the questions that needed to be answered to check these hypotheses were:

1. What is the present retention situation?
    a. How many cost analysis officers are there?
    b. How many slots for this specialty are there and what are the corresponding ranks?
    c. How many new slots have been created for this specialty?
    d. How many have left the service in the past few years?
    e. Is the number who have left significant?
2. What factors constitute the value of a trained officer?
    a. What are the costs to train these officers?
    b. What are the costs to separate these officers?
    c. Is a dollar figure determined for an individual?

Summary

There are actually two separate questions presented. One question deals with retention of USAF costs analysts and the other question deals with their value in dollar terms. It is important to know if there is a problem in retention of cost analysts. Determining the "value" of these officers provides insight that can be used to better understand the present and future situation.

II. LITERATURE REVIEW

Introduction

What is involved in determining the value of an individual? Part of the answer is readily apparent and part of the answer is not. The hard part is in determining what the individual contributes. In reviewing the literature, three major approaches were found. They are meta-analysis, utility analysis, and human resource accounting. It is appropriate to take a brief look at the development of these concepts.

Meta-Analysis

"Meta analysis is the quantitative cumulation and analysis of descriptive statistics across studies" (20:137).

Development of Meta-Analysis

Narrative Method. "The oldest procedure, the narrative review has also been described as 'literary,' 'qualitative,' 'nonquantitative,' and 'verbal'" (20:129). An individual reviews each study and tries to find some connection. The information in a small number of studies can be handled this way. With a large number of studies, the volume of information becomes too much.

It has been shown that different conclusions are reached by reviewers using quantitative methods and reviewers using narrative methods even when the number of studies reviewed is as small as seven (20:130).

Traditional Voting Method. "In its simplest form, it consists merely of a tabulation of significant and nonsignificant findings" (20:130). A conclusion is reached by determining which category of significantly positive, significantly negative, or no relationship has the greatest number of studies. The category with a plurality is called the winner and assumed to provide the best estimates of the relationship between the variables. The biggest problem with this method is it can lead to false conclusions due to artifacts. Other problems are a bias towards studies having large samples and the size of the effect is unknown (20:131).

> Furthermore, Hedges and Olkin (1980) have pointed out (and proven) that if there is a true effect, then in any set of studies in which mean statistical power is less than about .50, the probability of a false conclusion using the voting method increases as the number of studies increases. That is, the more data examined, the greater the certainty of a false conclusion about the meaning of the data! Thus the traditional voting method is fatally flawed statistically and logically [20:132-133].

Cumulation of p-Values Across Studies. This method tries to determine an average p-value (significance level) across the entire set of studies. The conclusion reached is that the effect exists if the p-value is small. The biggest problem is that generally the p-value will be significant, but there is no indication as to the size of the effect (20:133).

Statistically Correct Vote-Counting Methods. There are

two categories of statistically correct vote-counting methods. They are significance levels and effect sizes.

Significance Levels. This method utilizes the sign test to check any significant deviation from the null hypothesis. Also, the proportion anticipated can be compared with the actual proportion found in the studies. The biggest disadvantage is that no estimate of the effect size is given when the null hypothesis is false (20:134-135).

Effect Sizes. "If sample sizes are known for all studies, then the effect size can be estimated from either the proportion of positive results or from the proportion of positive significant results" (20:135-136). Confidence intervals can also be developed. However, the interval will be wider than when effect sizes are determined from the individual studies. This method assumes the size of the effect is the same across all the studies. If this is not true, the resulting number is "an approximate estimate of mean effect size. Further, this method provides no estimate at all of the variance of effect sizes across studies" (20:136).

Meta-Analysis. There are two methods - Glass' and Schmidt-Hunter's. While they were developed basically at the same time, the Schmidt-Hunter method is considered an extension of Glass' work (20:138-139).

Glassian Meta-Analysis. The primary properties of

Glassian meta-analysis are an emphasis on effect sizes, face value acceptance of effect size variance, and an empirical approach to deciding what should be checked against study outcomes (20:138).

Schmidt-Hunter Meta-Analysis. The Schmidt-Hunter method goes beyond Glass' method in that it can deal with such problems as sampling error and range restriction. The primary properties are:

1. Like Glass, the effect size is emphasized. However, they allow for correcting test unreliability and range restrictions.

2. They do not take the variance at face value. They check it for sampling errors, reliability differences, test validity, and range restrictions.

3. They then correct the variance for the above errors.

4. Finally, a confidence interval can be developed for the estimated mean effect size (20:139).

State-of-the-Art Meta-Analysis. State-of-the-art meta-analysis takes Glassian and Schmidt-Hunter meta-analysis a step further by having a provision for the situation when observed variance is not totally due to testing errors. It also includes formulas for experimental studies. This is "...the most complete meta-analysis procedure now known" (20:140). However, a problem still remains with capitalizing on chance and with a relationship not being

detected because of a low statistical power (20:142).

Utility Analysis

"Utility analysis is the assessment of the economic or social impact of organizational programs (Katzell and Guzzo, 1983)" (21:473).

Development of Utility Analysis

Utility analysis is the outgrowth of management's need to estimate the cost and utilities of different actions. In personnel selection, formulas for determining utility have been around for 40 years. "Three of the best known utility models are those of Taylor and Russell (1939); Naylor and Shine (1965); and Brogden (1946, 1949) and Cronbach and Gleser (1965)" (11:130).

The Taylor and Russell Model.

> Taylor and Russell (1939) developed perhaps the most well-known utility model and pointed out that the overall utility of a selection device is a function of three parameters: the validity coefficient (the correlation between a predictor of job performance and a criterion measure of actual job performance), the selection ratio (the proportion of applicants selected), and the base rate (the proportion of applicants who would be successful without the selection procedure). This model demonstrates convincingly that even selection procedures with relatively low validities can increase substantially the percentage successful among those selected when the selection ratio is low" [11:130].

This was a major step forward from the index of forecasting efficiency (popular in the 1920's) and the coefficient of determination (popular in the 1930's and 1940's) (36:610). However, there were some shortcomings in

this model. One shortcoming is that the validity coefficient is normally "based on present employees who have already been screened using methods other than the new selection procedure" (11:134). Another shortcoming is it "assumes fixed treatment selection (that is, individuals are chosen for one specified treatment or course of action that cannot be modified)" (11:134). Also, the model does not consider type II errors; that is, those individuals who are rejected when they would have been successful.

Then the model has individuals classified into successful or unsuccessful groups. Each person within a group is considered to make an equal contribution. The Taylor-Russell model is basically used to evaluate already chosen selection ratios rather than determine an optimal selection ratio (11:134).

"Perhaps the major shortcoming of this utility model is that it is cast so that the usefulness of a predictor is reflected only in the success ratio and nothing else" (11:135). As such, "the success ratio tells us that more people are successful, but not how much more successful" (11:135). The Taylor-Russell model is based on the assumptions that the relationship between predictor and criterion is bivariate normal, linear, and homoscedastic (11:135).

The Brogden Model. Brogden (1949) made the next major contribution. Brogden showed that if the predictor and

criterion variables have a linear relationship and their frequency distributions are the same, the correlation coefficient provides the ratio of the mean standard criterion score obtained by using the predictor variable to that which would be obtained by using the criterion variable itself. He concluded that this can be interpreted "as showing that the correlation coefficient is a direct index of predictive efficiency" (6:76).

Brogden demonstrated that an employer could use the correlation coefficient and the standard deviation to estimate the economic impact various selection devices should have (6:68-71).

The Naylor-Shine Model. The Naylor-Shine (1965) model assumes that validity and utility have a linear relationship that holds at all selection ratios.

> Thus the Naylor-Shine index of utility (originally derived by Kelley, 1923) is defined in terms of the increase in average criterion score to be expected from the use of a selection measure with a given validity and selection ratio. Like Taylor and Russell, Naylor and Shine assume that the relationship between predictor and criterion is bivariate normal, linear, and homoscedastic, and that the validity coefficient used is based on the concurrent validity model. Unlike Taylor and Russell, however, use of the Naylor-Shine model does not require that employees be dichotomized into satisfactory and unsatisfactory groups by specifying an arbitary cutoff on the criterion (job performance) dimension that represents minimally acceptable performance. Thus less information is required in order to use the Naylor-Shine utility model than the Taylor-Russell model [11:136].

The Naylor-Shine tables can provide three important answers. They are: 1) the average performance level of selectees given a selection ratio; 2) the mean criterion score given a selection ratio; and 3) the selection ratio to use when a certain level of improvement in the average criterion scores of selectees is given (11:136-137).

> The Naylor-Shine utility index appears more generally applicable than the Taylor-Russell index because in many, if not most cases, given valid selection procedures, an increase in average criterion performance would be expected as the organization becomes more selective in deciding whom to accept. However, neither of these models formally integrates the concept of cost of selection, or dollars gained or lost, into the utility index. Both simply imply that larger differences in the percentage of successful employees (Taylor-Russell) or larger increases in average criterion score (Naylor-Shine) will yield larger benefits to the employer in dollars saved [11:138-139].

The Cronbach-Gleser Model. Cronbach and Gleser (1965) built upon Brogden's (1949) model. Two of the differences are that Cronbach and Gleser included the cost of information gathering and they examined the mean gain per applicant rather than the mean gain per selectee (36:613). However, they did arrive

> at the same conclusions regarding the effects of r_{xy}, SD_e, the cost of selection, and the selection ratio on utility in fixed treatment selection. Utility is properly regarded as a linear function of validity and, if cost is zero, is proportional to validity. Contrary to the Taylor-Russell results, the linear relation holds at all selection ratios [11:144].

Boudreau (1984) has taken utility analysis and applied it to the utility of programs affecting work group

composition. He states, "changes in workforce membership occur when the workforce is altered by adding new individuals, removing individuals, or rearranging individuals among jobs or units" (5:3).

He contends utility analysis can be applied to four management areas and provide a better picture of "the interrelationships between human resource programs and their consequences" (5:3). The four areas are selection, recruitment, internal movement, and external movement.

Estimating Standard Deviation

A common thread that runs through the literature is that utility analysis has not been used very much due to the difficulty in estimating the standard deviation of job performance in terms of dollars. This difficulty has received a lot of attention recently. As such, it deserves its own section. Several different methods have been developed and they tend to support the results of each other.

Standard Costing. The first method was called standard costing and used cost accounting procedures. Using cost accounting involved a tremendous amount of time and still required judgements (36:618). Some of the factors that were considered are: the average value of outputs; the quality of outputs; overhead; inefficiencies due to errors, accidents, spoilage, etc; personalities, especially where public relations are involved; and the cost of time of other

people involved (11:154).

"It was assumed that the dollar profit that accrues to the company as a result of an individual's work provides the best estimate of his or her worth to the company (11:155). Performance ratios were developed to provide a measurement of the individual's return. If the individual produced less than the standard, an adjustment was made and it was referred to as the "burden adjustment" (11:156-157).

Survey. Some people, such as Cronbach-Gleser (1965) and Roche (1961), felt there were problems with standard costing. Schimdt, Hunter, McKenzie, and Muldrow (1979) developed a method for obtaining reasonable estimates of SDy. This opened the door for utility analysis.

They submitted a questionaire to 62 supervisors asking them to estimate the 15th, 50th, and 85th percentile of worker performance in terms of dollars.

> The method is based on the following reasoning: if job performance in dollar terms is normally distributed, then the difference between the value to the organization of the products and services produced by the average employee and those produced by an employee at the 85th percentile in performance is equal to SDy [36:619].

There are two advantages of this method over cost accounting techniques.

> First, the mental standard to be used by the supervisor-judges is the estimated cost to the organization of having an outside consulting firm provide the same products and/or services. In many occupations, this is a relatively concrete standard. Second, the idiosyncratic tendencies, biases, and random errors of individual experts

> can be controlled by averaging across a large number of judges [36:619].

Cascio refers to this method as the global estimation procedure. Methods similar to this one have been successfully used "by the Decision Analysis Group of the Stanford Research Institute to scale otherwise unmeasurable but critical variables" (36:619).

While this was a big step forward, there remained some problems. There was more agreement on the low end of the scale than on the high end, supporting Brogden, Cronbach and Gleser's opinion that often dollar outcomes are not normally distributed. Another problem is that "the procedure lacks face validity (that is, it does not look like it measures what it purports to measure) since the components of each supervisor's estimate are unknown and unverifiable (11:163).

Hunter and Schmidt later determined that for a typical job, the cost of labor was about half the cost of output. Thus,

> for the typical job in our economy, the standard deviation in job output can be conservatively estimated at 20% of mean output. For a job with a typical labor cost percentage, the standard deviation of output in dollar terms can be estimated at about 40% of annual wage [21:476].

The Cascio-Ramos Estimate of Performance in Dollars. The next method offered was the Cascio-Ramos estimate of performance in dollars (CREPID).

> The rationale underlying CREPID is as follows. Assuming an organization's compensation program reflects current market rates for jobs, then the economic value of each employee's labor is best

reflected in his or her annual wage or salary. CREPID breaks down each employee's job into its principal activity, and then requires supervisors to rate each employee's job performance on each principal activity. The resulting ratings are then translated into estimates of dollar value for each principal activity. The sum of the dollar values assigned to each principal activity equals the economic value of each employee's job performance to the company [11:163-164].

There are eight steps to the CREPID procedure. They can be summarized as follows.

1. Identify principal activities.

2. Rate each principal activity in terms of time/frequency, importance, consequence of error, and level of difficulty.

3. Multiply the numerical rating for time/frequency, importance, consequence of error, and level of difficulty for each principal activity.

4. Assign dollar values to each principal activity.

5. Rate performance on each principal activity on a zero to two hundred scale.

6. Multiply the point rating (expressed as a decimal number) assigned to each principal activity by the activity's dollar value.

7. Compute the overall economic value of each employee's job performance by adding the results of step 6.

8. Over all employees in the study, compute the mean and standard deviation of dollar-valued job performance [11:164-172].

Modified Survey. Burke and Frederick (1984) examined two modified versions of the Schmidt, Hunter, McKenzie, and Muldrow method.

The modified procedures, based on Bobko, Karren, and Parkington's suggestion, consist of feeding

> back to managers the mean estimated value for the 50th percentile judgments. Feedback sessions are to be conducted via a group discussion (Procedure A) as well as individually (Procedure B) to yield comparative data [9:483].

They concluded that there was some support

> for the normality of SDy estimates based on the Schmidt et al. procedure....In addition, the overall average SDys for the Schmidt et al. and Procedure B were approximately equal, suggesting that consistent overall SDy estimates may be obtained with these two procedures....With respect to a point estimate, the contention of Schmidt et al. (1982) that the average overall worth or output is twice the annual salary appears reasonable [9:487-488].

Robustness. Alexander and Cronshaw applied utility analysis in capital budgeting and demonstrated "a method for incorporating the effect of the variability (uncertainty) of the SDy estimates into utility analysis" (2:4). They used the beta distribution and thus did not need the assumption of normality. They used a pessimistic, most likely, optimistic method. While this method is robust, it allows the manager to assess the impact of the uncertainty in the estimates and quantify the effect in terms of discrete probabilities (2:6-13).

A comparison of three methods of estimating the standard deviation of performance in dollars was completed in 1985 by Weekley et al. They looked at the 40% rule, the CREPID procedure, and Schmidt et al. (1979) global estimation technique. Their results indicated that the CREPID procedure and the 40% rule provided comparable results. The Schmidt et al. procedure consistently provided

larger estimates than the other two methods (42:122-126).

While they could not state that one method was better than another one, they did state that the 40% rule and the CREPID procedure provided more conservative estimates than did Schmidt's et al. (1979) approach. This seems to be due to the smaller estimates of standard deviation produced by these two methods. The smaller estimates would indicate a smaller range of potential benefits. However, convention tells us that the larger standard deviation is more conservative because it is more likely to include the true values. What it comes down to is the 40% rule and the CREPID procedure provide similar results and "the logic underlying CREPID may be more easily understood by practitioners, whereas the simplicity of calculations favors the 40% technique" (42:125).

Human Resource Accounting

Human resource accounting is the "measurement and accounting that would enable the company to report accurate estimates of the worth of the human assets of the organization" (11:2).

Two Models.

There are two conceptual approaches to human resource accounting. They are the asset model and the expense model.

Asset Model. Cascio makes it clear that for employee valuation there are no generally accepted accounting

procedures. He states that human resource accounting (HRA) made its debut in the R. G. Barry Corporation's 1967 annual report, where HRA was described

> as a first step in the development of sophisticated measurement and accounting procedures that would enable the company to report accurate estimates of the worth of the human assets of the organization. Costs were accumulated in individual subsidiary accounts for each manager under five categories: recruiting, acquisition; formal training and familiarization; informal training, informal familiarization; experience; and development [11:2].

> This is the historical cost (i.e., expenses actually incurred) approach to employee valuation. It is an asset model of accounting; that is, it measures the organization's investment in employees. For the purpose of external reporting (to inform interested parties of the financial position and of the results of operations of a company, with emphasis on performance measurement), it is widely viewed as most appropriate (Tsay, 1977). The historical cost approach is relatively objective, it facilitates comparisons of levels of human resource investment on a basis consistent with accounting treatment of other assets, and it seems a fair matching of benefits exhaustion with expense in particular time periods (Brummet, Flamholtz, and Pyle, 1968) [11:3].

> The method is not without its disadvantages, however, as Baker (1974) has noted. First, historical cost valuation is based on the false assumption that the dollar is stable. Second, there is a great degree of subjectivity in the detection and write-off of abortive expenditures. Third, since the assets valued are not saleable, there is no independent check of valuation. Finally, this approach only measures costs to the organization; it ignores completely any measure of the value of the employee to the organization. Hence, there is no direct indication of the soundness of the investment in human resources [11:3].

> Other bases of valuation have been considered because

of these shortcomings. They can be grouped into three main categories: replacement cost, present value of future earnings, and present value to the organization.

Replacement Cost. The cost to replace an individual is one alternative to the historical cost concept. Replacement costs typically include recruitment, training, and the income lost during the transition period. "Flamholtz (1971) pointed out that it is easier in practice to estimate replacement cost than market value, and the former might therefore be adopted as a surrogate measure of the latter" (11:3).

An argument against this is that it just updates the valuation and actually adds more subjectivity to the measure. Just how useful is such a measure? It would normally be used when looking at the dismissal and replacement of employees. For most organizations, the decision of dismissal and replacement does not occur often enough to make it beneficial to incorporate the accumulation of replacement cost data on all employees into the accounting system (11:4).

Present Value of Future Earnings.

> Lev and Schwartz (1971) proposed an economic valuation of employees based on the present value of future earnings, adjusted for the probability of employees' deaths. That is, the organization determines what the contribution an employee will make in the future is worth to it today. That contribution can be measured by its cost, or the salary wages the organization will pay to the employee. The measure is an objective one because it uses widely based statistics such as census

> income returns and mortality tables. However, the measure is severely limited because it assigns a value to the average rather than to any specific group or individual. There is therefore no benefit in monitoring the efficiency of an individual firm's investment in employee development, since the investment would have little or no impact on the present valuation of future earnings [11:4].
>
> Baker (1974) pointed out three other faulty assumptions underlying this method. If the present value of future earnings is regarded as a fair appraisal of the individual's economic worth to an organization, then (1) subject to any profit expectancy built into the discount rate applied, because worth is equal to future cost, the employing organization is indifferent to whether it pays the cost to obtain the value or not (that is whether the employee is retained or not); in either case it comes out even. (2) Insofar as earnings exclude fringe costs, the organization is indeed better off without this resource. (3) Consequently, the value of past recruitment and development of the employee is zero in (1) or negative assuming (2) [11:4].

Value to the Organization. This is the concept where an employee works for the highest bidder; this is analogous to the sports world. This bid price would then be incorporated into the investment base. However, if opportunity costs are being measured, then the appropriate bid to enter is the highest unsuccessful bid.

> An alternative aggregate valuation approach has been proposed by Hermanson (1964). It involves establishing the net present value of expected wage payments (discounted at the economy rate of return on owned assts for the latest year) and applying to this a weighted efficiency ratio (the rate of income on owned assets for the current year against the average rate of income on owned assets for all firms in the economy). As we noted earlier, use of such broadly based statistics appears to diminish the precision of the calculations in general. It also incorporates unrelated risk factors into the efficiency ratio

calculation. Moreover, human resources so valued would apparently subsume all other intangible assets of a goodwill nature [11:5].

Asset models are important but are more limited than orginally thought. These models focus exclusively on inputs, ignoring outputs (11:5).

Expense Models. In expense models, the contention is that the employee's contribution is directly related to how he/she works and what is produced.

> What is different in the general costing approach is the quantification in financial terms of a set of common behavioral and performance outcomes. Standard cost accounting procedures are applied to employee behavior. To do this, the cost elements associated with each behavior must be identified and their separate and mutually exclusive dollar values computed. Costs can be conceptualized in two ways. One reflects outlay costs (for example, materials used in training new employees) versus time costs (for example, supervisors' time spent orienting the new employees). A second distinguishes between variable, fixed, and opportunity costs. Fixed costs are costs that are independent of production rate; variable costs are costs that rise as the production rate rises. Opportunity costs reflect what the organization might have earned had it put the resources in question to another use. An example of a variable cost would be the overtime cost incurred because of absenteeism; a fixed cost would be the salary and fringe benefits for personnel who replace the absentees; and an opportunity cost would be the profit lost during the replacement process. These distinctions are important because only variable costs are directly related to behavior. Fixed costs are incurred regardless of behavioral occurrences, and opportunity costs are realized only if some employees put their free time to productive use while others do not (Macy and Mirvis, 1976) [11:6-7].

Cascio states that "all aspects of human resource management (including morale) can be measured and quantified

in the same manner as any operational function (Driessnack, 1979)" (11:8). He identified six major areas where results are easily seen. They are:

1. Compensation policies and procedures.
2. Benefit programs and insurance premiums.
3. Personnel taxes.
4. Recruiting, training, and management development.
5. Affirmative action.
6. Turnover and outplacement.

Under compensation policies and procedures he states,

> Organizations that do not fully understand what a position is worth often either overpay or underpay their employees. The result is that incompetent overpaid employees do not leave and competent underpaid employees do not stay [11:8].

Cascio identifies the following as factors of turnover costs: separation costs, replacement costs, and training costs (11:20).

Summary

Through the development of meta-analysis, the validity of human behavior and organizational interventions can be measured. The stronger the validity of the action, the more faith an individual places on its use. This knowledge has been and is applied in trying to determine the economic benefits and value of organizational interventions and individuals. This can be found in the use of utility analysis and human resource accounting. It really is an attempt to translate the statistical or behavioral terms

obtained from behavioral measurements into dollars, the language of business (10:21-24). Meta-analysis could not be used in this thesis due to the lack of studies in the area of this research topic.

Concepts from utility analysis and human resource accounting allowed the value of a cost analyst in the USAF to be determined. An examination of retention of cost analysts in the USAF was also done.

III. METHOD

The method is covered in two major divisions: retention and value. Within each of these sections, the procedure used for that division is discussed.

Retention

The information needed was obtained from two different offices within the HQ USAF Manpower and Personnel Center, Randolph AFB, TX (MPCMR and MPCROS4C). The questions that needed answering were those that dealt with the number of officers assigned in cost analysis slots, the number who have left and the number of available slots for the past three years. A bench mark, level of significant loss, was also needed. This would have allowed some trend analysis to be performed and insight as to its significance.

Retention information was obtained on the four major comptroller specialities: 692X, Cost and Management Analysis; 674X, Cost Analysis; 673X, Budget; and 672X, Accounting and Finance. The information obtained was broken out by rank (Lt, Captain, Major, and Lt Colonel), with the number assigned, number authorized, and number resigned for each rank in each AFSC for the years 1983 and 1984.

Unfortunately, only two years of data were available (33). Thus, only a superficial analysis could be performed. The percentage of officers who resigned was computed by dividing the number who resigned by the number assigned for

each category (speciality code and rank). Since the number assigned and the number authorized vary from one year to the next, the comparisons were made on the percentage of officers resigned with the base being the number assigned for the respective year.

The analysis was further limited by two factors. The first one is that the raw data did not distinguish among the various reasons for resigning. The three most common reasons for leaving the service are retirement, lack of promotion, and other employment. The reason of primary concern for this thesis was resigning for other employment. This further breakdown was not available in the data received.

The other limitation was that a significant level of retention was not determined. One department (MPCROS4C) looked at the number of departures each year. A specific number was not established as being a cause for concern with regard to retention. Another department (MPCMR, AF Retention) examines retention over a period of time, usually from the four year point to the eleven year point. They take into consideration the promotion rates over that period of time. The 67XX specialities were lumped together, preventing any comparison as set-up in this thesis. Both the 592X and 67XX were considered small groups. Thus, the resignation of one or two officers in any one category could greatly distort the percentages. Under this method, if

retention fell below 55 to 60%, it would be examined closer. However, the fact that the speciality codes examined were such small groups, a lower retention rate (as low as 44% in one case) than this was not generally considered a cause for concern (38).

Value

Analysis of value is considerably more difficult than analysis of retention. Some of the value can be determined from the expense accounting model that Cascio presents. He splits turnover costs into three areas: separation costs (S), replacement costs (R), and training costs (T).

The key elements of separation costs are the exit interview, administrative functions related to termination, separation pay, and unemployment tax. The cost of the exit interview consists of the cost of the interviewer's time and the terminating employee's time. The costs of the administrative functions are the time required by the personnel department times the wages of the personnel employees needed to do the work (11:20-24).

It is more complicated to compute separation costs in the Air Force than it is in the private sector. To begin with, the bureaucracy of the Air Force forces many people to be involved with the file of an individual who leaves the Air Force.

The type of separation determines how many people and which people must be involved. The situation that this

thesis is concerned about is when an individual leaves the Air Force voluntarily with an honorable discharge. Separations for retirement or bad conduct or any other reason require more resources than the situation under consideration here.

This matter is further complicated in that base level separations are primarily geared for enlisted members and not officers. Thus, additional help is usually needed. On a very basic level, the administrative work of a separation is done by an Airman 1st Class and takes approximately two hours (4).

The other costs of separation in the Air Force are usually incurred over a long period of time (about six months) in bits and pieces. Thus, it is not realistic to pin-point a dollar value to them. Additionally, there is not a separation allowance. Separation costs then may seem insignificant in the Air Force. However, the principle is important and must be considered.

Replacement costs are those costs incurred to replace an employee. There are six categories of these costs. They are:

1. Communication of job availability.
2. Preemployment administrative functions.
3. Entrance interviews.
4. Staff meetings.
5. Post employment acquistion and dissemination of

information.

6. Employment medical exams (11:25-26).

The replacement costs described by Cascio (1982) are included in the acquisition costs of officers found in AFR 173-13. Once again, the Air Force is different from the private sector in that specific training is required to be in the military; training that is not job specific, but rather, simply military traditions and customs. AFR 173-13 states,

> Each factor is a composite of the average cost of recruiting, accession travel (one way cost to an initial training base or civilian institution), temporary duty (TDY) (per diem paid to trainees enrolled in courses of less than 20 weeks duration), initial clothing, education and training, and miscellaneous allowances. The factors are unique to the acquisition phase only. Costs do not include training to attain an Air Force Specialty Code (AFSC) [14:31].

These replacement costs vary depending on the source of acquisition.

"In virtually all instances, replacement personnel must be oriented and trained to a standard level of competence before assuming their regular duties" (11:29). The key elements of training (T) are informational literature, formal training, and informal training.

The cost of literature is the unit cost of the package. Formal training costs involve the length of the program times (the wages of the instructor plus the wages of the trainee). Informal training costs involve the amount of

time spent in instruction times the trainee's wages (11:29-32).

With respect to formal training in the Air Force, some problems with the computation of the cost of AFIT resident programs have been expressed. These problems stem from the way base support costs and Air University Command support costs have been allocated to the resident programs. The contention is that the cost per graduate should actually be lower than what has been stated. This is even more critical when AFIT resident programs are compared to AFIT civilian programs. This problem is currently being examined more closely by Air University (25).

It is impractical to attempt to place a dollar value on an officer's informal training. Informal training, while fairly easy to define, is very difficult to estimate, especially for an officer. Therefore, no dollar value is given.

Snedeker (1983) discusses education and training costs and concludes that they are not sunk costs, but really relevant costs. He does this on the basis (similar to Cascio) that a replacement would need similar training. He contends these costs are actually investments that should be protected and significant savings may result from training fewer replacements (37:8-9).

What we have so far are the readily identifiable costs of separation, replacement, and training. Separation costs

were obtained from MPCA, an analysis division at the Manpower and Personnel Center, Randolph AFB, TX. Replacement costs were obtained from Air Force Regulation 173-13. The factors that enter into replacement cost were contained in the cost of acquiring and training a new individual in the Air Force. Costs for other formal training programs were found in the Air University Education Digest prepared by the Cost and Management Analysis office at Air University. The costs to obtain a speciality code were not included. Some speciality codes do not have a technical school, such as 674X. However, these costs would be avaliable from Air Training Command, Cost and Management Analysis division.

A major problem still remains in determining value. The problem is: what does the individual in cost analysis add or detract to value? CREPID works under the assumption that the market sets the wage scale and thus wages are an indication of the value of the job performed (11:163-164). This is consistent with economic theory.

One contention is that military pay may not be reflective of job performance because military members are paid based upon rank and time in service, and not directly job performance. It may be argued that promotions are based on job performance and jobs are assigned ranks with which they are supposed to be filled. Thus, a job slated for a major would require more experience and knowledge than a job

slated for a captain. All too often, a person is found performing in a job who is junior in rank to that which the job requires. This individual's only reward is the hope that their Officer Effectiveness Report (OER) reflects this situation and increases the chances of their next promotion. Promotion decisions are primarily based upon the OER. The OER contains much more information than just an individual's job performance.

A solution to the problem of value was to follow the guidelines of Cascio and McEvoy (1984) and consult published pay surveys for the particular job in question. Cascio and McEvoy then apply the 40% guideline as an estimate of the standard deviation of job performance (12:3-4). In addition to consulting published pay surveys, national employment agencies were also consulted to provide broader and more accurate information. Once an average salary was determined, it became only a matter of deciding where a particular individual falls in comparison to the others in that speciality and applying the appropriate standard deviation. For an additional comparison, the federal civilian pay structure was also examined for the financial specialities. This salary information provided the value of an individual's performance, represented by IV.

The plan for determining individual value was to collect information on salaries in several categories. The categories were by section of the country (six locations -

northeast, southeast, upper midwest , lower midwest, northwest, and southwest), years of experience (1-4, 5-11, 12-16, and 16 or more), and the range of salary (pessimistic, most likely, and optimistic). This was not successful, as discussed below.

The employment agencies classified cost analysts as cost accountants. Their advice was to watch the ads in the newspapers for salary information. This was done. Even though it was not uncommon to find advertisements for cost analysts, there was never any salary information contained in the advertisements. The employment agencies did provide some information for cost accountants in the broad categories desired.

The civil servant can find employment as a cost analyst and is generally placed under the financial administration and program series, GS-501. An individual can advance quickly. The requirements are shown below.

TABLE I

Requirements for GS-501 Series Civil Servants

Grade level	General experience (years)	Specialized experience (years)	Total experience (years)
GS-5	3	0	3
GS-7	3	1	4
GS-9	3	2	5
GS-11 & above	3	3	6

General experience is defined as any experiences which

has provided basic management skills. Studies at the college level which have been successfully completed may be substituted for general experience at the rate of nine months of experience for one year of school, up to a maximum of three years. Thus, a college graduate should start at no less than a GS-5 (32:1).

Specialized experience is specific work experience that directly relates to the desired position. Generally, one year of graduate level education may be substituted for one year of specialized experience. In some cases, graduate level education may be substituted for two years of specialized experience. "Two full years of appropriate graduate education or a master's degree in an appropriate field meets all requirements for grade GS-9" (32:2).

The analysis on individual value was limited by several factors. The first limitation was that the specific job of cost analyst was not found in either the published pay surveys or from the employment agencies. The closest job description was that of cost accountant. The second limitation was that only employment agencies in the local area who advertised as being nation-wide were consulted. A further limitation here was that of the seven different employment agencies found, two had gone out of business. Thus, the number of data points was very small. A third limitation was that all the information desired could not be obtained. While there was some general agreement as to

salary ranges, years of experience, and location, none of the information obtained from one employment agency completely agreed with the information obtained from another agency. Often each category of salary and experience overlapped each other. None of the employment agencies provided the information in the detail originally desired.

Total value (TV) of the individual (loss to the Air Force) can be summed up by adding the separation (S), replacement (R), and training (T) costs to the individual's value (IV). The equation is TV = S + R + T + IV.

IV. RESULTS

The results are presented in two sections. The first section presents the results regarding the question of retention and the second section presents the results regarding value of the cost analyst.

Retention

There was an increase in both the number of officers assigned and number of officers authorized in all four specialities, except the 672X (Accounting and Finance) speciality. The 672X speciality had 9.08% decrease in the number of officers assigned.

Total officer resignations went up in three specialities. Resignations in 673X (Budget) went down. The actual number of resignations increased in the 674X (Cost) and 692X (ACM). The worst retention for 1984 was in the 692X speciality with a total loss of 14.81%, up from 5.43% the previous year. The 674X speciality experienced a loss of 9.80% of its officers in 1984, up from 6.63% in 1983. The resignations in the 672X speciality increased slightly, from 11.97% in 1983 to 13.18% in 1984. The resignations for individuals in the rank of major went up in percentage and in actual number in all four specialities. Resignations for individuals in the rank of captain went up in percentage and actual number for the 674X and 692X specialities. See the Appendix for the raw data.

The information provided by MPCMR (38) showed the 67XX speciality with 53% retention in FY84 and 54% in FY85. The 692X showed retention rates of 44% in FY84 and 56% in FY85.

Value

The first cost identified was the cost of separation. It was reduced to the basic administrative cost. That cost (S) is $16.84, 2 hours at $8.42 per hour (14:39). However, this is an extremely conservative representation of separation costs.

Replacement costs were discussed next. These costs vary depending upon the source of acquisition. According to AFR 173-13, the costs by selection source are: Academy - $161,649; ROTC - $20,803; OTS - $10,543; and AECP - $60,258 (FY84 dollars) (14:32).

Training costs were then covered. While informal training costs were not computed, dollar values for various formal training programs have been determined (1:39-43). The computed cost for a degree in cost analysis in residence at AFIT was $76,731 (FY84 dollars). Squadron Officer School, in residence, cost $12,751 (FY84 dollars). Air Command and Staff College, in residence, cost $45,302 for phase 1 and $22,491 for phase 2 (FY84 dollars).

Finally, the issue of the value of the individual's contribution was presented. There was general agreement that the highest salaries were on the west coast, particularly the southwest region. This was closely

followed by the northeast region. One agency stated that there was about a 30% difference between these two regions and the rest of the country. The midwest was left in the bottom of the list with the possible exception of a few major cities (namely, Chicago and Dallas).

The salary information listed below shows the total range given by the various agencies and then a most likely figure (an average) for different years of experience.

TABLE II

Salary Information for Cost Accountants in the Midwest

Years	Range ($1000)	Most likely ($1000)
0 - 2	16 - 22	19
2 - 5	22 - 26	23.5
4 - 8	24 - 34	28
7 - 10	28 - 36	33
10 +	45 +	45

Only one agency provided information for more than ten years experience. This was stated as being a senior level with the income potential being very high. This salary information is based upon the judgements of employment agency members for jobs primarily in the midwest.

Wright (1984) provided the following information on

accountants in private industry. The information was gathered from the Bureau of Labor Statistics with a date of March 1982 and breaks the accounting profession into six levels (43:334).

TABLE III

Average Salaries of Accountants in Private Industry

Level	Median	1st Quartile	3rd Quartile
I	$18,000	$16,260	$19,968
II	21,591	19,292	24,420
III	25,200	22,626	28,389
IV	31,200	28,200	34,707
V	38,400	34,728	41,983
VI	47,712	43,733	52,879

Level I is a beginning level job. A Level II accountant has more experience and prepares routine working papers, schedules, summaries, and examines documents for accuracy. Level III generally involves being in charge of a portion of the accounting system and developing nonstandard reports and trend analysis. Level IV accountants are usually in charge of an operation and can make changes in the accounting structure and procedures. Level V accountants do the same things as Level IV, except in larger and/or more complex departments. They may develop new systems, assure systems are in compliance, identify and resolve problems. Level VI accountants do the same as Level

V, except the degree of difficulty is higher (43:334).

The differences in salaries between the employment agencies and the Bureau of Labor Statistics are small. Some of these differences can be attributed to the fact that the information from the employment agencies is more current and more localized. However, a baseline for individual value has been established with this information.

TABLE IV

Annual Salary Ranges for Top-Level Jobs in Finance

Title	Company Volume (Millions)	1983 Range (in thousands)
Chief Financial Officer/ Treasurer	$ 10 - 50	$38 - 59
	50 - 250	52 - 83
	250 - 750	67 - 110
	750 +	95 - 158
Corporate Controller	$ 0 - 5	$28 - 32
	5 - 10	31 - 40
	10 - 50	37 - 50
	250 - 750	60.5- 95
	750 +	95 - 135
Asst Controller; Divisional Plant Asst Treasurer	$ 0 - 10	$27 - 30
	10 - 50	29 - 35
	50 - 250	34 - 42
	250 - 750	39 - 50
	750 +	52 - 67
Corporate Tax Managers	$ 0 - 50	$33 - 46
	50 - 250	40 - 50
	250 - 750	49 - 79
	750 +	73 - 96

It is worth noting the range of salaries for top-level jobs in finance as determined by the Robert Half Agency of New York. Geographic location can make some difference in compensation. For the most part, this difference would be about two to three percent. Attorneys and certified public accountants usually make about ten percent more. Extensive travel requirements may add an additional five percent (43:333-334).

The basic pay for civil servants prior to January 1985 for selected levels is displayed below. The years of experience shown reflect the idea that the individual would have a four year college degree. This was done to maintain a closer basis for comparision between the civil servant and the military officer. The benefits for civil servants were stated to be below that of their military counterparts.

TABLE V

Salary Information for Civil Servants

Grade	Experience (Years)	Low (Step 1)	High (Step 10)
GS-5	0	$13,903	$18,070
GS-7	1	17,221	22,387
GS-9	2	21,066	27,384
GS-11	3	25,489	33,139
GS-13	3+	36,327	47,226

As a baseline of comparison, pay for military officers was based on pay for 1984 at selected ranks and years of

experience with subsistence pay and the with dependent quarters allowance added in. The dollar figures are rounded to the nearset hundred.

TABLE VI

Salary Information for USAF Members

Rank	Experience (years)	Salary
O-1	2	$18,600
O-2	3	23,000
O-3	4	30,300
O-4	12	37,300
O-5	16	43,700

Total value of an individual to the Air Force can best be shown with an example. For this example the following assumptions were made. The individual is a captain with four years experience and entered the service through the Air Force Academy. This captain has attended the cost analysis program at AFIT and Squadron Officer School in residence. The individual's performance has been average.

Earlier it was stated that if an individual left the Air Force, the loss to the Air Force could be determined by the equation TV = S + R + T + IV. In this example S = $16.84; R = $161,649; T = $76,731 + 12,751; and IV = $28,000. Thus, the total value of this loss would be $279,147.84.

V. DISCUSSION AND CONCLUSIONS

The discussion has been broken into the two main questions examined - retention and value.

Retention

Overall, there did not seem to be a problem with retention. Neither office from which retention information was obtained felt the situation was one to be concerned about. However, there was not a basis of comparison between these two offices regarding the retention information. The one office only had data for two years. This does not allow a good look at the situation. The other office was primarily concerned with the long range picture. Problems in the short run or near future could be missed with this procedure. This is further complicated by the fact that the 67XX speciality codes are lumped together.

There appears to be a maturing of the force in these specialities. The number of lieutenants in each speciality decreased, while the number of captains increased. The largest increases in number occurred in the cost analysis speciality. This illustrates the emphasis the Department of Defense is placing on cost control and cost analysis.

The numbers also bring up another point. It can be reasoned that the Lieutenant Colonels were lost to retirement. While some Lieutenants may have left to seek other employment, many of the Lieutenants probably left

because they did not get promoted. This leaves the captains and majors. Could the primary reason for their departure be other employment? Captains and majors represent the bulk of middle management in the Air Force. The greatest number of resignations were given by captains. This could be nothing more than the promotion system at work. On the other hand, it could reflect the loss of the better trained, more experienced manager (officer) who seeks better compensation.

Value

The loss to the Air Force, in terms of dollars, can be high for any one individual. This loss becomes much greater if the individual received their commission through the Air Force Academy or attended an AFIT graduate program in residence. This loss is compounded if the individual has attended both the Academy and AFIT. The loss is greater yet if the officer has attended any Professional Military Schools in residence.

In the determination of the individual's value, it became apparent that there was not a great deal of difference between the military compensation and the general private sector compensation for cost accountants for approximately the first ten years. Benefits were stated to be better in the Air Force.

After the ten year point, the private sector had an advantage in annual compensation. This seemed to be due largely to the quicker advancement opportunities. The

military compensation structure has a cap on the top end. The private sector's compensation varies according to the position and dollar volume of the company. As illustrated in the last chapter, salaries for top financial positions in most organizations exceed the military's compensation, sometimes by more than double the amount.

The opportunity to advance to top positions was greater in the private sector. Also, the time required to reach those positions was less than it was in the military.

The research attempted to cover a broad base in the private sector. It did not use the defense contractors for salary information. This may have been a weakness in the research. Defense contractors and some consulting firms specifically use cost analysts. Jobs for cost analysts with defense contractors were consistently found in the local newspaper. However, salary information was never contained in the advertisements. Based upon conversations with two classes of graduate cost analysis students and various instructors at AFIT, the conclusion was drawn that the salaries offered by the defense industry for cost analysts were considerably above the military salaries and therefore generally above the private sector average. Benefits in the defense industry were generally equal and sometimes better than the benefits in the military.

In comparing the civil service structure with the military structure, it was found that a GS employee can move

up in grade quicker than their military counterpart and there is a greater range in the pay scale for the GS employee. As long as the job opportunities exist, a GS employee has the potential to consistently earn more in annual salary for the time in service than his/her military counterpart. A GS employee also does not need to be concerned with the "up or out" promotion policy found in the military. Benefits for the GS employee lag behind the benefits for the military member.

Conclusions

At the present time a problem in retention does not appear to exist. The loss when an individual voluntarily leaves the Air Force varies greatly. The size of the loss can be significant. It depends on how well the individual has been performing in his/her position and the investment the Air Force has made by acquiring the individual plus additional education/training.

A recommendation would be to watch the cost analysis career field. The defense industry has jobs for cost analysts, with the potential for increased compensation. This class of cost analysts is only the third class to graduate from AFIT with this speciality. Each student who has graduated from this program at AFIT is still under contract to the Air Force. What happens when the commitments for these students expire? Will they stay in

or will they choose to leave the Air Force? If a large percentage of these students do leave the Air Force, has the investment been worthwhile for the Air Force and why are these individuals leaving? These are questions that cannot be answered now. However, they should remain in the minds of management as unanswered questions of potential concern.

The Air Force is trying to upgrade its force of cost analysts and make cost a more prominent factor in everyone's mind. What has been gained if a significant number of individuals, trained to spearhead this attack on cost, leave shortly after acquiring this specialized knowledge? Another issue is that the present system of tracking retention makes it somewhat difficult to quickly detect a problem in the retention of cost analysts. These questions should be examined in five or six years. At that time, several classes would have finished their commitments and their subsequent actions will answer many of these questions.

APPENDIX: RETENTION DATA

674X - Cost Analysis

1983

Rank	# Assigned	# Authorized	# Resigned	% Resigned
Lt	75	16	2	2.67
Capt	62	110	6	9.68
Maj	25	40	2	8.00
Lt Col	4	16	1	25.00
TOTAL	166	182	11	6.63

1984

Rank	# Assigned	# Authorized	# Resigned	% Resigned
Lt	49	63	1	2.04
Capt	111	100	14	12.61
Maj	30	48	4	13.33
Lt Col	14	19	1	7.14
TOTAL	204	230	20	9.80

692X - Cost and Management Analysis

1983

Rank	# Assigned	# Authorized	# Resigned	% Resigned
Lt	101	31	3	2.97
Capt	56	89	7	12.50
Maj	18	52	0	0.00
Lt Col	9	14	0	0.00
TOTAL	184	186	10	5.43

1984

Rank	# Assigned	# Authorized	# Resigned	% Resigned
Lt	78	68	10	12.82
Capt	110	117	16	14.55
Maj	17	47	5	29.41
Lt Col	11	14	1	9.09
TOTAL	216	246	32	14.81

673X - Budget

1983

Rank	# Assigned	# Authorized	# Resigned	% Resigned
Lt	134	52	7	5.22
Capt	116	154	12	10.34
Maj	54	88	4	7.41
Lt Col	16	31	2	12.50
TOTAL	320	325	25	7.81

1984

Rank	# Assigned	# Authorized	# Resigned	% Resigned
Lt	71	85	2	2.82
Capt	190	156	11	5.79
Maj	46	97	5	10.87
Lt Col	31	32	3	9.68
TOTAL	338	370	21	6.21

672X - Accounting and Finance

1983

Rank	# Assigned	# Authorized	# Resigned	% Resigned
Lt	139	62	14	10.07
Capt	93	93	14	15.05
Maj	25	70	2	8.00
Lt Col	27	40	4	14.81
TOTAL	284	265	34	11.97

1984

Rank	# Assigned	# Authorized	# Resigned	% Resigned
Lt	72	71	11	15.28
Capt	136	93	11	8.09
Maj	27	73	5	18.52
Lt Col	23	43	7	30.43
TOTAL	258	280	34	13.18

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The questions of retention and value of USAF cost analysts were examined in this thesis. The literature review covered meta-analysis, utility analysis, and human resource accounting to establish the method and validity of quantifying the value of an individual in the language of business, the dollar. The method is applicable to any career field. Published pay surveys and employment agencies were consulted to determine salary information, leading to the determination of the individual's value. The basic formula is S (separation costs) + R (replacement costs) + T (training costs) + IV (individual value) = TV (total value). There did not appear to be a problem with retention of USAF cost analysts at this time. The value (loss to the Air Force) of a cost analyst varies greatly, but can be significant in absolute dollar terms.

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