Title: Performance Appraisal for Engineers and Technical Staff in Construction Industry

Course:
Year: 1990
Author(s): P. Wibowo

Report No: P90016

Abstract: This paper deals with aspects of employee performance analysis as applied to engineering personnel in the construction industry using such analysis as a management tool for effective utilization of manpower. We developed a plan through examination of writings in the field of performance analysis for technical personnel, for effective performance appraisal and use. An evaluation will then be made of the methods used by companies to see how well they fulfill these criteria. Finally, recommendations and suggestions are presented.

PERFORMANCE APPRAISAL FOR ENGINEERS AND TECHNICAL STAFF IN CONSTRUCTION INDUSTRY

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EMP - P9016

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EMGT 506

Prepare by.

Philipus Gunawan Wibowo

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Portland State University
Engineering Management Program
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Good project

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EXECUTIVE SUMMARY

In construction industry, due to the rapid changing in technology, the management needs to improve its ability to maintain, to improve, and to modernize the performance appraisal techniques in order to keep its employee's capability and skills. Many factors can be considered in appraising performance such as to give the employee a feedback, compensation, skills inventory, etc. The goals of this performance appraisal can be reached if the systematic technique and the correct methodology are applied.

To determine this performance appraisal practices, a survey of 300 questionnaires was made and sent to the construction companies all over the nation. The replies were received from 55 companies; 47 were completed questionnaires while eight companies were unable to complete the questionnaires and explained that the requested information was unavailable or considered confidential.

The results were compared to the literature and some of the expectations proved not to be true. These trends are forcing us to develop a discussion to seek the right methodology to be implemeted as recommended in the final chapter of this paper.

ABSTRACT

This paper will deal with the various aspects of employee performance analysis as applied to engineering personnel in the construction industry from the viewpoint of using such analysis as a management tool for effective utilization of manpower. Through examination of writings in the field of performance analysis for technical personnel, a plan for effective performance appraisal and use will be developed. An evaluation will then be made of the methods used by companies to see how well they fulfill these criteria. Finally, recommendation and suggestion can also be drawn in the last part of this paper.

I. INTRODUCTION AND SCOPE

Over the past two decades, performance appraisal (PA) has become one of the most complex issues faced by people in organizations. Regardless of whether one is in education, government, health services, business or industry, the consequences of making the right, or wrong, decision about what to do when it comes to hiring, firing, transferring, promoting, demoting, licensing, or certifying an individual in the organization can be considerable from a productivity standpoint as well as legally. Studies have shown that employee performance appraisals rank as the least desirable aspect of manager's duties often because the lack of an adequate and coherent performance appraisal system makes appraisal difficult.

In general, the empirical work on appraisal could be entitled "Another Thing That Can Go Wrong with Performance Appraisal, Part I ..... Infinity." (John Bernardin, p.1) An American philosopher, Woody Allen, has also have a good scenario to describe performance appraisal, he wrote:

> More than any-other time in one history, mankind faces a crossroads. One path leads to utter despair and hopelessness. The other to total extinction. Let us pray that we have the wisdom to chose correctly. (Allen, 1980, p.57)

One point we should aware that PA is a difficult process to implement and sustain properly. We cannot espouse simplistic and naive position that PA should be "kept simple" or that one method will work for all people and for all jobs. However, some assumption

The source of such manpower are several: 1) The institutions of higher learning enter a limited number of graduate engineers into the work force each year, 2) The transfer of personnel between companies and industries represents a real source to the individual company though it does not increase the total number and, often times, is deceiving since nearly as many leave as are hired.

Another source is internal development of technical personnel by upgrading, training, and changing work practices to release technical talent from non-technical duties. Often the specialist so avidly sought is already employed by the company but is overlooked or undiscovered. Apparently a system that would catalog the manpower available in terms of abilities, interests, and capabilities, would be of great help.

As in any situation of rapid growth, results were the first importance and methods second. This often resulted in an unbalance of the operations of an engineering department to the technical side and a slighting of the personnel management aspect. Companies should examine themselves in the light to see whether their personnel appraisal techniques are not geared to a working force that is a fraction of their present employment.

When making an examination of employee appraisal practices, the examiner should first determine what results are expected from the performance appraisal and what use will be made of the results. An evaluation to be used for salary adjustment will necessarily differ in some respects from an evaluation oriented toward employees counselling and improvement.

Once the goals of the appraisal system are fixed, attention should be given to the factors to be considered when analyzing performance in the various types of work. The relative importance of different traits will vary from job to job. An engineer supervising testing work will not require the drafting ability that another engineer designing a building structure would need to know.

A methodology for determining and recording the desired information about the individual's performance must be correlated to the goals of the appraisal system. Adequate consideration must be focused on each factor but at the same time efficient use of the rater's time must be made since the rater will usually be considering a number of individuals. Usually there will be more than one rater so the methodology chosen must promote uniformity of appraisal standards in any comparisons are to be based upon the appraisals.

This paper will deal with the various aspects of employee performance analysis as applied to engineering personnel in the construction industry from the viewpoint of using such analyses as a management tool for effective utilization of manpower. Through examination of writings in the field of performance analysis for technical personnel, a plan for effective performance appraisal and use will be developed. An evaluation will then be made of the methods used by representative companies at the present time to see how well they fulfill these criteria.

Although job evaluation is an integral part of performance appraisal, this report is limited to an examination of performance

appraisal without devoting particular attention to job evaluation.

II. WHY EVALUATE ENGINEERS AND TECHNICAL STAFF PEOPLE

At least once a year, most engineers confront their supervisor for an annual rite of passage, the performance appraisal. According to management gurus, engineers should emerge from such meetings equipped with a better understanding of how they can improve themselves and their company. But the reality strays far from the ideal.

Engineering managers often say that performance reviews are a major tool for making employees more productive and, consequently, improving the company bottom line. But when asked why they are evaluated, engineers speak only of one reason, to determine their pay raise.

In many companies, engineers get an overall evaluation number based on performance or their importance to their supervisor. Management then uses that number to come up with a proportional pay increased.

The construction industry has experienced a period of rapid growth due the greater use of the modern technology as a means of methods of designing, equipments and new material developments. Rapid advances in the construction technology have made building construction more complex.

At the same time that complexity has increased, the average building construction in big city seems to have slow-downed. The dollar amounts involved in engineering costs are now so large that engineering costs should no longer be considered just a part of overhead as they once were; they must be examined in detail in a

manner similar to the treatment of constructing costs.

The breakdown of engineering costs is a difficult task but within the capabilities of accounting. Even more difficult is the control of their costs once a budget is made. Engineering involves the production of ideas, a production process that does not start or stop with the flick of a switch. The machines involved are of minor importance, the critical item is the "operator" or engineer. Thus the control of engineering cost hinges upon the evaluation of the performance of the individual engineer, both as to his competency as an individual and as a cooperating member of his work-team. Broadly speaking this is the reason for performance appraisal; especially, the reasons for utilizing performance appraisal may be listed and expanded as is done in this chapter in what is felt to be the order of their importance.

*** The Economic Reason**

The underlying reason for performance appraisal is to answer the question: is the employer getting his money's worth? (E.I. Green, "Electrical Engineering", 1957, p.578) To determine the answer some methodology is required ranging from the simplest cursory glance at the output pile of the pieceworker to the more elaborate analysis felt necessary for the professional.

The factors to be considered when evaluating an engineer or technical staff person will be discussed in the next chapter. It is sufficient to say at this point that to attempt to evaluate objectively the performance of an engineer or any other

professional employee requires the consideration of many intangible facets of character at the same time that physical production, achievement, and contribution to group effort are weighed. To accomplish satisfactorily the appraisal of more than a very few engineers and technical staff people some systematic method is required so that each aspect, quantitatively differently for each individual, may be viewed in its proper light and the truest possible value assigned to the composite. This, when compared with the individual's compensation, gives an answer to the question: is the employer getting his money's worth?

It is to be pointed out that this is a one sided question. Should the worker be underpaid at present the employer would be getting more than his money's worth. But that gives rise to another discussion:

**** Salary Adjustment**

To maintain a smoothly functioning organization it is necessary to match, to a reasonable degree, compensation for services to the value of the services. While not wishing to dig into the question of compensation and the various factors that determine whether a worker feels he is sufficiently paid, the fact remains that a worker who is underpaid can be expected to attempt to correct this situation by either leaving the organization for more rewarding employment or matching his output to the rate of pay. Either of these actions represents a loss to the employer. Should a situation exist where employees feel that others are

overpaid in relation to services rendered, the former soon come to the conclusion that they themselves are underpaid with the previously mentioned results.

Since many technical people are in the income bracket where increased wages are not an incentive solely due to their purchasing power but also largely due to their symbol of status, many individuals are abnormally sensitive to minor inequities of reward. The present labor market situation for engineers and technical staff people when jobs exceed applicants by a goodly number makes it easier for a dissatisfied employee to leave. Performance appraisal can be organized as a tool to correlate salary with services for technical people with varying degrees of absoluteness.

**** Promotions, Retentions, And Layoffs**

Since financial reward, although important, is not the sole compensation to the engineer and technical staff person, it is doubly important that other factors, such as status symbols, be utilized as well as salary to round out the total compensation. One prime status symbol is the step in the "promotional ladder" assigned to the individual. The delay of a promotion when earned is often of more consequence to the engineer than monetary salary adjustment.

Typical salary advances are in small steps and consequently make less impression than promotions. A person failing to receive a salary increase feels sure that he will be considered next time around. Many engineers with a few years' experience are in a

position where dollar is too small a percentage of the total salary to worry about from a financial standpoint, whereas a promotion (a status symbol) is often considered as a once-in-a-long-time proposition. The opportunity to demonstrate effectively one's capabilities may not arise again for some time and the attitude of the employee is to strike while the iron is hot if he feels that he deserves promotion.

A formal evaluation plan makes it less likely that an individual will be passed over when promotions are due. A rating plan should, in fact, be set up to indicate to the supervisor that a promotion is pending sometime before the effective date so that a considered evaluation rather than a cursory glance may be given the employee at such time.

Performance appraisal is also most helpful in times of reductions in the labor force which are more frequent in the construction industry than in some other industries. When it is necessary to lay off workers, those of marginal productivity should be the first to go, other factors being equal. Some rating procedure is necessary to determine the marginal producer and, should the situation become acute, dismissals might need to continue in an orderly manner to the nucleus of workers who would be the last to go. It is not sufficient to rely entirely on salary retaining the lowest paid, releasing the higher paid, for a balanced organization must be maintained if it is to continue functioning or if it is to serve as a strong base for rebuilding the organization.

Growth must continue; older, more experienced workers (who are retained) will eventually retire and younger ones must be available to take their place. Many engineers discharged were never recovered, preferring to seek their livelihood in some industry appearing a bit more stable. Some of those retained were not those most capable. In times of stress, unless some assurance is given to the employees to be laid off, a panic often ensues and many employees, whom the management would like to retain, leave in anticipation of being laid off and wishing to be first in line at the employment office that is still accepting applications.

Layoff and retention do not represent only a problem of pressing times but a continual decision that must be made with regard to marginal producers and social misfits. Too often a supervisor will be reluctant to face up to the unpleasant situation of recommending discharge for an employee, feeling that perhaps he, himself, has not been fair and objective. A performance appraisal system that yields a continuing record of an employee's activity makes the changes smaller that an undesirable employee will be shifted around from group to group because of the "overfairness" of the supervisors. A continued record of unsatisfactory performance will result in a probationary attitude on the part of supervision and if the final decision is to release the worker, the facts are in the record to show that every attempt has been made to be fair, that the "one more chance" has already been given if indeed it has. The retention of a marginal producer or misfit for a protracted period after his characteristics are known can have

a markedly harmful effect on the morale of other employees who normally would do a good job.

*** Placement Assistance For Supervisor**

The shifts of personnel of the engineering departments in construction company as projects are initiated, worked upon, and completed, produce a problem for the supervisors of new groups as they attempt to assemble their individual work forces. Those engineers and technical staff persons that they know personally may not be available for their use at the present time or those available may not be enough. At any rate some information is required to assist the supervisor in selecting from available personnel, supplementing the short interview that often is the basis for choice.

Not only must skills and leadership qualities be considered but also the matter of fitting together a group that will cooperate within itself and with other related groups. In short, it must function and the round pegs must be placed in the round holes, the square pegs in the square holes. A performance evaluation record for each engineer or technical staff person will allow the supervisor building a group to select people that will fit into his organization or at least adapt into a place in it with a minimum of adjustment.

*** Cataloging Special Skills**

In the construction industry, it is important to keep track of the special aptitudes and training of employees with its expanding technology. The aptitude of some managers that the number of bodies can make up for the deficiencies of brains is a road to ruin. No one company has an edge on brainpower to any marked extent, each is able to hire on the free market, each can and does meet the price of the competitor. The tipping of the balance lies in the utilization of the talents of the work force at hand. If previous training and experience are ignored in a "bodies instead of brains" type of program, then only the employer is to be blamed.

A performance appraisal record shows the work experience and performance of employees, noting strong points and weaknesses, and this, along with other personnel records, will give a summation of his educational and work experience. An inventory record of specialists can be formulated from material gathered in making a performance appraisal and may be utilized in a manner similar to a raw material inventory record in a purchasing department.

*** Discovering Future Leaders**

If the ups and downs of the construction industry have produced problems of retention and layoff sequence, they have also yielded periods of rapid growth when new leaders must be found for expanded work forces. Even if the activity were constant, time would create a need for new leaders as the older employees retire

or others become restless and leave the company. It is necessary that any business keep itself aware of those who will be needed to lead tomorrow, the cyclical nature of the construction industry makes this more important. Leaders must be discovered at the lower levels, young in their careers, and given the diversified work experience within the company necessary to round out their viewpoints. A performance appraisal system can be used to recognize early and follow the progress of potential leaders and can produce an inventory record of leaders just as it can of engineers or technical staff persons with special skills.

*** Matching The Pegs And The Holes**

Not only must a match be made by skills and abilities but consideration should be given to the employee's performance if a smooth functioning unit is desired. The prime motivating factor for engineers or technical staff persons in their work is "challenging job", ranking above salary. If no formal outlet is provided for an employee to express his desires the usual result is griping, which interrupts the work of two or more people making neither feel better or dissatisfaction within the individual which decreases his productivity and may erupt at any time in any direction. A performance appraisal system can provide the employee the opportunity to express his preferences, whether or not they differ from his present assignment since the discussion of the evaluation can be made a two way communication device. This at least lets the supervisor know that corrective action may be

necessary at some time in the future if not practical at present. It also may postpone any crisis, although if the expressions of preferences are ignored the climactic action taken by the employee may have far reaching consequences.

*** Counselling**

Helping an employee to help himself is a simple way to put it, but it can be of great benefit for the management. Considering the many intangible aspects of an engineering job, it should come as no surprise that many engineers or technical staff persons need help to see their shortcomings and their latent strengths that need developing. It is possible to use performance appraisal as a tool to systematically develop an engineer or technical staff person to a predetermined goal assuming that such a goal is within his undeveloped capabilities of intelligence and character. Performance appraisal systems are also useful to bring attention to small faults and to praise good performance, items normally overlooked or neglected are brought out into the open by the reminder provided by the appraisal.

*** Consideration**

A systematic performance appraisal the additional benefit that no employee is overlooked. If each supervisor is required to evaluate all his workers periodically the average employee will receive his share of attention whereas otherwise he would often be

overlooked, being in the shadow of the outstanding performers, both the good ones and the bad. In this manner the average employee can often be helped to become a much better employee instead of just continuing at the same level of accomplishment, wondering why he did not seem to be advancing as rapidly as some of his more capable fellow workers. As departments increase in size and as the span of control of the supervisor in the organization becomes broader, the use of informal supervisors or leadmen becomes necessary for the direction of work yet the responsibility for performance evaluation and corresponding action remains with the supervisor as the representative of management. A system is required that makes it mandatory for him to consider periodically the employees under his command so that the proper personnel relationship are preserved. The lead man is given the authority to get the work accomplished but the company's responsibility to the employee still rests with the supervisor.

*** Communication**

Many engineers and technical staff persons are dissatisfied with the communication channels between management and themselves. They feel that they are ignored and frustrated when they do try to contact management. A performance analysis system provides at least a periodic opportunity for the employee to speak privately to his supervisor (management) and often, once opened, the channel of communication remains.

III. APPLYING APPRAISAL TECHNIQUES TO ENGINEERS AND TECHNICAL STAFF PEOPLE

The concept "ideas cannot be measured on an output chart" has long caused management to avoid or postpone the performance appraisal of engineers or technical staff people. Obviously the work is different from production work and requires an approach that will accommodate the intangible factors present. Accusing management of being too lazy to attack the problem with the necessary vigor, has outlined a rigorous method for establishing job evaluation and performance evaluation methods for an engineering department and relating each to the other and also to salary administration. Many administrators would shy away from the numerical methods used in linking salary to performance by means of rating scale. It is considered too absolute to apply to professional personnel.

A more personal approach is preferred, some going to the opposite extreme of performance appraisal: a freely written paragraph which all too often ends up as either a bitter denunciation or an extremely favorable report that presents the employee as absolutely perfect. Somewhere between the two extremes there lies a method that provides the necessary flexibility and yet serves as a guide so that a comprehensive evaluation can be made.

*** What To Evaluate?**

The first problem that faces the author of an appraisal system is the determination of the factors to be considered when evaluating the employee. Five areas are involved in performance appraisal of engineers and technical staff people no matter what the specific job description: skill, effort, responsibility, inherent personality qualities, and application. The breakdown within these areas will vary and must be tailored to the situation at hand.

**** Skills**

The skills required from an engineer or technical staff person are primarily mental skills. A certain amount of manual skill is often required but usually this is of secondary importance. Foremost of the mental skills is the technical knowledge of the individual. Part of this will be due to experience gained in the present job situation and in past jobs, and part due to continuing formal education through technical meetings, magazines, and other means of interchanging ideas.

Another combination of mental skills can be described by the words resourcefulness and adaptability. The engineer or technical staff person should be able to adapt his knowledge to the problem at hand. There are examples in all walks of life of individuals who know all there is to know about their specialties but cannot apply their knowledge to the solution of their tasks. Very often

an individual will encounter a job situation that taxes his knowledge severely, in fact requires more knowledge than he possesses at present. It is important that the engineer or technical staff person be resourceful and hunt for the answer under his own direction. He should know where and how to look for the information required to supplement the knowledge he has.

Very closely allied to resourcefulness and adaptability is the ability to analyze and visualize problems. When a problem is presented to the engineer or technical staff person, he should be able to grasp the idea and understand the nature of the problem, this ability is called visualization. Once the problem is understood, an analysis must be undertaken to break the large problem down into its various facets so that a systematic approach may be made to the solution.

This last statement ties in with skill in organization both of personal work and the work of others. An engineer or technical staff person must, as any employee in a job that is not routine, organize his own work efficiently, proceeding through all steps from problem to solution to presentation of the answer. Time is usually of the essence in engineering; there is almost always a deadline to meet. It is necessary to allocate sufficient time to each phase of the job to arrive at a valid conclusion yet know when to pass onto the next phase.

So far this discussion has treated the organization of personal work but, should the job be beyond the capabilities of one man, the engineer or technical staff person will be called upon

to organize and direct the work of others. The preceding points still apply but to them must be added the leadership ability to match jobs and personnel into a unit that will produce the desired results.

Many times the skill of salesmanship enters into the engineering profession. Presentation of results of investigation must be made to those who will make final decisions; information must be gathered from others; assignments must be made so that workers understand their jobs. This combines the skills of human relations and communication. The engineer or technical staff person should be able to express himself orally, in written form, and in graphic form as the job demands. He should be able to cooperate with and secure the cooperation of the people with whom he works.

There are the skills that an engineer or technical staff person should possess. Of course, few have them all to the highest degree but any performance evaluation will have to consider to what degree each individual does demonstrate each skill.

**** Effort**

To put it simply: how hard does he work? Once the skills that an individual possesses are noted, the next step is to evaluate how successful he is in putting them to use. Another facet of this analysis is the matching of workers to jobs that utilize all their skills at rates approaching capacity. Any person can easily perform tasks that are well within his capabilities, but this situation is wasteful to the degree that there is a difference between his

supervision in all phases. At first glance, this seems to repeat the factor of technical competence, a skill, but in reality it goes much beyond that, bringing in judgement and dependability and the combination of all qualities previously mentioned to a degree that enables completion of the assignment in a satisfactory manner with minimum supervision. Many people possess the skills required to complete a job but cannot successfully apply them to the task without direction; others require constant prodding to produce any progress; still others make progress but at tangents: they become diverted from the main problem by the interesting avenues to either side or become enmeshed in a net of details.

**** Inherent Personality Qualities**

Here are the intangible factors, the most difficult part of an evaluation, requiring subjective opinions from the evaluator that will certainly differ between different raters. First, as an overall indicator of other intangible characteristics, consider self-confidence. Not that a self-confident employee should not be evaluated further nor an employee lacking self-confidence should be forthrightly condemned, but self-confidence is a good indicator of a healthy general personality.

Another quality that becomes evident quickly in most work situations is the individual's capacity to receive criticism. It should be easy to evaluate because of its open nature and, considered with the necessary skill factors and other personality factors, can help indicate the growth potential of the individual.

dependability, leadership quality and so on. The choice of the specific titles must be made with the goals of the appraisal in mind so that those qualities are emphasized that fulfill the goals. For example an evaluation whose prime goal is the cataloging of technical talent would emphasize technical skills whereas a program for discovering leaders would examine personal qualities closely as well. Neither evaluation would neglect other fields but each would have its own particular direction of attack.

*** How To Evaluate?**

**** Form**

There are about 12 different systems for rating listed in a recent article on performance appraisal. If one considers combinations or minor variations of these the number of possibilities becomes huge. Actually the situation in an engineering department pares the list quite effectively so that only a few need be considered. The work is varied rather than standardized so that flexibility must be built into the rating system to accommodate this. Starting with the requirement of flexibility, an appraisal system may be evolved somewhat in the following manner:

It has been mentioned that the free form paragraph is one extreme of formal performance appraisal. It might be useful if the sole purpose of the appraisal were counseling but even in this instance it would be helpful to the rater to have a guide list of important factors that should be considered. If a comparison based

upon the appraisal is to be made between individuals then a degree of uniformity must be introduced to assure equal consideration for the individuals. Rather than use a free form paragraph with a standardizing set of instructions from a policy manual, it would be better to include the list of items to be considered on the appraisal and so compose a form. The directed paragraph does just this, giving the person making the appraisal system specific subjects to evaluate yet retaining the freedom of expression of the paragraph form reply.

Certain specific items, such as cooperativeness, when placed in a directed paragraph format usually lead to a brief statement such as, "He cooperates very well with others", or a similar statement expressing the opposite evaluation. A more precise evaluation is usually desired. Such factors are not basically suited to the directed paragraph approach but are more readily handled by some sort of scale ranging between superior and poor. Only those items where evaluation must be explained or qualified should be placed in the paragraph form, the remainder should use some other system designed to give a true spread of evaluation.

It is felt that the directed paragraph and the chart system, which allow a choice between average, above average, or below average with squares to be checked for the proper answer, can be combined to make a useful appraisal form for engineers or technical staff persons. Such a form would offer standardization necessary to make comparisons between individuals, freedom of expression by means of the convenience and speed for the rater by using check

marks in appropriate locations for traits that are adapted to this form of rating.

More rigid forms of rating utilizing numerical scores are ill-adapted to the appraisal system of engineers or technical staff people because of the feeling of absoluteness they give to an evaluation. The tendency is to rely upon the number arrived at to the exclusion of all other considerations that might temper the judgement. Such a system does not adequately consider the individual who has extreme strength in certain directions, balanced by extreme weaknesses in other fields. His strength may or may not occur in those fields most useful to his job. He may be a superior technical person yet poor or average personality traits might drag down his numerical score denying his reward for superior performance unless such inequities were reviewed.

**** Timing**

Some administrators would make no attempt to fix salary on the basis of performance appraisal. The evaluation is looked on only as a means of counseling to remedy defects and suggest areas for employee self-improvement. This does not complete the job, however, for another rating must still be made for the purposes of salary administration. If this second rating is made at a separate time from the performance appraisal it sometimes happens that the good performance appraisal and the salary increase do not go to the same people. In some instances a good performance appraisal system almost seems to be used in place of a raise in pay. If both

ratings are made at the same time there is less time used since the facts required for the salary rating are in mind due to the requirements of the performance appraisal and do not have to be recalled at a different time. There is negligible chance of a rating but no pay increase, the disagreement of the employee is likely to be substantial and he will require an explanation. If a poor performance report is unjustifiably written to substantiate the lack of a pay increase otherwise earned the individual is sure to make himself heard.

**** Standards**

Little has been said in this chapter of one of the large problems inherent in any attempt to evaluate performance, that of standards. So many intangible factors must be rated when evaluating professional personnel that the judgement of most becomes mostly a reflection of the rater's attitudes. When judging a factor such as cooperativeness, with what is a comparison to be made?

One system, performance planning, the standards are set by the employee himself in the form of goals for the next time period. Obviously such a system is oriented largely toward counselling for a comparison between workers using this type of standard would be meaningless.

A method for arriving at those standards that are possible is to bring together those concerned with the standard, representative workers and supervisors, and break the job down into segments of performance or establish a "job evaluation". Each segment may then

have a standard set for it.

Even with this system the establishing of a standard is up to the collective judgement of the group assembled and this system is applicable only to skill factors. The rater is still left with the problem of evaluating, in some manner, the remaining four areas. Usually the best than can be done is to ask the rater to compare the subject against others of comparable position that he has known, or that he has knowledge of in the present work group.

*** Who Should Evaluate?**

There seem to be several arrangements for evaluating personnel: a self-evaluation, evaluation by the personnel department, evaluation by fellow workers, evaluation by immediate supervisor, or evaluation by a committee which may be comprised of any combination of these. From a review of the development of performance appraisal to this point, the evaluator should possess these characteristics:

1. Objectivity to give an unbiased appraisal.
2. Familiarity with the worker, the demands of his work assignment, and his performance.
3. A relationship with the worker that is conducive to two-way communication.
4. A position that permits observation of the worker.
5. A broad outlook that permits evaluation of the worker with respect to the entire organization as well as the smaller work group.

Self-evaluating usually yields an over-critical report from a person afraid of being accused of bias in favor of himself or the opposite extreme from the braggart. Even though a self-evaluation is a strong tool for accomplishing remedial action with some people, people are more ready to correct shortcomings they realize themselves for they are not placed upon the defensive as with some other types of ratings, the difficulty of getting objective ratings for comparative purposes is a serious drawback.

A rating system by fellow employees is also lacking in objectivity since it often develops into a popularity contest or a personality rating. Technical proficiency usually becomes subordinated to social acceptance in this type of rating.

The rating of a worker by a representative from the personnel department gives great objectivity but at the expense of other factors. Such a rating becomes mechanical in its impersonality and with such an atmosphere constructive counselling is extremely difficult. An outside observer, unfamiliar with the technical nature of the work, is prone to make errors in evaluation due to misunderstanding the relative importance of various jobs and being unable to judge whether a job is well done or poorly done.

The employee's immediate supervisor is in a position to observe the day to day work, understands the job and its requirements, and can judge the final result. The relationship between employee and supervisor is as likely as any to be one wherein counselling can be effective. However, the immediate supervisor might be suspected of bias and there might be something

IV. APPRAISAL PROCEDURES USED FOR ENGINEERS AND TECHNICAL STAFF PEOPLE BY THE CONSTRUCTION INDUSTRY

To determine current engineer performance appraisal practices a survey was made to the construction company all over the nation. Questionnaires were sent to 300 companies including construction-consultant company, large and small, highway construction companies, hydrology construction and marine construction companies, and many others company related to construction industry. Replies were received from 55 companies; 47 were completed questionnaires while eight companies were unable to complete questionnaires and explained that the requested information was unavailable or considered confidential by the company.

V. SUMMARY OF SURVEY REPLIES

* General Evaluation Practice

It can be said in general that all of the companies answering the questionnaire make some attempt to evaluate the performance of their engineers and technical staff people. The majority of companies rate both engineers and technical staff persons annually but it is evenly divided as to whether they are rated simultaneously or whether the task of appraisal is spread out over the whole period. The appraisal is usually conducted once a year by the end of fiscal year, but some of the companies used semi-annual appraisal system and an anniversary date (date of hire).

SUMMARY OF REPLIES TO QUESTIONNAIRE

Item	Number of Replies	Percent
1. Total replies received	47	100.0 %
2. Total companies which employ:		
a. Engineers	39	83.0 %
b. Technical Staff persons	33	70.2 %
3. Performance is reviewed		
- Engineers		
a. annually	31	73.8 %
b. semi-annually	7	16.7 %
c. others	4	9.5 %
- Technical Staff persons		
a. annually	26	68.4 %
b. semi-annually	7	18.4 %
c. others	5	13.2 %
4. - Engineers are evaluated:		
a. simultaneously	24	58.5 %
b. spread out	17	41.5 %
- Technical Staff persons are evaluated:		
a. simultaneously	18	48.6 %
b. spread out	19	51.4 %
5. - Engineers are evaluated by.		
a. immediate supervisor	32	64.0 %
b. personnel department	1	2.0 %
c. professional	3	6.0 %
d. peers	1	2.0 %
e. special team	2	4.0 %
f. others	11	22.0 %
- Technical Staff persons are evaluated by.		
a. immediate supervisor	26	65.0 %
b. personnel department	1	2.5 %
c. professional	3	7.5 %
d. peers	1	2.5 %
e. special team	1	2.5 %
f. others	8	20.0 %

SUMMARY OF REPLIES TO QUESTIONNAIRE

Item	Number of Replies	Percent
6. A written record is kept of the evaluation	28	59.6 %
a. The evaluation is discussed	6	12.2 %
b. The evaluation is shown	3	6.1 %
c. The evaluation is shown and discussed	21	42.9 %
d. Others	6	12.2 %
e. No answer	13	26.5 %
7. A form is used for evaluation	24	51.1 %
a. No form	20	42.6 %
b. No answer	3	6.4 %
8. The form utilizes:		
a. directed paragraph	9	37.5 %
b. free form paragraph	5	20.8 %
c. critical incident	0	0.0 %
d. graphic scale or number rating	5	20.8 %
e. average, above average or below	13	54.2 %
f. check list	5	20.8 %
g. none	14	58.3 %
h. others	2	8.3 %
i. No answer	6	25.0 %
9. The results of the performance evaluation are cataloged	8	17.0 %
a. punched card	1	12.5 %
b. filed in folder	6	75.0 %
c. No special attempt to catalog	0	0.0 %
d. Others	1	12.5 %

*** Who Evaluates?**

The immediate supervisor was listed as the sole evaluator in 64 percent and 65 percent for engineers and technical staff persons based on the replies; around 20 percent from the replies say, engineers and technical staff persons are evaluated by president,

vice president, or owner of the company (small firms). Evaluation by personnel department, peers, or special team are considered less to be used.

*** Communication Of Evaluation To Employee**

A written record is made and kept of the evaluation by only 59.6 percent of the organizations replying. The evaluation is shown and discussed in an interview with the employee in 42.9 percent of the organization. 12.2 percent discuss the evaluation but keep the written record confidential to management and 6.1 percent only shown the evaluation to their employee. Some companies have no written record to be evaluated which is 12.2 percent from the replies and 26.5 percent of the replies give no answer to this question.

*** Use Of Forms**

The replies to this question are almost equal weight. The respondents use no form for their evaluation are 42.6 percent, and 51.1 percent of the replies indicate the use of evaluation forms. The forms often utilize more than one type of rating procedure. The most popular rating procedure is the chart system which allows a choice to be made among three grades (e.g. above average, average, below average), checking the one that applies to each specific trait, and the directed paragraph is the next likely to be used. The free form paragraph, graphic scale, and check list of traits

are used less frequent. Whether the critical incident form is the least frequent since no company is using this form based on the result of the questionnaire. About 25 percent of the respondents give no answer and 8.3 percent using other types of forms (e.g. self-produced goal position statement form, direct communication).

*** Cataloging Of Evaluation Information**

The usual resting place for the performance evaluation is the personnel folder (only 17 percent of the replies catalog their evaluation), although one company utilize a punched card and one company using other type of catalog system (different file not in personnel folder).

VI. THE GOALS OF PERFORMANCE APPRAISAL SYSTEM

*** Overall**

An examination of the goals of performance evaluation shows that the evaluation as a basis of compensation and rewards rate highest followed by the used of performance evaluation to let employees know where they stand and to give feedback. The used as a basis of individual development and training is in third place, and career planning is in fourth place; while as a basis of human resources planning and document personnel decisions, placement, promotions, firings rates fifth and sixth respectively.

RELATIONSHIP BETWEEN SIZE OF COMPANY AND GOALS OF PERFORMANCE APPRAISAL

Size of Organization	Number of Organization	Goals of Performance Evaluation					
		1	2	3	4	5	6
		Relative Importance					
0 - 50	31	112	50	48	42	80	61
51 - 100	3	7	7	8	7	12	9
101 - 250	3	14	11	6	5	12	15
251 - 500	3	15	14	8	7	15	12
501 - 1000	2	6	8	4	9	10	5
over 1001	3	13	9	5	9	14	13
other	2	10	5	5	3	12	7
Total	47	177	104	84	82	155	122
		Ranking					
0 - 50	31	1	4	5	6	2	3
51 - 100	3	4	4	3	4	1	2
101 - 250	3	2	4	5	6	3	1
251 - 500	3	1	2	4	5	1	3
501 - 1000	2	4	3	6	2	1	5
over 1001	3	2	3	4	3	1	2
other	2	2	4	4	5	1	3
Total	47	1	4	5	6	2	3

Note:

#1: As a basis of compensation and rewards
#2: For career planning
#3: As a basis of human resources planning
#4: To document personnel decisions, placement, promotions, firings.
#5: Used to let employees know where they stand and to give feedback
#6: Used as a basis of individual development and training.

*** Related To Size Of Organization**

In a few cases organizations of certain sizes vary from the overall pattern. The small groups (0 - 50) place more emphasis on the used of performance evaluation as a basis of compensation and rewards rather than the large firms which more emphasis on the used to let employees know where they stand and to give feedback. Both the small and the large firms place the used of performance evaluation to document personnel decisions, placement, promotions, firings as the least important purpose.

VII. TYPE OF RATING FORM

*** Overall**

The chart system, wherein traits are listed and a series of squares marked above average, average, or below average, (or some other system of adjectives) are provided beside each trait for the rater to indicate his evaluation and the most often used. The second frequent used is directed paragraph and the least often used are free form paragraph, graphic scale and check list. None uses critical incident form. Fourteen companies say they are not using any form and six companies gave no answer. Two companies using other type of rating form such as direct communication.

RELATIONSHIP BETWEEN SIZE OF COMPANY AND TYPE OF FORM USED

Size of organization	Number of organization	Techniques used on rating forms								
		1	2	3	4	5	6	7	8	9
0- 50	31	3	-	-	4	5	1	13	1	6
51- 100	3	2	1	-	-	-	1	1	-	-
101- 250	3	-	2	-	1	3	-	-	-	-
251- 500	3	2	-	-	-	-	2	-	-	-
501-1000	2	-	1	-	-	1	-	-	-	-
over1001	3	2	1	-	-	2	1	-	1	-
other	2	-	-	-	-	2	-	-	-	-
Total	47	9	5	0	5	13	5	14	2	6

#1: Directed paragraph
#2: Free form paragraph
#3: Critical incident
#4: Graphic scale or number rating assigned to each factor
#5: Each factor judged average, above or below average
#6: Check list
#7: None
#8: Other
#9: No answer

*** Factors Considered In Appraising Performance**

**** Engineers**

Industriousness is the one factor rated in all appraisal systems reported upon. Close behind are technical ability and leadership ability. Cooperativeness is placed on the third. Present work assignment and other work for which the engineer/staff person is qualified are rated about half of the performance appraisal.

**** Technical Staff Persons**

In evaluating technical staff persons, it seems that cooperativeness is more important than industriousness. It rated first and industriousness is rated second with technical ability in the same place. Leadership ability is rated third. The others are the same as the rate for engineers.

Besides the above factors which are listed in the questionnaire and which all respondents could check, other factors such as willingness to work more, reliability, results of the above efforts, and ability to write a report, are suggested by four respondents.

FACTORS CONSIDERED IN APPRAISING PEROFORMANCE FOR ENGINEER

Factor	Number of Times Checked	Rank
- Industriousness	35	1
- Cooperativeness	32	3
- Technical ability	34	2
- Leadership ability	34	2
- Present work assignment vs training and experience	18	4
- Other work for which the engineer/staff person is qualified	14	5
- Other factors	4	6

FACTORS CONSIDERED IN APPRAISING PERFORMANCE FOR TECHNICAL STAFF PERSON

Factor	Number of Times Checked	Rank
- Industriousness	29	2
- Cooperativeness	30	1
- Technical ability	29	2
- Leadership ability	23	3
- Present work assignment vs training and experience	14	4
- Other work for which the engineer/staff person is qualified	11	5
- other factors	4	6

VIII. CONCLUSION

When examining the results of this investigation, one factor stands out above all others. This is the widespread use of performance appraisal in the construction industry. All of the large companies make a systematic effort, specifying time and method, to evaluate their engineering personnel. Those few who do not evaluate systematically are small and do evaluate their personnel but at irregular intervals and by informal methods.

The variation in methods and philosophies coupled with the interest demonstrated indicate a need, and probable willingness, to exchange ideas on the subject. It is not expected nor intended that all will arrive at a common appraisal method but that the exchange of problems and experience incurred in administering the various methods in use could be of mutual benefit in the solution of current problems.

Despite the suspicion that performance analysis may be, in some companies, but a form to be periodically filled out by the supervisor and then forgotten, most seem to be making more use of the results of the appraisals as a basis of compensation and rewards or to be used to let employees know where they stand and to give feedback.

Employee performance appraisals can provide important feedback on job performance, and a standard form which has been developed will be flexible enough to apply meaningfully to a wide variety of jobs. The standard form is an improvement over typical appraisal forms because it focuses on employee expectations and emphasizes

the importance of defining jobs to make the appraisal task easier.

The mere presence of a systematic appraisal or evaluation gives some benefits, improving communications between management and employee, and improving the morale of the employee by assuring him that he is not forgotten. If employee performance analysis is used for more than this, add proportionately more to the benefits gained.

The consideration given to employee improvement and counselling by so many organizations cannot help but be beneficial. In an intangible occupation such as engineering, where the work assignment of the individual is a small item often lost in the mass of the final product, it is necessary for the individual to receive guidance from others if he is to improve. The pressure of the time schedule and the transitory nature of most assignments often result in an individual being unaware of his own mistakes an unable to profit from them. Mistakes are remedied by another department or often so many other assignments intervene that memory fades and the lesson is lost. Fundamental experience learning, trial and error followed by correction, is too slow and expensive a process for a rapidly advancing technology. It must be largely replaced by counselling to correct bad habits before they prove costly and build upon good traits that can give benefits.

The arguments advanced by some that such practice links too closely reward and current performance, overlooking potential for future performance, seems poorly founded. What should be more important than rewarding good current performance? If a man of

greater potential is not performing well in his present assignment and so is not rewarded, why isn't he doing well? If it is management's fault, in some way, that he isn't doing well then management should remedy these faults. To be equated against the unhappy individual of potential, who is not rewarded because of a performance appraisal and reward system that stresses current performance, are the several individuals who misunderstand and resent seeing a man rewarded who is not submitting an exemplary current performance. The value of potential is not recognized by all, the ability to recognize potential is restricted to even fewer; current performance is understood by most people.

Because of more complex organization and a greater number of employees to consider, it was expected that the larger companies might have a more pragmatic and mechanical approach to performance appraisal, stressing salary adjustment, promotion eligibility and cataloging in their goals. The techniques used by the larger companies also were expected to be those requiring the least amount of time by the supervisor. Neither of these expectations proved to be true. The larger companies, if anything, are apparently more interested in employee feedback and compensation/reward system than the smaller ones and stress the directed paragraph and chart type of form that is most demanding of rater time and least specific or mechanical.

The use of a flexible appraisal method allows something good to be said about all, the criticism can be easily disguised and buried among the other material or omitted entirely. However, the

means necessary to avoid controversy prevent the realizing of some of the benefits of performance appraisal in the area of employee improvement. A performance appraisal is needed because there is disagreement between employee and supervisor as to what constitutes proper performance. An effective appraisal must point out where such disagreement exists. If it does not then no improvement can be expected.

The results of analysis are usually filed in the engineer's personnel folder. They are not usually examined until the individual's current assignment phases out and he becomes eligible for promotion or transfer. They are not conveniently located to keep track of specialists who might be temporarily assigned to duties outside their specialty. More use should be made of the cataloging process for specialist and potential leaders than is done at present. It would seem that the electronic sorting machines utilizing punched cards would be suited to this job where numbers justify. In smaller organizations, lists might suffice.

The larger companies are more seriously hurt by the lack of personnel inventory than the smaller, due mainly to their size. Because of the lack of a means for cataloging skills of their employees, many of whom are quite versatile, the employment recruiters may be operating at full load while other parts of the same organization are laying off people. This is true to an even greater extent of companies with two or more divisions.

Some organizations are beginning to catalog their employees and their skills, utilizing information gathered in the course of

supervisor and yield more uniform treatment throughout the engineering department. The free paragraph is as notorious for its halo effect as the critical incident method is for its tendency toward adverse comments only. The arguments by many that numerical systems tend to give the best ratings to the average person who most closely resembles the norm are well founded; the non-conforming genius must be evaluated as well. The check list forces the supervisor to view the employee from various viewpoints but is lacking in flexibility. A combination of methods is in order and the most satisfactory seems to be to combine the uniformity of the chart system and the restrained freedom of the directed paragraph.

With the chart system, the rater is directed to look at various aspects of the employee and can quickly mark an evaluation, usually choosing from among five degrees such as superior, above average, average, below average, and poor. The process is as uniform as any rating can be and requires a minimum of time consistent with adequate ratings. The criticism that the two extremes are rarely checked should not be cause for alarm for statistical analyses show that it should be expected that the majority of any normal group will fall in the central regions.

For those items that require more detailed treatment than that afforded by the chart system a few directed paragraphs should be included. Items such as potential, work assignment and accomplishments, and employee self-help efforts, to mention a few, require explanations instead of pure ratings to be of useful value. The directed paragraph retains the desired uniformity of

consideration, allows the necessary freedom of expression, and, if not overdone, does not overly increase the burden on the rater.

There is a great tendency to rely upon the immediate supervisor as sole evaluator, asking him to rate on the basis of his experience. This does not provide, in itself, any device to insure or promote uniformity among supervisors other than the form itself. Neither does it fulfill the requirements for the objectivity required when making a department-wide ranking as sometimes required. A better method is to have review made by a higher level of supervision, and sometimes with the assistance of the personnel department. Department-wide rankings are made at this higher level and better perspective is thereby obtained.

Most organizations do rank their engineers and technical staff people whether or not they make such rankings known because of its direct applicability to solution of problems involving retention, layoff, transfer and promotion. There would be a great tendency for most supervisors to rank subjectively and then make their performance appraisal justify their ranking if strict numerical methods were used for performance appraisal and ranking. The appraisal system then becomes a mere substantiating device which lends unwarranted authority to the ranking. A less formal evaluation system could not be called upon to support rigorously a ranking and could retain its value as an evaluator. The ranking system would then exist for what it actually is, a personal evaluation by the supervisor weighing qualities in the proportion his judgement indicates best.

In summing up the conclusions of this report, it is found that employee performance appraisal is a complex, troublesome process for both the appraiser and the appraised. Despite the wide use of performance appraisal and the interest in the subject of evaluation shown by the construction industry, the general orientation towards employee counselling results in neglect of the other benefits that may be derived from a systematic performance appraisal. The possibilities of cataloging technical specialties and potential are not developed. To realize these potential benefits many of the present appraisal systems would need to be reoriented. At the time of this reorientation improvements could also be made in the forms to lessen the load on the rater and to promote uniform rating practices throughout the department.