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Post-Completion Audit of Capital Budgeting Projects : A Synthesis

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Abstract

This paper synthesizes the important issues related to the post-completion audit of capital budgeting projects from a managerial prospective, with a special emphasis on the managerial control system governing the decision making process. The paper contemplates to explain the importance of such audits and also covers major areas in its systematic process. The paper has a normative orientation and draws from both the relevant fundamental concepts in operational auditing and capital budgeting literature.

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Key words

Capital Budgeting - Post-Audit of Capital Budgeting -
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Introduction

The primary objective of any business enterprise is maximization of the wealth of its owner stockholders. The assumption in capital investment decisions, which involves long-term commitment of large sums of resources, is that "there is an assumed improvement in the long-range position of the enterprise" (Blocher, 1979). Capital budgeting projects may be undertaken to fulfill other objectives of the entity such as to foster employee relations; however, the assumption remains the same. The magnitude of capital investment decisions not only impact the firm's financial statement but can also affect the firm's image (Davidson, 1983).

While the science regarding the decision-making process regarding capital investments has become increasingly sophisticated, the area regarding audit of such important decisions has been given much less attention (Dillon, 1981). As various problems relating to the post-audit phase of capital budgeting have been addressed and solved, the practice has been increasingly accepted.

This paper will attempt to provide a synopsis of various pieces of information related to this phase of the capital budgeting

process. It will address the following areas:

- The post-completion audit as the last phase in the series of managerial controls established as part of the capital budgeting process.
- The purposes, benefits and objectives of the post-completion audit as well as problem areas and other considerations in establishing a post-completion audit system.
- Who should conduct the post-audit, when it should be conducted, and how projects should be selected for post-audit.
- The methods, procedures and gathering data for post-completion audits and related problems.
- The review and report of the results upon completion of post-audit.

Finally, a summary of ideas and conclusions will be presented.

Forms of Controls in Capital Budgeting

The capital budgeting system has been defined a "system, taken as a whole, for identifying, analyzing, authorizing and implementing major investments in plant, property, equipment and related capital assets" (Jensen , 1986). There is an assumption that there will be a return on/or of invested funds some time in the future (kim, 1991). Because this assumption is built on many other assumptions regarding such items as financial, market and similar conditions, there is an associated element of uncertainty and risk attached to capital budgeting decisions (Davidson, 1983).

In light of the magnitude and long term nature of these capital projects, managerial control systems are imperative.

Many forms of control may be built into the capital budgeting process from its inception to completion for verification of assumptions and validity of information. Controls are usually included at three stages: in the original budget, in approval of the appropriation and in the expenditure authorizations (Camillus, 1984). The primary goal of such controls is to ensure that management objectives are followed and goals of the given capital project are achieved. Among others, some control procedures in capital budgeting relate primarily to approved amounts against actual expenditures (kim, 1991). These controls are referred to as "in-process" controls.

In-process controls may take the form of conventional project management devices such as time or milestone-triggered reports, which contain updated estimates of time or cost variances above certain specified percentages (Blozher, 1979). The report form may be designed in such a way as to point out projects which are exceeding approved amounts so that management can take action to determine the reason(s) and if necessary to provide for additional funds required or take other corrective measures. Formulation of short-range capital budgets also help management to evaluate competing projects and to determine, in the short range, the contributions of each. Capital budgets may be continually monitored by use of capital budget status reports

or capital authorization progress reports. Control in this context also includes coordination of expenditure planning with related items such as cash and operating budgets. In-process controls tend to concentrate, however, on certain factors without providing a picture of the overall success of the capital project in terms of management objectives. The final success of the project can be measured by ex-post methods.

There are primarily two ex-post methods of monitoring capital investment decisions: post-completion audits and project accounts. A survey taken in 1980 of divisionalized companies in England and the U.S. indicated that project accounts are used by over 50% of firms in both countries (Hartley, 1977). According to Hartley, the use of post-completion audits, however, is much more widespread in the U.S. More than 84% of U.S. firms surveyed by Scapens and Sale increasingly employ the post-completion audit in conjunction with project accounts and other forms of controls. U.K. businesses have generally rejected the use of post-completion audits due to the difficulties in identifying costs and benefits associated with given projects. The percentage of firms in the U.S. who practice post-completion audits indicates that despite these difficulties, such audits are useful tools. These difficulties are discussed in detail later in the paper.

Objectives of the Post-Completion Audit

The primary purpose of the post-completion audit is to compare actual results with planned or estimated results to verify actual economic returns on the investment and provide to management the necessary information for current and future decision-making purposes. The post-completion audit has "great potential to contribute to the financial health of the organization" by encouraging learning from historical performance to improve capital budgeting techniques (Haka, et, al.,1985). Post-completion audits furnish top management with information on which type projects are best for the firm and which forecasting methods are most accurate (Jensen,1986). Thus, information is gained that helps improve planning and budgetary techniques for future projects (Hicks,1971). Improving the overall quality of the decision-making process can also reduce exposure to risk (Dillon, 1981).

The importance of psychological aspects and effect on human behavior of just having a post-audit procedure is another benefit of post-completion audit that cannot be overemphasized. This was confirmed by compaines surveyed by Scapens and Sale. If management is aware that their projects may be audited, they tend to plan more carefully to ensure realistic and accurate estimates as well as ensuring projects meet the planned results. It should be noted, however, that there is also a human relations problem associated with post-completion audits having to do with

the natural resistance of management to being checked on in such detail.

Specific objectives for post-audits should be developed and communicated by top management of the firm. The objectives could differ according to the size and type of project being audited. Objectives which management seek by use of post-completion audits may include the following:

- To evaluate management's capital expenditure decision making process.
- To improve methods used to analyze similar and future projects.
- To verify actual economic returns on the investment.
- To ensure better planning in the original justification of capital expenditures.
- To identify errors and error patterns in information estimates.
- To identify problem areas and make recommendations for correction to improve performance of given projects as well as to identify those projects which should be discontinued.
- To reinforce corporate objectives and ensure that projects are implemented as planned by upper management (Kim, 1991).

It may not be possible, feasible or even necessary to meet all of the objectives with every post-completion audit. Some decisions may be unique and thus require follow-up only to ensure desired results. The limited resources of the firm may prevent meeting all objectives with every post-completion audit.

The objectives of each specific post-audit should be established at the time the project is approved, allowing flexibility to change **as incremental actual results** are determined. By setting the **objectives at the approval stage**, management knows what to **expect** and may be more conscious in making estimates. It also **allows for ex-post controls** to be implemented from the outset of the **initial expenditure**.

To aid in determining control methods, projects are sometimes **classified by priority groups**, such as "essential, profitable, and **desirable**", "**expansion and growth or replacement**", "**absolutely essential**", "**competitively necessary**" and etc. (Kemp, 1966). These **priorital classifications** allow management to make change or **eliminations** more easily, but they may also indicate the type of **post-audit objectives** to be set.

Considerations in Conducting Post-Completion Audits

If a post-audit system has not yet been developed by a business entity, the first consideration must be whether or not it is currently feasible or desirable to develop such a system immediately. This is due to the requirement of extensive managerial resources to develop the system. It takes a great deal of time not only to develop a system which is flexible enough to meet future needs, but also requires many man-hours to make it operate effectively. Other forms of controls, as mentioned earlier, may suffice to meet present needs in this area depending on one

or several factors. These factors are relevant to the criteria for selection of projects to be audited, which is discussed later. Nonetheless, the first step in any post-completion audit is the establishment of managerial control procedures guiding the process.

Study of system design and implementation also indicates the second area of consideration, which involves gaining the support of management and employees for the system. Resistance to change and controls is at least to some extent a natural phenomenon. However, the human element is essential in making systems work. Generally, dissemination of the objectives and procedures regarding the post-audit system is the best way to combat "misinformation, rumors and erroneous concepts" (pike, 1995). Other considerations of major importance deal with the areas of who should design the system and conduct the audits and the timing of post-audits.

Who Should Design and Administer the Post-Completion Audit

Most authorities in this area agree that top management must be heavily involved in the design and administration of the post-completion audit system. In large corporations, information design specialists work closely with management to design the system. Internal auditing, accounting or finance department(s) must be involved to ensure (1) compliance with managerial controls, (2) compliance with GAAP capitalization and

depreciation requirements,¹ (3) that the best methods are used for verification of benefits (Pike, 1983). Operating and line management must contribute, as appropriate, with technical guidance. In certain business environments, where appropriate, the system may be designed and implemented by one person.

The problem of trying to decide who should perform the audit is avoided largely by dividing these responsibilities among those best qualified to perform portions of it as with the design process. Personnel from operating and other departments also should be used to provide necessary assistance to ensure accuracy of information. Teams of experts can be easily used to develop different aspects of the audit without close coordination or even agreement between the members (Larcker, 1981).

To resolve the question of who should design or perform the post-completion audit, it is more significant to look at criteria desired in whatever entity is responsible. The following are examples of desired criteria:

- Understanding of the firm's objectives, knowledge of the operation coupled with the ability to relate the information system to the needs of the operation.
- Understanding of managerial control system to evaluate its sufficiency in meeting organizational objectives.
- Knowledge of the past performance and the capabilities of

1- Because of any tax ramifications.

the firm to determine whether management project proposals include all key factors.

- Ability and organizational position to work with operating personnel to make changes.
- Competence in design and utilization of such system.

In firms lacking internal audit department, it is logical that the group to perform the post-audit should be the group who obtained the original justification, since they are the most knowledgeable. The finance or accounting group should provide support in the areas of accuracy, adequacy, and reasonableness, with regard to keeping the information unbiased (Hartly, 1977). In most cases, the post-audit information is reviewed by a group other than the one who prepares it. Frequently executive committees are the group who review post-completion results.

Timing of Post-Completion Audits

In general, the timing of the post-completion audit depends on the characteristics of the project and its level of impact on profitability of the firm. The decision regarding timing of the post-audit should be made when the project is selected for post-audit, which should in turn be at the point the project is approved. This allows planning of the timing, what type of managerial controls should be implemented from the outset, the information needed, and the amount of necessary manpower.

A post-audit should be conducted at any point in the project's

life that such information will most assist the decision makers. Most capital investments involving an expected economic return are audited at six months or a year intervals so that the project is fully implemented, gone through a debugging phase, and has accumulated a reasonable earnings or savings period to be used in the audit (Davidson, 1983).

Subsequent or additional post-audits may be required on all projects as a matter of policy, or only on ones which indicated problems in the first post-audit. It is also desirable to periodically post-audit projects of certain types (i. e. , those over a specified amount). However there are also firms that perform no subsequent post-audits. This implies an assumption that all factors will remain constant. But in most cases lack of follow-up is due to limited resources.

Project Selection for Post-Completion Audit

It is impractical that all capital expenditures be audited in most corporations. For this reason, sampling techniques or specified selection procedures are used to choose projects for post-audit. The best method for project selection involves weighing the cost of conducting the audit against the informational benefits. The cost ratio provides the basis on which to make the selection. However, difficulties in determining the benefit factor makes this a less popular method. Since the post-completion audit objectives vary with each firm and according to each type of project, each

firm must develop its own criteria for project selection. Most businesses set certain amounts above which a capital expenditure is post-audited. As previously discussed, firms also classify and prioritize capital expenditures to provide both in-process control as well as to indicate projects which should be selected for post-audit.

It is relevant in the context of project selection to further discuss types of capital expenditures. As discussed earlier, there are basically five types of capital expenditures, three of which should be audited and two of which may not (Pike, 1995). Expansion, replacement, and cost saving type projects generally can and should be audited. Expansion projects include adding major fixed assets, entering new markets, or buying another company ; whereas replacement projects usually relate to replacing obsolete equipment. Cost saving projects usually relate to saving in labor, material or other resources. The first of these, expansionary projects, are generally monitored from the outset because of their size and importance, while replacement and cost savings type projects are monitored only when they reach full operation. The last two types of projects are generally viewed as "defensive" type projects which are basically reactive and required to maintain competitiveness. The last types are research projects which are largely discretionary (Jensen, 1969).

Selection of projects solely based on the amount of expenditure or even by type of project are not necessarily the most beneficial

methods. While such criteria provide easy and definitive guidelines, there are associated problems. Projects below a certain limit, for example, may be forerunners of many projects to come. Thus, post-completion evaluation may provide important information for approval and implementation of succeeding projects in the future. Generally, projects below a certain limit should be chosen on a random basis, as management discretion regarding selection of these projects may involve bias as to audit those which will appear most successful. Random selection of projects below a certain amount eliminates the need for management's examination of every project to decide about whether it should be post-audited, which involves valuable time.

The consensus regarding project selection, to avoid the difficulties mentioned above, seems to be to select all projects above a certain amount and randomly select certain projects below that amount. This technique allows flexibility, within certain limits, to be built into the post-audit system. From the foregoing discussion it can be extrapolated that there is no single best method for evaluation and selection of projects for post-audit. Policy guidelines should be flexible enough to allow for differing treatment.

Information Gathering for Post-Completion Audits

It is generally agreed that in order to conduct a meaningful post-completion evaluation, key areas must be identified for

comparison of estimated benefits versus actual results. The review should generally address the following areas:

- Implementation and/or design of managerial control procedures.
- Evaluation of internal management control processes vis-a-vis capital budgeting projects.
- Evaluation of whether the proposal/approval process has identified the key factors on which the results of the project depend.
- Evaluation of the variables identified in the financial models used for project estimates. Such variables may include: market size (units), selling price, market growth rate, share of market, investment required, residual value of investment, operating and fixed costs, useful life and tax treatment.
- Measurement of contribution to overall profit (or benefit), where feasible.

Many people feel that once a project is selected and implemented, it is impossible to: 1) determine what would have occurred had the project not been implemented, or 2) to separate results of the given project from other operating results.

Although both issues contain some validity; however, both can be overcome with knowledge and use of proper tools and procedures for evaluation. In general, the tools used to post evaluate the project should be consistent with the tools used to evaluate the project when first approved.

The type of information gathered differs from project to project and is governed by the type of project, as previously discussed.

In general, the type of data used in the original proposal should guide the type of data used for post evaluation in order to provide meaningful analysis. Difficulties arise, however, in comparability of data, since actual results will not be readily identifiable for all key factors (Dillon, 1981). Following is a chart which delineates investment and operating data for which actual results will or will not be readily identifiable. Comparability of economic indicators or financial models used for post-audit analysis present special consideration and the discussion of the model is offered in the following section.

This model supports the position that key variables may be selected among only those items which are objectively determinable. However, with regard to comparing estimated operating data and the forecasted investment proposal, "there is a difference, for example, between estimating the changes and overall company working capital attributable to a given project and estimating the amount of actual supervisory time to charge the project during the initial operating stages" (Davidson, 1983). Thus, estimates which involve a relative, but not complete, amount of objectivity may be used as a surrogate information in the post-audit report. While return in the areas of overall company working capital and operating results can be measured

COMPARABILITY OF INVESTMENT
AND OPERATING DATA *

Investing / Operating Data	Availability of Data	Comparability of Data
1- Fixed Capital Invested Directly in the Project	1- Available From Property Records	1- Reliable Comparison of Actual and Forecast Amounts Usually Can Be Made.
2- Working Capital Invested Directly in the Project	2- Depending on Project Type, Elements of Working Capital Can Be Determined and Identified Directly with the Project.	2- To the Extent the Information Is Objectively Determinable, Actual Vs. Forecast Comparisons Should Be Made.
3- Changes in Overall Company Working Capital Attributable to the Project.	3- Assumption That All Other Factors Which Effect Company Working Capital Remain Constant. Impossible to Isolate.	3- Effect Can Only Be Estimated, Which Is Not Very Meaningful.
4- Operating Results (Revenues, Expenses and Expense Reductions) Directly Identifiable with the Project.	4- Actual Items Available from Accounting Records.	4- Comparison of Actual and Forecast Contributions Provides Reliable Measure.
5- Changes in Overall Company Operating Results Attributable to the Project.	5- Assumption That All Other Factors Which Effect Overall Company Operating Results Remain Constant.	5- May be Possible to Allocate Portions of Actual Amounts or Use Estimates, Which Is Not Meaningful.
6- Investment and/or Operating Results or Events Which Can Be Expected to Occur if the Project Is Not Undertaken.	6- Impossible to Verify.	Can only Assume Consequences .

* Modified Version of Model Originally Developed by Kemp (1966)

repeating estimate procedures originally used in the investment proposal, current available information can be substituted in the instances described above.

Another related problem involving comparability of data has to do with the accounting system and can be summarized as follows:

- Accounting data are generally kept on an accrual system, whereas capital projects may be evaluated according to cash budgets.

- The time periods used for accounting systems do not usually coincide with time periods for the project cashflows.

- Accounting data are usually gathered on cost centers or departments rather than by project.

- Accounting data are generally concerned with book values when projects use financial models.

To overcome the problems presented by accounting systems, there are three basic solution. Costs should be collected on a project basis, whether (1) it means modifying the present accounting system or (2) instituting a parallel system. Such Accounting systems can be used to accrue costs on a project or unit basis as well as on a period basis. This provides cashflow data needed for comparing actual rate of return on a project with the original estimated rate of return or other variance analysis. Such system, however, assume available computer facilities. Computerized systems can also be developed to convert the accounting data to a cash basis with adjustments for depreciation,

etc.

The third solution is to use "key" variables, as discussed previously, on which to base the assessment on rate of return. This method is most logical and efficient on projects which have been estimated to provide a return in specified area (s) such as reduced labor costs.

Information Format

The post-completion audit can be developed around two basic schedules as appropriate and where data can be objectively identified for comparison with original estimates. These schedules include the following:

1) Profit Variance Analysis Schedules

To the extent the incremental data regarding the project can be objectively determined, this schedule allows analysis of the "net effect on income" derived from the project. This is accomplished by comparison of net revenues and other incomes against incremental variable and fixed costs, operating expenses, one-time expenses, taxes, and other deductions.

2) Cash Flow and Financial Criteria Analysis Schedule

This schedule again compares data from the approved request to actual results to provide analysis of project cashflows and return variance(s). Included in the schedule are total cash

outflows in capitalized plant, property and equipment and changes in working capital, taking into account cash recovery on property disposal and non-recurring expenses. Using net profit obtained from the Profit Variance Analysis Schedule, and adjusting for depreciation and taxes, the net cash inflow is then used in the appropriate financial model (eg. net present value) to determine benefits derived from the project (Kemp, 1966).

As discussed earlier, the development of relevant and meaningful cashflow schedules is an integral part of the process to use for both schedules.

The Post-Audit Report

The results of the post-completion audit must be fed back to both those persons who initiated and those persons who approved the original proposal. The report itself should be as short as possible depending on the size of the investment. It should include the following information:

- Identification of the project.
- Identification of the group or unit who initiated the project.
- A brief description of the "nature and purpose" of the project.
- Comparison of actual amounts expended versus amounts estimated in the proposal.
- Explanation of the sources and methods of data collection.
- The estimated financial models or economic indicators.

- Estimated and actual initiation and completion dates.
- Explanation of all variances including a narrative of actual technical accomplishments.
- Identification of causes of variances.
- Relation of causes of variances to managerial control system.
- Suggestion of remedial action to be taken or description of actions already taken.
- Results of any follow-up audit.

Conclusion

The review procedure of capital budgeting projects provides two important outcomes: (1) management learns the value of the post-audit system and the information it provides, and (2) those persons who must provide justification or approval for future projects can learn from errors discovered in the process. Care must be taken in using the post-audit as a performance evaluation tool, to identify areas within the realm of each manager's control or data within his or her area of responsibility. Further, these tools must be used in the context of their value to the firm. While the post-audit can be a useful tool in evaluating management's decision-making abilities and to pin point problem areas for corrective measures, it must be kept in mind that the effectiveness and efficiency of initial proposals may depend on factors out of the realm of control of any given manager. Finally, the results obtained from the audit can help to identify possible deficiencies

in the managerial control system, which in turn with appropriate remedial actions, could lead to a better decision making processes.

While the use of post-completion audits as a tool for measuring the success of capital budgeting decisions continues to grow, the methods of conducting effective post-audits are still being refined. In terms of the primary business objective of maximizing owner/stockholder wealth, it is essential that the risk associated with capital investment decision due to the large amount of investment and the number of years associated with such projects, be minimized through performing some form of post-evaluation. Post-audits also provide feedback as to the capability of management to initiate, justify, and approve such projects.

The type of post-audit system used as well as the type of projects which will be selected for post-audit by any given entity must depend on the size and nature of the company and characteristics of the individual projects themselves.

References

- 1- Blocher, E. and C. Stickney, "Duration and Risk Assessment in Capital Budgeting," *The Accounting Review*, Vol. LIV, No. 1, (Jan. 1979), pp. 180-188.
- 2- Camillus, John. C., "Designing a Capital Budgeting System that Works," *Long Range Planning*, Vol. 17, (April. 1984), pp. 103-110.
- 3- Dillon, Ray and J. Calwell, "A System for Post-Auditing Capital Projects," *Managerial Planning*, Vol. 29, (Jan / Feb. 1981), pp. 18-22.

- 4- Davidson, Sidney and R. Weil, "Handbook of Modern Accounting," 3 rd ed., Mc Graw - Hill, (1983), New York, NY.
- 5- Enrenreich, Keith B., "Post-Audit Review of Capital Budgeting," **Internal Auditor**, Vol. 40, (Feb., 1983), pp. 33-35.
- 6- Haka, D. F., et al., "Sophisticated Capital Budgeting Selection Techniques and Firm Performance," **The Accounting Review**, Vol. 4, (Oct., 1985), pp. 651-669.
- 7- Hartly, R. V., "Teaching Capital Budgeting with Variable Reinvestment Rates," **International Accounting Education**, Vol. 5, (Fall, 1990), pp. 268-280.
- 8- Hicks, Carl F. and L. Schmidt, "Post-Auditing the Capital Investment Decision," **Management Accounting**, (August, 1971), pp. 24-28.
- 9- Jensen, R. E., "Capital Budgeting Under Risk and Inflation: A Pedagogical Guide," **Advances In Accounting**, Vol, 3 (1986), pp. 255-280.
- 10- Kemp, Patrick S., "Post-Completion Audits of Capital Investment Projects," **Management Accounting**, (August, 1966), pp. 49-54.
- 11- Kim, S. H., and E. J. Farragher, "Current Capital Budgeting Practices," **Management Accounting**, (June, 1981), pp. 26-31.
- 12- Larcker, D. F., "The Perceived Importance of Selected Information Characteristics for Strategic Capital Budgeting Decision," **The Accounting Review**, Vol. 3, (July, 1981), pp. 519-538.
- 13- Pike, R. H., "An Empirical Study of the Adoption of Sophisticated Capital Budgeting Practices and Decision-Making Effectiveness," **Accounting Behavioral Research**, Vol. 18, (Autum, 1988), pp. 341-351.
- 14- Pike, R. H., "The Capital Budgeting Behavior and Corporate Characteristics of Capital-Constrained Firms," **Journal of Bussiness, Finance and Accounting**, Vol. 10, (Winter 1983), pp. 663-672.