1-1978

Capital Budgeting in the Medium Size Firm

Gary S. Myrand

CAPITAL BUDGETING IN THE MEDIUM SIZE FIRM

by

GARY STEPHEN MYRAND

B.S., The University of North Dakota, 1970

An Independent Study Submitted to the Graduate Faculty

of the University of North Dakota in Partial Fulfillment

of the

Requirements for the Degree

MASTER OF BUSINESS ADMINISTRATION

GRAND FORKS, NORTH DAKOTA

1978

CAPITAL BUDGETING IN THE MEDIUM SIZE FIRM

by

GARY STEPHEN MYRAND

Approved:

F. A. Christensen, Ph.D. Date June 8, 1978

Major Professor

ACKNOWLEDGEMENTS

I would like to express my sincere appreciation to Dr. Rolf Christiansen, my faculty advisor and committee chairman. Without his advice and encouragement this project would not have been possible.

I would also like to thank all responding business firms for their cooperation in making available the data used in this study.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

PURPOSE

1. Introduction

There are many required criteria for a business firm to function both rationally and economically. One of the most important of these criteria is that the organization employ some form of logical method to determine expenditures for capital assets. These expenditures are usually out of the realm of day to day operations and can have a long range effect on the future performance of the firm. For these reasons it is imparative that management give capital acquisition expenditure decisions special attention. There are four general methods by which business organizations determine the desirability of capital asset acquisitions. These methods include payback period of investment, average rate of return, internal rate of return, and net present value of future cash flows. Each of these methods has specific advantages and disadvantages.

The advantage to the payback period method is that it is easy to calculate and understand. Payback is defined as the length of time it will take to recover the dollar amount of the investment. The real appeal of the payback period method to the business firm is that it serves as a measure of the risk involved in the investment. The farther into the future the estimated cash flows occur, the

more uncertain they become and the greater the risk involved in the investment. The main disadvantage to the payback period method is that it completely ignores any useful life of a capital acquisition beyond the period needed to recover the dollar amount of the investment. The ultimate investment decision could be greatly altered by ignoring this period of time. Yet another disadvantage to the payback period is that it completely ignores the existance of the time value of money. Future cash flows are considered equivalent to present cash flows and are freely substituted for each other in the calculation of the payback period.

The average rate of return is found by dividing the average annual net profit the asset creates by the average annual investment required for that asset's acquisition. This method has the same advantages as the payback period method in that it is easy to calculate and is readily understood. In addition, it takes into consideration the entire useful life of the asset. A major disadvantage to the average rate of return method is, for many kinds of assets, that cash flows over time are not constant. Since the average rate of return method also ignores the time value of money, decision errors can result.

The internal rate of return method does take into consideration the time value of money. It is calculated by determining which discount rate the present value of cash inflows equal the present value of cash outflows over the useful life of the asset. If the calculated discount rate for the new acquisition is lower than the

minimum acceptable rate then the decision to acquire the asset would be negative. The internal rate of return method has the disadvantages of being more difficult to calculate and harder for many individuals to conceptualize than either the payback period or the average rate of return method.

The net present value method is another method employing the time value of money concept. Both cash inflow and outflow expectations are discounted to their present value using the individual firm's required rate of return, usually the firms cost of capital, as the discounting interest rate. A non-negative net present value would indicate the capital acquisition would be a suitable investment. When several capital acquisition alternatives are available, the alternative with the highest net present value would be the optimum. Thus, this method like the others has the advantage of comparing alternative projects. Like the internal rate of return method, the net present value method has the disadvantage of being more difficult to calculate than the more elementary methods of payback period and average rate of return.

Each of the methods which employ the time value of money concept has the disadvantage of being based on uncertain future cash flow estimates. No firm can rely upon any investment with absolute certainty. There are too many environmental factors affecting performance that are uncontrollable by the company. Business executives must deal with the investment risk caused by this uncertainty in each capital asset acquisition decision. When the advantages of these methods of capital budgeting are weighed against

the disadvantages, it is generally agreed by academicians that the methods which use the time value of money approach are the most appropriate; the net present value method is superior to the other methods. The methods employing the time value of money do take into account the entire life of the asset; they do use an appropriate interest rate in discounting future cash flows. The accuracy of expected returns on an investment can be improved by the use of these more sophisticated methods.

2. Objective of Study

It is the objective of this study to discover which techniques are presently being used by business organizations to aid them in making a capital asset investment decision. This study will concentrate only on medium size manufacturing firms in the upper midwest. This study will test the hypothesis that medium size manufacturing firms in the upper midwest are presently using the payback period method as an aid in acquiring capital assets. The Kolmogorov-Smirnov nonparametric statistical test will be applied to the data to determine the validity of the hypothesis.

CHAPTER II

RELATED LITERATURE

Since business executives began to make use of methods more sophisticated than pure management intuition, they realized that logical plans for the determination of the desirability of capital asset acquisition were necessary for an efficiently run business organization. Academia, and to a certain extent the business community, realized there were several methods that could be employed in the decision making process. Studies during the 1950's such as "Business Investment Management", a 1958 study by George Terbough, indicated that a large number of United States business organizations were using the payback period method in the formation of their capital asset acquisition decision. Even at this point in time, the payback period method was coming under some academic scrutiny. For the next several years more and more criticism was being heaped upon the policy of using the payback period method as the main criterion in the capital acquisition decision making process. Authors realized the shortcomings of the payback period method but were unwilling to accept any other method in its present form. Ideas were proposed to limit the payback period method to include only those investments terminating in one year or less, or to investments of greater than one year that have a uniform cash

flow.[1] While these adjustments would have helped to nullify some of the obvious disadvantages of the payback period method, they would also drastically cutdown on the capital asset acquisition decisions in which it could be employed. It was suspected that although the discounting methods available have some merit, extreme caution should be taken with their use. Herbert E. Dougal in a 1961 article stated:

> "Rate of return, is not an appropriate, exclusive or in particular cases a prime capital investment selection criterion. Rather it is a useful tool and as such should be used with full recognition of its shortcomings and limitations."[2]

By 1963 the business community began to move toward the more sophisticated techniques of capital budgeting analysis.[3] Although the payback period method and the average rate of return method were still being used by an overwhelming majority of business organizations, the larger companies, which possessed an abundance of financial manpower and management expertise, were working with such concepts as net present value and internal rate of return. The national Industrial Conference Board issued a research repore

---

1. Dougall, Herbert E., "Payback as an Aid in Capital Budgeting", Controller, 29 (February 1961), p. 67-72.

2. Brown, Victor H., "Rate of Return; Some Comments on Its Applicability in Capital Budgeting", Accounting Review, 36 (January 1961), p. 62.

3. Wellington, Roger, "Capital Budgeting", Journal of Accountancy, 115 (May 1963), p. 46-53.

entitled "Managing Capital Expenditures" in mid 1963. The method of discounted cash flow was found to be the most widely used of the more sophisticated methods for calculating the return on an investment. This method is essentially the same as what the author has been referring to as internal rate of return. It was the large business organizations with well established financial departments that were making use of these more sophisticated techniques.

Business executives from eight large companies were interviewed by James C.T. Mao in a 1970 study.[4] He attempted to discover their criteria for implementing a capital asset acquisition investment. He found that one of the basic requirements of the surveyed companies was to minimize the downside risk of the investment. That is to say, they wanted to be relatively certain that the investment would actually give them the rate of return required by their company. Minimizing downside risk would also minimize the possibility of an actual loss on the investment. Even though theorists had been expounding the virtues of the net present value and the internal rate of return methods for several years, six of the eight companies interviewed used the payback period method at least to some extent in their capital acquisition decision making procedures. Mao suggested that the payback period method is primarily a measure of investment risk and for that reason it was being employed.

---

4. Mao, James C.T., "Survey of Capital Budgeting: Theory and Practice", Journal of Finance, 25 (May 1970), p. 349-360, 377-379.

Thomas Klammer, in a 1972 study encompassing 369 business firms found that business organizations had a tendency to shift from the simpler techniques of capital budgeting, such as payback period and average rate of return, to the more sophisticated methods of net present value and internal rate of return.[5] He, however, could not conclude from his results that the payback period was not being widely used in making the investment decision. He stated:

> "...it is clear that the use of one or more of the discounted cash flow methods has been gaining over time and that payback methods have been declining in popularity. Previous surveys usually showed payback as the most widely used standard. This is not strongly contradicted by the present survey responses..."[6]

In 1971, James M. Fremgen conducted a study of capital budgeting techniques used by large business organizations.[7] He surveyed 177 firms and found the most widely used method was the discounted rate of return. The next two preferred methods were the average rate of return and the payback period. His findings confirm the trend that although the more sophisticated techniques are being used to a greater extent by business executives, the more elementary methods such as payback period are still heavily relied upon by many organizations.

---

5. Klammer, Thomas, "Emperical Evidence of the Adoption of Sophisticated Capital Budgeting Techniques", Journal of Business, 45 (July 1972), p. 387-397.

6. Ibid., p. 394.

7. Fremgen, J.M., Capital, Budgeting Practices: A Survey", Management Accounting, 54 (February 1973), p. 67-72.

Departing from the practice used by more researchers, a 1972 study conducted by David F. Scott Jr., Otha L. Grey, and Monroe M. Bird concentrated on the small business operation.[8] The authors defined small business as having less than one million dollars in net assets. They found that only ten percent of the firms identified themselves as using one of the more sophisticated techniques in their capital asset decision making process. Given the tendency of "big business" toward using the payback period method and considering the lack of resources of "small business", these results were not unexpected.

In a survey of Fortune 500 companies in 1973, John J. Neuhauser and Jerry A. Viscone found that for the most part (85 percent of corporations with annual capital budgets greater than 100 million dollars and 60 percent of corporations with annual capital budgets less than 100 million dollars) these corporations use the time value of money approach to capital budgeting.[9] There was, however, still much hostility by practioners toward using the academician's theories about sophisticated capital budgeting techniques. The executives gave three main reasons for their feeling of hostility. First, future cash flows used in the more sophisticated techniques were uncertain and could reduce the credibility of the results of the calculations. Second, these techniques downgrade the human

---

8. Scott, David F., Jr; Grey, Otha L.; Bird, Monroe M., "Investing and Financing Behavior of Small Manufacturing Firms", Michigan State University Business Topics, 20 (Summer 1972), p. 29-38.

9. Neuhauser, John J. and Viscione, Jerry A., "How Managers Feel About Advanced Cpital Budgeting Methods", Management Review, 62 (November 1973), p. 16-22.

element of decision making; too much emphasis on the mathematical models could give young executives too great a feeling of security. Finally, the executives were not convinced that these procedures were actually improving the overall performance of the company. This last statement of the practioner's objection was the subject of a research project by Thomas Klammer.[10] His findings seem to support Neuhauser's conclusion. Using a regression equation, he could find no statistically significant correlation between the sophistication of the capital budgeting techniques employed by a business organization and the organization's ultimate performance.

The trend of the techniques being used by business organizations in the capital budgeting decision making process appears obvious. The modern, more sophisticated methods have been gaining in popularity with business executives. This is not to say that they are now being used by even a majority of business organizations. The question of what methods are actually being employed against what academicians theorize should be employed, remains a topic requiring further study. To this end, this study tested the hypothesis that medium size manufacturing firms in the upper midwest use the payback period method as an aid in acquiring capital assets. The significance of this study is that addressed the topic from a smaller business point of view on a regional basis.

---

10. Klammer, Thomas, "Association of Capital Budgeting Techniques with Firm Performance", Accounting Review, 48 (April 1973), p. 353-364.

CHAPTER III

SURVEY DESCRIPTION

1. Procedure

The purpose of this study is to survey a sample of medium size manufacturing firms in the upper midwest to determine what techniques they are presently using to aid them in making capital asset investment decisions. The firms selected for the sample represented the manufacturing sector, i.e., the two digit Standard Industrial Classification (SIC) ranging from 20-39. Organizations whose sales ranged from $20 to $80 million in 1977 were classified as medium size firms. For purposes of this study, the upper midwest was defined as comprising most of the Ninth Federal Reserve District, specifically the five states of North Dakota, South Dakota, Minnesota, Iowa, and Wisconsin.

A sample of 184 of the business organizations was obtained from Dunn & Bradstreet Million Dollar Directory 1978.[1] The survey of the firms was conducted by mail due to time and geographical constraints. The president of each of the respective firms was sent a questionnaire requesting information concerning his company's

---

1. Dunn & Bradstreet, Dunn & Bradstreet Million Dollar Directory 1978, Dunn & Bradstreet Inc., New York, New York, 1977.

hods of determining the desirability of capital asset acquisition e Appendix 1). A series of questions were asked which were ssigned to insure that the responding company did conform to the onstraints previously stated. Upon receipt of the completed uestionnaires, the information obtained from the individual companies was tabulated. The statistical technique of the Kolmogorov-Smirnov one-sample test was applied to the data to test the hypothesis that medium size manufacturing firms in the upper midwest are presently using the payback period method as an aid in acquiring capital assets. The results of this study were then compared to the findings of a 1971 study by J.M. Fremgen.[2] The Kolmogorov-Smirnov test was also applied to this comparison to varify the validity of the conclusions.

2. Analysis

A. An Overview

A questionnaire was mailed to a sample of 184 medium size manufacturing firms in the upper midwest. Of the total number of questionnaires mailed, 119 companies responded; 64 percent of the total. Not all of the returned responses were useable. The major activity of three of the respondents was non-manufacturing; 36 additional companies could not be classified as medium size. Thus, 80 useable responses were used in this study; 43 percent of the initial mailing.

---

2. Ibid, pg. 19-25.

In responding to the question as to whether their company prepared an annual capital budget, 66 of the 80 firms, 82 percent, indicated that preparing an annual capital budget was part of their company's policy. This would seem to indicate that these business executives realize the importance of capital asset acquisition to their organization. However, when they were asked whether or not a capital budget was prepared for more than one year, only 38 of the companies, 48 percent, answered affirmatively. Apparently, the executives were more concerned with short-run rather than long-run decision making.

When given a choice of among the four general methods used in cpital asset decision making, 48 firms, 60 percent, indicated that they used only one of the methods. Various combinations of two of the methods were being used by 17 companies, 21 percent of the respondents. Three of the methods were being used by eight companies, 10 percent. Only five of the respondents, six percent, made use of all four methods in their capital budgeting decision making process. The executive officer of two of the companies indicated that no formal methods were being used in making the capital budgeting acquisition decision. Their decisions were based on need as individually defined. A breakdown of the number of firms in the various categories can be found in the following table.

TABLE 1

BUDGETING METHODS IN ACTUAL USE

Number of Methods Employed	Payback Period	Average Rate of Return	Internal Rate of Return	Net Present Value	Total
One	31	5	10	2	48
Two	16	7	9	2	17
Three	8	3	6	2	8
Four	5	5	5	5	5
Total	60	20	30	13	

A total of all useable responses indicated that 75 percent of the companies were using the payback period method at least to some extent in their capital acquisition decision-making process. A total of 25 percent of the firms incorporated the average rate of return method into their calculations. The internal rate of return method was used by 37 percent of the respondents and the net present value method was employed by only 20 percent of the responding companies. While in many of these cases these techniques were being used in various combinations, it is not difficult to see by these statistics that the use of the payback period method in actual practice predominated in these medium size manufacturing firms in the upper midwest. A breakdown of the percentages in the various categories can be seen in the following table.

TABLE 2

BUDGETING PERCENTAGES IN ACTUAL USE

Number of Methods Employed	Payback Period	Average Rate of Return	Internal Rate of Return	Net Present Value	Total
One	65%	10%	21%	4%	48%
Two	94%	41%	52%	12%	21%
Three	100%	37.5%	75%	87.5%	10%
Four	100%	100%	100%	100%	6%
Total	75%	25%	37.5%	16.25%	

Since many of the respondents were making use of more than one of the capital budgeting methods, the percentages listed in the preceeding table do not total 100 percent.

B. Statistical Test

The purpose of this paper was to test the hypothesis that medium size manufacturing firms in the upper midwest are presently using the payback period method as an aid in acquiring capital assets. If greater than 50 percent of all firms fitting these criteria use the payback period method in their capital budgeting decision-making process, then it could be inferred that the original hypothesis was correct. Of the firms surveyed 75 percent used payback to at least some extent.

A nonparametric statistical technique was used to test the validity of the hypothesis. The parameters of the population of

manufacturing firms were not specified and the actual distribution of the population was unknown. The author chose the Kolmogorov-Smirnov one-sample test, a "goodness of fit" type of statistical test, as the appropriate technique. This test is concerned with the degree of agreement between a set of sample values and some specified theoretical population distribution. In his book, Nonparametric Statistics for the Behavioral Science, Sidney Siegel states:

> "...the Kolmogorov-Smirnow test may in all cases be more powerful than its alternative, the X^2 test."[3]

Since the Kolmogorov-Smirnov one-sample test has the nonparametric attributes this study required and appears to be some powerful than the chi-square (X^2) test, it was used to determine the validity of the hypothesis. A 0.05 level of significance established sufficient limits on the probability of error in the statistical procedures.

The null hypothesis, H_o, states that this sample could have been taken from a population in which 50 percent or less of the firms were using the payback period method. This hypothesis must be tested against the alternative hypothesis, H_1, that the population had a greater than 50 percent insidence of use of the payback period method.

The Kolmogorov-Smirnov one-sample test was applied to the data on the use of the payback period method. The calculated "D" value

---

3. Siegel, Sidney, Nonparametric Statistics for the Behavorial Science, McGraw-Hill Book Company, New York, New York, 1956.

from the sample responses is 0.25. The critical "D" value with a sample size of 80 at the 0.05 level of significance is 1.52. Thus, since the calculated value exceeds the critical value, the null hypothesis, H_o, can be rejected. For a sample size of 80, a D value of 0.25 has an associated probability under H_o, of $p<0.01$. The random probability that this sample could have been taken from a population in which 50 percent or less of the firms made use of the payback period to at least some extent is $p<0.01$.

In 1971 J.M. Fremgen conducted a survey of 177 business firms.[4] He found that 67 percent of the firms were using the payback period method in their capital budgeting procedures. In order to test his results against the present study, the author used his figure of 67 percent as the expected value of the useage of the payback period method by the population of manufacturing firms. In this case the null hypothesis became: The payback period method is presently being employed by 67 percent of the medium size manufacturing firms in the upper midwest. The Kolmogorov-Smirnov test was applied to the data; it yielded a calculated "D" value of 0.08. The critical "D" value remained 1.52. Since the calculated value is less than the critical value, the null hypothesis can not be rejected. Thus, one can conclude it is possible, at the 0.05 level of significance, that 67 percent of the firms in this category were using the payback period method in their capital budgeting decision making procedures.

---

4. Ibid, pg. 19-25

3. Implications

For years academicians have been educating business students to the fact that the time value of money approach to capital asset acquisition is the most appropriate method for use by a business organization. Why then do business organizations still persist in using such unscientific techniques as the payback period in their decision making process? The answer seems to lie in the fact that the payback period is essentially a measure of the risk involved in an investment. Just as Mao indicated in 1970, business executives want to minimize the downside risk of the investment.[5] Whether the business organization is small, medium, or large, this basic premise of managerial attitude remains unchanged.

The farther into the future that cash flows are projected the more uncertain they become. Unforseen changes in the economic climate can and do occur at anytime, and everywhere from the local community to the total world economy. The sooner an investment will pay for itself the less effect these unforseen changes will have on the ultimate possibility of an unprofitable investment. This uncertainty is what the payback period method measures. The longer the payback period of an investment the greater the uncertainty of return and the greater the downside risk of the investment.

The business executives sampled were fully aware of the downside risk measuring capabilities of the payback period method. Even when other methods were being used, the majority of the time they were being

---

used in conjunction with the payback period method.

Although the business executives realize the importance of capital budgeting to their organization (82 percent of the companies responding had capital budgets), only 47 percent of the firms prepared capital budgets for more than one year in advance. This is still another indication of the executives' unwillingness to extend their companies' financial commitments too far into the future.

Colleges and universities are constantly providing the business community with business graduates that are knowledgeable in the field of capital budgeting. In the past, these people have helped business organizations move from the methods of managing by intuition and guesswork to the use of more sophisticated mathematical models and techniques. This trend will undoubtedly continue for years to come. More and more as business executives become better educated, they will rely on the more sophisticated techniques of capital budgeting.

Another factor that affects the capital budgeting techniques being employed is the tools available to the present day executive. Such things as computers and pre-written programs are becoming more efficient and are more readily available to the entire business community. These factors can only lead to greater sophistication in the techniques of capital budgeting actually being employed by the business community.

It was the hypothesis of this study that medium size manufacturing firms in the upper midwest are presently using the payback period method as an aid in acquiring capital assets. This hypothesis was verified

by the findings of this study. The payback period method was being used by 75 percent of the firms sampled. The Kolmogorov-Smirnov one-sample test showed that the random probability that this sample could have come from a population in which 50 percent or less of the firms were employing the payback period method was $p < 0.01$. In comparison to 1971 practices this study could not establish any significant decline in the use of the payback period method. Payback seems to be as popular as ever with business organizations.

Not withstanding the trend toward more sophistication in capital budgeting techniques, the payback period method is here to stay. Its ease of calculation and its ability to act as a measure of the downside risk of capital investments will cause executives to continue to use payback. Undoubtedly it will be used more and more in conjunction with other techniques such as internal rate of return and net present value.

CHAPTER IV

SUMMARY

There are four general methods by which business organizations analyze capital budget decisions; the payback period of investment, the average rate of return, the internal rate of return, and the net present value. This study tested the hypothesis that medium size manufacturing firms in the upper midwest are presently using the payback period method to determine the desirability of acquiring capital assets. The significance of this study is that it begins to address this topic of capital budgeting to smaller businesses on a regional basis.

A survey was mailed to 184 medium size manufacturing firms in the upper midwest. The useable response rate was 43 percent. It was determined that 82 percent of the firms sampled made use of an annual capital budget. When asked to identify which of the four general methods were being used by their company 75 percent of the respondents indicated their firm was using the payback period method, to at least some extent.

The Kolmogorov-Smirnov one-sample test was applied to the sample data to determine the validity of the conclusions of the study statistically. The test confirmed the original hypothesis at the 0.05 significance level. Medium size manufacturing firms in the upper midwest are using the payback period method in their capital

asset acquisition decision making process.

When the data from this study was compared with data from a similar study conducted in 1971, there was no statistically significant differences in the use of the payback period by business firms.

Even though there is a trend toward more sophistication in capital budgeting techniques, the payback period method is here to stay. Its ease of calculation and its ability to act as a measure of the downside risk of an investment will cause executives to continue using the payback period well into the future.

APPENDIX

APPENDIX 1

QUESTIONNAIRE

1. Average number of employees

   0-25 _____; 25-100 _____; 100-250 _____; G.T. 250 _____

2. Annual gross sales (in millions)

   0-20 _____; 20-75 _____; G.T. 75 _____

3. Major SIC code (if Applicable) _____

4. Do you make a regular (either continuous or periodic) review of your equipment situation for the purpose of improvement and modernization? Yes _____; No _____

5. Do you have an annual capital budget? Yes _____; No _____

6. Do you make up a capital budget for more than one year ahead? Yes _____; No _____

7. Do you have an individual or staff with special responsibilities for the preparation of studies to determine the economic advantage of re-equipment? Yes _____; No _____

8. What methods are used by your company to determine the appropriate capital expenditures in a given situation?

   A. Payback period of the investment _____

   B. Internal rate of return _____

   C. Average rate of return _____

   D. Net present value _____

   E. Other (please specify) _____

   _____

   F. Combinations of the above methods (please list letters)

   _____

APPENDIX 2

311 8th Street North
Grand Forks, North Dakota
February 4, 1978

I am a masters degree candidate in business administration at the University of North Dakota. As a requisite for my degree I am conducting an academic study of capital budgeting methods. I am writing to a sample of business firms in the upper midwest in order to determine what, if any, methods are being used to decide upon capital asset acquisitions.

Would you please complete the attached questionnaire and return it to me in the enclosed envelope. All responses will be kept anonymous and confidential.

Your prompt assistance in this project is greatly appreciated.

Sincerely,

Gary S. Myrand

APPENDIX 2

311 8th Street North
Grand Forks, North Dakota
February 4, 1978

I am a masters degree candidate in business administration at the University of North Dakota. As a requisite for my degree I am conducting an academic study of capital budgeting methods. I am writing to a sample of business firms in the upper midwest in order to determine what, if any, methods are being used to decide upon capital asset acquisitions.

Would you please complete the attached questionnaire and return it to me in the enclosed envelope. All responses will be kept anonymous and confidential.

Your prompt assistance in this project is greatly appreciated.

Sincerely,

Gary S. Myrand

BIBLIOGRAPHY

Brown, Victor H., "Rate of Return; Some Comments on Its Applicability in Capital Budgeting", Accounting Review, 36 (January 1961), p. 10-62.

Dougall, Herbert E., "Payback as an Aid in Capital Budgeting", Controller, 29 (February 1961) p. 67-72.

Dunn & Bradstreet, Dunn & Bradstreet Million Dollar Directory 1978, Dunn & Bradstreet Inc., New York, New York, 1977.

Fremgen, J.M., "Capital Budgeting Practices: A Survey", Management Accounting, 54 (May 1973), p. 19-25.

Freund, William C., "Capital Budgeting", Journal of Accountancy, 54 (May 1963), p. 46-53.

Klammer, Thomas, "Association of Capital Budgeting Techniques with Firm Performance", Accounting Review, 48 (April 1973) p. 353-364.

Klammer, Thomas, "Emperical Evidence of the Adoption of Sophisticated Capital Budgeting Techniques", Journal of Business, 45 (July 1972), p. 387-397.

Kress, George, The Business Research Process, I. Candid Publications, Fort Collins, Colorado, 1974.

Mao, James C.T., "Survey of Capital Budgeting: Theory and Practice", Journal of Finance, 25 (May 1970) p. 349-360, 377-379.

Neuhauser, John J. and Viscione, Jerry A., "How Managers Feel About Advanced Capital Budgeting Methods", Management Review, 62 (November 1973), p. 16-22.

Scott, David F., Jr; Gray, Otha, L.; Bird, Monroe, M., "Investing and Financing Behavior of Small Manufacturing Firms", Michigan State University Business Topics, 20 (Summer 1972), p. 29-38.

Siegel, Sidney, Nonparametric Statistics for the Behavioral Science, McGraw-Hill Book Company, New York, New York, 1956.

Terbough, George, Business Investment Management, Machinery and Allied Products Institute and Council for Technological Advancement, Washington, D.C. 1967.

Weingartner, H. Martin, "Some New Views of the Payback Period and Capital Budgeting Decision", Management Science, 15 (August 1969), p. B-594 - B-607.

Wellington, Goger, "Capital Budgeting", Journal of Accountancy, 115 (May 1963), p. 46-53.

Wert, James E. and Prather, Charles L., Financing Business Firms, Richard D. Irwin Inc., Homewood, Illinois, 1975.