

A Comparative Analysis of the Evaluation Techniques of Capital Budgeting in E-Commerce

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Abstract: E-commerce has grown exponentially as the digital revolution reaches its peak. Most business transactions nowadays have the option of being done electronically or online through the Internet. In this growing field of e-commerce and with the increasing number of potential investments, intensive evaluation of a profitable proposal is essentially necessary in order to increase the value of the firm and avoid losses if possible. This paper aims to analyze the different e-commerce capital budgeting evaluation techniques by critiquing their formulas and identifying the corresponding advantages and disadvantages of using them. An introduction to capital budgeting and the key processes involved will also be presented.

Keywords: capital budgeting, e-Commerce, evaluation techniques, financial decisions

1. Introduction

As the proliferation of e-commerce continuous to grows, opportunities also arise for the possibility of new investments, business expansions, and providing business capabilities allowing online transactions [1]. Decision-making plays an essential role in the success or failure of an e-commerce investment. Thus, in making business decisions about whether to replace, improve, or expand investments, one of the main concerns is about the capitalization. When we say “*capital*,” we are referring to the investment or the financial resources that we can be able to use in the business. On the other hand, “*budgeting*” is the act of planning how and how much of the available resources will be used for a certain activity or event [2][3]. Now the term “*capital budgeting*” refers to a form of business decision-making process by which an entity determines and evaluates potential cash disbursements for major expenses or investments [4][5]. It can also be defined as the process of identifying, evaluating, planning, and financing capital investment projects for a business entity [6]. This may include land and building renovation, plant and machinery acquisition, research and development projects, or long-term venture investment [7].

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Capital budgeting decision-making is very important and must be done with due consideration of many factors. The financial manager of the firm must ensure that decisions are in line with the business entity's goals. In addition, these decisions must add value to the firm by choosing investments that yield the highest possible rate of return without sacrificing quality [8].

Capital budgeting plays the most critical role in financial decision making since it has a significant and direct impact on the profitability of the organization or an investment. These financial decisions are large, long-term, and irreversible. Thus, capital budgeting is very important and should be taken with the utmost consideration in evaluating and choosing investments [9].

Investment decisions come with greater financial risks [10][11]. Good investment decisions always result in great returns, while bad investment decisions may cost an organization its existence or can bankrupt it (*i.e.*, in the worst scenario). The higher risks involved require careful planning and analysis of capital budgeting. A large amount of funds can be required by investment decisions; thus, careful planning on capital budgeting can be essential to guaranteeing the profitability of these investments. In addition to cost reduction, capital budgeting also increases long-term revenues by providing significant changes in the organization's profitability by preventing over- and under-investments.

However, any investment decision depends on the applicable rules and objectives of the organization. Generally, the decision rule itself considers three factors that include cash flows, project life, and discounting factors, as shown in Figure 1.

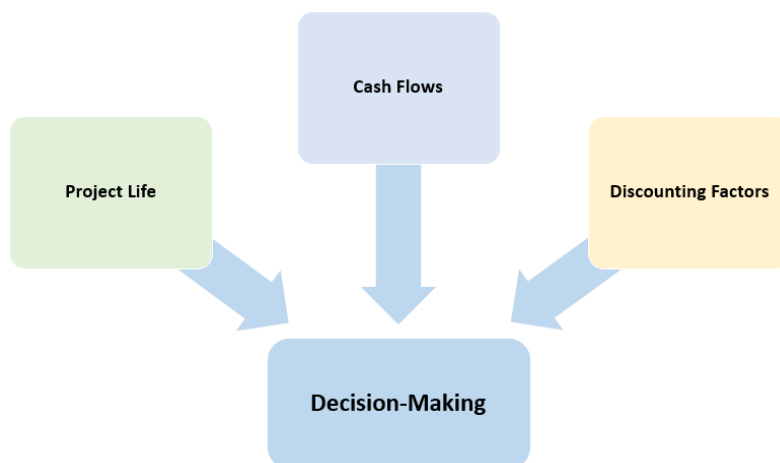


Figure 1. Factors Considered in Capital Budgeting Decision-Making

This paper deals with a comparative analysis of the various evaluation techniques of capital budgeting in e-commerce that are classified into traditional and modern evaluation techniques. The traditional capital budgeting evaluation techniques involve the payback period (PBP) and average rate of return (ARR) methods. On the other hand, modern capital budgeting evaluation techniques involve net present value (NPV), internal rate of return (IRR), and profitability index (PI) methods. This study also provides a discussion of the different steps involved in the e-commerce capital budgeting process. The evaluation techniques will serve as the major determinant in the decision-making process for capital budgeting.

The remainder of this paper is organized as follows: Section 2 outlines the processes involved in e-commerce capital budgeting; Section 3 identifies the different e-commerce capital budgeting evaluation techniques; the comparative analysis of these evaluation techniques is highlighted in Section 4; and Section 5 concludes the study.

2. The E-Commerce Capital Budgeting Process

This section identifies the different steps involved in the e-commerce capital budgeting process, as depicted in Figure 2. It starts with the generation and identification of various investment proposals and projects, followed by the screening of the proposals, evaluation, prioritizing, final approval, implementation, and the performance review [9][10]. In this series of steps, evaluation plays a crucial role in determining whether an investment is worthy of capital budgeting. Evaluating investment proposals is essentially important for making good decisions and increasing profitability for the organization.



Figure 2. The Capital Budgeting Process

2.1 Identification of Investment Proposals and Projects

The generation and identification of good and high-quality investment ideas is the most important step because it is where everything starts. Various investment proposals and projects may come from the organization's top management, functional divisions, or departments, or may even come from people or other entities outside of the organization. The department heads of the organization will be analyzing the various investment ideas and identifying the most promising investment proposals to be submitted to the strategic planning committee.

2.2 Screening the Investment Proposals and Projects

The organization's strategic planning committee will then analyze and screen the submitted investment proposals and projects. These investment proposals may either be a replacement of an old property or investment, an improvement of assets, the installation of new features, an upgrade of

hardware or software resources, or another business expansion. The investment proposals and projects are also verified to see if they are aligned with the organization's objectives and whether they are suitable for its current needs. The investment proposals are analyzed to determine whether they are independent or mutually exclusive projects and are considered based on the available resources.

2.3 Evaluation

When the screening process is done, the investment proposals and projects are then evaluated using the different e-commerce capital budgeting evaluation techniques. These techniques include payback period, net present value, accounting rate of return, internal rate of return, and profitability index methods. Risk analysis may also be used to calculate the probability of gaining or losing on investments in the project proposals. This process plays the most critical role in determining whether to pursue the investment proposals or not.

2.4 Prioritization

The shortlisted investment proposals and projects are then prioritized with respect to the economic resources available, the forecasted timing of the cash flows from the project, and their alignment to the overall strategic plan of the business entity or organization. In this process, the strategic planning committee will identify which investment proposals or projects are expected to become more profitable and economically beneficial to the organization. The expected profit can be calculated based on the projected income less the cash outflows to be incurred for the investment. If the investment proposals and projects are determined to be unsuitable for the organization's financial condition, they are rejected without considering the other nature of the proposals. If it is deemed aligned with the business goals and is found feasible and profitable, then the investment proposal or project will be subjected to further financial planning, property acquisition, and resource allocation.

2.5 Final Approval

When everything is in place, the planning committee approves the investment proposals and projects with consideration for profitability, economic considerations, financial stability, and market conditions.

2.6 Implementation

The approved investment proposals and projects are then implemented. The business activities defined in the proposals were performed, and the allocated resources were disbursed in accordance with the objectives set in the investment proposals and projects. The necessary responsibilities will be assigned accordingly, and an e-commerce website and its essential features will be designed and implemented. It must be guaranteed that the investment proposal and project will be completed within the timeframe indicated in the schedule.

2.7 Performance Review

The final stage of the e-commerce capital budgeting process is the performance review. A monitoring process will be performed once the investment or project has commenced, which involves the comparison of actual results with the standard and expected results. The unfavorable results are identified, and solutions will be determined to address the various difficulties and challenges of the investment or project.

3. Methods of E-Commerce Capital Budgeting Evaluation

The various methods for e-commerce capital budgeting evaluation are generally classified as Traditional and Modern evaluation techniques, as shown in Figure 3. Traditional capital budgeting evaluation techniques are also called “*undiscounted cash flow methods*,” while the modern capital budgeting techniques are called “*discounted cash flow methods*.”

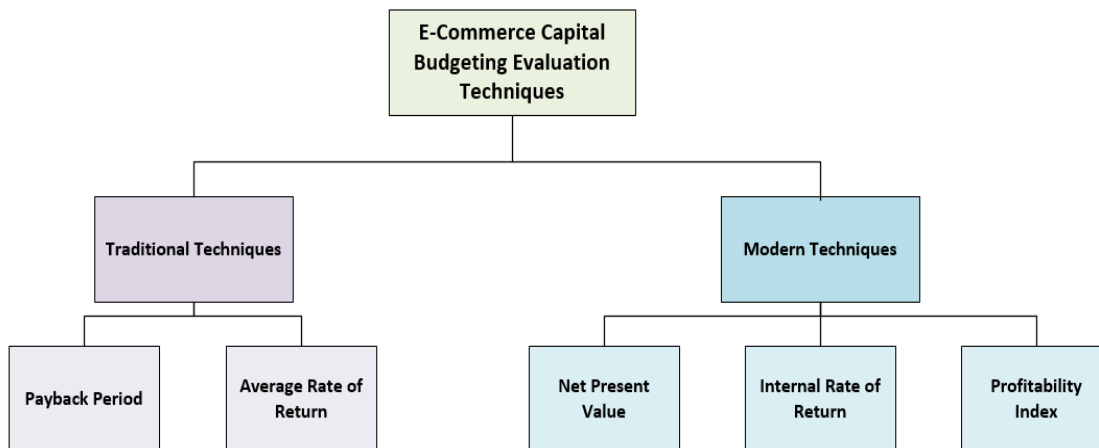


Figure 3. Classification of Capital Budgeting Evaluation Techniques

3.1 Traditional Capital Budgeting Evaluation Techniques

These traditional capital budgeting evaluation techniques do not consider the time value of money. It assumes that the present value is equal to the future value. Aside from being known as the undiscounted method, this can also be called the unsophisticated method. This includes the payback period and the average rate of return [12][13].

3.1.1 Payback Period (PBP)

The payback period is the simplest and most widely used quantitative method for appraising capital expenditure decisions [12][14]. The PBP method refers to the length of time required by the project to return the initial cash outlay investment in the project (*i.e.*, the investment proposal) [15]. The payback period can be computed based on Equation (1).

$$\text{Payback Period} = \frac{\text{Initial Investment}}{\text{Annual Cash Inflows}} \quad (1)$$

The investment proposal can be accepted if the PBP value being computed is less than the maximum acceptable payback period. On the other hand, if the value of the PBP is greater than the maximum acceptable payback period, then the investment proposal is rejected. The ranking method is used in determining the accepted and rejected investment proposals whenever there are many projects being evaluated.

3.1.2 Accounting Rate of Return (ARR)

The accounting rate of return refers to the expected amount of profit or the amount of return that an organization can gain from a certain investment proposal [10][12]. The ARR can also refer to the return on investment (ROI), book value rate of return, financial accounting rate of return, and unadjusted rate of return [16][17]. The accounting rate of return can be computed based on Equation (2).

$$\text{Accounting Rate of Return} = \frac{\text{Average Profit}}{\text{Average Investment}} \quad (2)$$

The investment proposal can be accepted whenever the ARR value computed is higher than the minimum rate being set by the organization's management. On the other hand, if the value is less than the established minimum rate, then, the investment proposal is rejected. In cases where there are many investment proposals, the ranking method is utilized in making decisions on their acceptance or rejection.

3.2 Modern Capital Budgeting Evaluation Techniques

These modern e-commerce capital budgeting evaluation techniques consider the time value of money. This set of methods is a more practical concept for decision-making. The concept of the time value of money states that money invested today will not have the same value tomorrow [10][12]. The modern method suggests that the estimated cash flows must be converted into present value before evaluating any project. Converting future value into present value is known as the process of discounting. This value then becomes the basis for decision-making processes, which is why it is called the discounted cash flow method. This includes the internal rate of return, net present value, and profitability index.

3.2.1 Internal Rate of Return (IRR)

The internal rate of return capital budgeting evaluation method refers to the discount rate that equates the net present value to zero (*i.e.*, NPV = 0). This is because the present value of cash inflows is equal to the initial investment. This is the compound annual rate of return that the entity will earn if it pursues its investment in the venture and receives the given cash inflows [18]. The IRR can be computed based on Equation (3).

$$\text{Internal Rate of Return} = \sum_{t=1}^n \frac{C_t}{(1+r)^t} \quad (3)$$

Where:

C_t = net cash inflow during the period t

r = discount rate

t = number of time periods

For the investment proposal to be acceptable, the value of its internal rate of return must be greater than the cost of capital; otherwise, it is rejected. If there are many projects (*i.e.*, investment proposals) being evaluated, the ranking method can be used in selecting or rejecting the proposals.

3.2.2 Net Present Value (NPV)

This is a time-adjusted method wherein cash flow streams at different time periods with varying amounts can be computed only when they are expressed in terms of a common denominator such as the present value [12]. Thus, this defines the difference between the present value of cash inflows and the present value of cash outflows [19][20]. This method of capital budgeting evaluation is considered the most appropriate measure of the investment's profitability. The NPV can be computed based on Equation (4).

$$\text{Net Present Value} = \sum_{t=1}^n \frac{C_t}{(1+r)^t} - C_0 \quad (4)$$

Where:

C_t = net cash inflow during the period t

C_o = total initial investment costs

r = discount rate, and

t = number of time periods

Decision-making using this method can be based on a comparison between the present value of the future cash inflows and the present value of the cash outflows. That is, if the net present value is greater than 0, the investment proposal can be accepted. On the other hand, the investment proposal will be rejected if the net present value is less than 0. In the case that there are many projects (*i.e.*, investment proposals) being evaluated, the ranking method can be used to make decisions on which proposals are worth investing in and which are to be rejected.

3.2.3 Profitability Index (PI)

The profitability index is also known as the benefit-cost ratio (BCR) of a project or investment proposal [21]. This refers to the ratio of the present value of future net cash flows with respect to the initial cash outflow. This evaluation technique is similar to the net present value method. The only difference is that the total initial investment cost was not a subtrahend, but instead, it became a dividend. The profitability index can be computed based on Equation (5).

$$\text{Profitability Index} = \frac{\left(\sum_{t=1}^n \frac{C_t}{(1+r)^t} \right)}{C_o} \quad (5)$$

Where:

C_t = net cash inflow during the period t

C_o = total initial investment costs

r = discount rate, and

t = number of time periods

For the decision-making process, the investment proposal can be accepted if the profitability index is greater than “1” and rejected if it is less than “1”. If the result is “0”, it would depend on the rules and decisions of the organization’s management.

4. Comparative Analysis

The comparative analysis among the various e-commerce capital budgeting evaluation techniques is presented in this section, where the advantages and disadvantages of each technique are identified. Table 1 presents the comparison between the traditional methods of e-commerce capital budgeting evaluation that involve the payback period technique and the accounting rate of return technique.

These traditional e-commerce capital budgeting evaluation methods depicted in Figure 4 can be simple and easy to understand; however, both the payback period and accounting rate of return methods do not consider the time value of money as well as the salvage value of the investment in the project. Thus, these methods can be considered unsophisticated and undiscounted.

Table 1. Comparative Analysis of Traditional Methods in E-commerce Capital Budgeting Evaluation

Evaluation Technique	Advantages	Disadvantages
Payback Period (PBP)	<ul style="list-style-type: none"> • It can be computed very simply. • Easy to understand. • The interest rates no longer need consideration. • Provide a measure of liquidity. • As an indicator of project risk, the lower the value, the lesser risk that can be incurred. 	<ul style="list-style-type: none"> • Lacks measures on whether the investment increases the organization's value. • The time value of money is not considered. • The salvage value of the investment or project is not considered. • The cash flow is disregarded after the payback period.
Accounting Rate of Return (ARR)	<ul style="list-style-type: none"> • The accounting concept is similar with the income measurement. • The computation is based on accounting information that is readily available. • The income is considered all throughout the life of the investment or project. • It acts as an indicator of the investment or project profitability. 	<ul style="list-style-type: none"> • The time value of money is not considered. • The effect of inflation is disregarded because the values being used are historical costs. • The salvage value of the investment or project is not considered.

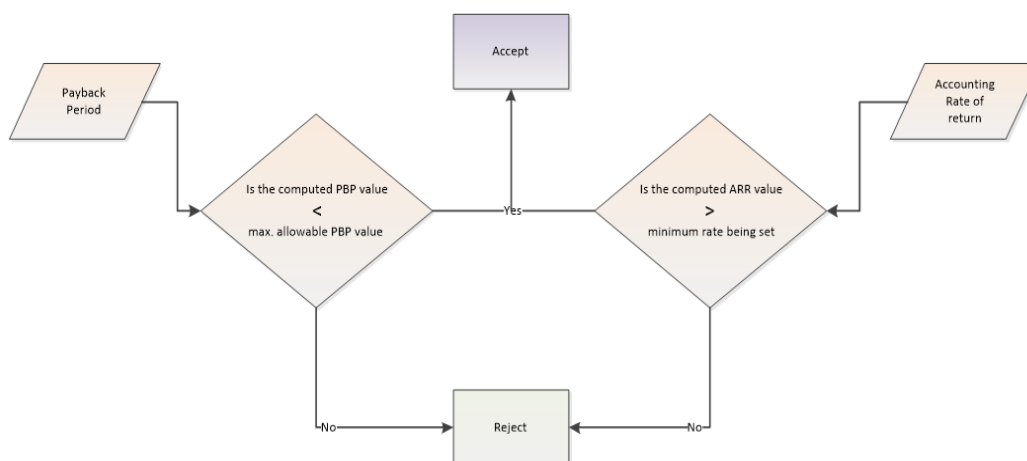


Figure 4. Traditional Capital Budgeting Evaluation Techniques

Table 2 presents the comparison between the modern methods of e-commerce capital budgeting evaluation that involve the internal rate of return technique, the net present value technique, and the profitability index technique.

Table 2. Comparative Analysis of Modern Methods in E-commerce Capital Budgeting Evaluation

Evaluation Technique	Advantages	Disadvantages
Internal Rate of Return (IRR)	<ul style="list-style-type: none"> • The cash flows are emphasized. • The time value of money is recognized and considered. • The true return of the investment or project is computed. 	<ul style="list-style-type: none"> • It does not give a value to maximizing the decision in comparing mutually exclusive investments or projects as well as to investments in capital rationing. • The investment's internal rate of return is assumed as the reinvestment rate. • A different rate of return may result if the investment or project includes negative earnings during its economic life.
Net Present Value (NPV)	<ul style="list-style-type: none"> • The cash flows are emphasized. • The time value of money is recognized and considered. • It assumes that the discount rate is the reinvestment rate. 	<ul style="list-style-type: none"> • It requires an estimate of the investment's cost of capital or the discount rate to be used. • The net present value of different competing investments or projects may not be comparable if their sizes are at different levels.
Profitability Index (PI)	<ul style="list-style-type: none"> • The cash flows are emphasized. • The time value of money is recognized and considered. • The PI value is useful in ranking and selecting investments and projects under capital rationing. 	<ul style="list-style-type: none"> • It requires an estimate of the investment's cost of capital or the discount rate to be used. • It is not appropriate for use in comparing mutually exclusive projects.

The modern e-commerce capital budgeting evaluation methods depicted in Figure 5 recognize and consider the time value of money and emphasize the cash flows, which are the most crucial factors in the determination of the investment or project proposal's economic feasibility. Thus, using these methods can always lead to great decision-making in the approval and disapproval of investment proposals and projects.

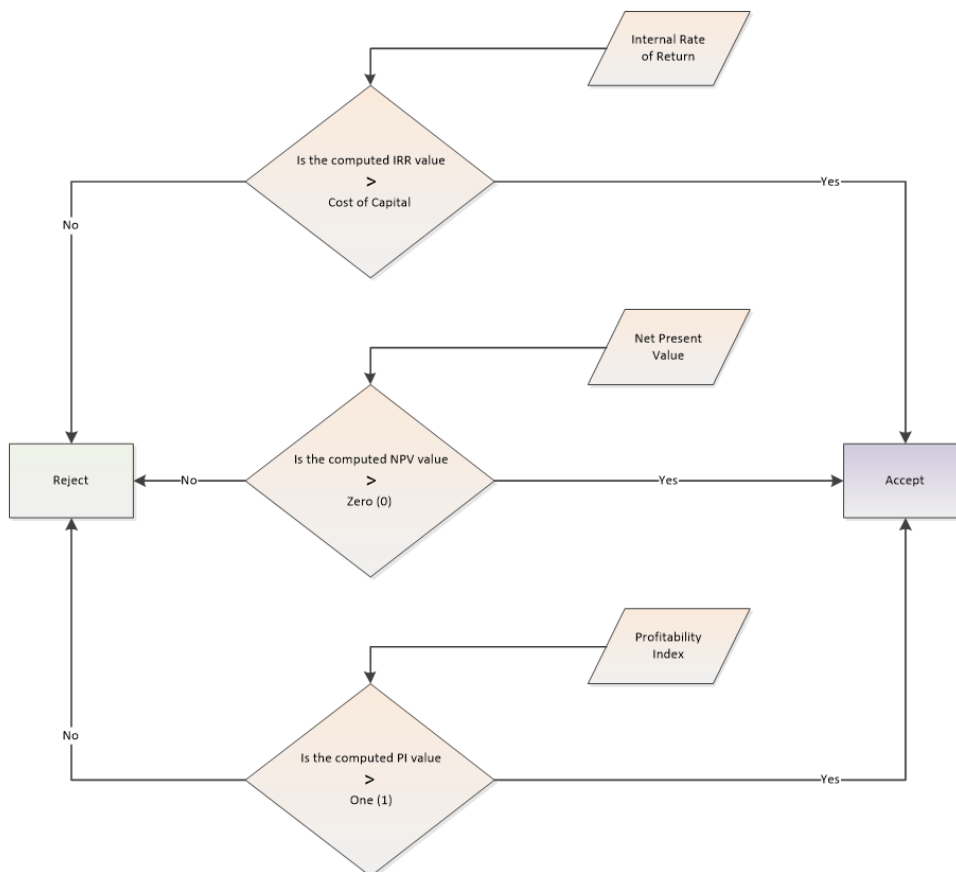


Figure 5. Modern Capital Budgeting Evaluation Techniques

5. Conclusion

E-commerce capital budgeting evaluation techniques are very useful in making financial decisions. Both traditional and modern evaluation methods are being widely utilized by organizations and businesses in evaluating investment proposals and projects. Their usage usually depends upon many factors such as the industry, complexity, and value of the investment or project proposal being evaluated. Micro, Small, and Medium Enterprises (MSMEs) usually utilize the traditional methods because of their simplicity. On the other hand, corporate businesses go with modern methods or even their own advanced techniques in the investment or project proposal evaluation.

Each technique has its own usability strengths. But one thing is for sure: in making investments, the cost-benefit rule must always be considered. The invested costs or value of resources must always be lower than the potential or actual benefits. Furthermore, capital budgeting evaluation is just one of the things to be considered in making business decisions, there are also a lot of other factors to be taken into account. Business experience along with these factors would help discern whether to accept or reject investment proposals or projects.

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