

Capital Budgeting Techniques and Financial Performance: Empirical Evidence from Century Plyboards (India) Limited

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Abstract — Capital budgeting occupies a central position in financial management, serving as the primary mechanism through which organisations assess and commit to long-term investment projects. This study empirically examines the application and effectiveness of standard capital budgeting techniques — Payback Period (PBP), Accounting Rate of Return (ARR), Net Present Value (NPV), Internal Rate of Return (IRR), and Profitability Index (PI) — at Century Plyboards (India) Limited, a leading publicly listed wood panel manufacturer, over the five-year period 2021–2025. Secondary financial data were sourced exclusively from the company's published annual reports and audited financial statements. The analysis reveals that the NPV for the study period is positive at ₹296.22 lakhs and the IRR stands at 15.31%, both indicating overall investment viability. However, the PBP exhibits an increasing trend, rising from 0.44 years in 2021 to 1.47 years in 2025, while the ARR declines from 227.87% to 67.80% over the same period, and the PI falls below unity in 2024 and 2025. These converging signals suggest that although the company's investment base is growing, the efficiency of capital deployment is declining. The study contributes practical insights into how capital budgeting tools can be integrated with comparative balance sheet analysis to assess investment efficiency in a capital-intensive manufacturing firm, and offers actionable recommendations to strengthen long-term financial performance.

Keywords — Capital budgeting; Net Present Value; Payback Period; Internal Rate of Return; Profitability Index; Financial performance; Wood panel industry.

I. INTRODUCTION

Capital budgeting constitutes one of the most consequential domains of financial decision-making in corporate management. It governs the process by which firms evaluate, select, and commit financial resources to long-duration projects whose expected benefits and risks extend over several accounting periods. Such decisions — encompassing capacity expansion, asset replacement, product diversification, and technological modernisation — are largely irreversible and demand substantial capital outlay. Errors in investment appraisal can lead to resource misallocation, diminished returns, and long-term operational inefficiency. It is therefore imperative that firms apply rigorous, scientifically grounded evaluation frameworks before committing funds.

In contemporary business environments characterised by rapid technological change, competitive intensity, and macroeconomic uncertainty, the relevance of robust capital budgeting frameworks has only intensified. The scholarly consensus identifies Net Present Value (NPV) and Internal Rate of Return (IRR) as the most theoretically sound methods, given their explicit incorporation of the time value of money. The Payback Period (PBP), while methodologically simpler and ignorant of post-recovery cash flows, remains widely adopted in practice — particularly in industries requiring rapid liquidity assessment. The Accounting Rate of Return (ARR) offers a profitability perspective grounded in accrual-based income, while the Profitability Index (PI) provides a relative measure of value creation per unit of investment, proving especially useful under conditions of capital rationing.

This study focuses on Century Plyboards (India) Limited, a capital-intensive organisation operating within the Indian wood panel manufacturing sector — an industry experiencing substantial growth pressures arising from urbanisation, real estate expansion, and evolving consumer preferences for branded engineered wood products. The company's recurring investment in plywood, laminate, Medium Density Fibreboard (MDF), and particle board manufacturing facilities creates a rich empirical context for examining how capital budgeting techniques reflect and shape financial performance over time.

This paper proceeds as follows: Section II situates the study within the relevant academic literature. Section III outlines the research methodology and data sources. Section IV presents the empirical analysis and results. Section V discusses key findings and practical implications, and Section VI concludes with recommendations and directions for future research.

II. LITERATURE REVIEW

The academic literature on capital budgeting has evolved considerably over the past four decades, advancing from single-method prescriptions towards integrated, multi-criteria approaches. The theoretical foundation remains rooted in the NPV framework, which Brealey and Myers (2022) affirm as the most reliable measure of value creation, as it directly captures the surplus generated for shareholders after accounting for the opportunity cost of capital. However, empirical surveys consistently document a divergence between theoretical prescriptions and practical adoption patterns, with simpler heuristics — most notably PBP — remaining prevalent among practitioners.

Sokolov (2024) presents a unified analytical framework that links NPV, IRR, PI, PBP, and Discounted Payback Period (DPP), arguing that each metric represents a distinct facet of a project's financial resilience. The study draws particular attention to conditions under which individual metrics may produce conflicting rankings, underscoring the case for multi-method evaluation. Su (2024) provides a comprehensive review of the NPV method's current trajectory in practice, noting growing tensions between the method's theoretical optimality and its sensitivity to discount rate estimation — a challenge amplified in high-uncertainty environments.

Shaheen et al. (2024) conduct a systematic literature review spanning 2000–2023, documenting the progressive incorporation of Environmental, Social, and Governance (ESG) considerations and sustainability metrics into capital budgeting frameworks. Their synthesis highlights that modern investment appraisal must extend beyond financial returns to incorporate long-term societal and ecological consequences. Sharma (2025) reinforces this perspective, advocating for Real Options Analysis (ROA) and AI-driven evaluation models as superior tools for managing flexibility and uncertainty — limitations inherent in conventional discounted cash flow methodologies.

Patawari and Sarawgi (2024) provide rare empirical evidence from the Indian cement industry, employing multiple regression analysis across 380 respondents to demonstrate a statistically significant positive relationship between capital budgeting technique usage and financial performance. Their work establishes the empirical feasibility of this study's approach. Similarly, Mirembe (2023) documents a positive correlation between capital budgeting adoption and financial performance outcomes among Small and Medium Enterprises, while Mota and Moreira (2023), in a two-industry comparative survey, find that metalworking SMEs — which more actively utilise NPV — outperform footwear firms that rely predominantly on PBP.

Within the Indian manufacturing context, Mohan and Narwal (2022) identify a persistent theory-practice gap, observing that financial managers often default to conventional methods despite familiarity with more sophisticated techniques. Siziba and Hall (2021) document the longitudinal evolution of capital budgeting practice across India, South Africa, the United Kingdom, and the United States, noting that NPV adoption has increased in India while PBP continues to serve as a supplementary screening tool. Chandrasekaran (2019) and Imegi and Nwokoye (2015) affirm similar patterns in prior Indian manufacturing studies, with the latter noting that traditional techniques remain inadequate for environments characterised by significant risk and uncertainty.

Taken collectively, the extant literature establishes three salient points that motivate the present study: first, that multi-method capital budgeting evaluation is theoretically superior to single-metric approaches; second, that empirical studies linking technique application to firm-level financial performance in Indian manufacturing remain sparse; and third, that the wood panel sector — notwithstanding its capital intensity and growth significance — is conspicuously underrepresented in capital budgeting research.

III. RESEARCH METHODOLOGY

A. Research Design

This study adopts an analytical research design, examining secondary quantitative data to evaluate the application of capital budgeting techniques and their relationship with financial performance at Century Plyboards (India) Limited. The analysis is longitudinal, covering a five-year period from 2020–21 to 2024–25 (referred to as 2021–2025 throughout this paper). An analytical design is appropriate given the study's objective of synthesising financial data, computing investment appraisal metrics, and drawing interpretive inferences from their temporal trends.

B. Data Sources

All data employed in this study are secondary in nature, sourced exclusively from the company's audited consolidated annual reports and financial statements for the years 2021 through 2025, available through the Bombay Stock Exchange (BSE) regulatory disclosures and the company's official investor relations portal. Financial data extracted include annual sales revenue, operational costs, depreciation, earnings before and after tax, capital expenditure figures, and balance sheet items spanning non-current and current assets and liabilities.

C. Analytical Tools

Five standard capital budgeting techniques are applied, each capturing a distinct dimension of investment performance:

- **Payback Period (PBP):** Measures the time required to recover the initial investment from annual cash inflows. $PBP = \text{Initial Investment} / \text{Annual Cash Inflow}$.
- **Accounting Rate of Return (ARR):** Evaluates profitability relative to the original investment using accounting income. $ARR = (\text{PAT} / \text{Original Investment}) \times 100$.
- **Net Present Value (NPV):** Computes the difference between the present value of future cash inflows and the present value of initial investments, discounted at 10% per annum.
- **Internal Rate of Return (IRR):** Identifies the discount rate at which NPV equals zero, estimated through interpolation between 10% and 11% discount rates.
- **Profitability Index (PI):** Measures the ratio of the present value of future cash inflows to the initial investment. $PI > 1$ indicates acceptance; $PI < 1$ indicates rejection.

In addition, a Comparative Balance Sheet analysis for four sub-periods (2021–22, 2022–23, and 2024–25) is incorporated to contextualise how investment activity has shaped the company's asset structure, capital structure, and liquidity position over time.

IV. DATA ANALYSIS AND RESULTS

A. Cash Flow Derivation

Annual cash inflows are derived from the company's consolidated income statements. Table I presents the computation of Profit After Tax (PAT), which serves as the primary cash inflow proxy throughout the capital budgeting calculations.

TABLE I. ANNUAL CASH INFLOW COMPUTATION (₹ in Crores)

Particulars	2021	2022	2023	2024	2025
Total Sales	2,617.99	3,023.64	3,665.78	3,799.52	4,116.67
Less: Costs	2,137.81	2,543.45	3,171.68	3,372.65	3,719.58
EBDT	542.82	547.72	566.48	508.23	485.38
Less: Depreciation	62.63	67.53	72.38	81.36	88.28
EBT	480.19	480.19	494.11	426.87	397.09
Less: Tax	114.92	154.92	127.27	112.13	112.54
PAT (Cash Inflow)	365.27	325.27	366.84	314.74	284.56

B. Payback Period Analysis

Table II presents the PBP calculated for each year by dividing annual capital expenditure (initial investment) by PAT (annual cash inflow).

TABLE II. PAYBACK PERIOD ANALYSIS (2021–2025)

Year	Initial Investment (₹ Cr.)	Annual Cash Inflow (₹ Cr.)	PBP (Years)
2021	160.33	365.27	0.44
2022	207.73	325.27	0.64
2023	251.16	366.84	0.68
2024	300.80	314.74	0.96
2025	419.78	284.56	1.47

The PBP follows a consistent upward trajectory across the study period, increasing from 0.44 years in 2021 to 1.47 years in 2025. This trend reflects the simultaneous growth in capital expenditure and the declining growth rate of cash inflows. While all observed payback periods remain under two years and are thus within generally acceptable thresholds, the directional trend warrants attention, as it signals a gradual erosion in investment recovery efficiency.

C. Accounting Rate of Return

TABLE III. ACCOUNTING RATE OF RETURN ANALYSIS (2021–2025)

Year	PAT (₹ Cr.)	Initial Investment (₹ Cr.)	ARR (%)
2021	365.27	160.33	227.87%
2022	325.27	207.73	156.60%
2023	366.84	251.16	146.03%
2024	314.74	300.80	104.63%
2025	284.56	419.78	67.80%

The ARR demonstrates a pronounced declining trend, falling from a peak of 227.87% in 2021 to 67.80% in 2025. Despite remaining above conventional benchmarks throughout the study period, the sustained downward pressure reflects the accelerating growth in capital investment outpacing the growth in accounting profits. This compression in ARR indicates that the marginal productivity of each additional rupee invested has been declining — a pattern consistent with the diminishing returns typically observed as firms scale up operations.

D. Net Present Value

TABLE IV. NET PRESENT VALUE ANALYSIS (Discount Rate: 10%)

Year	PAT (₹ Cr.)	Discount Factor (10%)	PV of Cash Inflows (₹ Cr.)	PV of Investment (₹ Cr.)
2021	365.27	0.909	332.43	145.72
2022	325.27	0.826	268.67	171.58
2023	366.84	0.751	275.45	188.62
2024	314.74	0.683	214.96	205.45
2025	284.56	0.621	176.70	260.69
Total	—	—	1,268.21	971.99
Net Present Value (NPV)			₹ 296.22 Crores (Positive — ACCEPTED)	

The cumulative NPV over the five-year study period amounts to ₹296.22 crores, which is positive, satisfying the fundamental NPV acceptance criterion ($NPV > 0$). This indicates that, in aggregate, the investment decisions undertaken by Century Plyboards during 2021–2025 have generated value in excess of the cost of capital, thereby enhancing shareholder wealth.

E. Internal Rate of Return

The IRR is estimated through linear interpolation between 10% and 11% discount rates. At a 10% discount rate, the present value of Cash Flow After Tax (CFAT) aggregates to ₹1,544.82 crores; at 11%, this figure reduces to ₹1,506.23 crores, against a cumulative investment cost of ₹1,339.80 crores.

$$IRR = 10\% + [(1,544.82 - 1,339.80) \div (1,544.82 - 1,506.23)] \times 1\% = 10\% + 5.31\% = 15.31\%$$

An IRR of 15.31% comfortably exceeds the assumed cost of capital of 10%, further corroborating the investment viability indicated by the positive NPV. This spread of approximately 531 basis points represents the margin of safety available to the firm against potential cost of capital increases or cash flow deterioration.

F. Profitability Index

TABLE V. PROFITABILITY INDEX ANALYSIS (2021–2025)

Year	PAT (₹ Cr.)	PV Factor (10%)	PV of Cash Inflows (₹ Cr.)	PI
2021	365.27	0.909	332.43	2.07
2022	325.27	0.826	268.67	1.29
2023	366.84	0.751	275.50	1.10
2024	314.74	0.683	214.97	0.71
2025	284.56	0.621	176.31	0.42

The PI analysis presents a nuanced picture. While the aggregate NPV and IRR indicate overall viability, the annual PI reveals a sharp deterioration in per-unit investment efficiency. The PI declines from 2.07 in 2021 — signifying ₹2.07 in present value generated per rupee invested — to 0.42 in 2025, which falls decisively below the acceptance threshold of 1.00. This signals that the incremental investments made in 2024 and 2025 are, on a standalone year-by-year basis, value-destructive.

This divergence between aggregate NPV and declining annual PI highlights the risk of over-reliance on any single metric and underscores the value of multi-method appraisal.

G. Comparative Balance Sheet Overview

The comparative balance sheet analysis reveals significant shifts in Century Plyboards' financial structure over the study period. Total assets grew from ₹2,52,061 lakhs in 2021 to ₹4,59,283 lakhs in 2025 — an increase of approximately 82% — driven primarily by substantial additions to Property, Plant and Equipment (PP&E) and Capital Work-in-Progress (CWIP). The CWIP figure, in particular, surged from ₹7,540 lakhs in 2021 to ₹72,987 lakhs in 2025, reflecting ongoing large-scale capacity expansion commitments.

On the liabilities side, short-term borrowings expanded from ₹7,232 lakhs to ₹1,04,550 lakhs — a nearly 14-fold increase — indicating a significant reliance on short-term debt to finance long-term asset creation. This structural mismatch between the tenor of financing and the duration of assets represents a material liquidity risk. Equity reserves grew from ₹1,24,834 lakhs to ₹2,34,286 lakhs, demonstrating consistent internal profit retention, although equity growth has not kept pace with the rapid expansion of borrowings. These balance sheet dynamics contextualise the declining PI and increasing PBP: the company is investing aggressively, but the capital efficiency of newer investments has diminished relative to earlier years.

V. DISCUSSION

The multi-method capital budgeting analysis conducted in this study produces a coherent, though nuanced, assessment of Century Plyboards' investment performance during 2021–2025. At the aggregate level, the results are encouraging: the positive NPV of ₹296.22 crores and the IRR of 15.31% — exceeding the assumed cost of capital by over five percentage points — confirm that the company's cumulative investment programme has generated positive economic value. These findings are consistent with broader industry growth dynamics in Indian wood panel manufacturing, which has benefited from strong demand tailwinds arising from urbanisation and real estate expansion.

However, the annual trajectory of key metrics tells a more cautionary tale. The monotonically increasing PBP (0.44 to 1.47 years), the declining ARR (227.87% to 67.80%), and the collapse in PI from 2.07 to 0.42 over five years collectively suggest that the marginal efficiency of capital investment is deteriorating. This pattern is consistent with the economic phenomenon of diminishing marginal returns: as the firm expands its capital base rapidly, each successive increment of investment yields proportionally lower returns. The balance sheet data reinforces this interpretation, with short-term borrowing levels rising sharply, creating potential vulnerability to liquidity shocks.

These findings resonate with theoretical insights offered by Sokolov (2024), who cautions that individual metrics can convey conflicting signals, and with the empirical observation by Mohan and Narwal (2022) that Indian manufacturing firms frequently underinvest in post-completion investment audits. The current study suggests that Century Plyboards would benefit from integrating post-audit mechanisms into its investment appraisal process — comparing projected cash flows with actual outcomes for completed projects — as a means of refining future investment evaluation.

A further implication concerns capital structure management. The rapid accumulation of short-term borrowings to fund long-duration assets introduces structural risk that conventional capital budgeting metrics do not capture. Complementing NPV and IRR analyses with explicit scenario and sensitivity testing — examining the impact of interest rate increases, demand slowdowns, and cost escalation — would substantially strengthen the firm's investment appraisal framework.

VI. CONCLUSION AND RECOMMENDATIONS

This study has examined the application of capital budgeting techniques at Century Plyboards (India) Limited across a five-year period (2021–2025), employing PBP, ARR, NPV, IRR, and PI as analytical instruments. The primary conclusion is that while aggregate investment viability is confirmed by a positive NPV and a comfortably positive IRR, the temporal trajectory of annual efficiency metrics signals a meaningful and sustained decline in the marginal productivity of capital. The company's investment programme, while strategically necessary in the context of industry growth, has been accompanied by an escalation in capital costs and a compression in cash flow returns per unit of investment that demands managerial attention.

On the basis of these findings, the following recommendations are advanced:

- **Capital Structure Optimisation:** The firm should review its financing strategy to reduce reliance on short-term borrowings for long-term investments, seeking to match asset and liability tenors more effectively.
- **Post-Completion Audits:** Systematic post-completion project audits should be institutionalised to benchmark actual cash flows against projected estimates, enabling continuous improvement in appraisal accuracy.
- **Scenario and Sensitivity Analysis:** Sensitivity analysis examining the effect of ± 10 –20% changes in key variables (revenue growth, discount rate, raw material costs) should be incorporated as a standard component of every investment appraisal.

- Working Capital Management: Tighter control over receivables and inventory — consistent with the observed increases in trade receivables and inventories — would improve operating cash conversion and reduce the gap between accounting profit and free cash flow.
- ESG Integration: In alignment with emerging regulatory requirements and investor expectations, the company should begin integrating environmental and sustainability metrics into its long-term capital planning processes.

Future research may extend this analysis through a comparative multi-firm study across the Indian wood panel sector, or by employing stochastic modelling techniques such as Monte Carlo simulation to account explicitly for uncertainty in cash flow projections. Incorporating qualitative data from managerial interviews would further enrich understanding of how capital budgeting decisions are made in practice at firms of this type.

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