Beyond the Bottom Line: Functional-Category Patterns in Monthly Budget Variance at a Commercial Vehicle Manufacturing Plant

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Abstract:

The most important element of budgetary control in large manufacturing plants is to break down the annual financial goals into month-by-month operating disciplines. Although a plant's monthly budget position is readily apparent, little is known whether this variance varies systematically by functional head used to spend the plant's money, such as facilities, human resources, administration, commercial activity, security/legal/compliance and other miscellaneous heads. Primary data on operating cost heads for each month has been used in this study for Commercial Vehicle Business Unit (CVBU) Pune plant of Tata Motors Limited to answer this question from the on the job training placement in Plant Finance department. Variances were calculated for each cost head separately in absolute terms and percentages, both favourable and adverse, and then logical functional categories. One-way ANOVA was used to determine if there was a difference in mean percentage variance between the six functional categories. The plant posted a net favourable variance of ₹1.14 crore for the month with a planned expenditure of ₹210.45 crore (0.54% under budget). There were 27 cost heads (excluding zero plan values) of which 14 were unfavourable, 9 were favourable and 4 were in line after rounding. The results of one-way ANOVA showed that there was no significant difference between the mean percentage variance across the six functional categories, $F(5, 21) = 0.77$, $p > .05$, indicating that the overall positive effect of the plant was not due to any particular functional category. The results indicate that budgets are not managed on a category basis at CVBU Pune, but are balanced at a plant level with cross-functional balancing, where savings in maintenance are counterbalanced by seasonal, HR and compliance-related overspending.

Index Terms:

Budgetary Control, Variance Analysis, Cost Control, Standard Costing, Commercial Vehicle Manufacturing, Plant Finance.

I. Introduction

1.1 Background and Context

Severe month-to-month costs control is essential to the automotive sector and other capital-intensive manufacturing businesses to safeguard margins that are otherwise vulnerable to raw-material price fluctuations, seasonal utilities spikes and compliance with regulations. The key governance tool to ensure this discipline is budgetary control, which involves ongoing monitoring of actual spending against an approved annual operating plan (AOP). Plants convert the annual plan into monthly allocations to dozens of operating cost heads, and Finance teams monitor each month for any early warning signals of overspending or any opportunities for saving money which can be reallocated.

One question that has never been explored in this process is whether under-performance of the plant's overall variance position is due to robust performance in one or two functional areas of plant spending (for instance maintenance), or whether under-performance or over-performance is evenly spread across all functional categories of plant spending. The pattern determines where limited investigative and corrective-action resources should be directed for Finance and Production.

This study addresses this question using primary monthly budget-versus-actual data collected during an on-the-job training (OJT) placement in the Plant Finance department of Tata Motors Commercial Vehicle Business Unit (CVBU), Pune, covering 28 operating cost heads for May 2025.

1.2 Problem Statement

Plant finance teams routinely produce a single net variance result (favourable or adverse) for the month, but this can mean there is a very different story behind the numbers. If one big saving is offset by many small overruns it can lead to a small variance, and if the performance is broadly balanced in all cost categories. If variance is not broken down by functional category, management will not be able to determine if the plant's cost discipline is focused or spread out and therefore know where to direct corrective attention and predictive monitoring.

1.3 Research Gap

The mechanics of standard costing, variance analysis and activity-based costing (ABC) have been well documented in the cost accounting literature (Horngren, Datar, & Rajan, 2021; Drury, 2018; Kaplan & Cooper, 1998); practitioner-oriented texts provide details regarding the computation of volume, rate, and mix variances (Arora, 2021; Khan & Jain, 2020). But comparatively, little published work looks at whether the magnitude of the variance varies systematically across the functional categories of spend within a single plant-month, especially for commercial vehicle manufacturing in India. This study goes beyond that with a granular, cost-head level data from a single plant.

1.4 Objectives of the Study

- To classify the plant's monthly cost heads as favourable or adverse against the approved monthly plan.
- To compute absolute and percentage variance for each of the 28 cost heads.
- To group cost heads into functional categories and test whether mean percentage variance differs significantly across categories.
- To identify the functional categories most responsible for the plant's net favourable position and to recommend areas for tighter monitoring.

1.5 Research Questions

RQ1. What proportion of the plant's cost heads recorded a favourable versus an adverse variance in the month studied?

RQ2. Is there a significant difference in mean percentage variance across functional categories of plant spend?

RQ3. Which functional category contributed the largest share of the plant's net favourable variance?

1.6 Significance of the Study

The study offers Plant Finance and Production teams an evidence-based view of whether cost discipline is concentrated in specific functions or distributed across the plant, informing decisions on where to deploy predictive dashboards, root-cause documentation, and cross-functional budget ownership initiatives.

II. Literature Review

Horngren, Datar, and Rajan (2021) describe standard costing as the practice of setting predetermined benchmarks for material, labour, and overhead costs against which actual performance is measured, enabling early isolation of deviations.

Drury (2018) distinguishes budgetary control, a short-term regulatory discipline that keeps actual spend within sanctioned limits, from cost reduction, a long-term structural effort to permanently lower the unit cost base.

Kaplan and Cooper (1998) introduced activity-based costing as a refinement over blanket overhead allocation, arguing that indirect costs should be traced to the specific activities and drivers that consume them, which is particularly relevant in multi-segment manufacturing plants.

Arora (2021) and Khan and Jain (2020) provide the standard formulae for absolute variance (Actual Cost − Budgeted Cost) and percentage variance (Absolute Variance / Budgeted Cost × 100), and classify deviations into favourable and adverse movements, the framework applied in this study.

Industry reports from the Society of Indian Automobile Manufacturers (2025) and the India Brand Equity Foundation (2025) document the operating environment of Indian commercial vehicle manufacturers, including exposure to commodity price volatility, seasonal utility demand, and regulatory compliance costs — all of which surface as line items in the present dataset.

2.1 Research Gap: While the mechanics of variance analysis are well established, few studies test whether variance magnitude is statistically distinguishable across the functional categories of plant spend within a single reporting period. This paper fills that gap using cost-head-level data from a single CV manufacturing plant.

III. Conceptual Framework and Hypotheses

The conceptual framework treats each of the plant's 28 monthly cost heads as an observation, classified along two dimensions: (a) functional category of spend, and (b) variance direction and magnitude relative to the monthly plan.

Variable	Role	Operationalisation
Functional category	Grouping variable	Facilities & Operating; HR & Employee; Administrative & Overheads; Commercial & Strategic; Security, Legal & Compliance; Miscellaneous
Percentage variance	Primary dependent variable	(Plan − Actual) / Plan × 100, per cost head
Variance direction	Secondary dependent variable	Favourable (variance > 0), Adverse (variance < 0), On-target (variance = 0)

H1. The cost head variances in the plant are not consistent in their direction of favour or against favour.

H2. There is a significant variation in mean percentage variance by the six functional categories of plant spend.

H3. The variance in the plant is heavily skewed in favour of a small number of cost heads, predominantly those for Facilities & Operating.

IV. Research Methodology

4.1 Research Design

This study adopts a quantitative, single-plant, cross-sectional design based on secondary internal data compiled during an OJT placement. The unit of analysis is the individual cost head-month observation.

4.2 Sample

The dataset comprises 28 operating cost heads for May 2025 at the Tata Motors CVBU Pune plant, together with their full-year (FY25) plan, monthly plan, actual monthly spend, and absolute variance. One cost head (Investment Value Write-down) carried a zero plan value and was excluded from percentage-variance and ANOVA calculations, yielding an analytic sample of 27 cost heads.

4.3 Measures

Absolute variance was computed as Plan − Actual (a positive value denotes a favourable/under-spend position). Percentage variance was computed as Absolute Variance / Monthly Plan × 100. Each cost head was assigned to one of six functional categories following the classification used by the plant's own monthly review process: Facilities & Operating (Rent, Repairs & Maintenance, Civic Charges & Water, Yard/Warehouse Upkeep); HR & Employee (Training, Staff Welfare & Recruitment); Administrative & Overheads (Communication, Books & Journals, Printing & Stationery, Memberships & Subscriptions, General Expenses, Shared Services); Commercial & Strategic (Sales & Service Support, Homologation & Export, Advertising & Promotion, Publicity, Consulting Fees); Security, Legal &

Compliance (Security Spend, Audit Fees, Exchange Listing Fees, Wealth Tax Provision, Rates & Taxes, Legal Fees); and Miscellaneous (Lease/Rental Costs, Travel/Conveyance, Investments, Other Costs).

4.4 Data Analysis

Descriptive statistics summarised the overall plan-versus-actual position. Cost heads were classified as favourable, adverse, or on-target. A one-way ANOVA was used to test whether mean percentage variance differed across the six functional categories, with a significance level of 0.05.

V. Results and Data Analysis

5.1 Overall Budget Position

Total planned monthly expenditure across all 28 cost heads was ₹210.45 crore, against actual expenditure of ₹209.31 crore — a net favourable variance of ₹1.14 crore, or 0.54% under budget.

5.2 Classification of Cost Heads

Of the 27 cost heads with a non-zero monthly plan, 9 recorded a favourable variance, 14 recorded an adverse variance, and 4 were exactly on target (Rent, Exchange Listing Fees, Wealth Tax Provision, and Rates & Taxes). Thus H1 is supported: the plant's net favourable position was not the result of uniformly favourable performance, but of favourable movements outweighing a larger number of smaller adverse movements.

Variance direction	Number of cost heads	% of analytic sample (n=27)
Favourable	9	33.3%
Adverse	14	51.9%
On-target	4	14.8%

5.3 Percentage Variance by Functional Category

Functional category	n	Mean % variance	Largest contributor
Facilities & Operating	4	-0.26%	Plant & Machinery Repairs (+₹1.00 cr favourable)
HR & Employee	2	-3.92%	Staff Welfare & Recruitment (-₹0.15 cr)
Administrative & Overheads	6	+1.42%	Shared Services Costs (+7.27%)
Commercial & Strategic	5	-2.06%	Books & Journals-adjacent Homologation & Export (-8.33%)
Security, Legal & Compliance	6	-0.60%	Audit Fees (-5.26%)
Miscellaneous	4	-1.37%	Investments (-2.50%)

A one-way ANOVA testing whether mean percentage variance differed across the six functional categories was not statistically significant, $F(5, 21) = 0.77$, $p > .05$ (SS-between = 59.50, SS-within = 326.48). H2 is therefore not supported: the size of variance is broadly comparable across functional categories rather than concentrated in one or two areas.

5.4 Largest Single Contributors to the Net Favourable Position

Although there is no significant category-level effect, the biggest cost-head contribution towards the plant's net benefit variance was Repair, Renovation & Upkeep with a favourable variance of ₹1.15 crore from a planned expenditure of ₹29.00 crore (mainly ₹1.00 crore on Plant & Machinery Repairs due to a decline in breakdowns). The net favourable position of the head alone in this plant was ₹1.14 crore, which was slightly more than the entire net adverse position of the rest of the 27 cost heads. The plant's overall result was therefore somewhat in favour, namely due to the single Facilities & Operating cost head, and H3 is therefore partially accepted: the net favourable result of the plant was caused mainly by the single cost head ‘Facilities & Operating cost'.

5.5 Offsetting Adverse Movements

The biggest negative movements were in the seasonal and compliance heads including: Municipal Water Charges (-₹0.15 crore) due to longer running of cooling towers in summer months; Training (-₹0.15 crore) due to mid-year hiring; Staff Welfare & Recruitment (-₹0.15 crore) due to interns pre-placement activity; Homologation & Export Activity (-₹0.20 crore) due to compliance testing of export models; and Advertising & Promotion / Publicity (-₹0.25 crore combined) due to digital summer campaigns.

VI. Discussion

6.1 Interpretation of Findings

The results show that CVBU Pune had a higher monthly position for May 2025 due to one cost head Repair, Renovation & Upkeep, where they had many small cost overshoots, mostly seasonal and compliance related, across the rest of the plant. When that one substantial saving is subtracted from the result of the ANOVA, the other categories do not differ very much from each other from the perspective of variance, and no one category ranks significantly higher or lower than the rest.

6.2 Theoretical Contribution

The results clarify the difference between cost-control and cost-reduction (Drury, 2018) and demonstrate that, in reality, a plant's total monthly variance figure may mask a substantial single point of savings. Without cost-head or functional-category disaggregation, this may lead to a misstatement of a plant's extent of cost discipline.

6.3 Managerial Implications

Finance teams need to be careful not to assume a good-net-monthly variance is representative of overall good control, but instead disaggregated review should be carried out to determine if the favourable variance is cumulative or dispersed as had occurred here. Plants should identify the underlying driver (Preventive Machinery Maintenance) as a repeatable practice to sustain, and should use targeted, standardised documentation of root-causes to the recurrent seasonal and HR related overruns that were identified in Section 5.5.

VII. Limitations and Future Research

- Single-month, single-plant data: the analysis covers one month (May 2025) at one plant, limiting generalisability across seasons and sites.
- Small category sizes: functional categories contained as few as two cost heads, reducing the statistical power of the ANOVA.
- Confidentiality: exact proprietary figures beyond the aggregated dataset used here were not accessible, restricting deeper root-cause analysis.
- Future research should extend this analysis across a full financial year to test whether the concentration pattern observed in May recurs, and should incorporate activity-based costing to trace overhead drivers within each functional category more precisely.

VIII. Conclusion

In this study, the authors investigated whether or not a budget variance, which was favourable for the net income of a commercial vehicle manufacturing plant, was generally experienced throughout the company or in particular functional groups. The analysis conducted using primary cost-head data from CVBU Pune, Tata Motors, indicated that the plant closed with a net favourable variance of ₹1.14 crore (0.54% under budget) in general, which was mostly on account of savings in one cost-head – Repair, Renovation & Upkeep – and not uniformly across all functional cost-heads. There was no statistically significant difference in mean percentage variance between the six functional categories that were studied (one-way ANOVA). This study indicates that plant-level budgetary control should be worked out at the cost-head level, not just based on the net monthly figure, and that preventive-maintenance driven savings can be maintained

and recurring seasonal and compliance overruns investigated in a standardised manner; this provides a practical approach to becoming more resilient with budgetary control.

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