



Real Estate Cost Variance Analytics System

From Data Generation to Executive Decisions

This system offers a full-stack analytics solution, simulating real-world cost governance to transform how real estate costs are managed.



Python



SQL Server



Power BI



ChatGPT

The Business Problem: Why We Need Change



Real-world challenges

- Cost overruns identified too late for effective intervention.
- Variance is merely reported, lacking actionable explanations.
- Decisions are often reactive, not data-driven or analytical.



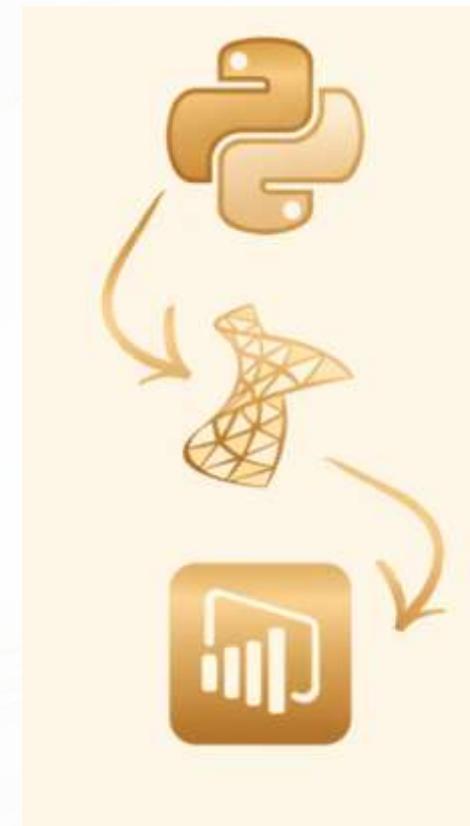
Our Objective

To build a robust system that precisely identifies:

- **Where** cost variance occurs.
- **Why** it occurs.
- **Whether** immediate action is required.

This initiative focuses on developing a **decision-support system**, not just another dashboard.

System Overview: The Architecture Behind the Insights



Key Outputs

- Precise Budget vs. Actual tracking.
- Automated policy breach detection.
- Insights into controllable vs. uncontrollable costs.
- Executive and diagnostic views for targeted action.

□ **Key Principle:** Business logic is rigorously enforced within SQL Server, ensuring data integrity and consistency across all outputs.



Tools & Roles: Leveraging Technology for Precision

Python

- Generated realistic project, budget, and actual cost data.
- Enforced timelines, phases, departments, and behavior patterns.

SQL Server

- Implemented star schema modeling for optimal performance.
- Encoded variance and policy logic directly into the database.
- Ensured data governance and constraint enforcement.

Power BI

- Focused exclusively on data visualization and presentation.
- Strictly no data manipulation or logic creation within Power BI.

ChatGPT

- Provided design validation and refinement.
- Accelerated iteration cycles and debugging processes.
- Served as an AI *co-pilot*, augmenting human expertise.

Data Model & Governance: The Foundation of Trust

Robust Data Model

- **7 Dimensions:** Project, Time, Region, Manager, Phase, Department, Cost Type.
- **3 Facts:** Budget, Actual, and Variance for comprehensive tracking.



Strict Data Governance

- Fixed grain (Project × Month × Phase × Department) ensures granular analysis.
- Policy thresholds are rigorously enforced within SQL Server.
- Controllable vs. uncontrollable costs are clearly modeled and distinguished.

❑ The result is a singular, trusted BI-facing data layer, ensuring consistency and reliability for all stakeholders.



Executive Summary: High-Level Findings

Unfavorable Variance

13 projects currently show an unfavorable variance.

Overall Policy Adherence

Despite individual variances, the overall cost variance remains within company policy guidelines.

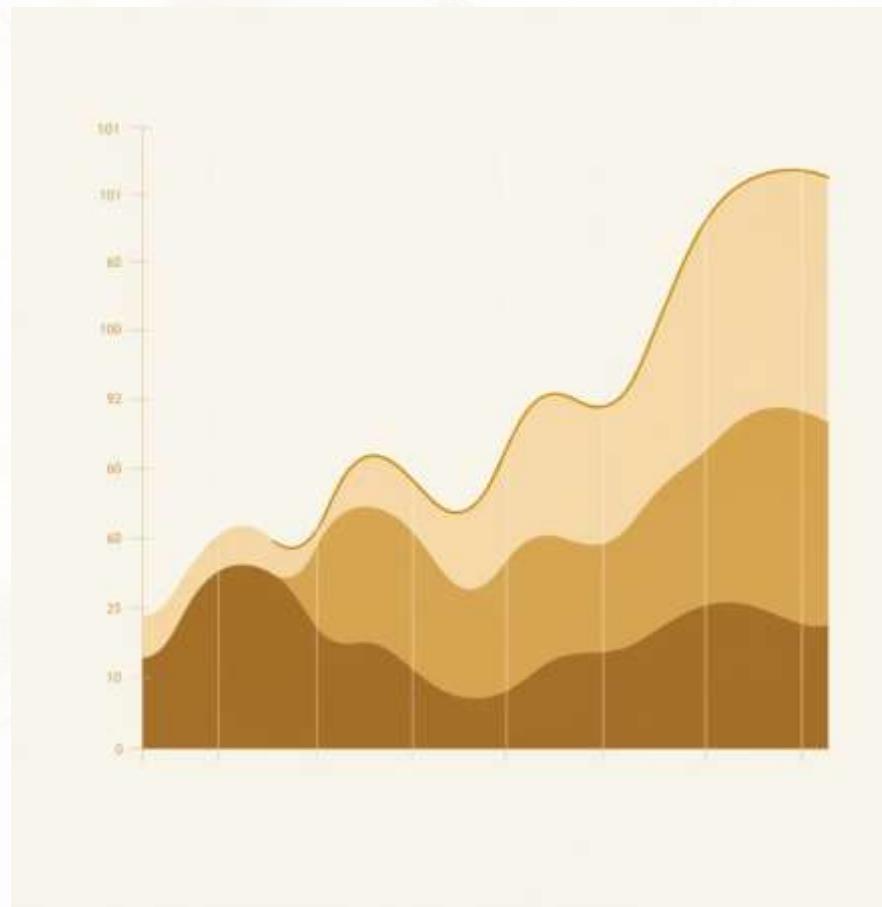
Policy Breaches

Only 2 projects have explicitly breached established policy limits.

Interpretation

While risks exist, they are **contained**. Our focus should be **targeted** and strategic, rather than a broad, undifferentiated response.

Diagnostic Insights: Uncovering the "Why"



Key Drivers of Variance

- **Time:** Q3 (July–September) consistently exhibits the highest unfavorable variance.
- **Resource:** Labor costs represent the largest individual contributor to overruns.
- **Phase:** Structural and Handover phases are significant drivers of project cost overruns.

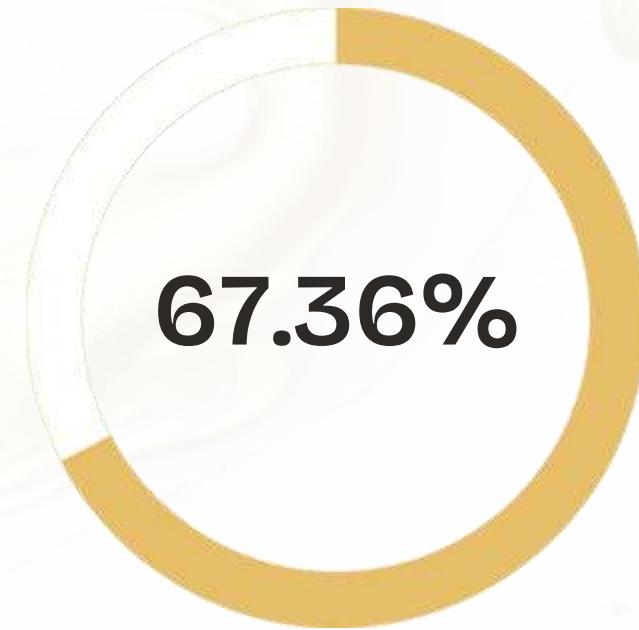


Emerging Patterns

Analysis reveals that smaller projects, often overlooked, carry a disproportionately higher relative risk compared to their larger counterparts.

- This highlights a critical area for focused governance and early intervention.

Controllability & Policy Breach: Actionable Intelligence



Controllable Variance

A significant portion of unfavorable variance can be influenced and managed through proactive measures.

This critical insight shifts the narrative from acceptance to empowerment: most overruns are not inevitable.



Detailed Policy Breaches

- Only 2 projects breached defined policy limits.
- Both were identified as delayed small projects.
- Primary drivers for these breaches: Equipment and Structural costs.

Business Implications: Prescriptive Actions



For the CFO

- Prioritize focus on controllable overruns.
- Implement enhanced governance for small projects.



For Operations

- Strengthen labor and logistics planning, especially for Q3.
- Review and optimize execution protocols during the handover phase.



For Finance

- Shift paradigm from merely reporting variance to actively managing it.
- Leverage insights for predictive financial modeling.





The Power of Integration: What This Project Demonstrates

Strong Data Modeling & Governance

Ensuring reliable, accurate, and secure data foundations.

Ability to Design Systems

Moving beyond dashboards to comprehensive decision-support systems.



Business-First Analytical Thinking

Translating data into strategic business value.



Responsible Use of AI

Leveraging AI as a co-pilot for enhanced efficiency and insights.

Power BI communicates the insight. SQL enforces the truth. Python creates realistic complexity.