

# Project Title: ***Building Expense Analysis & Unit Cost Attribution (1-Year)***

## Overview

This data analysis project aims to explore, clean, analyze, and visualize the operational expenses of a residential building across a one-year period. The core focus is on understanding cost distributions, identifying trends, and attributing expenses fairly across units.

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## Objectives

- Analyze building expenses across 12 months.
  - Classify and generalize expense categories.
  - Calculate per-unit cost shares, considering participation logic.
  - Identify high/low-cost events and monthly patterns.
  - Visualize and report trends for decision-making and reporting.
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## Data

**Source:** Manually cleaned Excel dataset prepared from monthly reports

**Format:** `.xlsx`, one sheet with standardized structure

**Fields:**

- `Month`
- `Cost` (type of expense)
- `Amount` (in Toman)
- `Date` (not used in analysis due to format)

- **Units involve** (e.g., "All", "But 1,3")
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## Data Cleaning & Preprocessing

- Converted **Amount** to integer and removed formatting.
  - Standardized **Cost** descriptions  
(e.g., typo fix: **Electriciy Bill** → **Electricity Bill**).
  - Created a new field **Cost Category** to group costs into general types:
    - Cleaning, Utilities, Repairs, Elevator Maintenance, etc.
  - Parsed **Units involve** to compute unit-specific shares:
    - "All" → shared by all 11 units.
    - "But 1,3" → shared by units 2,4–11 only.
  - Created:
    - **Other Units Share**: amount for each of the 9 participating units.
    - **Unit 1&3 Share**: amount for each of those 2 units.
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## Key Analysis Results

### 1. Total Paid by Each Unit

Unit	Total Paid (Toman)
Unit 1	1,953,402
Unit 3	1,953,402

Units 2,4–11 2,726,513 each

📌 Units 1 & 3 pay less due to exclusion from elevator costs.

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## 2. Total Cost by Category

Category	Total Amount	Frequency
Cleaning	7.24M	18
Elevator Maintenance	5.65M	13
Repairs	...	...

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## 3. Extremes

- 💰 **Highest single expense:** 2,037,600 Toman (Water Bill – Dey 403)
  - 🧹 **Lowest single expense:** 40,000 Toman (Cleaning – Shahrivar 403)
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## 4. Monthly Trends (Pivot Analysis)

- Cleaning was consistently recurring each month.
  - Elevator Maintenance showed spikes in Tir & Ordibehesht.
  - Utility bills (electricity/water) had the highest totals among fixed costs.
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## Visualizations

- Bar chart** — Total paid per unit
- Pie chart** — Cost distribution by category

3. **Line chart** — Monthly trend per cost category
  4. **Stacked bar chart** — Frequency of cost categories by month
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## Tools Used

- **Python**, `pandas`, `matplotlib`
- **Excel** (initial manual data cleaning)
- **Power BI** for Dashboard visualization