✅ Use Case 2: Variance Analysis for Anomaly Detection

The system now performs variance analysis. It reviews key financial metrics across periods, identifying anomalies such as unexpected spikes in depreciation or revenue. These anomalies are summarized in a dedicated sheet, allowing managers to quickly focus on critical issues.

🔄 Automation Steps

1. **Input Data Source**
    - Use the reports downloaded in Use Case 1 as input.
2. **Define Stable Metrics**
    - Identify metrics expected to remain stable:
        - Depreciation
        - Operating Expenses (OPEX)
        - Revenue
3. **Run Variance Analysis**
    - Compare current period vs. previous periods.
    - Flag anomalies such as:
        - Sudden spikes in depreciation
        - Unusual increases in OPEX
        - Unexpected drops or spikes in revenue
4. **Generate Summary Sheet**
    - Create a new sheet in the Excel file:
        - Title: “Anomalies Summary”
        - List flagged items with:
            - Subsidiary name
            - Metric

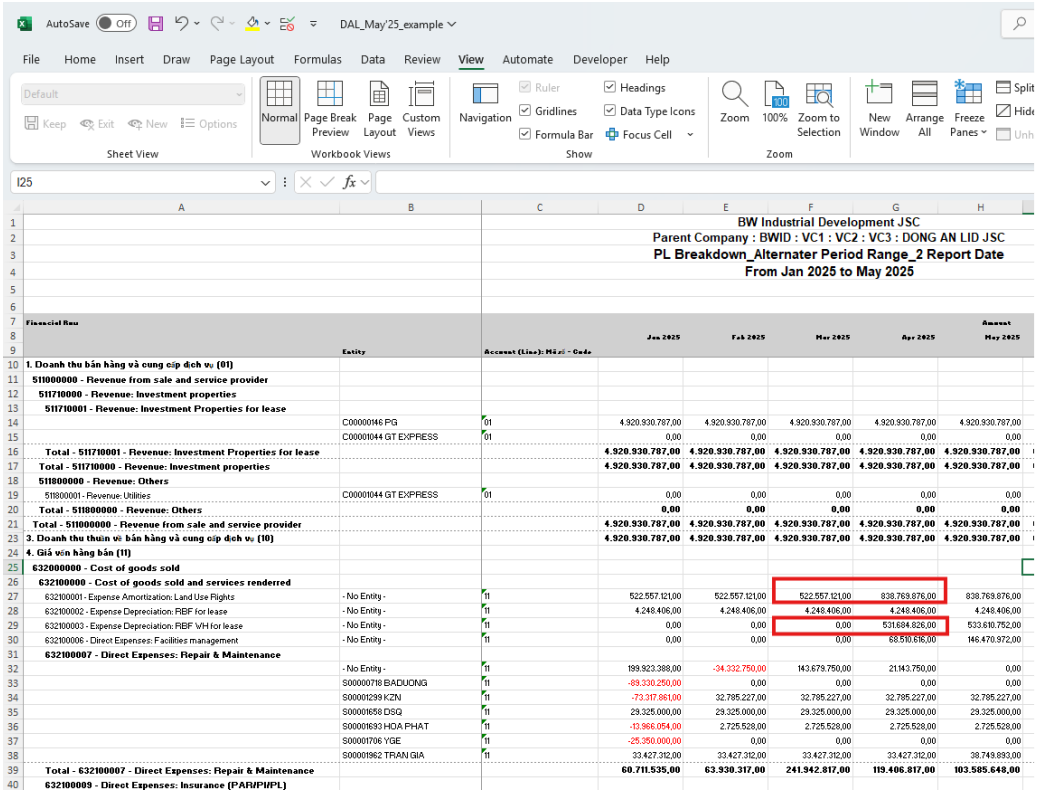
- Period
- Description of anomaly

5. **Highlight for Manager Review**
    - Use conditional formatting to highlight critical anomalies.
    - Optionally, add comments or explanations.

Example review:

D&A (Depreciation & Amortisation) significant increase in Apr'25 and remain stable in May'25 suggesting due to transfer of completed assets;

PL Breakdown



BW Industrial Development JSC
Parent Company : BWID : VC1 : VC2 : VC3 : DONG AN LID JSC
PL Breakdown_Alternater Period Range_2 Report Date
From Jan 2025 to May 2025

Financial Rep	Entity	Account (Line): Mã zi - Code	Jan 2025	Feb 2025	Mar 2025	Apr 2025	May 2025
1. Doanh thu bán hàng và cung cấp dịch vụ (01)							
511000000 - Revenue from sale and service provider							
511710000 - Revenue: Investment properties							
511710001 - Revenue: Investment Properties for lease							
	C00000146 PG	01	4.920.930.787,00	4.920.930.787,00	4.920.930.787,00	4.920.930.787,00	4.920.930.787,00
	C00001044 GT EXPRESS	01	0,00	0,00	0,00	0,00	0,00
Total - 511710001 - Revenue: Investment Properties for lease			4.920.930.787,00	4.920.930.787,00	4.920.930.787,00	4.920.930.787,00	4.920.930.787,00
Total - 511710000 - Revenue: Investment properties			4.920.930.787,00	4.920.930.787,00	4.920.930.787,00	4.920.930.787,00	4.920.930.787,00
511800000 - Revenue: Others							
511800001 - Revenue: Utilities	C00001044 GT EXPRESS	01	0,00	0,00	0,00	0,00	0,00
Total - 511800000 - Revenue: Others			0,00	0,00	0,00	0,00	0,00
Total - 511000000 - Revenue from sale and service provider			4.920.930.787,00	4.920.930.787,00	4.920.930.787,00	4.920.930.787,00	4.920.930.787,00
3. Doanh thu thuần về bán hàng và cung cấp dịch vụ (10)			4.920.930.787,00	4.920.930.787,00	4.920.930.787,00	4.920.930.787,00	4.920.930.787,00
4. Giá vốn hàng bán (11)							
632000000 - Cost of goods sold							
632100000 - Cost of goods sold and services renderred							
632100001 - Expense Amortization: Land Use Rights	- No Entity -	11	522.557.121,00	522.557.121,00	522.557.121,00	838.769.876,00	838.769.876,00
632100002 - Expense Depreciation: RBF for lease	- No Entity -	11	4.248.406,00	4.248.406,00	4.248.406,00	4.248.406,00	4.248.406,00
632100003 - Expense Depreciation: RBF VH for lease	- No Entity -	11	0,00	0,00	0,00	531.684.826,00	533.610.752,00
632100006 - Direct Expenses: Facilities management	- No Entity -	11	0,00	0,00	0,00	68.510.616,00	146.470.972,00
632100007 - Direct Expenses: Repair & Maintenance							
	- No Entity -	11	199.923.388,00	-34.332.750,00	143.679.750,00	21.143.750,00	0,00
	S00000718 BADUONG	11	-89.330.250,00	0,00	0,00	0,00	0,00
	S00001299 KZN	11	-73.317.861,00	32.785.227,00	32.785.227,00	32.785.227,00	32.785.227,00
	S00001658 DSQ	11	29.325.000,00	29.325.000,00	29.325.000,00	29.325.000,00	29.325.000,00
	S00001693 HOA PHAT	11	-13.966.054,00	2.725.528,00	2.725.528,00	2.725.528,00	2.725.528,00
	S00001706 YGE	11	-25.350.000,00	0,00	0,00	0,00	0,00
	S00001962 TRAN GIA	11	33.427.312,00	33.427.312,00	33.427.312,00	33.427.312,00	38.749.893,00
Total - 632100007 - Direct Expenses: Repair & Maintenance			60.711.535,00	63.930.317,00	241.942.817,00	119.406.817,00	103.585.648,00
632100009 - Direct Expenses: Insurance (PAR/PI/PL)							

BS Breakdown

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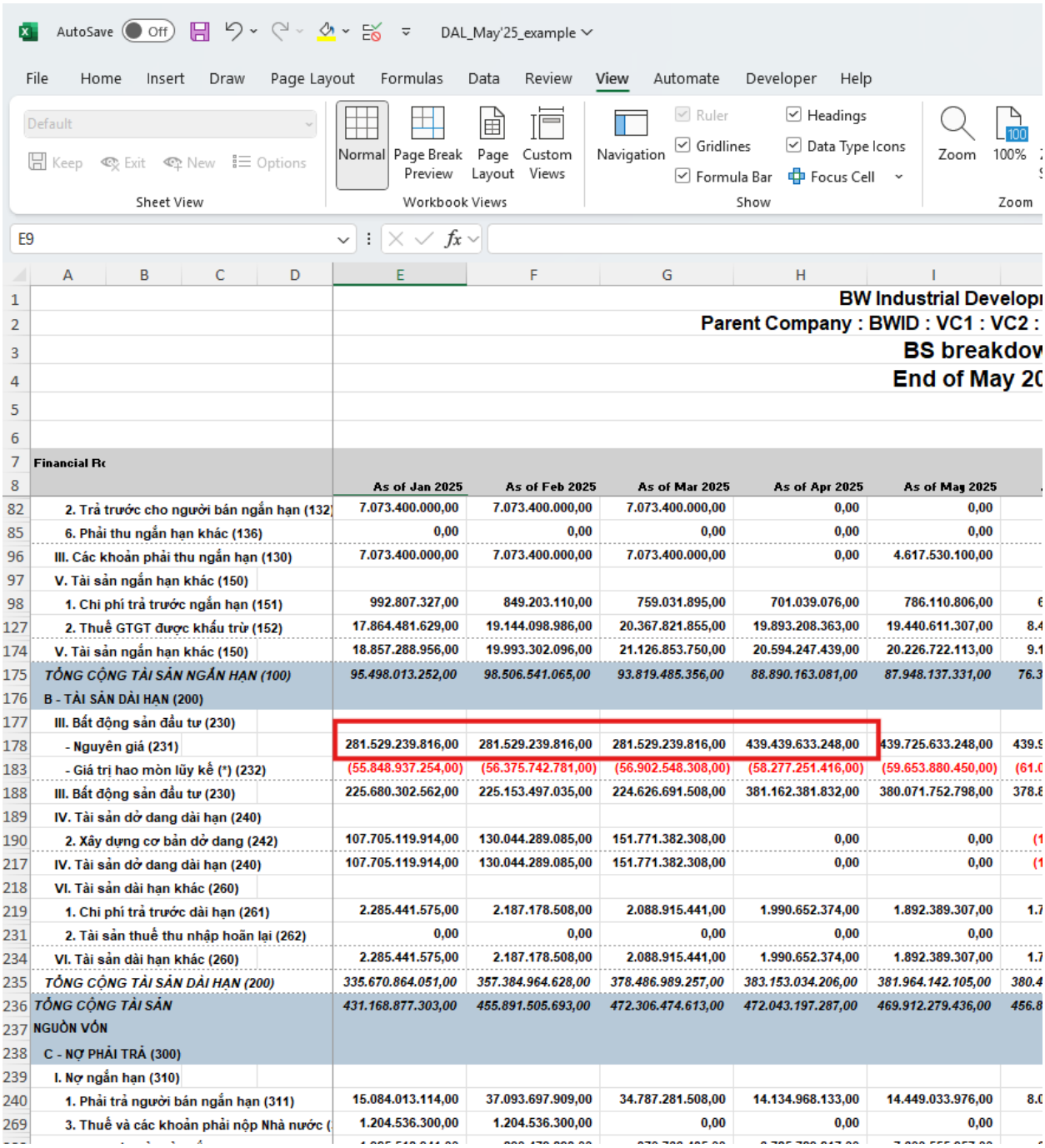

	A	B	C	D	E	F	G	H	I
1									BW Industrial Developı
2									Parent Company : BWID : VC1 : VC2 :
3									BS breakdov
4									End of May 20
5									
6									
7	Financial Rc								
8					As of Jan 2025	As of Feb 2025	As of Mar 2025	As of Apr 2025	As of May 2025
82	2. Trả trước cho người bán ngắn hạn (132				7.073.400.000,00	7.073.400.000,00	7.073.400.000,00	0,00	0,00
85	6. Phải thu ngắn hạn khác (136)				0,00	0,00	0,00	0,00	0,00
96	III. Các khoản phải thu ngắn hạn (130)				7.073.400.000,00	7.073.400.000,00	7.073.400.000,00	0,00	4.617.530.100,00
97	V. Tài sản ngắn hạn khác (150)								
98	1. Chi phí trả trước ngắn hạn (151)				992.807.327,00	849.203.110,00	759.031.895,00	701.039.076,00	786.110.806,00
127	2. Thuế GTGT được khấu trừ (152)				17.864.481.629,00	19.144.098.986,00	20.367.821.855,00	19.893.208.363,00	19.440.611.307,00
174	V. Tài sản ngắn hạn khác (150)				18.857.288.956,00	19.993.302.096,00	21.126.853.750,00	20.594.247.439,00	20.226.722.113,00
175	*TỔNG CỘNG TÀI SẢN NGẮN HẠN (100)*				*95.498.013.252,00*	*98.506.541.065,00*	*93.819.485.356,00*	*88.890.163.081,00*	*87.948.137.331,00*
176	B - TÀI SẢN DÀI HẠN (200)								
177	III. Bất động sản đầu tư (230)								
178	- Nguyên giá (231)				281.529.239.816,00	281.529.239.816,00	281.529.239.816,00	439.439.633.248,00	439.725.633.248,00
183	- Giá trị hao mòn lũy kế (*) (232)				(55.848.937.254,00)	(56.375.742.781,00)	(56.902.548.308,00)	(58.277.251.416,00)	(59.653.880.450,00)
188	III. Bất động sản đầu tư (230)				225.680.302.562,00	225.153.497.035,00	224.626.691.508,00	381.162.381.832,00	380.071.752.798,00
189	IV. Tài sản dở dang dài hạn (240)								
190	2. Xây dựng cơ bản dở dang (242)				107.705.119.914,00	130.044.289.085,00	151.771.382.308,00	0,00	0,00
217	IV. Tài sản dở dang dài hạn (240)				107.705.119.914,00	130.044.289.085,00	151.771.382.308,00	0,00	0,00
218	VI. Tài sản dài hạn khác (260)								
219	1. Chi phí trả trước dài hạn (261)				2.285.441.575,00	2.187.178.508,00	2.088.915.441,00	1.990.652.374,00	1.892.389.307,00
231	2. Tài sản thuế thu nhập hoãn lại (262)				0,00	0,00	0,00	0,00	0,00
234	VI. Tài sản dài hạn khác (260)				2.285.441.575,00	2.187.178.508,00	2.088.915.441,00	1.990.652.374,00	1.892.389.307,00
235	*TỔNG CỘNG TÀI SẢN DÀI HẠN (200)*				*335.670.864.051,00*	*357.384.964.628,00*	*378.486.989.257,00*	*383.153.034.206,00*	*381.964.142.105,00*
236	*TỔNG CỘNG TÀI SẢN*				*431.168.877.303,00*	*455.891.505.693,00*	*472.306.474.613,00*	*472.043.197.287,00*	*469.912.279.436,00*
237	NGUỒN VỐN								
238	C - NỢ PHẢI TRẢ (300)								
239	I. Nợ ngắn hạn (310)								
240	1. Phải trả người bán ngắn hạn (311)				15.084.013.114,00	37.093.697.909,00	34.787.281.508,00	14.134.968.133,00	14.449.033.976,00
269	3. Thuế và các khoản phải nộp Nhà nước (				1.204.536.300,00	1.204.536.300,00	0,00	0,00	0,00

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📊 Correlations for Variance Analysis

#	Primary Metric	Correlated Metric	Expected Relationship	Explanation
1	Investment Properties (IP)	Depreciation & Amortisation	↑ IP → ↑ Depreciation	As more assets are capitalized, depreciation increases proportionally.
2	Loan Balance	Interest Expenses	↑ Loan → ↑ Interest	Higher loan principal leads to higher interest costs.
3	Cash Deposits	Bank Interest Income	↑ Cash → ↑ Interest Income	More cash in bank earns more interest.
4	Trade Receivables	Revenue Timing	↑ Receivables → Quarterly Billing Cycle	Rental fees billed quarterly cause spikes in receivables at start of each quarter.
5	Unbilled Revenue	Lease Revenue Recognition	↑ Unbilled Revenue → End of Quarter	Due to straight-lining and advance collection, unbilled revenue fluctuates cyclically.
6	Unearned Revenue	Advance Rental Collection	↑ Unearned Revenue → Start of Quarter	Advance collection leads to temporary

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#	Primary Metric	Correlated Metric	Expected Relationship	Explanation
				increase in unearned revenue.
7	Construction in Progress (CIP) + IP	VAT Deductible	↑ CIP/IP → ↑ VAT Deductible	Capital expenditures increase deductible VAT.
8	Occupancy Rate	Revenue	↑ Occupancy → ↑ Revenue	Higher occupancy leads to more rental income.
9	Maintenance Expenses	OPEX	↑ Maintenance → ↑ OPEX	Maintenance spikes can drive up operating expenses.
10	Asset Disposal	↓ Depreciation	↓ Assets → ↓ Depreciation	Disposal of assets reduces depreciation base.
11	New Lease Contracts	↑ Revenue	↑ Leases → ↑ Revenue	New tenants increase rental income.
12	Lease Termination	↓ Revenue	↓ Leases → ↓ Revenue	Terminations reduce rental income.
13	FX Rate Changes	FX Gain/Loss	FX Volatility → FX Gain/Loss	Currency fluctuations affect FX-related accounts.

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🧠 Rule-Based Logic for Anomaly Detection

🔹 1. Investment Properties vs. Depreciation

- Rule:
  IF Investment Properties ↑ AND Depreciation ↓ OR Flat → FLAG anomaly
- Reason: Depreciation should increase with asset base.

🔹 2. Loan Balance vs. Interest Expense

- **Rule:**
  IF Loan Balance ↑ AND Interest Expense ↓ OR Flat → FLAG anomaly
- **Reason: Higher loans should lead to higher interest costs.**

🔹 3. Cash Deposits vs. Bank Interest Income

- **Rule:**
  IF Cash ↑ AND Bank Interest Income ↓ OR Flat → FLAG anomaly
- **Reason: More cash should earn more interest.**

🔹 4. Trade Receivables vs. Billing Cycle

- **Rule:**
  IF Month = Start of Quarter AND Trade Receivables ↓ → FLAG anomaly
  IF Month = Mid/End of Quarter AND Trade Receivables ↑ → FLAG anomaly
- **Reason: Receivables should spike at start of quarter due to billing.**

🔹 5. Unbilled Revenue vs. Quarter Timing

- **Rule:**
  IF Month = End of Quarter AND Unbilled Revenue ↓ → FLAG anomaly
  IF Month = Start of Quarter AND Unbilled Revenue ↑ → FLAG anomaly
- **Reason: Unbilled revenue should peak at quarter-end.**

🔹 **6. CIP + IP vs. VAT Deductible**

- **Rule:**
  IF CIP/IP ↑ AND VAT Deductible ↓ OR Flat → FLAG anomaly
- **Reason: Capital investment should increase deductible VAT.**

🔹 **7. Occupancy Rate vs. Revenue**

- **Rule:**
  IF Occupancy ↑ AND Revenue ↓ OR Flat → FLAG anomaly
- **Reason: More tenants should increase revenue.**

🔹 **8. Asset Disposal vs. Depreciation**

- **Rule:**
  IF Asset Disposal ↑ AND Depreciation ↑ OR Flat → FLAG anomaly
- **Reason: Disposals should reduce depreciation.**

🔹 **9. Lease Termination vs. Revenue**

- **Rule:**
  IF Lease Termination ↑ AND Revenue ↑ OR Flat → FLAG anomaly
- **Reason: Terminations should reduce rental income.**

🔹 **10. FX Rate Volatility vs. FX Gain/Loss**

- **Rule:**
  IF FX Volatility ↑ AND FX Gain/Loss Flat → FLAG anomaly
- **Reason: FX fluctuations should reflect in gains/losses.**

📌 **Rule: Material Movement in Recurring Accounts**

🔹 **Definition**

Recurring accounts are those expected to remain relatively stable over time (e.g., depreciation, recurring revenue, OPEX).

🔹 **Logic Rule**

🔹 **Example Accounts**

- Depreciation & Amortisation
- Recurring Rental Revenue
- Operating Expenses (e.g., insurance, utilities, R&M)
- Interest Expense (if loan structure is stable)
- Bank Interest Income (if cash balance is stable)

🔹 **Implementation Notes**

- Compare current period vs. previous period or average of last 3–6 months.
- Use percentage change
  formula: Change %=Current−PreviousPrevious×100Change %=PreviousCurrent−Previous×100

🔹 **Flagging Criteria**

- **> +5% or < -5%** change in recurring account → **Flag as anomaly**
- Include flagged items in the “Anomalies Summary” sheet with:
  - Account name
  - Subsidiary
  - Period
  - % change
  - Suggested reason or comment field