Free Sample Chapter

Controls: PO, contract and the matrix that shows the truth

Procurement Analytics & AI Starter Kit · Version v1.0, November 2026 · All data fictional

This is Chapter 3 of the Starter Kit Guide, complete. It runs on the kit's fictional dataset: 150 invoices from 20 invented Nigerian suppliers, NGN 552,660,500 in total. In the full kit you get the dataset itself, so you can reproduce every number here, build it in Excel step by step, and check your answers.

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Chapter 3. Controls: PO, contract and the matrix that shows the truth

Control analytics: PO and contract together

"PO compliance" is four different things

Concept	Evidence it needs	Sample can show?
PO presence	A valid PO reference on the transaction	Yes
Prior approval	Approval timestamp before the earliest binding commitment	No (no dates)
PO matching	Invoice matched to PO quantity, rate and receipt within tolerance	No
Policy compliance	Applicable policy version, exemptions, correct approval authority	No

The kit's 82.03% measures **PO presence**. A PO raised after the invoice (a retrospective PO) repairs the reference but creates no prior control. An exempt transaction can lack a PO without breaking policy.

Report gross PO coverage first, then a separately labelled policy-adjusted rate with documented exclusions. Never quietly change the headline denominator.

Spend-weighted versus count-based

Spend-weighted PO compliance is 82.03% (NGN 453,357,000 of NGN 552,660,500). Count-based is 70.00% (105 of 150). Both are correct. Spend-weighted answers "how much money is controlled?"; count-based answers "how often do people follow the process?" The department view shows why both matter:

Department	By spend	By count
Operations	97.25%	85.71%
Human Resources	96.10%	76.67%
IT	80.48%	50.00%
Sales	76.48%	78.26%
Supply Chain	54.86%	71.43%
Finance	53.96%	53.57%

IT looks acceptable by spend and poor by count: half its invoices have no PO, but they are the small ones. Supply Chain is the reverse: most invoices follow the process, the big ones do not. Report both, name which is which, and avoid department league tables that ignore different exemption mixes.

The control matrix

Cross the two flags. This is the most important view in the dataset.

	Contracted	Not contracted	Row total
PO raised	NGN 295,172,000 (53.41%), 66 invoices	NGN 158,185,000 (28.62%), 39 invoices	NGN 453,357,000 (82.03%)
No PO	NGN 47,825,000 (8.65%), 34 invoices	NGN 51,478,500 (9.31%), 11 invoices	NGN 99,303,500 (17.97%)
Column total	NGN 342,997,000 (62.06%)	NGN 209,663,500 (37.94%)	NGN 552,660,500

Each box is a different problem with a different owner:

Box	Reading	First investigation	Owner
PO and contract (53.41%)	The process worked	Price compliance: are invoices at contract rates? Validate scope and timing on a sample	Category manager
PO, no contract (28.62%)	Approved buying from suppliers with no contract. A PO compliance KPI hides it	Contract gaps, authorised spot buying, classification errors	Category management; preferred supplier lists at requisition
Contract, no PO (8.65%)	Right supplier, wrong process	Invoices before POs, missing call-offs	P2P process owner; blanket or call-off POs
Neither (9.31%)	Combined exception, 11 invoices	Review each one by name, with no presumption of misconduct	Analytics lead with budget holders

In the "Neither" box, Harbour Insurance Brokers (NGN 25,600,000) and SwiftHaul Nigeria Ltd (NGN 12,875,000) are most of the value. The Finance department holds NGN 38,550,000 of it.

Two arithmetic traps with overlapping flags

Trap 1: adding exception rates. Non-PO spend (NGN 99,303,500) plus non-contracted spend (NGN 209,663,500) is NGN 308,967,000, but that counts the "Neither" box twice. The true review population is 99,303,500 + 209,663,500 - 51,478,500 = **NGN 257,488,500 (46.59%), 84 invoices** (45 + 50 - 11).

Trap 2: subtracting coverage rates. PO compliance minus contracted share is 82.03 - 62.06 = 19.97 points. It is tempting to call that the off-contract PO gap. It is not. With complete Y/N flags:

PO compliance % - contracted % = (PO, no contract %) - (contract, no PO %) = 28.62 - 8.65 = 19.97

The real "PO but off-contract" share is 28.62%. The subtraction hides 8.65 points, because two opposite failures cancel.

Rule: overlapping flags must be cross-tabbed, never added or subtracted.

The Ibadan paradox

Ibadan has the highest PO compliance of any location (87.81%) and the lowest contracted share (44.35%). NGN 91,380,000 of Ibadan spend went through a PO to a non-contracted supplier:

- DataBridge Consulting Ltd, NGN 62,500,000 (one invoice, INV-0018)
- Savanna HR Services Ltd, NGN 12,500,000
- Sahel Office Supplies Ltd, NGN 11,250,000
- five smaller suppliers, NGN 5,130,000 together

A manager who sees only the PO chart would praise Ibadan. The lesson: **a high compliance number can coexist with weak control, because each KPI checks one gate.** The fix in Ibadan is preferred supplier lists enforced at requisition, not PO training.

Software subscriptions bypass the process

Only 35.10% of IT category spend is PO-backed. NaijaCloud Services Ltd, a software subscription supplier, has NGN 14,425,000 of spend without a PO. Subscriptions renew automatically, often on cards or direct debits, and nobody raises a PO for a renewal. The fix is a subscription register with renewal dates and a blanket PO per subscription.

What the sample cannot show: retrospective POs

The sample has no PO date, so 82.03% cannot be split into genuine and retrospective POs. To measure it, add PODate and compute:

Genuine PO compliance = spend where PODate is on or before InvoiceDate / total spend

In many organisations the gap between headline and genuine PO compliance is the biggest finding in the analysis. Present it calmly as a baseline.

Off-contract (maverick) spend, properly defined

Three things people call "maverick"

Term	Definition	Sample field
Off-contract	Paid to a supplier without an active contract for that category and date	ContractedSupplier = N
Off-process	Committed without the required PO or approval	POCompliant = N

Term	Definition	Sample field
Off-policy	Breaks a rule even with PO and contract (split orders, wrong approver)	Needs approval data

The kit defines maverick as off-contract: NGN 209,663,500, 37.94%. Keep that for reproducibility. Say it out loud in every report, because finance teams often mean off-process. Outside the exercise, call the flag-based figure a **proxy** until contract scope and dates are tested.

Calculate maverick from the N flag directly, never as 1 minus contracted share. On the sample they agree because no flag is blank. On real data, the subtraction silently counts unknowns as maverick.

The one-invoice trap

Professional Services holds NGN 115,410,000 of maverick spend (55.05% of it). Consulting is the largest piece at NGN 62,500,000, and that is **one invoice**:

- INV-0018, DataBridge Consulting Ltd, 12 February 2025
- Operations, Ibadan
- 250 units at NGN 250,000
- PO raised, no contract, 7-day terms

It is 54.15% of Professional Services maverick spend and 29.81% of all maverick spend. Without it, maverick spend falls to NGN 147,163,500, or 26.63%.

Before recommending a category programme, ask whether the number is a pattern or an event. One invoice is an event. The right first step is a conversation with the Operations budget holder: what was bought, why no contract existed, and why it was paid in 7 days.

Rule: sort the underlying invoices before recommending any programme.

The flag changes within a supplier

ContractedSupplier is set per invoice, not per supplier. 19 of 20 suppliers have both Y and N invoices; only Mainland Fuel Distributors is contracted on every invoice. Examples:

- DataBridge Consulting Ltd is 44.34% contracted (INV-0018, NGN 62,500,000, is N; INV-0024, NGN 30,000,000, is Y).
- Abuja Facility Care Ltd is 7.83% contracted.
- IronPeak Equipment Ltd is 97.03% contracted.

Keep the flag on the invoice fact. Copying one status from a supplier master onto all history would change the verified answer.

In real data, a flag that varies within a supplier means one of three things:

- a contract started or ended in the period

- the contract has limited scope
- someone set the flag by hand

The robust method is to **derive** status: join each invoice to a contract register on supplier, category, location and invoice date within validity (the Build Guide, section C3, shows the Power Query merge).

Root-cause groups

Group maverick spend by cause, because each has a different fix:

1. No contract exists for a real need: source it.
2. A contract exists but buyers do not know: catalogue, or a preferred supplier list at requisition.
3. A contract exists but does not meet the need: renegotiate scope or service levels.
4. Urgency: an emergency route with retrospective review.
5. Relationship or preference: approval escalation and conflict-of-interest declarations.

You find the cause by taking the top ten invoices to budget holders, not in the data. Budget time for those conversations.

Exercises for this chapter

Worked answers, with common mistakes, are in the full kit's answer key.

F4 [Dataset]. Two PO rates and the lowest location

Task: Calculate PO compliance by spend and by count, and explain why they differ. Which location is lowest?

F6 [Dataset]. Off-contract spend by department

Task: Which department has the most off-contract (maverick) spend in naira?

C1 [Dataset]. The control matrix and the two arithmetic traps

Task:

1. Cross PO and contract flags: spend, share and count in each box.
2. A manager adds non-PO and non-contracted spend to describe "total exposure". Correct the number.
3. Another manager subtracts contracted share from PO compliance to measure "the off-contract PO gap". Correct that too.

C2 [Dataset]. Spend versus count by department

Task: Compute PO compliance by spend and by count for each department. Which department's two numbers disagree most, and why does it matter?

C5 [Dataset]. Pattern or event?

Task: Off-contract Professional Services spend is NGN 115,410,000. How much of it is the single largest invoice? Recompute company maverick share without that invoice.

C6 [Dataset]. The Ibadan paradox

Task: Compare PO compliance with contracted share by location. Which location is best on one and worst on the other, and how much of its spend went through a PO to a non-contracted supplier?

C7 [Dataset]. Possible duplicates

Task: Flag the same supplier and same amount within 45 days. For each flagged pair, what would you check before calling it a duplicate?

C10 [Dataset]. Is the contract flag a supplier property?

Task: For each supplier, compute the contracted share of its spend. How many suppliers have both Y and N? Where should the flag live in the model?

C11 [Dataset]. Subscriptions and the PO process

Task: What is the PO compliance of IT category spend? Which supplier drives it, and what is the likely cause?

What else is in the full kit

In the kit	What it does
The full Guide, 12 chapters	Decisions and reconciliation, concentration, controls, tail and cash, category strategy, savings Finance will sign, safe AI, management reporting, Nigeria practice notes, career evidence, and the limits of the data
Build Guide: Excel and Power BI	Click-by-click builds with an expected value for every formula and measure
Exercise Answer Key	29 exercises and 3 case studies with worked answers and common mistakes
AI Prompt Library	28 prompts with evidence boundaries, many with test answers
Dataset, workbook, KPI dictionary	The fictional CSV, a self-checking Excel workbook, and 29 KPIs with their values on the sample