INTERNAL MEMO

TO: Senior Data Analyst
 FROM: Head of Data & Business Intelligence
 DATE: January 19, 2026
 SUBJECT: URGENT: Transaction Reconciliation Crisis - Financial Systems Integrity
Investigation

Dear Analyst,

We are currently facing a critical situation regarding the integrity of our transaction
processing infrastructure. Following multiple customer complaints, settlement discrepancies
with our banking partners, and alarming findings from our preliminary financial audits, the
Executive Team has mandated an immediate and comprehensive reconciliation analysis.

The CFO has raised serious concerns that transactions are disappearing between systems,
customers are being charged without services being delivered, and our monthly financial
statements may be materially inaccurate. Additionally, we lack visibility into where exactly
transactions are failing in our payment pipeline, which service providers are unreliable, and
how much money we're losing daily.

To address this crisis, we have extracted raw transactional data from five critical systems:
our mobile app, Banklink (our bank transfer gateway), NIBBS (the final settlement system),
CoralPay, and IRecharge (our utility payment processors).

Your task is to build a Transaction Reconciliation & System Integrity Report using SQL that
answers the following critical business problems.

UNDERSTANDING OUR TRANSACTION FLOW (READ THIS CAREFULLY!)

Before you begin your analysis, you MUST understand how transactions flow through our
systems. There are TWO DIFFERENT PATHS depending on transaction type:

PATH 1: BANK TRANSFERS

THE JOURNEY:

STEP 1: Customer initiates transfer in Mobile App

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STEP 2: Transaction sent to Banklink (our banking gateway partner)

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STEP 3: Banklink forwards to NIBBS (Nigeria Inter-Bank Settlement System)

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STEP 4: Money reaches beneficiary's bank

KEY POINTS:

- EVERY bank transfer MUST follow this exact path: App → Banklink → NIBBS
- Banklink is NOT optional - it's our legally required gateway to the banking system
- Timing: App to Banklink takes 1-15 seconds, Banklink to NIBBS takes 5-45 seconds
- Tracking: We link transactions using:
    - `app_transactions.txnRef` = `banklink_transactions.merchantRef`
    - `banklink_transactions.transaction_id` = `nibbs_transactions.transaction_id`

WHAT SHOULD HAPPEN: A customer transfers ₦50,000 to pay rent:

1. App creates transaction with `txnRef: TXN123456789012`
2. Banklink receives it with `merchantRef: TXN123456789012` and assigns `transaction_id: BL9876543210`
3. NIBBS receives it with `transaction_id: BL9876543210`
4. All three systems show status: "successful"
5. Money reaches landlord's account

WHAT GOES WRONG:

- Transaction in App but missing in Banklink = Gateway failure (money debited but stuck)
- Transaction in Banklink but missing in NIBBS = Settlement failure (stuck in transit)
- Transaction in App and NIBBS but missing in Banklink = IMPOSSIBLE! (data corruption or fraud)

PATH 2: UTILITY PAYMENTS

These include: Airtime, Data, Cable TV, Electricity

THE JOURNEY:

STEP 1: Customer buys airtime/data/cable/electricity in Mobile App

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STEP 2: Transaction routes to EITHER CoralPay OR IRecharge (never both!)

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STEP 3: Provider delivers service to customer

KEY POINTS:

- Only ONE provider should process each transaction - check the `provider` column in app_transactions
- CoralPay and IRecharge are competitors - they don't communicate with each other
- Timing: App to provider takes 1-25 seconds
- Tracking: We link transactions using `app_transactions.txnRef` = `coralpay_transactions.txnRef` OR `irecharge_transactions.txnRef`

WHAT SHOULD HAPPEN: A customer buys ₦1,000 airtime:

1. App creates transaction with `txnRef: TXN987654321098` and `provider: irecharge`
2. IRecharge receives it with `txnRef: TXN987654321098`
3. IRecharge shows status: "successful"
4. Customer receives airtime on their phone

WHAT GOES WRONG:

- Transaction in App with `provider: coralpay` but found in IRecharge = Wrong routing
- Transaction in App but in BOTH CoralPay and IRecharge = Duplicate charge (customer charged twice!)
- Transaction in App but in NEITHER provider = Service not delivered (customer didn't get airtime/data)
- Transaction in CoralPay but not in App = Orphaned transaction (who initiated this?)

CRITICAL RECONCILIATION RULES

RULE 1: Every bank transfer MUST appear in all three systems (App → Banklink → NIBBS)
RULE 2: Every utility transaction MUST appear in App AND exactly ONE provider
RULE 3: Transaction status should match across all systems
RULE 4: Transaction amounts should be identical across all systems
RULE 5: Downstream systems (Banklink, NIBBS, providers) should NEVER have transactions that don't exist in App

When these rules are broken, we have a reconciliation issue that needs investigation!

BUSINESS QUESTIONS TO ADDRESS

1. Complete Bank Transfer Reconciliation: Are Transactions Following the Correct Path?

Despite customers reporting successful transfers in our app, banks are claiming they never received the funds. Finance reports that settlement amounts from our partners don't match our app records. Additionally, our audit team found transactions in Banklink and NIBBS that don't exist in our app database.

The Problem:
 We need to verify that every bank transfer initiated in our app successfully flows through Banklink and reaches NIBBS for final settlement. We must also identify where transactions are getting lost in the pipeline and detect "ghost" transactions that appear downstream without originating in our app. Any break in this chain means customer money is stuck somewhere, and we're liable.

What to Investigate:

A. Forward Flow Analysis (App → Banklink → NIBBS):

- How many app bank transfers exist in Banklink?
- How many Banklink transactions made it to NIBBS?
- How many transactions are seen across the 3 services (App → Banklink → NIBBS)?

B. Reverse Flow Analysis (Orphaned Transactions):

- How many Banklink transactions have no matching app record?
- How many NIBBS transactions have no matching Banklink record?
- Which transactions exist in the app but are missing in Banklink?
- What is the total value of these orphaned transactions?
- Are these orphaned transactions successful or failed?

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2. Are Customers Being Charged Twice for Utility Payments?

Customer service is overwhelmed with complaints about duplicate airtime and data purchases.

The Problem:
 Utility transactions should be processed by EITHER CoralPay OR IRecharge, never both. We need to identify transactions that appear in both systems (duplicates) and transactions that appear in neither system (missing payments).

What to Investigate:

- Which app utility transactions appear in BOTH CoralPay and IRecharge?
- Which app utility transactions are missing from BOTH providers?
- Which app transactions went to the wrong provider? (e.g., app says CoralPay but it's in IRecharge)
- How many CoralPay/IRecharge transactions have no matching app record?

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3. Are Transaction Statuses Consistent Across Systems?

Customers show us "successful" screenshots from our app, but partners claim the transactions failed.

The Problem:
Status mismatches create customer disputes, accounting errors, and revenue recognition problems. A transaction marked "successful" in our app but "failed" in Banklink means we think we earned money we never actually received.

What to Investigate:

- How many transactions are "successful" in app but "failed" in Banklink?
- How many transactions are "successful" in banklink but "failed" in NIBBS?
- How many utility transactions have status mismatches between app and providers?
- What is the total value of transactions with status discrepancies?

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4. Which Service Provider Is Most Unreliable?

We need to determine if transaction failures are concentrated with specific partners.

The Problem:
If one provider has significantly higher failure rates, we need to escalate with their management or consider switching providers. Our contracts have SLA penalties we may be able to claim.

What to Investigate:

- What is the success rate for transactions through Banklink vs direct to NIBBS?
- What is the success rate for CoralPay vs IRecharge?
- Which provider has the most missing transactions?
- Which provider has the most status mismatches?

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5. How Much Money Are We Losing Daily?

The CFO needs an immediate estimate of financial exposure from these reconciliation gaps.

The Problem:
 Every missing, failed, or duplicated transaction represents either lost revenue, customer refunds, or settlement discrepancies. We need to quantify the total financial impact.

What to Investigate:

- Total value of transactions missing from Banklink
- Total value of transactions missing from NIBBS
- Total value of missing utility transactions
- Total value of duplicate utility transactions
- Total value of status mismatch transactions
- Calculate daily average loss rate

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6. When Are These Issues Most Common?

Operational teams suspect failures spike during peak hours or specific times.

The Problem:
 If failures correlate with high transaction volume, we may have system capacity issues. If they correlate with specific dates, we may have partner maintenance windows we're unaware of.

What to Investigate:

- Do reconciliation issues spike on certain days of the week?
- Do issues increase during specific months?
- Are there patterns in transaction failure times?
- Do issues correlate with transaction volume spikes?

WHAT THE EXECUTIVE TEAM EXPECTS

This is not a routine analysis. The CEO has personally reviewed customer complaints, and the Board of Directors is aware of the situation. Your analysis will be presented directly to C-level executives and potentially to our banking partners and regulators.

They need answers to:

1. How bad is the problem? (quantified with numbers and percentages)
2. Where exactly is the problem occurring? (which system/partner)
3. How much money is at risk? (total exposure in Naira)
4. Which customers are affected? (volume and demographics)
5. What immediate actions should we take? (data-driven recommendations)

TECHNICAL GUIDELINES

Data Files Available:

1. `app_transactions.csv` (80,000 records)
2. `banklink_transactions.csv`
3. `nibbs_transactions.csv`
4. `coralpay_transactions.csv`
5. `irecharge_transactions.csv`

Key Relationships:

- `app_transactions.txnRef` = `banklink_transactions.merchantRef`
- `banklink_transactions.transaction_id` = `nibbs_transactions.transaction_id`
- `app_transactions.txnRef` = `coralpay_transactions.txnRef`
- `app_transactions.txnRef` = `irecharge_transactions.txnRef`

DEADLINE

The CFO is presenting to the Board on Sunday, and your findings will determine whether we face regulatory scrutiny, customer lawsuits, or partner contract terminations.

Get to work!!!

This is your opportunity to directly impact the company's financial health and operational integrity. The entire organization is counting on your analytical skills.

Best Regards,

Mr. David Okonkwo
 Head of Data & Business Intelligence

CC:
 Chief Financial Officer
 Chief Technology Officer
 Head of Risk & Compliance