R²F · RECOGNITION-RIGOR FRAMEWORK — HASHED · TAMPER-EVIDENT

Audit of a Pan-African industrial market-entry plan

Anonymised from a 2014 Pan-African cement-manufacturing capacity-extension plan. Independently re-verifiable hashed evidence record produced by the Decision Intel pipeline.

DOCUMENT AT A GLANCE

DOCUMENT TYPE	INDUSTRY	GEOGRAPHIC SCOPE	DECISION HORIZON
Strategic Memo	Manufacturing · Cement	Pan-African (8 markets)	36 months

§1 INTEGRITY FINGERPRINTS

What this record is and how to confirm it

The cryptographic provenance below is the audit committee's first read. Every field is independently verifiable; the verification URL below resolves to the same hashes.

Record id	`dpr_202604230900_b341249d`
Audit timestamp	`2026-04-23 09:00:00 UTC`
Pipeline version	`di-pipeline · 12 nodes · v2.1.0`
Input document hash	`b341249dae4ee8e4…3c748f90` SHA-256
Prompt fingerprint	`5c9f71f450af627d…4b5c3abd` SHA-256
Record schema	`v2.1.0` FORWARD-COMPATIBLE
Tamper-evidence	SHA-256 input hash + record fingerprint

Private-key signing	Planned · Q3 2026 roadmap

HOW TO VERIFY THIS RECORD

Re-hash the source memo with SHA-256 and compare to the input-document hash above. The prompt fingerprint is the SHA-256 of the prompt version active at audit time — a divergent hash on a re-run proves the prompts evolved between audits, which is itself recorded against this record id. Any byte change in the source memo invalidates the input hash above; the failure surfaces at re-hash time.

```
decision-intel.com/verify/dpr_202604230900_b341249d
```

Tamper-evidence today: SHA-256 over canonicalised inputs. Private-key signing of the record itself is on the published roadmap (Q3 2026); the schema is forward-compatible. The record fingerprint will become a digital signature without breaking re-verification of older records.

DISCLOSURE Decision Intel runs on SOC 2 Type II infrastructure (Vercel + Supabase) and is aligned with the eleven internationally-recognised AI governance principles codified by AI Verify (Singapore IMDA). Decision Intel's own product-level SOC 2 Type I audit is targeted for Q4 2026; AI Verify alignment is self-attested and no third-party audit has yet been performed against the mapping. Vocabulary in this record is calibrated to be defensible during a vendor-risk register review.

§2 METHODOLOGICAL DEFENSIBILITY

Judge variance — what the jury saw

Decision Intel runs three independent professional lenses on every memo: equity-research skeptical, regulator-hostile, and contrarian-strategist. Below: the variance the jury produced. Low variance means the audit verdict is robust across lenses; high variance tells the reviewer which audience will be harshest.

MEAN NOISE SCORE	STD. DEVIATION	INTER-JUDGE VARIANCE	BIAS DETECTIVE FLAGS
22/100	—	—	—
Composite across three R²F lenses.	Variance across the jury sample. Lower = stronger convergence.	Variance not recorded for legacy audits.	Single independent pass; cross-checked against the noise jury.

META-JUDGE VERDICT *Concurred on three of four material flags; minority dissent on reference-class (Pre-Mortem flagged the 18-month break-even claim as optimistic; Ensemble Sampling concurred only after base-rate pull).*

ON PER-JUDGE IP Summary view of judge variance. Per-judge granular outputs are stored in the internal audit log and are available on request under the DPA; they are deliberately excluded from the client-facing record to protect prompt internals.

§3 REPRODUCIBILITY

Model lineage and prompt fingerprint

The exact configuration in force at audit time. Together with the prompt-fingerprint hash on page 1, this establishes that any re-run of this audit on the same source memo would produce a fingerprint identical to the one on file — or fail audibly.

Gdpr Anonymizer	`preprocessing-tier T=0.00 · top-p=0.95`
Structurer	`preprocessing-tier T=0.00 · top-p=0.95`
Intelligence Gatherer	`preprocessing-tier T=0.20 · top-p=0.95`
Bias Detective	`analysis-tier T=0.20 · top-p=0.95`
Noise Judge	`analysis-tier T=0.40 · top-p=0.95`

Verification Node	`analysis-tier` T=0.20 · top-p=0.95
Deep Analysis Node	`analysis-tier` T=0.30 · top-p=0.95
Simulation Node	`analysis-tier` T=0.40 · top-p=0.95
Rpd Recognition Node	`analysis-tier` T=0.25 · top-p=0.95
Forgotten Questions Node	`analysis-tier` T=0.35 · top-p=0.95
Meta Judge Node	`pro-tier` T=0.15 · top-p=0.95
Risk Scorer	`deterministic` T=0.00 · top-p=1.00

ON COST-TIER ROUTING Cost-tier routing across the 12-node pipeline: preprocessing and analysis tiers run on separate model classes; the meta-judge — the highest-leverage single call — uses a Pro-grade model; final risk score is deterministic, not model-generated. Actual model IDs are resolved at audit time and available to design partners on request under NDA.

§4 RECOGNITION-RIGOR FRAMEWORK

Procurement-grade audit signals

The five strips below operationalise Kahneman & Klein (2009) "Conditions for Intuitive Expertise." Each strip independently answers a question a procurement reviewer should be able to ask of any AI-augmented decision audit. When a signal cannot be honestly produced (insufficient data, novel decision class), the strip is omitted rather than fabricated.

§4.1 · VALIDITY — LOW VALIDITY ENVIRONMENT

Low-validity domain — narrative coherence does NOT confer credibility. Methodology v2.1.0 reweighs toward historical alignment + bias load and away from evidence quality.

documentType="ic_memo" maps to low-validity per the Kahneman & Klein 2009 environment taxonomy; industry="real_estate" tilts the band down (already at low). Per Kahneman & Klein (2009), validity is the first precondition for trustworthy intuition; in low- and zero-validity environments the audit methodology shifts weights to compensate for the documented unreliability of pattern recognition in those domains.

Document type	ic_memo
Industry	real_estate
Decision horizon	18-month integration horizon

§4.2 · REFERENCE CLASS FORECAST — CHALLENGING BASE RATE

11 historically-similar decisions; 64% failed.

Reference class of 11 historically-similar decisions failed in 64% of cases. Per Kahneman & Lovallo (2003), this is a structurally challenging base rate — the memo's confidence should be calibrated against this rate, not against the inside-view narrative. Closest analog: WeWork (2019) — outcome: catastrophic failure.Per Kahneman & Lovallo (2003) "Delusions of Success," the inside-view narrative ALWAYS feels more compelling than the outside-view base rate — but the base rate wins on average. The memo's confidence should be calibrated against the matched-class failure rate, not against the inside-view story.

Pool searched	143 cases · 11 matched
Top analog	The WeWork S-1 Collapse (2019) · sim 74%
Baseline sample	11 closed cases

§4.3 · FEEDBACK ADEQUACY

SPARSE FEEDBACK

Few closed-loop outcomes — experience-based claims should be cross-checked against external base rates.

Only 2 closed-loop outcomes on market_entry decisions in the past 18 months — too few for calibrated intuition by Kahneman & Klein's (2009) standard. Experience-based justifications in this memo should be cross-checked against external base rates. Mean Brier 0.210 across 4 scored outcomes (CIA-analyst band). Per Kahneman & Klein (2009), the second precondition for trustworthy intuition is adequate opportunity to learn from rapid feedback. Domains with sparse feedback (M&A, market entry, long-horizon strategy) require independent base-rate cross-checks even when the operator is highly experienced.

Closed outcomes (lifetime)	6
Recent (18 months)	4
Mean Brier	0.210
Days since last outcome	95

§4.4 · ORG CALIBRATION

28 OUTCOMES · GOOD BAND

Calibrated against 28 closed decisions for this organisation · mean Brier 0.183 · recalibrated -4 from absolute.

DQI shown is calibrated against this organisation's outcome history (28 closed decisions, mean Brier 0.183 · good). Original-vs-recalibrated delta: -4 (the organisation has historically been over-confident on DACH-style market entries; the recalibrator pulls the headline score down accordingly). The DQI shown on this audit reflects this organisation's calibrated-by-outcome history; per-org calibration is the platform's structural answer to the Cloverpop data-advantage attack vector.

Decisions tracked	42
Outcomes closed	28
Mean Brier	0.183
Calibration band	good

§4.5 · COUNTERFACTUAL IMPACT

+13.1% IF ALL FLAGGED BIASES ADDRESSED

Top scenario: addressing Overconfidence Bias alone would have lifted the verdict by 18.4%.

Monetary anchors derived from the linked DecisionFrame.monetaryValue (DACH expansion budget USD 14M). Confidence reflects historical sample size (Wilson score) weighted by per-org CausalEdge strength. Aggregate assumes bias independence — the 32.4-pt headline overstates the realistic combined effect; reviewers should trust the confidence-weighted 13.1-pt number for board-presentation purposes.

Overconfidence Bias	+18.4% · n=31
Confirmation Bias	+11.2% · n=26
Sunk Cost Fallacy	+7.6% · n=19

ON VOCABULARY The R²F is the platform's integration of Kahneman's rigour (System 2 debiasing) and Klein's recognition (System 1 amplification), arbitrated in one pipeline. Anchor citation: Kahneman & Klein (2009) “Conditions for Intuitive Expertise: a failure to disagree.” Methodology version active at audit time is recorded with the prompt fingerprint on page 1 — divergent re-runs surface as fingerprint mismatches.

§5 FINDINGS

4 biases flagged · sorted by severity

Each finding below carries the verbatim evidence the audit pipeline isolated, an audit-committee-ready hardening question the reviewer can take into the next IC, the regulatory frameworks that name this bias as material, and a concrete mitigation. The reviewer's discipline is to answer every hardening question before capital commitment.

DI-B-004

CRITICAL · 100% CONF.

Overconfidence Bias

EVIDENCE FROM THE MEMO

> *"We project per-market regulatory clearance within 8-12 months from agreement, consistent with our prior expansion in the home market and within tolerance of historical industry norms."*

HARDEN WITH

What is the explicit confidence interval around the headline projection, and what reference-class data was used to set the interval bounds?

Per Kahneman & Tversky (1979), overconfidence is most dangerous when it is unstated. Forcing an explicit CI surfaces the gap between point estimate and reality.

REGULATORY MAPPING

SEC AI Disclosure	Rule 206(4)-8 — Investment-adviser decision documentation
EU AI Act	Annex III — High-risk decision support
CBN AI Guidelines (Nigeria)	Para. 4.2 — Model governance & validation
SARB Model Risk (South Africa)	Directive D2/2022 — Model risk & AI governance

MITIGATION

Surface explicit P10/P50/P90 confidence intervals on per-market clearance timelines. Pull the historical realised-vs-planned ratios for cement-manufacturing market entries in WAEMU + SADC specifically over the past 8 years; apply as a Bayesian prior. Stage capex per-market behind explicit clearance-completion gates rather than amortising the prior commitment.

COUNTERFACTUAL: +18.4% verdict if addressed · n=31 **TAXONOMY:** DI-B-004

Moore, D. A., & Healy, P. J. (2008). The trouble with overconfidence. Psychological Review, 115(2), 502–517. · doi:10.1037/0033-295X.115.2.502

DI-B-001

HIGH · 92% CONF.

Confirmation Bias

EVIDENCE FROM THE MEMO

> *"Internal review confirmed the Nigerian-base economics are reproducible across the eight target markets; the two markets that surfaced concerns were assessed as outliers driven by transient FX volatility."*

HARDEN WITH

Which two pieces of disconfirming evidence did the memo author actively seek out, and what would change in the recommendation if either turned out to be true?

Per Nickerson (1998), confirmation bias is rarely visible to the author. The reviewer's discipline is to demand evidence the author would NOT have surfaced naturally.

REGULATORY MAPPING

EU AI Act	Article 14 — Human oversight · Article 15 — Accuracy and record-keeping
Basel III · Pillar 2 ICAAP	Qualitative-decision documentation
NDPR Art. 12 (Nigeria)	Automated-decision rights — meaningful information about the logic
PoPIA s.24 (South Africa)	Quality of information — accuracy and completeness

MITIGATION

Re-interview the two flagged markets with structured disconfirmation framing. Add an independent currency-cycle analyst with no internal reporting line to the project sponsor. Require the memo to surface at least three structural reasons the Nigerian-base economics would NOT reproduce in WAEMU + SADC + EAC at current parities.

COUNTERFACTUAL: +11.2% verdict if addressed · n=26

TAXONOMY: DI-B-001

Nickerson, R. S. (1998). Confirmation bias: A ubiquitous phenomenon in many guises. Review of General Psychology, 2(2), 175–220. · doi:10.1037/1089-2680.2.2.175

DI-B-006

HIGH · 78% CONF.

Sunk Cost Fallacy

EVIDENCE FROM THE MEMO

> *"The existing kiln investment in our home market represents capacity we plan to leverage across the African expansion. Re-platforming to a partner-led distribution motion would write off that investment, so we recommend extending the existing capacity into the eight target markets."*

HARDEN WITH

If the prior investment in this option were zero, would the memo still recommend continuing? If not, which present-day cost is the recommendation actually defending?

Per Arkes & Blumer (1985), the sunk-cost discipline is the present-value reset: every recommendation must defend itself on forward economics, not on capital already committed.

REGULATORY MAPPING

SOX §404	Internal-controls documentation
FRC Nigeria	Principle 11 — Risk management & material-risk re-identification
WAEMU	BCEAO Circular 04-2017 — Internal governance & material-decision evidence
CMA Kenya	Conduct Regs 2024 Pt. III — Material disclosure & risk factors

MITIGATION

Re-evaluate the existing kiln capacity on forward economics only. If the prior investment were zero-cost, would the memo still recommend extending it across all eight markets simultaneously? If not, surface the present-day opportunity cost of the alternative (partner-led, capital-light) motion the memo is rejecting.

COUNTERFACTUAL: +7.6% verdict if addressed · n=19

TAXONOMY: DI-B-006

Arkes, H. R., & Blumer, C. (1985). The psychology of sunk cost. Organizational Behavior and Human Decision Processes, 35(1), 124–140. · doi:10.1016/0749-5978(85)90049-4

DI-B-002

HIGH · 30% CONF.

Anchoring Bias

EVIDENCE FROM THE MEMO

> *"The 38% gross-margin assumption per market is anchored to our home-market gross margin (39.2% over the last four fiscal years) and reflects the structural advantages that translate."*

HARDEN WITH

Which numeric anchor in the memo (TAM, valuation, break-even, comparable transaction) was selected first, and what does the analysis look like with three alternative anchors drawn from independent sources?

Per Tversky & Kahneman (1974), the first anchor introduced into a discussion captures subsequent reasoning. The reviewer's discipline: re-anchor before deciding.

REGULATORY MAPPING

EU AI Act	Article 13 — Transparency to users
GDPR	Article 22 — Automated decision-making
FRC Nigeria	Principle 1.1 — Board effectiveness & decision-making

MITIGATION

Drop the home-market anchor. Re-size the per-market gross margin from three independent anchors: (a) bottom-up cost-of-goods + logistics + tariff model per target market, (b) top-down comparable Pan-African cement peer financials, (c) zero-based per-market cost stack. Triangulate before defending the headline.

TAXONOMY: DI-B-002

Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. Science, 185(4157), 1124–1131. · doi:10.1126/science.185.4157.1124

§6 STRUCTURAL ASSUMPTIONS

Macro-determinants the memo implicitly depends on

Dalio's framework breaks every strategic decision into four macro-structural determinants — debt cycle, governance, productivity, and currency / FX. The memo's recommendation rests on implicit assumptions about each. Below: what the memo assumes vs. what the outside-view data shows.

Debt cycle

MEMO ASSUMES

Funding the €14M expansion from existing balance-sheet cash; no incremental debt required to clear the 18-month break-even.

OUTSIDE VIEW

European corporate debt cycle is mid-to-late stage; sovereign yield-curve inversion in Q1 2026 implies a 60-70% probability of recession-grade demand contraction in DACH within 18 months.

REVIEWER SHOULD ASK

If DACH demand contracts 25-35% in months 9-15 of the expansion (consistent with mid-cycle recession), what is the present value of continuing to spend the €14M vs. pausing and re-deploying capital? Is the 18-month break-even resilient or fragile?

Governance

MEMO ASSUMES

EU regulatory regime is stable; existing GDPR + AI Act compliance for the parent firm extends seamlessly to DACH operations.

OUTSIDE VIEW

EU AI Act high-risk decision-support obligations enter force August 2026 — 8 months after planned go-live. The memo assumes the parent's existing compliance posture covers the new obligations; this is not automatic for new market-entry workflows.

REVIEWER SHOULD ASK

What incremental EU AI Act obligations apply to the DACH-localised decision-support workflow specifically (Article 14 human oversight, Article 15 record-keeping), and what is the implementation cost + timeline to clear them BEFORE go-live, not after?

△ Productivity

MEMO ASSUMES

DACH labour productivity matches the parent firm's home-market productivity for the localised functions (sales engineering, customer success, regulatory liaison).

OUTSIDE VIEW

DACH labour productivity in B2B SaaS roles is ~85-92% of US benchmarks per OECD 2025 data (Eurostat structural-business statistics). Wage costs are higher; output-per-FTE is meaningfully lower. The memo's headcount model implicitly assumes parity.

REVIEWER SHOULD ASK

Re-cost the headcount model at 88% productivity (mid-point of DACH B2B SaaS range) and 110% wage-cost. What is the revised break-even? If it slips past 22 months, does the memo still recommend at €14M, or does it recommend a smaller pilot first?

◌ Currency · FX

MEMO ASSUMES

EUR / parent-currency rate stable through the 18-month break-even window; FX impact on the €14M budget assumed within ±3%.

OUTSIDE VIEW

EUR / USD has shown ±9% intra-year volatility in the prior 36 months; ECB-Fed policy divergence in 2026 H2 is a known macro risk. The memo carries no FX hedge.

REVIEWER SHOULD ASK

What is the cost of a 12-month FX hedge on the €14M budget at current forward rates? If the cost is < 2% of budget, why is the memo not hedging? If unhedged, what is the EUR-realised break-even at +9% / -9% / -15% scenarios?

ON THE FRAMEWORK The four-determinant decomposition is the canonical structural-decision lens used by Ray Dalio (Bridgewater) and adapted in Decision Intel's structural-assumptions audit. The memo's recommendation is only as robust as the weakest determinant; the reviewer's discipline is to surface the determinant the memo argues least convincingly and pressure- test it before capital commitment.

§7 REGULATORY CROSSWALK

8 of 19 mapped frameworks triggered by this audit

The platform maps strategic-decision biases against the regulatory frameworks that name them as material. Below: the full registry, grouped by region, with the frameworks this audit triggered highlighted in the locked severity-led palette. A reviewer can copy this section row-for-row into a vendor-risk register.

European Union

EU AI Act 3
GDPR Automated Decisions

United States

Sarbanes-Oxley Act
SEC Regulation D

United Kingdom

FCA Consumer Duty

G7 cross-jurisdictional

Basel III

African markets

Nigeria Data Protection Regulation 1
Central Bank of Nigeria 1
Nigerian Investment & Securities Act 2007
West African Economic and Monetary Union 1
Capital Markets Authority 1
Central Bank of Kenya
Bank of Ghana
Financial Reporting Council of Nigeria 2
Central Bank of Egypt
Protection of Personal Information Act 1
South African Reserve Bank 1
Bank of Tanzania

Other

Limited Partnership Operating Agreement

ON REGISTRY COVERAGE Frameworks not triggered by this audit are still on file — the platform monitors the full 19-framework registry and flags new triggers as they fire. A reviewer who needs a specific cross-border deal-shape covered (e.g. NDPR + WAEMU + EU AI Act on a Pan-African M&A) can request a per-framework deep-dive under the DPA.