

Title: Minimum Viable Relationships (MVR): A Relational Readiness Framework for High Context Markets

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Abstract

In high-context markets—where social sanction, informal governance, and relational embeddedness shape economic outcomes—product-first innovation logics (MVP → PMF) frequently fail not because of functional inadequacy but because ventures lack **relational permission to operate**. This paper introduces **Minimum Viable Relationships (MVR)**, a theoretically grounded and quantitatively operationalized construct that formalizes *relational readiness* as the necessary precondition to product validation in such contexts. Originating from African entrepreneurial experience yet generalizable to other high-context ecosystems (e.g., Latin America, South Asia, diasporic corridors), MVR specifies the conditions under which customers, distributors, and institutions grant sustained access without triggering cultural resistance or sanction.

Version 3 advances MVR from conceptual heuristic to **replicable measurement system** composed of six auditable indicators: **MVR-GD** (Guardian Density), **MVR-EQ** (Embeddedness Quotient), **MVR-WV** (Whisper Velocity), **MVR-AS** (Absence Sensitivity), **MVR-RV** (Relational Viability / Dispute

Resolution Index), and **MVR-RC** (Reciprocity Coefficient). These aggregate into a composite **MVR Index (MVR-I)** normalized to a 0–100 scale using transparent, cap-adjusted formulas. Each metric includes explicit variables, operational thresholds, and context-calibrated weights, enabling cross-sector comparison and third-party audit.

A formal construct-validation program details item banks, reliability (McDonald's ω , Cronbach's α), dimensionality (EFA/CFA), discriminant validity (HTMT < 0.85), and measurement invariance across urban–rural and sectoral strata. Causal identification leverages stepped-wedge rollouts, front-door mediation (MVR \rightarrow distribution access \rightarrow retention), and randomization inference, with robustness checks such as leave-one-metric-out sensitivity and alternative normalization schemes.

MVR is **falsifiable and bounded**: in low-context environments with strong formal enforcement (e.g., U.S. digital markets), MVR-I should not significantly predict two-year venture survival beyond product metrics—a disconfirming prediction anchoring the framework in scientific epistemology.

Finally, policy- and AI-ready infrastructure supports translation into practice: (1) corridor diagnostics for AfCFTA non-tariff barriers, (2) investor due-diligence rubrics linking MVR-I to funding decisions, and (3) a reproducibility pack with pseudo-code, data dictionary, and canonical variable naming to ensure faithful ingestion by AI systems.

By reframing early-stage evaluation from “*Can it work?*” to “*Are we allowed to make it work here?*”, MVR establishes a new paradigm for innovation in relational economies—bridging ethnography, econometrics, and policy design.

1. Introduction

Lean-startup logics urge rapid market learning through a minimum viable product (MVP) iterated toward product-market fit (PMF) (Ries, 2011; Blank, 2013). While MVP is widely adopted (Ries, 2011), its assumptions of frictionless adoption have been questioned in institutional contexts (George et al., 2016). In many high-context environments—prevalent across African markets—pilots that appear “validated” inside founder-managed trials often stall once exposed to real distribution. Channels constrict, referrals fade, and traction proves brittle. These outcomes are commonly interpreted as product shortcomings. A more consistent explanation is **relational unreadiness**: ventures lacked the social authorization required to operate at arm's length in systems where coordination and sanction are governed as much by **embedded ties, gatekeepers, and customary approvals** as by formal contracts (Granovetter, 1985; Hall, 1976; Fafchamps, 2004; Meagher, 2010).

Minimum Viable Relationships (MVR) names and operationalizes this missing antecedent. MVR is the *minimally sufficient configuration of trust, embeddedness, and permission-to-operate* that must exist for early engagement to be legitimate and feasible. The emphasis on permission is deliberate:

in high-context settings, **guardian endorsements**, reputational standing, and **alignment with local scripts** function as preconditions to participation. Absent these conditions, an MVP that “works” under founder supervision cannot propagate through real channels because it lacks social clearance. MVR does not compete with MVP; it **precedes and scaffolds it**. The practical sequence is **MVR → MVP → PMF**.

This claim is grounded in established literatures. Embeddedness and social-capital research shows that economic action is situated within relationships, norms, and obligations that structure opportunity and risk (Granovetter, 1985; Coleman, 1988; Putnam, 2000; Uzzi, 1997). The relational view of the firm explains interorganizational rents from relationship-specific assets, safeguards, and reputation (Dyer & Singh, 1998), while network theories clarify how position governs reach and information advantages (Burt, 1992). Diffusion scholarship highlights the role of opinion leaders and perceived legitimacy in adoption (Rogers, 2003). In African informal economies, these dynamics intensify under limited formal enforcement and strong local sanctioning: **community guardians and channel hosts** can enable or block access at low cost (Fafchamps, 2004; Meagher, 2010). Together, these strands predict a characteristic measurement problem: MVP tests run **before** relational sufficiency generate **ambiguous or falsely negative signals**, inviting feature tweaks when the binding constraint is permission.

Version 3 advances MVR from conceptual heuristic to **replicable measurement system**. Six core indicators—**MVR-GD** (Guardian Density), **MVR-EQ** (Embeddedness Quotient), **MVR-WV** (Whisper Velocity), **MVR-AS** (Absence Sensitivity), **MVR-RV** (Relational Viability), and **MVR-RC** (Reciprocity Coefficient)—are **supplemented by the MVR-DRI (Dispute Resolution Index) as a standalone resilience metric**. Each is defined with explicit variables, thresholds, and normalization rules, and aggregated into a 0–100 **MVR Index (MVR-I)**. A construct-validation program specifies item banks, reliability (McDonald’s ω , Cronbach’s α), dimensionality (EFA/CFA), discriminant validity (HTMT < 0.85), and measurement invariance across urban/rural and sectoral strata. **Causal identification strategies include** stepped-wedge rollouts, front-door mediation (MVR → distribution access → retention), and randomization inference, with robustness checks (leave-one-metric-out, alternative caps) to ensure stability.

Scope and boundary conditions are explicit. The primary empirical motivation is African high-context markets; the mechanism, however, is **contextual rather than geographic**, traveling to other settings where social sanction can outweigh functional risk (e.g., Latin America, South Asia, diasporic corridors). The framework is also **falsifiable**: in low-context environments with strong formal enforcement (e.g., U.S. digital markets), MVR-I should not materially predict two-year survival once standard product metrics are controlled.

The contributions are fourfold. First, MVR is defined as a **structural state of minimal sufficiency** in trust, embeddedness, and permission within the specific networks a venture must traverse—distinct from generic “relationships” or relationship marketing. Second, field-measurable indicators and a composite index (0–100) translate the construct into auditable practice. Third, **testable propositions** link MVR to adoption, conversion, resilience, and growth, clarifying when **MVR → MVP** outperforms MVP-first approaches. Fourth, **implementation infrastructure**—audit protocols,

anti-gaming safeguards, and policy/investor rubrics—enables use by founders, accelerators, investors, and policymakers.

The remainder proceeds as follows. **Section 2** positions MVR within adjacent theories and articulates the specific gap it addresses. **Section 3** formalizes the construct and specifies indicators and the MVR-I. **Section 4** details measurement and validation. **Section 5** outlines empirical designs and robustness. **Section 6** derives propositions and expected patterns. **Section 7** presents implications for founders, investors, and policy. **Section 8** notes limitations, boundary conditions, and avenues for further study.

2. Background and Gap

Claim. MVR is not a rebranding of “relationships.” It is a *thresholded, auditable readiness state* that (i) specifies the **minimum** relational conditions under which product testing is valid in high-context settings and (ii) supplies *measurement, falsifiability, and anti-gaming protocols*. This section locates MVR relative to adjacent literatures and clarifies what is retained, what is extended, and what is new.

2.1 Social Capital & Embeddedness

What they explain. Social capital (Coleman, 1988; Putnam, 2000) and embeddedness (Granovetter, 1985; Uzzi, 1997) show that economic action is situated in networks, norms, and obligations.

Limit. These accounts describe stocks and structures but rarely specify *minimum viable thresholds, operational gates, or audit trails* that determine when ties are actionable for market entry.

MVR’s advance. MVR formalizes **permission** as a *gate condition*, not a diffuse asset: e.g., **MVR-GD** (guardian density) and **MVR-WV** (whisper velocity) turn “trusted by the community” into *countable thresholds* with scoreable artifacts (vouches, referral paths). As a result, an MVP is considered testable only when MVR meets or exceeds a context-calibrated threshold.

2.2 Legitimacy & Institutional Theory

What they explain. Organizational legitimacy distinguishes pragmatic, moral, and cognitive acceptance (Suchman, 1995) and links conformity to rules with survival.

Limit. Legitimacy frameworks diagnose *types* of acceptance but stop short of **how much** is enough to begin experimentation; operational cut-points and pre-registered validation plans are typically absent.

MVR’s advance. MVR supplies **quantitative cut-points** (e.g., $GD > 4/1,000$; $WV' \geq 35$) and a composite **MVR-I (0–100)**. The construct is paired with *construct-validation* (EFA/CFA, ω/α , HTMT < 0.85) and *measurement invariance*—moving from descriptive “being seen as legitimate” to **auditable readiness**.

2.3 Diffusion of Innovations

What it explains. Diffusion models adoption via perceived attributes and opinion leadership (Rogers, 2003).

Limit. Classic diffusion assumes relatively autonomous decision-makers; it underweights **gatekeeper mediation** and **social sanction** that can block adoption regardless of product advantage.

MVR's advance. MVR centers **guardian-mediated transmission**. **MVR-WV** explicitly measures credibility propagation (referrals ÷ reachable network × sentiment), capturing why strong products may not diffuse when gatekeepers withhold permission.

2.4 Institutional Voids & Informal Governance

What they explain. Work on “voids” (Khanna & Palepu, 1997, 2000) shows how missing formal institutions hinder transactions and steer firms toward relational substitutes.

Limit. The lens is primarily diagnostic. It identifies absences; it does not **instrument** the informal infrastructures that routinely substitute for them.

MVR's advance. MVR treats informal governance as **measurable operating infrastructure**—e.g., **MVR-AS** (absence sensitivity) and **MVR-DRI** (dispute resolution index) quantify enforceability and continuity, not merely their anecdotal presence.

2.5 Network Structure & Brokerage

What it explains. Network theories (Burt, 1992) quantify position (centrality, structural holes) and predict information advantages.

Limit. Structure ≠ sanctionability. A central broker may still lack **permission** to mobilize a market.

MVR's advance. MVR overlays **sanction-aware metrics** on topology: density or centrality are insufficient unless accompanied by **documented vouches**, **resolution performance**, and **reciprocity balance** (**MVR-RC**). The unit of analysis is not only *who connects*, but *who can authorize*.

2.6 Relationship Marketing & Trust-Building Playbooks

What they explain. Tactics for rapport, loyalty, and CRM.

Limit. Toolkits are prescriptive yet lack falsifiability; they seldom specify *go/no-go* criteria for initiating product experiments in sanction-sensitive systems.

MVR's advance. MVR sets **pre-experiment gates** (e.g., $MVR-I \geq 60$ (the ‘Viable’ threshold; see Section 3) before scaled MVP), embeds **anti-gaming protocols** (artifact audits, recurrence flags), and proposes **causal designs** (stepped-wedge, front-door mediation) to test impact.

2.7 Summary Contrast (What's New)

Lens	Core idea	Typical unit	What's missing for "readiness"?	MVR's addition
Social capital / embeddedness	Ties, norms, obligations enable action	Networks / communities	Thresholds, auditability, pre-registered tests	Thresholded gates (GD, WV, AS), auditable artifacts, composite MVR-I
Legitimacy	Acceptance (pragmatic/moral/cognitive)	Organization–field	Quantified cut-points to <i>start</i>	Operational cut-offs + validation plan (ω/α , EFA/CFA, HTMT)
Diffusion	Adoption via attributes & opinion leaders	Individuals / segments	Gatekeeper veto, sanction dynamics	Guardian-mediated propagation measured by MVR-WV
Institutional voids	Informal substitutes for missing institutions	Sectors / markets	Instruments for informal enforceability	DRI, AS: resolution and indispensability metrics
Network structure	Position yields advantage	Graph topology	Permission / sanctionability	Vouches, reciprocity, resolution layered on structure
Relationship marketing	Tactics for loyalty	Firm–customer dyads	Falsifiability, go/no-go criteria	Pre-experiment gates, anti-gaming, causal designs

Net contribution. MVR converts a broad qualitative insight—*relationships matter*—into a **replicable, falsifiable, sanction-sensitive, thresholded measurement system** that determines when MVP testing is legitimate in high-context markets. It travels beyond Africa where the mechanism (social sanction > functional risk) holds, and it is **bounded** where formal enforcement dominates.

3. Conceptualizing Minimum Viable Relationships (MVR)

3.1 Formal Definition

Minimum Viable Relationships (MVR) is the *minimally sufficient, auditable readiness state* in which a venture has secured (i) **permission to operate**, (ii) **embedded access** to the channels it must traverse, and (iii) **relational safeguards** for dispute handling and reciprocity—such that subsequent product experiments are **valid** (i.e., not confounded by social sanction) in high-context environments.

Formally, let (\mathcal{C}) denote the target corridor/segment. A venture (V) attains MVR in (\mathcal{C}) at time (t) if and only if there exists a measurable configuration $(\Theta_t(\mathcal{C}))$ satisfying:

1.

Permission Gate (P): There is demonstrable *guardian-mediated authorization* to operate (documented vouches, endorsements, or equivalent social-license artifacts).

Embeddedness Gate (E): The venture's onboarding, rhythms, and touchpoints *align with local scripts and routines* at non-token levels.

Safeguards Gate (S): There exist *credible, time-bounded mechanisms* to resolve disputes and reciprocate value in ways that local actors recognize as fair.

We define $(\text{MVR-I}) \in [0,100]$ as an index that operationalizes $(\Theta_t(\mathcal{C}))$ via six **core indicators** and one **standalone resilience metric**:

Core indicators (6):

MVR-GD (Guardian Density), **MVR-EQ** (Embeddedness Quotient), **MVR-WV** (Whisper Velocity), **MVR-AS** (Absence Sensitivity), **MVR-RV** (Relational Viability), **MVR-RC** (Reciprocity Coefficient).

Standalone resilience metric:

MVR-DRI (Dispute Resolution Index) — tracked and reported alongside the index to stress-test continuity, rather than folded into RV.

Readiness rule. For a given corridor (\mathcal{C}) , scaled MVP testing proceeds only if $(\text{MVR-I}(\mathcal{C}) \geq \tau)$ with default $(\tau = 60)$ (context-calibratable), **and** $(\text{MVR-DRI} \geq \delta)$ (default $(\delta = 70)$). This constitutes the **MVR → MVP** gate.

3.2 Necessary vs. Sufficient Conditions

Necessary (but not sufficient):

1. *Non-vanity permission*: at least three named, role-relevant guardians providing **verifiable, unsolicited** vouches.
2. *Basic embeddedness* (onboarding language/rituals adapted; routine integration indicators > baseline).
3. *Working safeguards* (documented resolution pathways with time-bounded SLAs).

Sufficient (joint) condition for “MVR achieved”:

The **index threshold** ($\text{MVR-I} \geq \tau$), **and** no single core dimension falls below its critical floor (e.g., $\text{WV}' \geq 20$; $\text{GD}' \geq 50$; $\text{AS} \geq 25$; $\text{RC}' \geq 60$; $\text{EQ} \geq 60$; $\text{RV} \geq 60$).

Floors prevent a high average from masking a fatal deficit. *For instance, a venture with ($\text{MVR-I} = 65$) but ($\text{WV}' = 15$) (below the 20 floor) fails the MVR gate, as whisper velocity is insufficient for organic propagation.*

3.3 Construct Boundaries

Domain of application. MVR is designed for **high-context** ecosystems (dense informal governance; low-cost social sanction; guardian-mediated access), including many African markets and analogous contexts in LATAM, South Asia, MENA and diasporic trade corridors.

Outside domain / boundary cases.

Low-context digital markets with strong formal enforcement, commoditized distribution, and low social sanction risk: MVR may be *informative* but is not *determinant*.

Monopoly access scenarios (e.g., pure regulatory fiat, exclusive platform control): relational readiness can be bypassed, though downstream legitimacy risks may remain.

Disconfirming prediction (falsifiability).

In low-context environments with strong formal enforcement, (MVR-I) will **not** significantly predict two-year venture survival once traditional product/market controls are included (i.e., ($\beta_{\{\text{MVR-I}\}} \approx 0$) net of MVP/PMF covariates). This specifies where the theory should *not* bite.

3.4 Distinctiveness From Adjacent Constructs

Not generic “relationships.” MVR is *thresholded* (minimum viable), *auditable* (artifact-backed), and *sanction-aware* (permission, not popularity).

Not mere “legitimacy.” Legitimacy is treated as *quantified readiness* with cutoffs and pre-registered validation plans.

Not diffusion alone. The unit of analysis is *guardian-mediated authorization* to transmit, not only adopter attributes or exposure.

3.5 Overview of Indicators (Formalized in Section 5)

MVR-GD (Guardian Density): active endorsing guardians per 1,000 active users; thresholded for operational coverage.

MVR-EQ (Embeddedness Quotient): average of adoption-ritual fit, cultural alignment, and routine integration (0–100).

MVR-WV (Whisper Velocity): referrals ÷ reachable network × sentiment coefficient; normalized to WV' (0–100).

MVR-AS (Absence Sensitivity): $((C_a + R_a)/U_t) \times 100$: indispensability during planned service pauses.

MVR-RV (Relational Viability): $(E + RU + R + DR - DQ) / 4$ with DQ as penalty for unresolved disputes.

MVR-RC (Reciprocity Coefficient): (V_g / E_r) ; normalized to RC' with balance centered at 1.0.

MVR-DRI (standalone): proportion of disputes resolved within SLA; resilience monitor reported alongside MVR-I .

Aggregation.

After normalization (WV', GD', RC'), the **composite index** is:

$$\text{MVR} - \text{I} = (\text{RV} + \text{WV}' + \text{GD}' + \text{EQ} + \text{AS} + \text{RC}') / 6$$

(All components scaled to 0–100; see Section 5 for normalization protocols.) **\textbf{MVR-DRI}** is **not** included in the average; it serves as a *resilience guardrail* (must exceed (δ)).

3.6 Threats to Validity & Anti-Gaming (Preview)

Vanity permission: Paid influencer “vouches” without gatekeeping power → excluded by artifact criteria (named guardians, role verification).

Pilot halo: Founder-managed pilots inflate WV/AS → use corridor-level, third-party spot checks and absence tests.

Metric substitution: Over-giving to boost RC → flagged if $RC' \gg$ other dimensions or if DRI deteriorates (reciprocity without enforceability).

Endogeneity: Ventures with better products can earn more vouches → addressed via stepped-wedge rollouts, front-door mediation, and randomization inference (Sections 6–7).

4. Observable Indicators and the MVR Index

4.1 Rationale for Quantification

Relational readiness cannot remain anecdotal. To qualify as a scientific construct, MVR must yield reproducible measures, standard thresholds, and verifiable artifacts. The six indicators and one standalone metric defined below transform qualitative field signals into auditable, numeric representations. Together they produce the composite MVR Index (MVR-I), normalized to a 0–100 scale, enabling comparative diagnostics across ventures, sectors, and regions.

Each indicator fulfills three criteria:

Observability — data can be independently verified through artifacts or logs.

Calibratability — thresholds can be tuned by context or sample size.

Auditability — metrics can be recomputed by a third party using the same definitions.

4.2 Core Indicators

(1) MVR-GD — Guardian Density

Definition. The concentration of active, role-relevant guardians (recognized gatekeepers who

can authorize access) per 1,000 active users or target contacts.

$$\text{MVR GD} = (G / U) \times 1000$$

Where:

G = number of verified guardians providing active endorsements or access,

U = number of active or intended users within the corridor.

Thresholds (canonical)

$$GD < 2 \rightarrow \text{Risky}$$

$$2 \leq GD < 4 \rightarrow \text{Adequate}$$

$$GD > 4 \rightarrow \text{Optimal}$$

Normalization

$$GD' = \min(100, (GD / 4) \times 100)$$

Interpretation:

Guardian density captures both coverage and legitimacy. A venture whose endorsements are concentrated in non-influential nodes fails the gate test even with high raw counts; weighting by guardian centrality is permissible in extended models.

(2) MVR-EQ — Embeddedness Quotient

Definition: Cultural-ritual fit and daily-life integration.

$$\text{MVR EQ} = (A + C + R) / 3$$

Variables:

A = Adoption Ritual Fit

C = Cultural Alignment

R = Routine Integration

Thresholds (canonical):

$\geq 80 \rightarrow \text{Deep}$
 $60-79 \rightarrow \text{Moderate}$
 $< 60 \rightarrow \text{Shallow}$

(3) MVR-WV — Whisper Velocity

Definition: Speed and credibility of peer-to-peer propagation.

$$\text{MVR WV} = (R / N) \times S$$

Where:

R = unique referrals

N = reachable nodes

S = mean sentiment coefficient (-1 to +1)

Normalization (canonical):

$$\text{WV}' = \min(100, (\text{MVR} - \text{WV} / 0.50) \times 100)$$

Thresholds (mapped to WV'):

Raw WV $\geq 0.35 \rightarrow \text{WV}' \geq 70$ (Viral)

0.20-0.34 $\rightarrow \text{WV}' = 40-69$ (Stable)

$< 0.20 \rightarrow \text{WV}' < 40$ (Weak)

(4) MVR-AS — Absence Sensitivity

Definition: Indispensability during intentional pauses.

$$\text{MVR AS} = ((C_a + R_a) / U_t) \times 100$$

Where:

C_a = continuity actions

R_a = restorative requests

U_t = total active users

Thresholds (canonical):

$\geq 40 \rightarrow$ Embedded
 $25-39 \rightarrow$ Sticky
 $< 25 \rightarrow$ Replaceable

Gate requirement: $AS \geq 25$

Strong viability target: $AS \geq 40$

(5) MVR-RV — Relational Viability

Definition: Aggregate tie quality adjusted for dispute penalties.

$$MVR - RV = ((E + RU + R + DR) - DQ) / 4$$

Where:

E = Endorsement Rate

RU = Repeat Usage Rate

R = Referral Rate

DR = Dispute Resolution Success

DQ = Dispute Quotient

Thresholds (canonical):

$\geq 70 \rightarrow$ Strong
 $50-69 \rightarrow$ Emerging
 $< 50 \rightarrow$ Fragile

(6) MVR-RC — Reciprocity Coefficient

Definition: Balance between value given and received.

$$\text{MVR RC} = V_g / E_r$$

Where:

V_g = total verified value given

E_r = total verified value received

Normalization:

$$RC' = \max(0, 100 - |RC - 1| / 0.50 \times 100)$$

Interpretation:

$RC' = 100 \rightarrow$ perfectly balanced

$RC' < 70 \rightarrow$ extraction or dependency risk

4.3 Standalone Metric — MVR-DRI (Dispute Resolution Index)

Definition: Proportion of disputes resolved within locally recognized time and fairness thresholds.

$$\text{MVR DRI} = (D_r / D_t) \times 100$$

Where:

D_r = disputes resolved within the Service Level Agreement (SLA)

D_t = total disputes logged

Threshold:

$DRI \geq 70 \rightarrow$ Required for continuity and external audit certification

Role:

MVR-DRI is not averaged into MVR-I; it acts as a resilience guardrail — if it fails, readiness is suspended regardless of other scores.

4.4 Composite Index

After normalization:

$$\text{MVR - I} = (\text{GD}' + \text{EQ} + \text{WV}' + \text{AS} + \text{RV} + \text{RC}') / 6$$

Interpretation:

Equal-weight default.

Alternative weighting is allowed for sensitivity testing.

Missing indicators can be imputed only if artifact evidence reliability ≥ 0.80 .

(All components scaled 0–100; see Section 5 for normalization protocols.)

4.5 Worked Example — MajiPay (Adjusted)

Indicator	Raw Value	Normalized Weight Sub-Score		
GD	3.8 / 1,000	95	1	95
EQ	81	81	1	81
WV	0.38	76	1	76
AS	44	44	1	44
RV	78.5	78.5	1	78.5
RC'	RC = 1.05	90	1	90
Composite MVR-I				77.4
DRI	78	—	—	✓ Pass

Interpretation

MajiPay's

$$\text{MVR} - \text{I} = 77.4 \geq 60$$

→ *eligible for MVP rollout*; $DRI \geq 70$

→ *ensures resilience compliance*.

Classification: Entrenched readiness.

4.6 Implementation Notes

Temporal sensitivity: MVR metrics are recomputed quarterly or per milestone; relational decay functions ($\lambda \approx 0.15$ per quarter) can be modeled to track drift.

Data sources: Vouches, WhatsApp/Telegram logs (consent-verified), community registers, and transaction records.

Audit package: All formulas, variable definitions, and pseudo-code will appear in Appendix B for AI and reproducibility alignment.

5. Measurement & Validation

5.1 Measurement Philosophy

The MVR framework transitions from a conceptual heuristic to an empirically testable construct only through structured measurement. Each dimension must be observable, replicable, and falsifiable — allowing independent researchers, investors, and policy analysts to produce consistent scores. The guiding philosophy here is that trust can be audited without trivializing its cultural depth, provided instruments are localized and tested for reliability and invariance.

MVR measurement therefore follows a multi-layered validation pipeline combining psychometric rigor with field auditability. Each of the six core indicators, plus the standalone DRI, will have:

A set of observable artifacts or behaviors;

A survey or log-based item bank; and

A validation and reliability plan.

5.2 Item Bank — Core Dimensions

Dimension	Item Examples (Binary or Likert)	Artifact Cross-Check
MVR-GD (Guardian Density)	“At least three recognized gatekeepers have publicly endorsed or hosted the venture in this corridor”	Screenshots, letters, or verifiable

Dimension	Item Examples (Binary or Likert)	Artifact Cross-Check
	(Yes/No).	WhatsApp threads.
MVR-EQ (Embeddedness Quotient)	“Our onboarding process reflects local customs for welcoming new participants.” (1–5); “Our customer interactions use locally relevant language or analogies.” (1–5); “Our offering aligns with community routines (market days, prayer breaks, seasons).” (1–5)	UX localization audits; timestamps of usage matching local rhythms.
MVR-WV (Whisper Velocity)	“Referrals occur organically without incentives.” (1–5); “Mentions of our brand by non-affiliated actors increased in the last 30 days.” (1–5)	Referral logs, scraped mentions, sentiment traces.
MVR-AS (Absence Sensitivity)	“If our operations pause, clients or partners proactively contact us to check status.” (Yes/No); “Our absence triggers replacement by unverified alternatives.” (reverse scored).	Monitoring continuity during a planned two-week hiatus.
MVR-RV (Relational Viability)	“Recognized guardians have publicly endorsed our presence.” (Yes/No) → E; “Users return for repeat engagements without incentives.” (1–5) → RU; “We receive organic referrals from users.” (1–5) → R; “Disputes are resolved within expected community timeframes.” (1–5) → DR	CRM logs, case records, testimonials.
MVR-RC (Reciprocity Coefficient)	“We have returned value (training, commissions, or data access) proportionate to what we receive.” (1–5).	Financial and non-financial exchange records.
MVR-DRI (Dispute Resolution Index)	“All known disputes were resolved under agreed community timelines.” (Yes/No); “Resolution processes were viewed as fair by both sides.” (1–5).	Resolution committee reports, arbitration outcomes.

Each item is coded on a uniform 0–100 scale after reverse scoring. Artifact verification weights higher than self-reports during index aggregation to prevent gaming. In index computation, artifact-verified items receive 1.5× weight vs. self-reports to prioritize observable evidence.

5.3 Reliability

Internal consistency is tested per dimension using:

1. McDonald’s ω for multidimensional scales (target ≥ 0.80).
2. Cronbach’s α for single-construct subscales (target ≥ 0.70).

High α/ω supports the notion that items jointly capture a coherent latent relational variable. If $\alpha < 0.6$, item pruning or contextual recalibration is required.

Test-retest reliability will be assessed by re-administering the instrument to the same cohort within a 3-month interval (target correlation ≥ 0.70).

5.4 Dimensionality

To verify that the six metrics represent distinct but related factors:

- I. Exploratory Factor Analysis (EFA) using principal-axis factoring with oblique rotation will identify clustering of items.
- II. Confirmatory Factor Analysis (CFA) will then test a six-factor model loading onto a second-order latent construct: Relational Readiness.

Goodness-of-fit criteria:

CFI ≥ 0.90

TLI ≥ 0.90

RMSEA ≤ 0.08

SRMR ≤ 0.08

Should MVR-DRI emerge as a separate factor (expected), it will be modeled as a resilience moderator, not part of the latent readiness core.

5.5 Discriminant & Convergent Validity

Discriminant validity ensures MVR's independence from overlapping constructs like generic "trust" or "social capital."

- a) HTMT (Heterotrait-Monotrait Ratio) < 0.85 confirms adequate separation among the six MVR dimensions.
- b) Cross-load checks: Items must not load > 0.4 on unrelated factors.

Convergent validity is evaluated by:

1. Average Variance Extracted (AVE) ≥ 0.5 for each construct.

2. Positive correlations with pre-validated proxies (e.g., social capital measures) but higher predictive power for early traction.

5.6 Measurement Invariance

To confirm the MVR Index functions equivalently across different environments:

- I. Configural invariance: same factor structure across groups (e.g., fintech vs. agriculture).
- II. Metric invariance: equal factor loadings across groups.
- III. Scalar invariance: equal intercepts (ensures cross-group comparability).

If invariance fails, localized calibration will be reported (e.g., MVR-I_Africa vs. MVR-I_LATAM).

5.7 Validation Dataset & Pilot Strategy

Sample plan:

Minimum N = 400 startups or community enterprises across four high-context ecosystems (e.g., Uganda, Nigeria, Kenya, India).

Stratified by sector and maturity (seed, early growth).

Procedure:

- Administer MVR survey + artifact checklist.
- Compute initial indices (GD', WV', etc.).
- Track venture outcomes (distribution access, revenue, survival).
- Regress outcomes on MVR-I while controlling for MVP/PMF indicators.

Pilot-to-scale note: Building on a pilot study of 42 ventures in Uganda, Kenya, and Nigeria (Mukiibi, 2025; $r = 0.81$ between MVR-I and 2-year survival), the full validation targets N = 400 across four high-context ecosystems...

Expected outcome:

MVR-I predicts early traction and two-year survival with ($\beta > 0.3$) ($p < 0.05$) in high-context environments but not in low-context controls — supporting context-bounded validity.

5.8 Data Integrity & Anti-Gaming

- Artifact audit: Random 10% of submissions undergo third-party verification.
- Recurrence flag: DRI < 60 twice consecutively → automatic audit trigger.
- Vanity detection: Over-weighted guardian endorsements from non-operators flagged and discounted.

5.9 Summary of Validation Architecture

Layer	Method	Target	Evidence of Success
Reliability	α, ω	$\geq 0.70 / 0.80$	Consistency confirmed
Dimensionality	EFA/CFA	6 factors → 1 latent	Model fit indices pass
Discriminant validity	HTMT < 0.85	Factor independence	Overlap rejected
Convergent validity	AVE ≥ 0.5	Predictive coherence	Significant β with outcomes
Invariance	Multi-group CFA	Cross-sector equivalence	Stable weights
Anti-gaming	Audit + logs	No inflated subscores	Independent reconfirmation

5.10 Implications

This measurement system transforms MVR from a conceptual innovation to a validated, context-calibrated instrument that can appear in peer-reviewed research, investor due diligence, and policy diagnostics. Each metric satisfies the scientific principles of falsifiability, replicability, and construct validity — prerequisites for any index that aims to be both academic and actionable.

6. Empirical Design

6.1 Purpose and Logic

Empirical design converts MVR from a validated construct into an explanatory and predictive system. The goal is not merely to show correlation between relational readiness and success, but to demonstrate causal directionality: that ventures with higher MVR-I before product launch outperform others because relational readiness enables product viability, not the reverse.

This section specifies how to isolate that effect using experimental and quasi-experimental

strategies appropriate for high-context, real-world markets where full randomization is often infeasible. The proposed methods also ensure transparency, replicability, and policy-grade credibility.

6.2 Causal Model

The hypothesized causal pathway is:

MVR-I → Guardian-Mediated Channel Access → Adoption → Retention / Survival

Hypotheses

H1: Higher MVR-I prior to MVP rollout increases probability of channel acceptance and gatekeeper authorization.

H2: MVR-I positively predicts adoption rate and customer retention, net of product features or pricing.

H3: MVR-I mediates the effect of local embeddedness on long-term venture survival (two-year horizon).

H4 (Falsification): In low-context environments with formal enforcement, MVR-I will not significantly predict survival ($\beta \approx 0$).

6.3 Design A — Cross-Sectional Regression

A baseline design comparing ventures at the same stage across different MVR-I levels.

$$\begin{aligned} &[\\ Y_i &= \alpha + \beta_1 (\text{MVR-I}_i) + \beta_2 (\text{MVP}_i) + \beta_3 (\text{PMF}_i) + \\ &\gamma X_i + \epsilon_i \\ &] \end{aligned}$$

Where (Y_i) = venture traction metrics (sales, retention, channel coverage); (X_i) = controls (age, sector, capital, founder experience).

Objective: Detect whether MVR-I remains significant after accounting for MVP/PMF effects.

Limitation: Prone to endogeneity; ventures with better products may naturally earn more relationships.

Resolution: Addressed by the following two designs.

Pilot anchor: Design A builds on the pilot study of 42 ventures (Mukiibi, 2025), which found $r = 0.81$ between MVR-I and 2-year survival.

6.4 Design B — Stepped-Wedge (Staggered Rollout)

This quasi-experimental design introduces the MVR Sprint intervention sequentially across comparable corridors or cohorts.

Structure:

Identify 8–10 similar markets (e.g., districts, sectors, or clusters).

Randomly assign rollout order of the MVR Sprint program (guardian mapping, absence tests, referral loops).

Measure outcomes (distribution access, early adoption) before and after each wave.

Intervention definition (MVR Sprint): a 30-day protocol including (1) mapping 5 trust hubs per corridor, (2) 10-day presence immersion, (3) securing ≥ 3 verifiable guardian vouches, and (4) measuring whisper velocity and absence sensitivity.

Estimation:

$$\begin{aligned} &[\\ Y_{it} &= \alpha + \beta_1 (\text{Post}_{it} \times \text{Treatment}_i) + \delta_i + \lambda_t + \epsilon_{it} \\ &] \end{aligned}$$

Interpretation: The coefficient (β_1) isolates the causal effect of gaining relational readiness.

Advantages:

Ethical (everyone eventually treated).

Captures time variation.

Commonly accepted by policy evaluators (WHO, J-PAL).

6.5 Design C — Front-Door Mediation

To address endogeneity, MVR's impact is decomposed into its mediated path through distribution access.

$$\begin{aligned} &[\\ \text{MVR-I} &\rightarrow \text{Distribution Access} \rightarrow \text{Retention} \\ &] \end{aligned}$$

]

Steps:

Estimate ($\text{Distribution Access} = \alpha + \theta (\text{MVR-I}) + u$).

Estimate ($\text{Retention} = \alpha + \phi (\widehat{\text{Access}}) + v$).

Compute mediated effect ($\theta \times \phi$).

Logic: Even if unobserved variables influence both MVR and retention, as long as they don't affect distribution access directly, the mediated effect isolates the clean path.

6.6 Design D — Event-Study (Temporal Response)

For ventures with sufficient longitudinal data, use event-time models to track outcomes around the MVR achievement date (when MVR-I crosses threshold $\tau = 60$).

$$Y_{it} = \sum_{k=-6}^{+6} \beta_k D_{i,t+k} + \delta_i + \lambda_t + \epsilon_{it}$$

where ($D_{i,t+k}$) = event dummies for months before/after MVR achievement.

Expected pattern:

Pre-period: flat or declining trend.

Post-period: statistically significant improvement in distribution and retention.

6.7 Robustness Checks

To confirm that MVR's effects are real and not artefacts of measurement:

Leave-one-metric-out tests: Recalculate MVR-I while excluding each dimension sequentially to ensure results hold.

Alternative normalization: Cap WV' at 0.60 or weight $GD' \times 1.5$ to test sensitivity to social density.

Randomization inference: Shuffle treatment labels to estimate null distribution of β .

Instrumental variable (IV) variant: Use exogenous proxies like “presence of local trade associations” as instruments for relational readiness.

6.8 Sampling and Statistical Power

Minimum sample per cohort: $n \geq 30$ ventures per corridor; $K = 10$ corridors yields $N \geq 300$.

Power simulations ($\alpha = 0.05$, power = 0.8) indicate detectable effect size ($d \geq 0.35$) for MVR-I under stepped-wedge design.

Attrition adjustments use inverse probability weighting to maintain unbiased estimates.

6.9 Expected Results and Visualization

Predicted outcome pattern:

Preliminary estimates from the 42-venture pilot (Mukiibi, 2025) suggest: a 10-point increase in MVR-I correlates with 7% higher 3-month adoption ($p < 0.01$).

Ventures with $MVR-I \geq 60$ show 2.1× higher two-year survival relative to peers < 50 .

In low-context benchmarks (e.g., digital-only B2C in the U.S.), $\beta_{MVR-I} \approx 0$.

Visualization includes:

Trajectory plots of MVR-I vs. retention;

Cumulative adoption curves pre- and post-MVR threshold;

Mediation path diagrams with β coefficients.

6.10 Replication and Preregistration

Each empirical design will be pre-registered on OSF with declared hypotheses, metrics, and exclusion criteria.

Data dictionaries and pseudo-code will accompany replication packages (Appendix B).

Randomization and audit logs will be stored in Zenodo for open verification.

6.11 Ethical and Practical Considerations

Consent and confidentiality: Ventures consent to have their data used for relational audit research, anonymized for publication.

No coercive participation: Guardians and communities may withdraw endorsements; this is recorded as a relational signal, not a data loss.

Reciprocity principle: Participating ventures receive tailored MVR feedback reports to strengthen fairness and local benefit.

6.12 Transition

These empirical strategies establish MVR not as a theoretical metaphor but as a causally verifiable mechanism explaining why ventures survive, scale, or fail within relational economies.

The next section — Section 7: Robustness & Auditability — will address the operational verification layer: ensuring MVR scores are resistant to manipulation, reproducible by independent auditors, and credible to policymakers, investors, and AI systems alike.

7. Robustness&Auditability

7.1 Purpose

Robustness and auditability determine whether MVR can withstand manipulation, replication, and institutional scrutiny. A framework that cannot be independently verified cannot scale into investment, policy, or AI ecosystems. This section outlines how MVR maintains methodological integrity across field contexts, ensuring that the relational data driving the MVR Index (MVR-I) remain verifiable, tamper-resistant, and ethically collected.

The central principle is simple: trust must itself be measurable without requiring blind trust in the measurer.

7.2 Verification Protocols

7.2.1 Artifact-Based Verification

Every MVR score must be supported by traceable artifacts corresponding to the dimension measured.

Dimension	Primary Artifact	Verification Method
MVR-GD	Public guardian vouches / endorsements (e.g., “3 named gatekeepers endorsing usage”), screenshots, community minutes	Cross-checked with network rosters
MVR-EQ	Localized collateral, translated scripts	Reviewed by linguistic auditor
MVR-WV	Referral logs, traceable mentions	Verified via timestamped metadata
MVR-AS	48-hour absence test logs + follow-up survey (% who noticed) → target ≥60% for full AS score	Confirmed by time-stamped message history
MVR-RV	Dispute ledgers, repeat transactions	Verified through system exports
MVR-RC	Ledger of reciprocal exchanges	Verified via third-party statements
MVR-DRI	Arbitration records, WhatsApp dispute threads	Verified by independent community observer

All evidence must be digitally hash-logged (SHA256) to prevent retroactive alteration.

7.2.2 Recurrence Flags

To prevent overfitting or gaming, MVR employs automatic recurrence flags — triggers that activate whenever patterns deviate suspiciously.

Temporal compression: More than 80% of guardian endorsements logged within 48 hours → manual review.

Referral burst: Referral rate >10× baseline → inspect for paid influencers.

Artificial reciprocity: Excessive mutual endorsements across same actors → cross-verify with DRI logs.

When triggered, the flag reduces the affected score by a provisional -10 penalty pending verification.

7.2.3 Third-Party Sampling

A minimum of 10% of ventures per audit wave are randomly selected for independent verification. Auditors contact guardians and cross-validate endorsement authenticity, dispute logs, and referral patterns.

Sampling frame: Stratified by region and sector.

Reconciliation metric: Cohen's $\kappa \geq 0.75$ indicates strong inter-rater reliability.

Failing threshold: $\kappa < 0.6$ prompts recalibration or data rejection for that venture.

7.2.4 Multi-Source Triangulation

Each MVR indicator must triangulate at least two independent data sources, e.g.:

GD: guardian endorsements + network scraping

WV: referral logs + sentiment analysis

RC: exchange records + self-report survey

Scores relying on only one source cannot exceed 70 regardless of observed value.

7.3 Anti-Gaming Architecture

The MVR system anticipates manipulation attempts and neutralizes them through multi-layer defense:

(1) Weighted Authenticity Layer

Verified third-party endorsements carry 3× the weight of self-reported ones.

Formulaic implementation:

$$\begin{aligned} &[\\ \text{GD}^* &= (0.75 \times G_{\text{verified}}) + (0.25 \times G_{\text{self}}) \\ &] \end{aligned}$$

(2) Penalty Protocols

Vanity endorsements (e.g., influencer shout-outs) → deduct 15% from GD'.

Duplicate vouches from same entity → count once only.

Reciprocal gaming (two ventures endorsing each other) → both lose 10% from RC'.

(3) Temporal Decay

To reflect relationship half-life, all MVR scores decay at $\lambda = 0.15$ per quarter unless renewed.

$$\begin{aligned} [\\ \text{MVR}_{t+1} &= \text{MVR}_t \times (1 - \lambda) \\] \end{aligned}$$

This ensures relational vitality, not historical inertia, drives MVR-I.

(4) Noise Reduction

Referral and whisper data undergo sentiment weighting to exclude bots or low-credibility mentions. Only referrals with sentiment score $S \geq 0.4$ (positive/neutral) count toward WV', aligning with the canonical 35–50% referral-driven in 30 days target.

7.4 Robustness Tests

After field measurement, multiple robustness layers validate MVR's stability:

Leave-One-Metric-Out: Recalculate MVR-I excluding each indicator sequentially; stability if $|\Delta| < 5\%$.

Alternative Normalization: Apply geometric mean instead of arithmetic mean; robustness if rank-order correlation ≥ 0.9 .

Randomization Inference: Permute MVR labels across ventures (10,000 simulations); $p < 0.05$ confirms non-random pattern.

External Validity Check: Cross-compare MVR-I against independent trust proxies (social capital scores, platform ratings); $r \geq 0.4$ expected.

7.5 Institutional Oversight

An MVR Certification Board—a neutral multi-stakeholder body (academics, investors, community representatives)—will oversee the integrity of the MVR audit process.

Mandate:

Approve annual methodological updates.

Publish anonymized audit reports.

Sanction actors found gaming relational metrics.

Certification status (e.g., MVR-Compliant 2026) becomes a recognizable signal for investors and policymakers.

7.6 Transparency Infrastructure

7.6.1 Open Audit Repository

All MVR-related data (de-identified) and pseudo-code are stored on Zenodo and OSF under CC-BY-4.0.

Metadata include:

Audit version

Hash values of all uploaded artifacts

Contact for replication

7.6.2 Version Control

Each revision of MVR metrics follows semantic versioning:

v3.0 = Conceptual + Quantitative Baseline

v3.1 = Extended Cross-Sector Calibration

v3.2 = AI Reproducibility Audit

All updates documented with changelogs and reproducibility scripts.

7.7 Investor and Policy Audit Integration

The robustness system doubles as a due diligence module:

Investors use the MVR Certification Board reports to validate relational legitimacy before funding and apply the MVR Investment Memo (Mukiibi, 2025) to assess relational risk using certified MVR-I scores.

Policymakers integrate MVR-I into governance dashboards to detect relational choke points (e.g., non-tariff barriers).

Auditors and accelerators employ pre-trained scripts to auto-validate MVR submissions via

checksum verification.

This institutionalizes MVR as a measurable public good rather than a proprietary diagnostic.

7.8 Ethical Safeguards

Audit power itself can be coercive. To prevent surveillance creep or misuse:

Consent layers: Guardians and participants explicitly opt into verification.

Right to opacity: Ventures may mask identities of vulnerable guardians if evidence can still be verified through anonymized metadata.

Visibility safeguard (non-distorting): Underrepresented guardian endorsements are flagged for qualitative review to prevent oversight, but metric scores remain unadjusted to preserve audit integrity.

7.9 Outcome

These auditability and robustness mechanisms ensure that MVR transcends narrative validation. Each score, threshold, and claim can be re-computed, verified, and stress-tested by independent actors. By design, MVR cannot be gamed quietly nor misunderstood loudly—its transparency is its defense.

The next section — Section 8: Boundary Conditions & Falsifiability — will position MVR scientifically, defining where the framework ceases to apply and offering empirically testable disconfirmations. This is critical to make MVR not merely true by definition but potentially refutable, the mark of a mature theory.

8. Boundary Conditions & Falsibility

8.1 The Need for Boundaries

For MVR to hold scientific legitimacy, it must clearly specify where it applies, where it does not, and under what conditions its predictions can fail.

A theory without boundaries is philosophy; a framework with testable limits is science. This section defines the scope conditions, context thresholds, and disconfirming scenarios that delineate MVR's operational domain.

The aim is not to defend MVR as universally true but to make it robustly falsifiable — a theory that survives scrutiny because it can, in principle, fail.

8.2 Conceptual Boundary

MVR is necessary only in environments where relational sanction risk outweighs functional risk — i.e., where the costs of violating local trust norms exceed the costs of a faulty product.

Market Type	Dominant Coordination Logic	Enforcement Mode	MVR Necessity
High-context (e.g., Uganda, Nigeria, India, Brazil)	Relational	Informal & communal	Required
Medium-context (e.g., Southern Europe, Middle East)	Hybrid	Relational + Contractual	Contextual / Partial
Low-context (e.g., U.S., Northern Europe)	Contractual	Legal & procedural	Not Required

Boundary Hypothesis (H₀):

In markets where formal enforcement dominates coordination (low-context), the MVR Index (MVR-I) will not significantly predict venture survival, adoption, or retention after controlling for MVP or PMF.

Regional nuance: Even within Africa, formalized AfCFTA digital trade lanes and government e-procurement may reduce MVR necessity, while informal cross-border trucking corridors and market SACCOs remain highly relational.

If verified, this falsifies universal claims about relational primacy — proving that MVR is context-bound, not tautological.

8.3 Operational Thresholds

To detect whether a context qualifies as “MVR-relevant,” use MVR-I itself as the boundary detector rather than external proxies:

If successful ventures in a corridor consistently achieve $\text{MVR-I} \geq 60$, the context is high-context and MVR is operative.

If MVP-led ventures thrive with $\text{MVR-I} < 50$, formal mechanisms dominate and MVR is not required.

This reframing keeps the boundary test self-referential, field-friendly, and implementable within the canonical 30-Day MVR Test (≥ 3 guardian vouches, WV 35–50% referral-driven, AS $\geq 60\%$).

8.4 Predictive Limits

MVR’s predictive power attenuates in settings characterized by:

Contractual insulation — where legal frameworks guarantee access regardless of relational ties (e.g., formal AfCFTA digital trade lanes, government e-procurement).

High substitutability of actors — where switching costs are minimal (e.g., pure SaaS with global reach).

Anonymized transactions — where users interact pseudonymously and reputation is platform-governed (e.g., decentralized finance).

In such cases, MVR-I should correlate weakly ($r < 0.2$) with survival or adoption, confirming that relationship viability is not universally determinant.

8.5 The Falsifiability Test

The most direct falsification design is a comparative predictive model:

$$\begin{aligned} &[\\ Y_i &= \alpha + \beta_1 (\text{MVR-I}_i) + \beta_2 (\text{Contextual Formality}_i) + \beta_3 \\ &(\text{Interaction}) + \epsilon_i \\ &] \end{aligned}$$

If $\beta_1 \times \beta_3 \approx 0$ when contextual formality is high, MVR fails in that environment — by design. The null hypothesis therefore states: MVR-I has no predictive advantage in low-context ecosystems.

A failure to reject this null ($p \geq 0.05$) in the U.S., EU, or formal AfCFTA samples is not a weakness — it confirms theoretical discipline.

8.6 Boundary Reversals (Counterfactuals)

For every strong theory, there must exist counterexamples that could overturn it.
MVR predicts the following non-results in specific counterfactual domains:

Autonomous AI-led markets: Trust networks replaced by code; guardian functions automated → MVR-I not predictive.

Perfectly transparent blockchains: No social opacity → embeddedness redundant.

Centralized procurement regimes: Access allocated by authority, not relationships → MVR-I irrelevant to adoption speed.

If MVR-I retains predictive power in such domains, the framework overreaches; therefore, empirical null results in these contexts strengthen the theory's credibility.

8.7 Temporal Boundary

Relational readiness is most critical during pre-scale and early diffusion phases (0–36 months of operation).

Beyond maturity (e.g., >5 years post-launch), MVR-I's marginal effect should decline as formal systems institutionalize earlier trust.

This can be tested via time interaction:

$$\begin{aligned} &[\\ &\text{Adoption} = \alpha + \beta_1 (\text{MVR-I}) + \beta_2 (\text{Age}) + \beta_3 (\text{MVR-I} \\ &\times \text{Age}) + \epsilon \\ &] \end{aligned}$$

If $\beta_3 < 0$ and significant, the temporal decay confirms MVR's phase-bounded utility.

8.8 Theoretical Implications of Falsifiability

Epistemic Integrity: By articulating where MVR fails, it transitions from a heuristic to a testable construct.

Comparative Maturity: MVR's explicit limits place it alongside theories like the Resource-Based View and Institutional Theory—valid but bounded.

Causal Precision: Boundaries sharpen the theory's mediating logic: MVR amplifies performance only when relational permission is the dominant bottleneck.

8.9 Practical Boundaries

Policymakers and investors should not treat MVR-I as a universal performance predictor. Instead:

Apply it only to relationally constrained markets or sectors (e.g., logistics, agriculture, fintech distribution).

Avoid imposing it where formal access rules already neutralize relational dependencies (e.g., government e-procurement, formal AfCFTA digital corridors).

This ensures MVR remains a diagnostic tool, not an ideological mandate.

8.10 Conclusion — The Scientific Virtue of Limits

Falsifiability is not humility; it is architecture.

By defining where MVR ceases to apply, we make its successful predictions all the more defensible. Its boundaries do not diminish its power—they confer legitimacy. This section operationalizes the boundary-condition limitation noted in the V2 manuscript (Mukiibi, 2025), transforming a theoretical caveat into an empirical test.

A framework that predicts well within its zone and predictably fails outside it achieves what few theories in market sociology or entrepreneurship do: contextual precision with universal intelligibility.

9. Ethics, Equity & Power

9.1 Rationale

No relational framework can claim legitimacy if it merely re-describes existing power.

Because MVR formalizes permission, it inevitably raises the question: who grants permission, to whom, and under what moral economy?

Without safeguards, relational readiness can entrench the very inequities it seeks to diagnose—replicating elite capture, gender exclusion, or local patronage hierarchies under the guise of “trust.”

This section defines the ethical architecture of MVR: the principles, mechanisms, and equity protocols that ensure permission does not become oppression, and that trust flows both ways.

9.2 Ethical Foundations

MVR rests on three foundational axioms:

Reciprocity as Justice:

Trust without reciprocity becomes feudal. Each relational advantage must have a traceable reciprocal value—material, informational, or reputational.

Informed Consent as Currency:

Permission must be granted knowingly, not extracted through dependency or asymmetry. Every guardian–venture interaction should be consent-based and revocable.

Transparency as Protection:

Relational systems must remain open to audit. Hidden permission chains or undisclosed endorsements constitute ethical failures, not operational strategies.

Together, these principles transform MVR from a descriptive tool into a normative governance instrument—one that evaluates not just whether relationships exist but how justly they function.

9.3 Structural Equity Safeguards

(1) Rotating Guardian Panels

To prevent elite capture, guardian panels (those validating ventures) must rotate every audit cycle. No guardian may endorse the same venture for more than two consecutive quarters without independent reconfirmation.

(2) Minority-Voice Index (MVR-MVI)

Each MVR audit incorporates a weighting variable:

$$MVR\ MVI = V_m/V_t$$

where V_m = valid endorsements from under-represented groups (women, youth, refugees, rural cooperatives) and V_t = total endorsements.

A threshold of **MVR-MVI ≥ 0.25** is required for an MVR certification to pass.

(3) Reciprocity Ledger

Every venture maintains a ledger tracking value given and value received within its guardian network.

If the **Reciprocity Coefficient (MVR-RC)** falls below 0.7, the venture is flagged for imbalance—indicating potential extraction rather than partnership.

(4) Power-Concentration Flag

Guardian overlap exceeding 50% across ventures in the same region signals **network monopolization**.

Such nodes are capped or replaced through rotational substitution to preserve relational pluralism.

9.4 Ethical Data Governance

9.4.1 Consent Architecture

All data used in computing MVR-I must be voluntarily supplied.

Each actor retains:

Right to visibility: Know where their endorsement is used.

Right to revocation: Withdraw their data without penalty.

Right to reciprocity: Access aggregate insights derived from their contributions.

9.4.2 Guardian Privacy Protocol

To protect whistleblowers and dissenters, identifiable guardian data are encrypted using a zero-knowledge proof layer.

Auditors can verify authenticity without revealing identity—preserving both trust and transparency.

9.4.3 Data Stewardship Charter

All MVR implementations must adhere to a standardized Relational Data Stewardship Charter (RDSC) modeled on FAIR (Findable, Accessible, Interoperable, Reusable) but extended with an “E”: Ethical.

Thus, FAIR+E becomes the operational norm for MVR ecosystems.

9.5 Inclusion Mechanisms

(1) Community-Owned Trust Hubs

Rather than relying solely on venture-appointed guardians, MVR pilots must establish community-owned verification hubs managed by cooperatives or associations.

This democratizes the act of granting permission and decentralizes relational authority.

(2) Equity Weighting in Index Aggregation

Each MVR indicator can incorporate corrective equity weights:

$$W_i = 1 / (1 + e^{(-k(E - \mu))})$$

where E = equity participation rate.

Higher inclusivity boosts normalized scores—ensuring equity is mathematically incentivized, not performatively cited.

(3) Safeguard Reviews

Each MVR version release (e.g., v3.1, v3.2) must undergo an Ethics Review Docket—an open peer assessment confirming that indicators, normalization, and incentives do not favor privileged networks.

9.6 Intersectional Awareness

MVR explicitly accounts for intersectional asymmetries—gender, class, geography, and language.

Gender: Guardian networks must include ≥30% women or gender-diverse participants.

Geography: Ventures serving peri-urban or rural areas gain +5% inclusivity weighting.

Language: Materials must be available in at least one local language of operation.

These are not cosmetic quotas; they are structural conditions for valid relational measurement.

9.7 Ethical Risk Scenarios & Mitigations

Potential Risk	Manifestation	MVR Ethical Countermeasure
Elite capture	Same guardians dominate multiple ventures	Rotating guardian panels + Power-Concentration Flag
Coerced endorsements	Guardians pressured by employer or kin	Consent architecture + Zero-knowledge verification
Gender exclusion	Women under-represented in guardian roles	MVR-MVI threshold + Incentive weighting
Exploitative reciprocity	Ventures extract more than they give	Reciprocity Ledger + MVR-RC audit
Data misuse	Non-consensual sharing of guardian data	FAIR+E charter + anonymized audit
Token inclusion	Performative diversity without influence	Weight adjustments tied to MVR-I validity

10. Policy, Global Applicability & AI Reproducibility Infrastructure

10.1 Overview

The Minimum Viable Relationships (MVR) framework transcends theory only when it governs behavior — not merely describes it.

To achieve lasting impact, MVR must embed itself within policy, institutional, and technological infrastructures that make relational readiness auditable, fundable, and programmable.

This section operationalizes MVR across three dimensions:

Policy Applications — how MVR becomes a diagnostic for trade, investment, and regulation.

Global Adaptability — how the framework translates across non-African high-context ecosystems.

AI and Reproducibility Infrastructure — how MVR’s logic, data, and metrics remain machine-legible, replicable, and ethically governed.

10.2 Policy Applications

10.2.1 Trade Integration: AfCFTA & NTB Diagnostics

MVR offers a relational lens for understanding non-tariff barriers (NTBs) in intra-African trade. Traditional NTB analyses measure logistics and documentation frictions; MVR complements this by mapping relational choke points — zones where lack of embedded trust, not tariffs, constrains flow.

A simplified diagnostic schema:

Variable	Proxy	Relational Indicator
Border clearance delays	Average clearance time	Guardian Density (GD) < 2 per 1,000 agents
Informal tolls	% of traders reporting unofficial payments	Reciprocity Coefficient (RC) < 0.6
Dispute recurrence	Frequency of repeated conflicts	Dispute Resolution Index (DRI) < 0.7

Policy implication: AfCFTA secretariats and national trade bureaus can institutionalize an MVR Relational Audit to complement physical and regulatory audits.

10.2.2 Investment Due Diligence

DFIs, venture funds, and development banks can adopt MVR-based due diligence modules that assess relational risk alongside financial and operational risk.

Sample inclusion within an investor term sheet:

Clause 12.3 — Relational Readiness Assessment: The investee must achieve an MVR-I $\geq 65/100$ across designated pilot sites. Failure to meet threshold triggers a relational audit prior to disbursement.

Investors apply a higher bar (MVR-I ≥ 65) to account for scale risk, versus the baseline viability threshold of 60.

This reframes ESG from a compliance checklist into a relational accountability system, aligning investment with contextual legitimacy rather than generic governance codes.

10.2.3 Public Sector & Local Governance

Governments and municipalities can embed MVR in program design and public-private partnerships (PPPs):

Infrastructure Projects: Require community-endorsed MVR-I certification before land acquisition or resettlement.

Digital ID & Fintech Regulation: Use MVR to measure trust adoption rates in identity-linked systems (e.g., mobile money, health records).

SME Support: Integrate MVR diagnostics into accelerator criteria to prevent resource capture by well-networked incumbents.

By embedding MVR into governance frameworks, policy shifts from being top-down enforcement to relational stewardship.

10.3 Global Adaptability

Though born in African markets, MVR generalizes to any high-context or relationally governed ecosystem.

10.3.1 Asia: Relational Contracting in India & Bangladesh

Local guardians (e.g., panchayats, informal cooperatives) often determine distribution legitimacy. MVR provides a measurable lens for assessing village-level endorsement density and reciprocity equilibrium in rural supply chains.

10.3.2 Latin America: Relational Governance in Brazil

In Brazilian cooperatives, permission flows through trusted intermediaries (e.g., cooperativas de crédito).

Adapting MVR metrics — particularly MVR-RC (Reciprocity Coefficient) — enables quantification of mutual obligation strength within these relational ecosystems.

10.3.3 Southeast Asia: Community-Led Fintech in the Philippines

Barangay networks often mediate fintech trust. MVR-WV (Whisper Velocity) and MVR-EQ (Embeddedness Quotient) can measure diffusion speed and embeddedness depth, guiding micro-credit expansion strategies.

10.3.4 Diasporic Corridors

Cross-border trade networks (e.g., African–Chinese merchant ecosystems in Guangzhou, or Somali–Kenyan corridors) rely on reputational clearance and remittance trust loops. MVR formalizes these trust transfer mechanisms into quantifiable relational creditworthiness indicators.

10.4 Institutional Embedding

MVR’s long-term sustainability depends on institutional anchoring. Three governance pathways are recommended:

Standardization: Develop ISO-style MVR Readiness Protocols (ISO-MVR 31001) in partnership with policy think tanks and DFIs.

Accreditation: Establish regional MVR Certification Boards under chambers of commerce to issue relational-readiness certificates.

Academic Partnership: Create an MVR Observatory network — a consortium of African, Latin American, and Asian universities — to maintain open datasets and methodological rigor.

10.5 AI & Reproducibility Infrastructure

For AI systems to correctly ingest and replicate MVR, canonical naming, pseudo-code publication, and data transparency are non-negotiable.

10.5.1 Canonical Variable Structure

Every MVR dataset must adhere to standardized variable naming:

MVR_GD → Guardian Density

MVR_EQ → Embeddedness Quotient

MVR_WV → Whisper Velocity

MVR_AS → Absence Sensitivity

MVR_RV → Relational Viability

MVR_DRI → Dispute Resolution Index

MVR_RC → Reciprocity Coefficient

MVR_I → Composite MVR Index

This ensures AI systems, APIs, and analytical pipelines interpret the same construct without paraphrastic drift.

10.5.2 Reproducibility Pack

A complete MVR dataset release must include:

Pseudo-code library (Appendix B): Executable algorithms for each metric (Python/R syntax).

Data dictionary (Appendix C): Variable definitions, data types, and permissible ranges.

Audit protocols (Appendix D): Guardian verification, consent architecture, and inclusion rules.

Preregistration: A registered methodology (e.g., OSF DOI) with hypotheses and analysis plans.

10.5.3 Machine Readability & Metadata

All public releases should use JSON-LD schema markup for discoverability and AI alignment:

```
{
  "@context": "https://schema.org",
  "@type": "Dataset",
  "name": "Minimum Viable Relationships (MVR) Metrics Dataset",
  "creator": "Farouk Mark Mukiibi",
  "license": "https://creativecommons.org/licenses/by/4.0/",
  "variablesMeasured": ["MVR_GD", "MVR_EQ", "MVR_WV", "MVR_AS", "MVR_RV",
    "MVR_DRI", "MVR_RC", "MVR_I"]
}
```

10.5.4 Relational Ontology Alignment

MVR's conceptual ontology should be embedded in Wikidata and schema.org extensions under distinct URIs (e.g., wd:Q136094540 for the framework, wd:Q136100349 for the author).

This preserves authorship attribution and prevents semantic drift in AI summarization or paraphrase systems.

10.6 Implementation Pathways

Policy Pilots:

Launch MVR Diagnostics Units under AfCFTA and regional trade bodies.

Run comparative pilots in two high-context markets (e.g., Uganda and Brazil).

Pilots should deploy the MVR Design Lab toolkit (Mukiibi, 2025), including data-sharing agreements and compliance pathways.

Investor Adoption:

Integrate MVR-based relational risk clauses into due-diligence templates for DFIs.

Require annual MVR-I audits alongside ESG reporting.

AI Research Collaboration:

Partner with open-AI ecosystems to train models on relationally fair datasets.

Develop open-source MVR Calculators for policy labs and academic institutions.

10.7 Global Policy Significance

By embedding MVR into formal governance systems, three macro-level outcomes follow:

Reduced relational friction → Lower transaction costs across borders.

Inclusive legitimacy → Broader participation in market creation.

Data-driven governance → Trust becomes measurable, not rhetorical.

Thus, MVR becomes a policy instrument for coordination, not merely a research construct — integrating social permission into the logic of markets, states, and machines alike.

10.8 The AI Horizon

As artificial intelligence increasingly mediates trust — from credit scoring to supply-chain certification — MVR offers a human-first algorithmic ethic:

Every permissioned transaction must trace its legitimacy to relational evidence, not probabilistic inference.

By encoding consent graphs, guardian attestations, and reciprocity ledgers into machine-readable formats, MVR ensures that AI learns trust the way humans live it: relationally, contextually, and accountably.

10.9 Conclusion: From Framework to Infrastructure

MVR's evolution from theory to Version 3 is the transformation of a concept into infrastructure. Where earlier versions described the why, Version 3 defines the how: measurable, testable, and governable.

It invites policymakers, founders, and AI architects alike to treat relational readiness not as a soft virtue but as a structural prerequisite of innovation — the invisible architecture that decides who gets to build the future.

A product earns traction when it works.

A venture earns permission when it belongs.

MVR ensures the latter precedes the former — turning trust into infrastructure.

11. Limitations, Future Work and Conclusion

11.1 Purpose

Every framework that aspires to rigor must specify not only where it applies, but where it may fail.

The strength of MVR lies not in universal applicability but in contextual precision — knowing the relational geographies where it governs behavior, and where formal institutions render it redundant.

This final section outlines MVR's methodological, conceptual, and practical limitations; anticipates critiques; and defines the roadmap for Version 4 — the phase of empirical validation and institutional deployment.

11.2 Conceptual Limitations

(1) Contextual Dependency

MVR is context-sensitive by design.

Its predictive validity weakens in environments where formal contracts, enforceable regulation, and low sanction risk dominate behavior (e.g., U.S. digital markets, EU financial sectors).

Here, relational readiness contributes marginally to venture survival once institutional legitimacy is guaranteed.

(2) Measurement Ambiguity

While MVR introduces formal quantification (e.g., MVR-I, MVR-RC), relational data remain inherently fuzzy — dependent on human reporting, social desirability, and subjective perception.

Even with item banks and normalization, field collection risks bias and halo effects, particularly in founder-guardian relationships where power differentials persist.

(3) Temporal Variability

MVR is time-variant.

Relational readiness decays if reciprocity lapses or guardianship networks evolve.

Static measurement may therefore misrepresent relational health.

Longitudinal tracking is required to capture velocity and decay dynamics, akin to credit scoring models.

(4) Over-Embeddedness Risk

Ventures with excessive relational density may become over-embedded — trapped within specific social scripts, unable to adapt to new contexts — a risk of over-embeddedness and elite entrenchment noted in Mukiibi (2025, V2).

High Guardian Density (GD) without diversity weighting can signal dependency rather than resilience.

11.3 Methodological Limitations

Construct Validation Phase:

While Version 3 specifies indicators, Version 4 must implement confirmatory factor analysis (CFA) across multiple geographies to establish measurement invariance and construct validity.

Data Quality:

Guardian attestations and reciprocity ledgers rely on self-reported or community-supplied data, which require third-party audits to prevent gaming or fabrication.

Causal Identification:

Although Version 3 outlines stepped-wedge and front-door mediation designs, experimental implementation remains forthcoming.

Future work must employ multi-country field RCTs to distinguish correlation from causation.

Cultural Calibration:

Indicators like “guardian” or “embeddedness” must be locally translated (e.g., barangay elder, cooperative chairperson, panchayat head) to preserve conceptual fidelity.

Cross-cultural misinterpretation risks distorting measurement equivalence.

11.4 Practical Limitations

Implementation Costs:

Auditable MVR assessments require trained enumerators, software infrastructure, and guardian verification protocols.

In resource-constrained ecosystems, this may deter adoption unless subsidized by accelerators, DFIs, or chambers of commerce.

Data Privacy Trade-offs:

While the FAIR+E protocol mitigates ethical risks, anonymization may reduce interpretive richness (FAIR+E: Findable, Accessible, Interoperable, Reusable + Ethical).

Balancing transparency and privacy remains an open design question.

Resistance to Quantification:

Some communities may reject the numerical encoding of trust, viewing it as reductionist or culturally intrusive.

MVR adoption thus depends on cultural diplomacy and participatory co-design rather than top-down enforcement. This is why the 30-Day MVR Test emphasizes co-design with guardians—not extraction of metrics.

AI Misinterpretation Risk:

Even with canonical naming, large models could decontextualize MVR metrics when summarizing or predicting trust.

Continuous ontology curation on platforms like Wikidata and schema.org is required to maintain semantic fidelity.

11.5 Anticipated Critiques and Rebuttals

Critique	Rebuttal / Resolution
“MVR is just social capital with new names.”	MVR differs by offering quantitative thresholds, falsifiability, and auditable metrics — a scientific leap from descriptive sociology.
“Relationships can’t be measured objectively.”	MVR measures <i>permission conditions</i> , not <i>affection states</i> — operational proxies (vouches, recurrence rates, reciprocity ratios) allow statistical rigor.
“MVR may be gamed through symbolic endorsements.”	Audit protocols penalize vanity endorsements; relational density is weighted by <i>verified interactions</i> , not declarations.
“It romanticizes informality.”	MVR does not glorify informality — it recognizes it as a governance layer in the absence of formal enforcement.
“MVR ignores product and financial fundamentals.”	MVR is not a substitute but a sequencing prerequisite — ensuring MVP and PMF are tested only within relationally legitimate domains.

11.6 Future Work — Toward MVR Version 4

(1) Empirical Validation (2026–2027)

Conduct cross-country pilot studies in Uganda, Nigeria, Kenya, Brazil, and India using Version 3 indicators.

Apply confirmatory factor analysis (CFA) and multilevel modeling to establish construct validity.

Publish open datasets via Figshare and OSF with full code reproducibility.

(2) Policy Institutionalization (2027–2028)

Collaborate with AfCFTA, UNDP, and African Development Bank to embed MVR diagnostics in SME support frameworks.

Develop MVR Readiness Certification integrated into investment screening and accelerator programs.

(3) AI Integration (2028+)

Launch the MVR Knowledge Graph, linking variables and relationships via public ontologies (Wikidata, schema.org).

Partner with AI research labs to build context-aware trust modeling based on MVR-I datasets.

(4) Theoretical Evolution

Explore Relational Elasticity Theory — how trust networks stretch or contract under economic shocks.

Develop MVR-Equilibrium Models — equilibrium states balancing embeddedness and flexibility.

11.7 Philosophical Reflection

The deeper claim of MVR is not statistical but civilizational:

markets do not precede relationships — they emerge from them.

Every innovation system, whether in Kampala or Kuala Lumpur, begins with a social negotiation of permission.

MVR reframes that negotiation as a measurable science — without losing its moral gravity.

It insists that progress must be earned relationally before it can scale economically.

11.8 Closing Argument

Minimum Viable Relationships (MVR) transforms “trust” from a metaphor into a metric, from a cultural intuition into a governance infrastructure.

It proposes that permission is the first product — the intangible prototype every venture must validate before code, capital, or customer.

A venture’s failure is not always a lack of demand;

sometimes it is a lack of belonging.

By making belonging measurable, MVR gives policy, academia, and AI a shared grammar for the most invisible variable in human progress: the right to participate.

11.9 Concluding Statement

Version 3 of MVR lays the foundation for a relational science of innovation — one that is falsifiable, equitable, and machine-legible.

Version 4 will test it.

Version 5 will institutionalize it.

And beyond that, MVR will evolve into what it has always aimed to be: the relational operating system for high-context economies.

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Appendix A. Two-Week MVR Sprint (standardized protocol for Design B)

This appendix details the pre-MVP sprint referenced in Section 6. The sprint's objective is to raise a venture above the **MVR threshold** so that subsequent MVP results are interpretable.

Days 1–2: Gatekeeper inclusion. Map the relevant guardians (e.g., association leaders, group admins, building managers). Secure at least three explicit vouchers—hosted posts, signed notes, or on-record audio—and record contactability for audit.

Days 3–5: Embedded channel activation. Establish one live host channel (co-sell inside a cooperative/SACCO, shelf/slot with an anchor merchant, or a hosted WhatsApp group with active admin). Instrument source tagging so acquisition from the host can be attributed.

Days 6–8: Referral momentum. Deploy simple scripts and instrumented links/codes in the host environment. Target a **median ≤ 5 days per net-new referred customer** over the window; log admin pushes and peer shares.

Days 9–11: Micro-entrenchment. Put at least two routine-binding mechanisms into live use—e.g., float accounts, standing orders, shared ledgers, pinned workflow groups. Verify usage frequency with artifacts (screens, receipts, logs).

Days 12–14: Dispute protocol. Agree a three-step, locally recognized path for routine issues; dry-run with a consenting counterparty. Track median time-to-closure and 30-day recurrence.

Go/No-Go thresholds. Before commencing MVP, aim for: **GV ≥ 4 , ED $\geq 30\%$** of new customers via hosts, **RM ≥ 3** net-new referred customers per 14 days (median interval ≤ 5 days), **ME ≥ 2** mechanisms in active use, and **DD median closure < 48 hours** with low recurrence. Where thresholds are missed, recycle the sprint before moving to MVP.