DMIE MODEL — REGULATORY DOCUMENTS

(For the DMIE Calculator App)
Status: *App Recently Audited*
Version: 1.0
Prepared by: Babylon19 / Into Binary Research Unit
Model: *DMIE — Diophantine Model of Informal Economy*

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1. EXECUTIVE SUMMARY

The **DMIE (Diophantine Model of Informal Economy)** is a computational model designed to estimate informal economic activity using structured, integer-based parameter relationships. This document outlines the **regulatory, methodological, and compliance foundations** underpinning the DMIE Calculator App.

The purpose of this document is to ensure that DMIE operates with:

- Transparency
- Academic defensibility
- Regulatory alignment
- Operational accountability
- Ethical integrity

This regulatory documentation has been prepared following an **independent methodological and operational audit**, confirming that the DMIE Calculator App adheres to accepted norms for economic modelling, research software, and data-handling compliance.

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2. REGULATORY & POLICY FRAMEWORK

The DMIE Calculator App aligns with the following policy and regulatory environments:

2.1 National Regulatory References

- **South African Department of Higher Education & Training (DHET)** norms for research-based modelling tools.
- **Statistics South Africa (StatsSA)** methodological guidelines for labour, household, and microeconomic indicators.

- **National Treasury economic data governance** principles, especially transparency and replicability.

- **POPIA (Protection of Personal Information Act)** for data protection and processing limitations.

2.2 International Regulatory Alignment

- **OECD System of National Accounts (SNA) Guidelines** on measuring informal production.

- **ILO (International Labour Organization)** frameworks for informal sector estimation.

- **UN Data Quality Assurance Framework (DQAF)**, as applicable to non-survey modelling.

- **GDPR principles**, specifically regarding user privacy and data minimisation.

2.3 Industry Standards

- Academic modelling norms: peer-review transparency, replicable equations, parameter interpretability.

- Software development standards: secure code practices, user-data minimisation, model-output clarity.

- Ethical AI & modelling practices: non-malicious use, non-discriminatory design, methodological honesty.

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3. METHODOLOGICAL REGULATORY BASIS

3.1 Core Model Classification

DMIE is categorised as a **non-survey, computational estimation model** using:

- Deterministic Diophantine equations

- Integer-constrained optimisation

- Multi-parameter cross-checking

- Sensitivity-bound output ranges

It is not a forecasting tool, behavioural predictor, or policy simulator.

3.2 Transparency Requirements

The model provides:

- Explicit equation structures
- Full parameter definitions
- Model assumptions clearly listed in the accompanying User Manual
- Step-by-step logic flow visible during computation

This transparency aligns with academic economic modelling expectations.

3.3 Assumption Governance

All assumptions must be:

- Realistic
- Defensible with available data
- Free from ideological bias
- Consistent with South African economic behaviour patterns
- Consistent with SADC and broader African informal sector literature

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4. MODEL GOVERNANCE

4.1 Oversight Structure

The DMIE Model is maintained under a research-governance structure including:

- Lead Researcher (Model Owner)
- Methodology Review Board
- External Academic Auditor (appointed per audit cycle)
- Technical Maintainer (Calculator App engineer)

4.2 Version Control

All model changes follow documented procedures:

- Change proposals
- Methodological justification
- Impact assessment
- Version tagging
- Public change logs in the README

4.3 Annual Review Cycle

The model undergoes:

- Annual methodological review
- Bi-annual operational stability checks
- Compliance review following any regulatory change

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5. AUDIT SUMMARY — "APP RECENTLY AUDITED"

The most recent audit covered:

1. **Model Integrity Check** — Mathematical correctness of Diophantine relationships.
2. **Input–Output Validation** — Ensuring the model behaves predictably.
3. **Sensitivity Analysis** — Confirming the model does not exaggerate or underrepresent informal activity.
4. **Data-Handling Review** — Verifying POPIA & GDPR alignment.
5. **User Transparency Check** — Ensuring outputs are labelled, explained, and appropriately caveated.
6. **Operational Stress Testing** — Stability under multiple parameter configurations.

Audit results:

- No structural or mathematical errors found
- All outputs within acceptable behaviour ranges
- No personal data collection detected
- Documentation meets regulatory requirements
- Recommended that future versions include optional expert-mode parameters (non-critical)

The DMIE Calculator App is cleared for public academic and policy-support use.

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6. OPERATIONAL CONTROLS

6.1 Data Handling Controls

- The app does *not* store personal information
- All inputs are processed in-memory
- No identifiers, cookies, or tracking
- Users may export results locally only

6.2 Security Controls

- Codebase reviewed for injection and tamper vulnerabilities
- Input validation prevents invalid parameter injection
- Offline-safe: can run without transmitting data anywhere

6.3 Documentation Controls

- README and User Manual must be updated with each model revision
- Regulatory Document must be version-aligned with the model

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7. RISK MANAGEMENT & MITIGATION

7.1 Misinterpretation Risk

Mitigation:

- Clearly labelled output ranges
- Model assumptions explained
- Non-survey limitation disclaimer visible in all results pages

7.2 Incorrect Input Risk

Mitigation:

- Built-in validity thresholds
- Error prompts for missing or impossible parameter combinations

7.3 Policy Misuse Risk

Mitigation:

- Ethical Use Standards (separate document)
- Clear statement that DMIE is a *support tool*, not a policy mandate

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8. COMPLIANCE STATEMENT

The DMIE Model Calculator App complies with:

- POPIA
- GDPR
- DHET research norms
- StatsSA methodological expectations
- OECD/ILO informal economy guidelines
- Academic modelling transparency standards

- Annual independent audit requirements

No prohibited data practices, harmful modelling behaviour, or undocumented assumptions were detected.

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9. APPENDICES

Appendix A — Key Definitions

- *Informal Economy*
- *Diophantine Equation*
- *Integer-Constrained Optimisation*
- *Parameter Confidence Bounds*

Appendix B — Audit Documentation Overview

- Checklists
- Methodological verification instruments
- Compliance crosswalk tables

Appendix C — Change Log Framework

A template for tracking future revisions.