

DATA-DRIVEN PORTFOLIO SELECTION AND OPTIMIZATION IN GOVERNANCE, RISK AND COMPLIANCE MANAGEMENT

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The complexity of regulatory requirements and organizational risks demands structured, data-driven Governance, Risk, and Compliance (GRC) decision-making (Avianti & Handoyo, 2025). Traditional qualitative and fragmented approaches often fail in dynamic environments (Papazafeiropoulou & Spanaki, 2015). This study proposes a portfolio-based optimization framework for GRC, integrating portfolio theory with risk analytics to improve compliance effectiveness and reduce organizational risk exposure.

Governance, Risk, and Compliance (GRC) has become a strategic function due to regulatory pressure, digital transformation, and complex risk environments (Avianti & Handoyo, 2025). Organizations must allocate resources across multiple initiatives while balancing risk appetite and obligations. Traditional GRC approaches remain reactive, relying on isolated controls and subjective judgments that often miss interdependencies between risks (Papazafeiropoulou & Spanaki, 2015; Maf'ul Taufiq, 2023). Data-driven decision-making can enhance GRC by converting risk and compliance data into actionable insights (Zhu, 2019). Portfolio selection theory offers a framework to optimize decisions under uncertainty, balancing expected outcomes and risk exposure (Markowitz, 1952). Integrated, analytics-based GRC systems improve transparency and compliance performance (Avianti & Handoyo, 2025), with big data enhancing risk assessment and proactive mitigation (Theodorakopoulos et al., 2025). Portfolio optimization models, including Bayesian approaches, address uncertainty and multi-objective constraints, making them suitable for GRC (Boyd et al., 2024; Nguyen et al., 2021; Bauder et al., 2018). This study models GRC initiatives—compliance programs, internal controls, and governance reforms—as portfolio assets defined by cost, expected risk reduction, compliance impact, and uncertainty. Data from organizational systems are analyzed to estimate effectiveness, and portfolio optimization identifies the best combination of initiatives aligned with risk appetite and resource constraints (Papazafeiropoulou & Spanaki, 2015; Boyd et al., 2024). This framework allows continuous adjustment as regulatory and risk conditions evolve.

Overall, data-driven portfolio selection and optimization provide a rigorous, practical approach to GRC management, enhancing compliance effectiveness, reducing risk exposure, and supporting informed governance decision-making (Avianti & Handoyo, 2025). The approach offers a focused, scalable, and analytically grounded framework for strategic GRC management..

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