Paper Summary

<!--META_START-->

Title: Machine Learning-Based Framework for the Analysis of Project Viability

Authors: Jean Marie Tshimula, Atsushi Togashi

DOI: 10.1109/CCOMS.2018.8463273

Year: 2018

Publication Type: Conference

Discipline/Domain: Data Science / Development Economics

Subdomain/Topic: Machine Learning for Investment Decision Support in African Development Projects

Eligibility: Eligible

Overall Relevance Score: 82

Operationalization Score: 90

Contains Definition of Actionability: Yes (implicit)

Contains Systematic Features/Dimensions: Yes

Contains Explainability: Partial

Contains Interpretability: No

Contains Framework/Model: Yes

Operationalization Present: Yes

Primary Methodology: Mixed Methods (Data Mining, Machine Learning, Topic Modeling)

Study Context: African Development Bank (AfDB) project portfolio analysis for investment guidance

Geographic/Institutional Context: Africa / AfDB (headquartered in Côte d'Ivoire)

Target Users/Stakeholders: Investors, policy makers, AfDB analysts

Primary Contribution Type: Machine Learning workflow for actionable investment guidance

CL: Yes

CR: Yes

FE: Yes

TI: No

EX: Partial

GA: Yes

Reason if Not Eligible: N/A

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Machine Learning-Based Framework for the Analysis of Project Viability

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Discipline/Domain:

Data Science / Development Economics

Subdomain/Topic:

Machine Learning for Investment Decision Support in African Development Projects

Contextual Background:

The study focuses on transforming African Development Bank (AfDB) project data into actionable insights

Geographic/Institutional Context:

Africa / African Development Bank

Target Users/Stakeholders:

Potential investors, AfDB officials, development economists, policy makers

Primary Methodology:

Mixed Methods (Machine Learning classification + NLP topic modeling)

Primary Contribution Type:

Design and implementation of a machine learning-based workflow for actionable investment recommenda

General Summary of the Paper

The paper presents a machine learning framework designed to process and analyze AfDB project data, c

Eligibility

Eligible for inclusion: **Yes**

How Actionability is Understood

Actionability is implicitly understood as the ability of the analytical framework to transform raw project data

> "…transforming the project data…into actionable insights and…giving investment directions to follow ba

> "…generate the knowledge required for orienting people…willing to know more details…with insightful g

What Makes Something Actionable

- Connection to AfDB's strategic "High Five" priorities

- Clear identification of sectors and countries with investment potential

- Data-driven classification of promising projects using RF accuracy and LDA topic extraction

- Reduction of uncertainty and investment risk through predictive modeling

How Actionability is Achieved / Operationalized

- **Framework/Approach Name(s):** Machine Learning-Based Workflow (AfDB investment analysis)

- **Methods/Levers:** Web scraping (afdbr R package), MongoDB storage, Random Forests, LDA topic r

- **Operational Steps / Workflow:** Data extraction → Structured storage → Data cleaning & translation →

- **Data & Measures:** Project descriptions, status, sector, elapsed time, reappraisal status

- **Implementation Context:** AfDB project portfolio

> "…workflow…consists of two phases: data collection and storage, and analysis module." (p. 2)

> "…built a model with 100 trees…then built an LDA model to outline the data with 20 topics." (p. 4)

Dimensions and Attributes of Actionability (Authors' Perspective)

- **CL (Clarity):** Yes — Clear sector classification and thematic topic identification aid understanding.

- **CR (Contextual Relevance):** Yes — Links directly to AfDB's High Five priorities and African market t

- **FE (Feasibility):** Yes — Uses existing AfDB data and scalable ML methods.

- **TI (Timeliness):** No explicit reference.

- **EX (Explainability):** Partial — RF feature importance is used, but model interpretability is not deeply

- **GA (Goal Alignment):** Yes — Explicitly tied to AfDB's strategic priorities.

- **Other Dimensions Named by Authors:** Risk reduction, investment prioritization.

Theoretical or Conceptual Foundations

- AfDB High Five priorities

- Random Forest classification theory (Breiman, 2001)

- LDA topic modeling (Blei et al., 2003)

Indicators or Metrics for Actionability

- RF classification accuracy (99.8%)

- Identification of top 7 sectors for investment

- Topic frequency and relevance to strategic priorities

Barriers and Enablers to Actionability

- **Barriers:** Missing project descriptions (7.1%), language inconsistencies requiring translation

- **Enablers:** Comprehensive AfDB dataset, automated continuous data scraping, alignment with strate

Relation to Existing Literature

Positions itself as extending previous AfDB project evaluation models (e.g., Mubila et al. 2002) by focusin

Summary

This paper develops and demonstrates a machine learning-based workflow to make AfDB project data ac

Scores

- **Overall Relevance Score:** 82 — Strong implicit definition of actionability and clear link to features (se

- **Operationalization Score:** 90 — Detailed workflow, concrete ML methods, data sources, and sector c

Supporting Quotes from the Paper

- "Transforming the project data…into actionable insights and…giving investment directions to follow bas

- "…generate the knowledge required for orienting people…with insightful guidance." (p. 2)

- "…built a model with 100 trees…then built an LDA model to outline the data with 20 topics." (p. 4)

Actionability References to Other Papers

- Mubila & Lufumpa (2002) — Statistical model for project success factors

- Blei et al. (2003) — LDA model

- Breiman (2001) — Random Forests