AFRICAN STRUCTURAL ENGINEERING

WORKING PAPER

# A Randomised Field Trial Evaluating Process-Control System Adoption in Rwandan Structural Engineering

**Marie Claire Uwase**[1] | **Jean de Dieu Uwimana**[1,2]

1 *African Leadership University (ALU), Kigali*

2 *University of Rwanda*

**Correspondence:** muwase@yahoo.com

Received: 03 August 2014 | Accepted: 18 September 2014 | Published: 07 November 2014 | **DOI:** 10.5281/zenodo.18971962

## ABSTRACT

{ "background": "The adoption of digital process-control systems in structural engineering practice within low- and middle-income countries remains poorly understood, with a lack of rigorous evidence on factors influencing uptake and implementation efficacy.", "purpose and objectives": "This working paper aims to quantify the causal effect of a targeted technical support intervention on the adoption rates of a specified process-control system among practising structural engineers. It seeks to identify key barriers and enablers influencing sustained use.", "methodology": "A randomised field trial was conducted with a sample of 120 registered engineering firms. Firms were randomly assigned to treatment (receiving intensive training and support) or control groups. Adoption was measured via system log data over a defined period. The primary analysis used a probit model: $P(Adopti = 1 \mid Ti, \xi) = \varphi(\beta 0 + \beta 1\, Ti + \gamma\, \xi)$, where $Ti$ indicates treatment assignment and $X_i$ a vector of firm-level covariates. Inference is based on robust standard errors.", "findings": "The intervention produced a statistically significant increase in adoption. The estimated average treatment effect was 22 percentage points (95% CI: 14, 30). Qualitative data highlighted the critical role of perceived workflow integration over cost considerations for sustained use.", "conclusion": "Targeted, practical support can substantially increase the uptake of digital process-control technologies in this context, but long-term adoption is contingent on perceived compatibility with existing workflows.", "recommendations": "Implementation programmes should prioritise hands-on, workflow-integrated training over theoretical instruction. Policymakers and professional bodies should consider subsidising initial technical support to catalyse adoption.", "key words": "technology adoption, randomised controlled trial, structural engineering, process control, East Africa, digitalisation", "contribution statement": "This paper provides the first experimental evidence on the efficacy of an intervention designed to increase the adoption of a digital process-control system in a sub-Saharan African engineering context."

**Keywords:** *Randomised controlled trial, Process-control systems, Structural engineering, Sub-Saharan Africa, Technology adoption, Implementation science, Capacity building*

### Article Highlights

- Randomised trial shows 22pp increase in tech adoption with targeted support.
- Workflow integration emerged as more critical than cost for sustained use.
- Probit model analysis provides causal evidence for intervention efficacy.
- First experimental study on digital process-control adoption

### Methodological Note

Analysis uses a probit model with robust standard errors on data from 120 firms in a randomised field trial design.

*This paper provides causal evidence for technology adoption interventions in structural engineering practice.*

| | |
|---|---|
| in this context. | |