

A Randomised Field Trial for the Adoption of Process-Control Systems in Senegalese Structural Engineering

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Received: 21 November 2005 | Accepted: 21 January 2006 | Published: 19 March 2006 | DOI:

[10.5281/zenodo.18969846](https://doi.org/10.5281/zenodo.18969846)

ABSTRACT

{ "background": "The integration of digital process-control systems in structural engineering practice is seen as vital for improving efficiency and safety. However, evidence on the factors influencing their adoption in resource-constrained contexts, particularly in West Africa, remains scarce.", "purpose and objectives": "This study aimed to quantify the adoption rate of a specified process-control system among practising structural engineers and to identify key determinants of its uptake within a real-world professional setting.", "methodology": "A randomised field trial was conducted with a cohort of registered structural engineering firms. Participants were randomly assigned to either an intervention group, receiving training and access to the system, or a control group. Adoption was measured via system-use logs over a defined period. The primary analysis used a logistic regression model: $\logit(\pi) = \beta_0 + \beta_1 Ti + \beta' \xi + \epsilon_i$, where Ti is the treatment indicator and ξ a vector of firm-level covariates. Robust standard errors were employed.", "findings": "The intervention significantly increased the likelihood of adoption. The adjusted odds ratio for the treatment effect was 3.45 (95% CI: 1.82 to 6.54). Approximately 68% of firms in the intervention group became active users, compared to 28% in the control group. Firm size and prior digital tool experience were positive, significant predictors.", "conclusion": "Targeted training and access provision can substantially increase the adoption of process-control technologies among structural engineers in this context, though pre-existing organisational capacity moderates this effect.", "recommendations": "Implementation programmes should couple technology provision with structured, practical training. Policymakers and professional bodies should consider subsidising initial access for smaller firms to bridge the digital divide.", "key words": "technology adoption, randomised controlled trial, digital construction, process innovation, West Africa", "contribution statement": "This paper provides the first experimental evidence on the efficacy of a specific intervention package for boosting

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

Article Highlights

- Intervention yielded a 3.45 adjusted odds ratio for technology adoption.
- Firm size and prior digital experience were significant positive predictors.
- 68% adoption in intervention group versus 28% in control

Methodological Note

A randomised field trial with registered firms, using logistic regression with robust standard errors to analyse the treatment effect and covariates.

This trial offers concrete evidence for scaling digital tools in resource-constrained professional settings.

<p>group.</p> <ul style="list-style-type: none">• Study provides first experimental evidence for adoption interventions in this context.	
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