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FROM SPRINTS TO SUSTAINABILITY: THE AGILE–AI–DIGITAL TRANSFORMATION PIPELINE FOR NEXT-GENERATION GREEN PERFORMANCE

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ABSTRACT

This study investigates how Agile practices influence Environmental Sustainability Performance through a sequential mediation pathway involving AI Capabilities and Digital Transformation, with Digital Leadership moderating the final stage of the pipeline. Survey data were collected from 215 professionals across organisations implementing Agile practices. A 27-item questionnaire written in plain language was administered [1, 2]. Seven hypotheses were tested using Partial Least Squares Structural Equation Modelling (PLS-SEM) with bootstrapped significance testing (B = 5,000 iterations) in accordance with Hair et al. [3]. Environmental Sustainability was measured using two distinct items (ES1 and ES3) from the four-item administered scale; the remaining two items exhibited near-identical response patterns and were excluded from analysis to avoid artificially inflated measurement indices.

Keywords

Agile practices, AI capabilities, digital transformation, environmental sustainability, digital leadership, PLS-SEM, composite reliability, discriminant validity, serial mediation.

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INTRODUCTION

Theoretical contribution. N. This research builds upon the dynamic capabilities theory to identify and empirically test sequential causal chain: Agile Practices, AI Capabilities, Digital Transformation, Environmental Sustainability, Performance in one PLS-SEM model and assesses the measurement model for each construct (Outer Loadings, CR, AVE, HTMT).10 Practical contribution. The research develops recommendations for managers and policy-makers concerning the effective sequence of the application of Agile practices, development of AI capabilities, investment in the digital transformation, and its eventual generation of measurable environmental performance benefits.

Most studies examine Agile, AI, and Digital Transformation as parallel-independent phenomena, overlooking their sequential interdependence. No prior study has tested all three as a causally ordered pipeline culminating in Environmental Sustainability Performance within a single integrated SEM framework. The moderating role of Digital Leadership within this pipeline has received very limited empirical attention (Reyna-Vargas, 2024).

2. OBJECTIVES AND RESEARCH QUESTIONS

1.4.1. Research Objectives

• RO1: To examine the direct influence of Agile practices on AI capabilities (H1; RQ1).

• RO2: To investigate the direct influence of AI capabilities on Digital Transformation (H2; RQ2).

• RO3: To assess the direct effect of Digital Transformation on Environmental Sustainability Performance (H3; RQ3).

- RO4: To test whether AI capabilities mediate the Agile → DT relationship (H4; RQ4).
- RO5: To test whether Digital Transformation mediates the AI → ES relationship (H5; RQ5).
- RO6: To assess the moderating role of Digital Leadership on the DT → ES relationship (H6; RQ6).
- RO7: To examine the full serial mediation Agile → AI → DT → ES (H7; RQ7).

CONCLUSION

Three voids call for these hypotheses: firstly, no research has tested H1, H2, and H3 at the same time under the same PLS-SEM and model configuration in a sustainability context. Secondly, H4, H5, and H7 fill in the void for serial mediation within the Agile-AI-DT-ES pipeline. Thirdly, H6 fills in a major void, that there is almost no empirical research done on Digital Leadership as a moderator in sustainability DT research [7].

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