

Forecasting Organizational Innovation Performance Through Long Short-Term Memory (LSTM) Networks and Strategic Capability Indicators

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1. Round 1

1.1. Reviewer 1

Reviewer:

The paragraph beginning with “Recent developments in strategic management literature emphasize that organizational capabilities constitute the foundation upon which sustainable innovation is built” synthesizes numerous capability constructs; however, no explicit theoretical framework is presented. The manuscript would benefit from a conceptual model illustrating how each strategic capability dimension is hypothesized to influence future innovation performance and why these variables were selected over other innovation antecedents.

In the final paragraphs of the Introduction, the authors argue that LSTM networks are particularly suitable for forecasting innovation performance. However, the manuscript does not adequately justify why LSTM was preferred over alternative temporal architectures such as GRU, Temporal Convolutional Networks, Transformer-based models, or hybrid deep learning frameworks. A stronger methodological rationale is needed.

In the Methods and Materials section, the sentence “Historical organizational data spanning five consecutive years were collected to establish temporal patterns suitable for deep learning analysis” lacks sufficient detail regarding temporal granularity. Please clarify whether observations were collected annually, quarterly, monthly, or at another interval, as the effectiveness of LSTM modeling depends heavily on sequence structure and temporal resolution.

The statement “Hyperparameter tuning was performed using grid search and validation-based optimization procedures” is insufficiently detailed. Please report the hyperparameter search space, evaluation criteria, computational cost, and final selected parameters. This information is essential for methodological reproducibility.

In Table 1, correlations among strategic capability variables are relatively high (e.g., knowledge management capability and organizational learning capability, $r = .69$). The authors should examine potential multicollinearity issues and report variance inflation factors (VIFs), tolerance values, or related diagnostics, particularly because correlated predictors may influence feature importance estimates.

Authors revised the manuscript and uploaded the new document.

1.2. Reviewer 2

Reviewer:

The paragraph describing the study population reports that 312 organizations participated, represented by four managerial respondents each. The manuscript should explain how responses from multiple managers within the same organization were aggregated. Were inter-rater agreement statistics (e.g., rwg, ICC(1), ICC(2)) calculated to justify aggregation to the organizational level? Without such evidence, organizational-level inference may be problematic.

The authors state that organizations undergoing major restructuring were excluded “to preserve data consistency and model reliability.” This exclusion criterion may introduce selection bias because organizational restructuring is often associated with innovation dynamics. Please discuss how this exclusion may have affected external validity and model generalizability.

In the measurement section, the manuscript reports that “Cronbach’s alpha values for the capability dimensions ranged from 0.82 to 0.94.” While internal consistency is important, the study should also report composite reliability (CR), average variance extracted (AVE), factor loadings, discriminant validity indices, and CFA fit statistics to establish construct validity comprehensively.

The paragraph beginning with “Organizational innovation performance was measured using a multidimensional innovation performance scale” indicates that a CFA supported construct validity, yet no CFA results are presented. Please provide model fit indices (CFI, TLI, RMSEA, SRMR, χ^2/df) and standardized loadings, either within the manuscript or as supplementary material.

The manuscript mentions that “Data preprocessing procedures included normalization, missing-value treatment, outlier detection, and temporal alignment.” However, the procedures are described only generally. The authors should specify the percentage of missing data, imputation methods used, criteria for identifying outliers, and the exact normalization formula applied. These preprocessing decisions may substantially affect predictive performance.

In the paragraph describing model development, the authors note that “Multiple network configurations were evaluated during model development, including variations in the number of hidden layers, neuron counts, dropout rates, learning rates, and optimization algorithms.” The final selected architecture is not reported. Please provide complete architectural details, including number of LSTM layers, units per layer, activation functions, batch size, epochs, dropout parameters, optimizer settings, and computational environment.

Authors revised the manuscript and uploaded the new document.

2. Revised

Editor's decision after revisions: Accepted.

Editor in Chief's decision: Accepted.