

G25 Enriching Research and Policy Methods in Regional Science: Digital Tools, AI, Participatory Approaches, Mapping and Stakeholder Engagement

For Ordinary Sessions (O-)

Title: A Context-Engineered AI Agent Framework for Automating Public Investment Evaluation

Abstract (200 – 400 words)

Ex-ante evaluation of large-scale public investment projects is a critical institutional mechanism for assessing policy relevance, economic viability, and fiscal accountability prior to implementation. However, prolonged review periods and complex administrative procedures frequently delay decision-making, increasing social costs and weakening the timely provision of essential infrastructure and public services. Although recent advances in large language models (LLMs) have opened new possibilities for automating knowledge-intensive policy tasks, conventional LLM applications encounter significant limitations when processing extensive regulatory documents and structured evaluation frameworks. In particular, context rot and hallucination can undermine analytical reliability and institutional consistency in high-stakes public decision environments.

To address these challenges, this study proposes a Context Engineering–based AI agent framework for automating structured public investment evaluation. The framework organizes the assessment process into four coordinated stages. First, during the knowledge ingestion phase, institutional guidelines, evaluation criteria, and standardized cost references are retrieved through a Retrieval-Augmented Generation (RAG) mechanism to ensure traceability and regulatory alignment. Second, in a multi-agent collaborative analysis stage, specialized agents responsible for demand forecasting, cost estimation, and policy assessment exchange data through a Shared Unified History, maintaining analytical coherence across modules. Third, Recursive Summarization selectively transmits essential information between stages to prevent context degradation during long-document generation. Finally, Memory Consolidation integrates intermediate outputs into a logically consistent final evaluation report.

Empirical testing using real-world public project proposals demonstrates that the proposed system generates evaluation documents with high structural integrity and alignment with institutional standards. Furthermore, the framework produces confidence intervals for key performance indicators, such as benefit–cost ratios, enabling pre-submission scenario simulations and early identification of potential vulnerabilities.

The findings indicate that context-engineered AI agents can substantially reduce administrative lead times while strengthening reliability, transparency, and traceability in public investment decision-

making. More broadly, this research advances the methodological integration of LLM-based systems into institutional policy evaluation, positioning context-aware AI as a scalable governance infrastructure for enhancing efficiency and consistency in the public sector.

Keywords (Max. 5): Public Investment Evaluation, Context Engineering, AI Agents, Policy Automation