

MOUNTAINS OF THE MOON UNIVERSITY

FOCULTY OF SCIENCE, TECHNOLOGY AND INNOVATION

DEPARTMENT OF COMPUTER SCIENCE

INDIVIDUAL ASSIGNMENT

LECTURER NAME: TUGUME ANDREW

COURSEUNIT: SOFTWARE ENGINEERING

NAME: NALUKANGA WINNIE

REG NO: 2023/U/MMU/BCS/00102

**Problem Discovered**

The research identifies that Agile Project Management (APM) is fraught with persistent, multi-faceted challenges, or "pain points," that hinder project success. These challenges, derived from a comprehensive literature review, are complex and interlinked. They range from practical issues like managing changing requirements, unclear stakeholder support, and ambiguous role definitions to more systemic problems such as resistance to organizational change, difficulties in effort estimation, and a lack of deep understanding of agile processes. These pain points necessitate adaptive and strategic responses from project managers, who often operate in dynamic and high-pressure environments.

**Proposed Solution**

To address these challenges, the paper proposes the novel application of Generative AI (GenAI), specifically ChatGPT, through the discipline of Prompt Engineering. The core solution is the development of structured "Prompt Patterns." These patterns are reusable templates designed to guide ChatGPT to act in specific roles, understand project constraints, and generate context-aware, actionable outputs. For example, a "Requirements Engineering Pattern" can guide the AI to act as a requirements engineer, ask clarifying questions, and produce a structured requirement specification. The proposal is not to replace the human project manager but to provide them with an AI-powered assistant that can automate tasks, offer guidance, simulate stakeholder perspectives, and help mitigate the identified pain points.

**Methodology**

The study was conducted using the Design Science Research (DSR) methodology, which is geared toward creating and evaluating artifacts designed to solve identified problems. The process unfolded in several stages:

**Problem Identification & Objective Definition** A thorough problem identification phase was the first step in the process. To identify common "pain points" in Agile Project Management (APM), the writers reviewed the literature. Effort estimation (e.g., technical knowledge), process (e.g., agile understanding), endurance (e.g., resistance to change), people (e.g., role definition), and project (e.g., requirements management) were the five main areas into which these difficulties were methodically divided into a theoretical model. This was followed by the definition of the objectives, which was to use ChatGPT to develop and evaluate "prompt patterns"—structured templates for engaging with Generative AI—that were especially intended to offset these problems.

**Development:** The artifact—the prompt patterns—was developed. Each pattern followed a structured template (Name, Intent, Motivation, Structure, and Demonstration). The prompts were designed to be explicit, often using role-playing (e.g., "Act as a steering group member") and incorporating constraints and specific output formats.

**Demonstration & Evaluation**: each prompt pattern was empirically tested by entering it into ChatGPT (the GPT-4 model) three times in a single session to ensure response consistency. The outputs were assessed using qualitative methods rather than quantitative metrics, evaluating the relevance, actionability, and adaptability of the generated solutions by contrasting the AI's recommendations with previous research and the authors' real-world project management expertise.

**Findings and Discussion**

The empirical testing demonstrated that ChatGPT, when guided by the engineered prompt patterns, can be a highly effective assistant in APM contexts. Key findings include:

**Task Assistance:** ChatGPT successfully assisted in creating and prioritizing requirements, proposing strategies for improving stakeholder engagement, and defining clear team roles and responsibilities based on project constraints.

**Contextual Understanding and Adaptability:** The AI demonstrated a strong ability to understand the context of the prompt, ask relevant clarifying questions, and adapt its responses based on iterative user feedback. For instance, it could refine a requirement table or adjust role specifications after receiving more information.

**Actionable Outputs:** The outputs were consistently structured in the requested formats (tables, memos) and were deemed actionable and valuable as a starting point for project managers.

**Critical Limitation - Variability:** A major discussion point was the lack of consistency in ChatGPT's responses. While the quality remained high, the specific content, number of suggestions, and sometimes the depth of analysis varied across the three identical test prompts. This highlights the non-deterministic nature of the technology.

**Complementary, Not Replacement**: The discussion concludes that ChatGPT's knowledge is generally reliable but must be overseen by a human expert. It is a powerful tool for assistance, guidance, and automation of specific tasks, but it cannot replace the critical thinking, experience, and decision-making of a human project manager, especially in complex or critical situations.

**Gaps**

The study acknowledges several gaps that present opportunities for future research:

**Limited Real-World Validation:** The prompts were tested on hypothetical scenarios. Their efficacy and impact in live, complex agile projects over a sustained period remain unproven.

**Incomplete Pattern Set:** Although a ten-point pain point model was presented, the paper only provides examples for three of the prompt patterns (Requirements, Stakeholder Support, and Role Clarification), ignoring the others.

**Subjective Evaluation:** Since there are no quantitative measures to analyze the AI's output, the evaluation is inevitably subjective and depends more on expert opinion and alignment with the literature than on quantifiable performance data.

**Consistency and Reliability:** The variability in responses across iterations points to a reliability gap, making it difficult to fully trust the AI for standardized, repeatable processes without human review.

**Technical Constraints:** The token limit of ChatGPT (2048 tokens at the time) could restrict its use for very large or complex project contexts.

**Conclusion**

In conclusion, this research establishes a compelling foundation for the use of Prompt Engineering and GenAI as a support mechanism in Agile Project Management. By developing a structured pain point model and corresponding prompt patterns, the study provides a practical approach for project managers to leverage ChatGPT for tackling common challenges. The findings confirm that AI can significantly aid in tasks ranging from requirements engineering to stakeholder communication. However, the conclusion is tempered by the identified gaps, particularly the variability of AI responses and the need for human oversight. The future of AI in APM, as envisioned by this study, is not one of replacement but of augmentation, where human expertise is powerfully complemented by AI-assisted tools. Future work is directed towards validating these patterns in real-world settings and expanding the catalog of prompt patterns to cover more agile pain points. Solving and often ambiguous nature of agile endeavors