



جامعة ميدأوشن

كلية الإدارة

ماجستير إدارة المشاريع

Project Title

Integrating Agile Principles into Stage-Gate Systems to Accelerate Project Delivery, Enhance Cost one Efficiency and Improve Customer Satisfaction at engineering Project management department for of Petrochemical industry company in Jubail region- KSA

Student Name:

Mohammed Ibrahim Al haboob

إشراف/

د . الفيصل عبدالحميد محمد حسن

د. فايز جراد

العام الدراسي:

2025

Introduction:

In today's fast-paced and highly competitive industrial landscape, the ability to deliver projects with speed, efficiency, and customer-centric focus has become a critical success factor particularly within the petrochemical sector. The engineering project management departments operating in the Jubail region of the Kingdom of Saudi Arabia (KSA), one of the world's largest industrial hubs, face increasing pressure to meet complex project requirements within stringent timeframes and budgets, while also responding swiftly to evolving client needs.

Traditional project management methodologies, such as the Stage-Gate system, have provided a structured framework for managing large-scale engineering projects.

To address these limitations, there is growing interest in integrating Agile principles into existing Stage-Gate systems.

Hence, by embedding Agile practices into the structured Stage-Gate process, organizations can potentially accelerate project delivery, enhance cost efficiency and improve customer satisfaction.

Problem Statement Introduction:

The engineering project management department within the petrochemical industry in Jubail is a cornerstone of industrial projects, characterized by complex & large-scale engineering projects that demand high levels of precision, coordination, and timely execution.

Despite using the well-established Stage-Gate system to manage project development, many projects face persistent challenges related to delayed project delivery, escalating costs, and insufficient alignment with evolving customer requirements.

The traditional Stage-Gate model, while structured and risk-conscious, often lacks the flexibility needed to adapt to rapid changes in project scope, market conditions, or stakeholder expectations.

In contrast, Agile methodologies offer a more flexible and adaptive approach, promoting faster decision-making, enhanced team collaboration, and continuous customer feedback.

The current absence of a hybrid framework that balances the structure of Stage-Gate with the agility required for modern project environments leads to inefficiencies, cost overruns, and missed opportunities for customer-focused innovation.

Importance of the Study:

This study holds significant importance in the field of engineering project management, particularly within the petrochemical industry.

First, the petrochemical sector in Jubail represents a critical pillar of Saudi Arabia's industrial economy, contributing substantially to national GDP and employment. The scale and complexity of engineering projects in this sector demand advanced project management methodologies that can ensure timely delivery, cost control, and stakeholder satisfaction.

Second, this study seeks to bridge that gap by exploring how Agile methodologies can be integrated into the Stage-Gate system to create a more adaptive and responsive hybrid framework.

Third, help the organizations operating in Jubail and across similar industrial environments to build more agile, efficient, and customer-focused project management cultures.

Fourth, the study has the potential to deliver long-term value by improving project outcomes, project execution strategy, introducing contracting strategy, Maturity KPI & Performance initiative, improvement of site projects schedule, cost and quality.

Objectives of the Study:

The primary objective of this study is to explore the integration of Agile principles into the traditional Stage-Gate project management system in order to improve project performance, project delivery time, cost efficiency, and customer satisfaction within the engineering project management departments of the petrochemical industry in the Jubail region, Kingdom of Saudi Arabia.

To achieve this, the study is guided by the following specific objectives:

1. To examine the limitations of the traditional Stage-Gate system currently used in managing engineering projects in the petrochemical industry in Jubail.
2. To identify key Agile principles and practices that are relevant and adaptable in the context of the petrochemical sector.
3. To assess challenges and barriers to implementing a hybrid Agile–Stage-Gate framework in the context of the petrochemical sector.
4. To improve the project time line of the Stage-Gate system and to develop a practical integration model or framework for applying Agile principles within the Stage-Gate process tailored to the operational needs of engineering project management department.

5. To introduce CAPEX Maturity KPI & Performance initiative to improve projects performance cultures.
6. To introduce new contracting strategy at engineering project management department.
7. To introduce new project execution strategy at engineering project management department
8. To provide recommendations for project managers, stakeholders, and decision-makers on adopting and managing the hybrid model for improved project outcomes.

Research Questions

1. How can integrating Agile principles into the Stage-Gate process impact project delivery time, cost efficiency, and customer satisfaction?
2. What are the main limitations of the traditional Stage-Gate project management system in the context of engineering projects in the petrochemical industry in Jubail, KSA?
3. Which Agile principles and practices can be effectively adapted for use within capital-intensive engineering projects?
4. What strategies or models can facilitate the successful integration of Agile methodologies into the existing Stage-Gate system?

Research Assumptions

1. The current Stage-Gate system is widely adopted in the engineering project management departments of petrochemical companies in the Jubail region and forms the standard framework for project execution.
2. Agile principles are adaptable at least partially to engineering projects despite being originally developed for software and IT industries.
3. Project managers and team members within the petrochemical industry are familiar with both Stage-Gate and Agile concepts to a degree that allows them to provide informed input through surveys, interviews, or case studies.
4. Integration of Agile principles into the Stage-Gate process can be implemented without compromising regulatory, safety, and quality standards required in the petrochemical industry.
5. Customer satisfaction, cost efficiency, and project delivery speed are valid and measurable indicators of project performance in the context of engineering project management.

Previous study:

Exploring of previous study to support this research are ongoing.

Theoretical Framework of the study:

This study investigates how integrating Agile principles into the traditional Stage-Gate project management system can improve project performance outcomes specifically focusing on project delivery speed, cost efficiency, and customer satisfaction in the engineering project management context of the petrochemical industry in Jubail, KSA. Constructs as following:

1. Guides the structured approach to planning, executing, and finalizing projects. The PMBOK Guide (by PMI) provides the foundational elements of scope, time, cost, quality, and stakeholder management,
2. Integrating Agile into Stage-Gate will reduce project delivery timelines by increasing flexibility and reducing decision-cycle time.
3. Agile integration will enhance cost efficiency through iterative planning, early risk mitigation, and resource optimization.
4. Customer satisfaction will improve due to frequent feedback, early visibility of deliverables, and better alignment with customer needs.

Research Methodology and Methods:

This section outlines the data collection methods, and analysis techniques used to investigate the integration of Agile principles into Stage-Gate systems within the engineering project management departments of the petrochemical industry in Jubail, KSA.

1. Data Collection Methods

Surveys (Quantitative):

Structured questionnaires will be distributed to project managers, engineers, and team members in engineering project management departments. Questions will focus on project timelines, cost performance, customer feedback, and use of Agile or Stage-Gate practices.

Semi-Structured Interviews (Qualitative):

In-depth interviews with selected stakeholders (e.g., project managers, senior engineers, department heads) will explore:

- Challenges of current Stage-Gate use
- Awareness and application of Agile practices
- Perspectives on integrating the two methodologies

2. Sampling Strategy

- Engineering project management personnel within petrochemical companies operating in the Jubail region.
- Approximately 100 respondents for the survey (depending on access).
- 10–15 in-depth interviews with key stakeholders.

3. Data Analysis Methods with tools like SPSS or Excel.

Study Tools:

1. Questionnaire (Survey Instrument)

A structured questionnaire designed to collect standardized quantitative data from a large number of project professionals.

Key Features:

- Closed-ended questions (Likert scale, multiple choice)
- Sections on demographics, familiarity with Agile and Stage-Gate, project performance indicators (cost, time, satisfaction)

Purpose:

To statistically assess how Agile–Stage-Gate integration affects project performance.

2. Interview Guide

A semi-structured interview guide used to gather in-depth qualitative insights from experienced project professionals.

Key Features:

- Open-ended questions
- Thematic prompts related to implementation challenges, benefits, change management, and stakeholder engagement

Purpose:

To explore deeper insights into individual and organizational experiences with Agile and Stage-Gate, and gather expert opinions on hybrid implementation feasibility.

3. Statistical Analysis Software

Software for analyzing quantitative data collected via questionnaires.

Study Boundaries:

1. Geographical Boundary

The study is limited to the Jubail region in the Eastern Province of Saudi Arabia, which is a major industrial hub for the petrochemical sector.

2. Industrial Boundary

The research focuses exclusively on the petrochemical industry, particularly on engineering project management departments. Other sectors, such as general construction, IT, or financial services, are outside the scope of this study.

3. Organizational Scope

The study targets medium to large-scale organizations operating in the petrochemical field. It does not include small businesses, startups, or companies outside the capital-intensive, engineering-driven project environment.

4. Methodological Boundary

Data collection is limited to human participants (project managers, engineers, and stakeholders); the study does not include technical system data, software logs, or real-time operational monitoring.

5. Stakeholder Boundary

Only internal stakeholders (e.g., project managers, engineers, project support staff, team leaders) are involved in the study. External customers, vendors, and government regulators are not directly surveyed or interviewed.

References

Exploring of reference to support this research are ongoing.