Journal of Business Decision and Risk Sciences (JBDRS)

https://doi.org/

Journal Homepage: *www.JBDRSJournal.com*

ORIGINAL RESEARCH PAPER

Development of Relationship Model Among Project Management Methodologies, Project Claims and Project Success

Parisa Fareghbal [a]; Majid Parchami Jalal [b, *]; Abbass Alimoradi [c]

[a] *Department of Petroleum Economics and Energy Diplomacy, Tehran Faculty of Petroleum, Petroleum University of Technology, Abadan, Iran.*
[b] *Department of College of Fine Arts, School of Architecture, University of Tehran, Tehran, Iran.*
[c] *Department of Modern Financial Sciences in Petroleum Industry, Petroleum University of Technology, Abadan, Iran.*

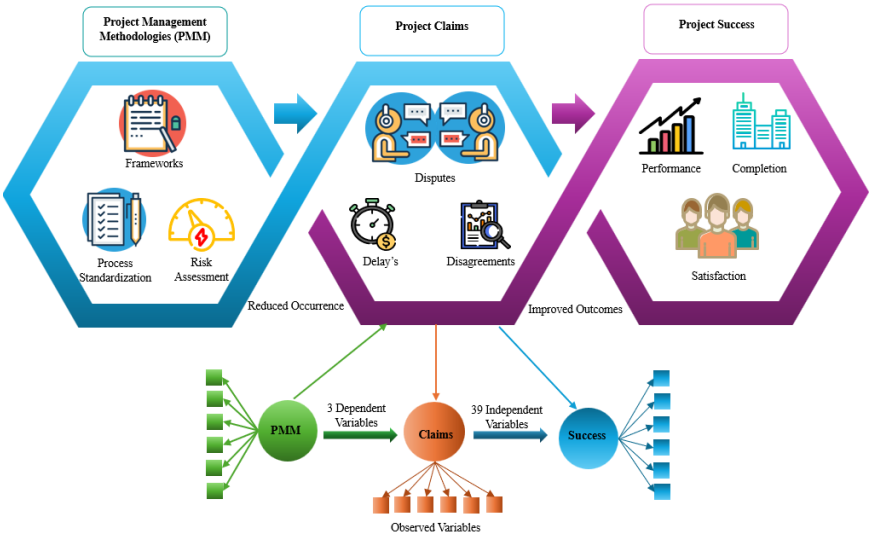
P A P E R I N F O

Paper history:
Received: 04/02/2026
Revised: 05/22/2026
Accepted in revised form: 06/10/2026
Published: 06/30/2026

***Keywords*:**
Project Claim Management;
Project Success;
Oil & Gas;
SEM.

A B S T R A C T

A large number of projects have faced the claims. These claims have plenty of negative effects on projects performance. Claims cause extension of time and added costs or can even stop a project. Therefore it seems essential to take actions in order to prevent these claims. Project management methodologies are known as methods which lead managers to run a project properly. In this study we evaluate the relationship among project management methodologies implementation, claim occurrence and project success. This relationship is going to be evaluated as an SEM model and statistical analysis which is aimed to show more detailed relations. The model has 3 dependent variables and 39 independent variables. The result of model evaluation shows that there is a significant relation among project management methodologies implementation, claim occurrence and project success and the details will be discussed.



1. Introduction

Large-scale oil and gas projects are among the most complex industrial projects due to their high capital investment requirements, technological uncertainties, long implementation periods, and involvement of multiple stakeholders. Particularly, downstream oil and gas projects, including refineries, petrochemical plants, and processing facilities, are characterized by complex contractual arrangements, strict regulatory requirements, and significant risks related to cost, schedule, and quality performance. Consequently, achieving successful project outcomes in such environments remains a major challenge for project managers and organizations.

Project success has traditionally been evaluated based on the achievement of the main project constraints, including cost, time, scope, and quality objectives. However, contemporary research emphasizes that project success is a

* Corresponding Author: Majid Parchami Jalal
E-mail address: parchamijalal@ut.ac.ir
ISSN:
URL: https://www.jbdrsjournal.com/article_735684.html

Please cite this article as: P. Fareghbal, M. P. Jalal & A. Alimoradi, *Journal of Business Decision and Risk Sciences (JBDRS)*, 2026, *2*(2), 63-70. https://doi.org/

/© 2026 The Author(s). Published by Power of New Vision Movement Institute.

multidimensional concept influenced by managerial, organizational, contractual, and environmental factors [1,2]. Therefore, identifying managerial approaches that enhance project performance and reduce failure factors has become a critical concern in project-based industries.

One of the major sources of project failure in construction and industrial projects is the occurrence of contractual claims. Claims are common consequences of disagreements between project parties and usually arise from factors such as delays, changes in project scope, unclear contractual requirements, inadequate documentation, and poor communication. Previous studies have demonstrated that claims can significantly increase project costs and extend completion schedules. Found that a considerable proportion of construction claims resulted in schedule delays exceeding the original contract duration, while many claims caused additional costs exceeding 30% of the initial contract value[3]. Furthermore, delays have been identified as one of the most frequent and costly causes of claims and disputes in construction projects [4].

Claims are considered disruptive events because they negatively affect relationships among project stakeholders, increase administrative and legal costs, and reduce the probability of achieving project objectives [5]. In large industrial projects, especially oil and gas projects, the consequences of claims can be more severe due to the high financial value of contracts and the dependency of downstream facilities on timely completion. Therefore, developing effective strategies for preventing and controlling claims has become an essential element of successful project management.

Project management methodologies (PMMs) have been developed as structured approaches to improve project planning, execution, monitoring, and control. These methodologies provide standardized processes, tools, and practices that enable project managers to manage complexity, allocate resources effectively, identify risks, and improve decision-making. According to the Project Management Institute (PMI), the systematic application of project management knowledge, skills, tools, and techniques increases the likelihood of achieving project requirements and improving project outcomes [6].

Various project management methodologies, including PMBOK, PRINCE2, Agile, Critical Path Method (CPM), Lean Project Management, and Six Sigma, have been widely adopted across different industries. These methodologies aim to improve project performance through better scope definition, schedule control, cost management, risk management, stakeholder communication, and quality assurance. Joslin and Müller [7] indicated that project methodologies influence project success by providing management structures and practices that support effective project governance. Similarly, Wells [8] demonstrated that project management methodologies can generate significant benefits when properly aligned with organizational requirements and project characteristics.

Although extensive studies have investigated the relationship between project management methodologies and project success, limited attention has been given to the mediating role of project claims in this relationship. Most previous studies have focused either on identifying causes and types of claims or on examining critical success factors of projects separately. For example, Zaneldin [5] classified construction claims into major categories including delay claims, change claims, acceleration claims, and additional work claims. Similarly, Golabchi et al. [9] demonstrated that cost, time, and scope-related issues represent the most frequent sources of claims in construction projects.

Previous research has also emphasized that effective claim management requires systematic documentation, early identification of potential disputes, proper contract administration, and efficient communication among project participants [10]. However, despite the recognized importance of claim prevention, few studies have explored whether implementing structured project management methodologies can reduce claim occurrence and consequently improve project success.

This research gap is particularly significant in Iran's oil and gas downstream projects, where projects are frequently exposed to complex contractual conditions, economic fluctuations, technological challenges, and stakeholder conflicts. Although project management methodologies are increasingly implemented in such projects, empirical evidence regarding their effectiveness in reducing claims and improving project success remains insufficient.

Therefore, this study aims to develop a structural model explaining the relationships among project management methodologies, project claims, and project success in Iran's oil and gas downstream projects. Specifically, this research investigates whether the implementation of project management methodologies reduces project claims and whether both methodology implementation and claim reduction contribute to higher project success. By integrating these three dimensions into a unified model, this study contributes to the existing project management literature by providing a comprehensive understanding of how managerial practices influence contractual outcomes and overall project performance.

1.1. Project Management Methodologies

Project management has become an essential managerial discipline for organizations involved in complex and large-scale projects. The increasing complexity of projects, uncertainty in business environments, technological challenges, and the involvement of multiple stakeholders have emphasized the necessity of adopting structured project management approaches. Project management methodologies (PMMs) provide systematic frameworks consisting of processes, practices, tools, and techniques that guide project planning, execution, monitoring, and controlling activities throughout the project life cycle (Project Management Institute) [6].

A project management methodology can be defined as a structured set of principles, procedures, techniques, and rules designed to improve the effectiveness and efficiency of project delivery. The primary objective of implementing PMMs is to establish standardized management processes, clarify responsibilities, enhance communication among stakeholders, improve risk management, and increase the probability of achieving project objectives [11]. Unlike informal management practices, methodologies provide organizations with repeatable processes that facilitate better decision-making and organizational learning.

Several project management methodologies have been developed and applied across different industries. The Project Management Body of Knowledge (PMBOK) developed by the Project Management Institute is one of the most widely recognized frameworks and provides guidelines for managing projects through process groups and knowledge areas. PMBOK emphasizes the importance of scope management, schedule management, cost management, risk management, communication management, and stakeholder management in achieving successful project outcomes [6]. Other methodologies, such as PRINCE2, Agile, Lean Project Management, Critical Path Method (CPM), and Six Sigma, have also been adopted depending on project characteristics and organizational requirements.

Previous studies have demonstrated the positive effects of project management methodologies on project performance. Milosevic, investigated the relationship between project management standardization and project effectiveness and concluded that structured project management practices contribute to improved schedule, cost, and quality performance. Similarly, emphasized that project management methodologies provide organizations with integrated processes, tools, and techniques that support efficient project execution and control.

However, the effectiveness of PMMs depends not only on their existence but also on their appropriate implementation. Wells [8] examined several project management methodologies, including PRINCE2 and Agile approaches, and found that the benefits of methodologies are achieved when they are properly aligned with organizational conditions, project characteristics, and managerial capabilities. Joslin and Müller [12] also argued that project methodologies influence project success through specific methodological elements and that different components of methodologies may affect project outcomes differently.

In complex industrial projects, especially oil and gas downstream projects, effective implementation of project management methodologies becomes particularly important. These projects usually involve large financial investments, long durations, complex contractual arrangements, and significant uncertainty. Therefore, systematic management of scope, schedule, and cost is essential to minimize deviations and prevent contractual conflicts. Since many project claims originate from poor planning, inadequate scope definition, schedule delays, and cost management failures, effective implementation of PMMs may play an important role in reducing claim occurrence.

1.2. Project Claims and Claim Management

Project claims represent one of the most important challenges affecting construction and industrial project performance. A claim can be defined as a formal request by one project party seeking additional time, compensation, or other contractual adjustments due to events that are perceived to be outside its responsibility. Claims generally arise from contractual disagreements, changes, delays, inaccurate project information, poor communication, and ineffective project management practices[5].

The occurrence of claims is particularly common in large and complex projects because such projects involve uncertainty, multiple stakeholders, and long contractual periods. [3] investigated construction claims in Western Canada and found that many claims resulted in significant schedule extensions and additional costs. Similarly, [4] identified delays as one of the most frequent and costly causes of disputes and claims in construction projects.

Previous studies have categorized claims into several major groups. [5] classified construction claims into six main categories, including contract ambiguity claims, delay claims, acceleration claims, change claims, extra-work claims, and differing site condition claims. These categories demonstrate that claims are usually associated with deficiencies in project planning, contract administration, and change management.

Among different claim causes, scope, time, and cost-related issues have received considerable attention in the literature. Golabchi et al. [9] developed a model for identifying claim causes and demonstrated that cost, schedule, and scope issues represent the most frequent sources of claims. Their findings indicated that unclear project scope, inaccurate initial studies, economic

changes, and ineffective management practices significantly contribute to claim occurrence.

Claim management has therefore become an essential component of successful project management. Effective claim management includes four main activities: claim prevention, claim mitigation, claim identification and quantification, and claim resolution [10]. The primary objective of claim management is not only to resolve existing disputes but also to prevent claims through proper planning, documentation, communication, and contract administration.

Research has shown that many claims can be prevented through effective project management practices. Bakhary et al. [10] found that inadequate documentation, poor communication, insufficient contract knowledge, and ineffective record management are among the major barriers to successful claim management. Similarly, Yusuwan and Adnan [13] emphasized that proper contract administration and accurate documentation are critical factors in supporting successful claim prevention and resolution.

Since project management methodologies provide structured processes for scope definition, schedule control, cost management, and documentation, their implementation may reduce the likelihood of claim occurrence. Therefore, this study proposes that effective implementation of PMMs negatively influences project claims.

1.3. Project Success

Project success has been one of the most widely investigated topics in project management literature. Traditionally, project success was evaluated based on the achievement of the "iron triangle," including completion within planned cost, schedule, and scope constraints. However, contemporary researchers argue that project success is a multidimensional concept that includes technical performance, stakeholder satisfaction, organizational benefits, and managerial effectiveness [2].

Cooke-Davies [1] distinguished between project management success, project success, and consistently successful projects. The study demonstrated that successful projects require not only effective control of traditional project constraints but also appropriate organizational processes, risk management practices, and leadership capabilities.

Fortune and White [1], through an extensive literature review, identified numerous critical success factors, including clear objectives, effective communication, competent project teams, senior management support, and appropriate project planning. Their findings highlighted that project success depends on the interaction between technical, managerial, and organizational factors.

In complex projects such as oil and gas downstream projects, achieving project success is particularly challenging because these projects are exposed to uncertainty, technical complexity, and contractual risks. Therefore, effective project management practices are essential for achieving desired outcomes.

Project management methodologies contribute to project success by providing standardized procedures for planning, monitoring, and controlling project activities. Joslin and Müller [7] demonstrated that appropriate project methodologies positively influence project success characteristics, particularly when supported by suitable governance structures. Similarly, Carvalho et al. [13] found a significant positive relationship between structured project management practices and project success.

Furthermore, project claims have a direct negative effect on project success. Claims often result in cost overruns, schedule delays, reduced productivity, and deterioration of stakeholder relationships. Therefore, reducing claims can contribute significantly to improving project performance and increasing the likelihood of project success.

1.4. Development of Research Hypotheses

1.4.1. Relationship between Project Management Methodologies and Project Claims

The literature indicates that many project claims originate from weaknesses in project planning, scope definition, schedule control, cost estimation, and documentation. Project management methodologies provide structured processes to address these weaknesses by improving planning accuracy, controlling changes, and enhancing communication among stakeholders.

PMBOK-based practices, particularly scope, schedule, and cost management processes, enable project teams to identify potential problems before they develop into contractual disputes [6]. Since claims are frequently associated with poor management practices, effective implementation of PMMs is expected to reduce claim occurrence.

Therefore, the following hypothesis is proposed:

H1: Implementing project management methodologies has a significant negative effect on project claims.

1.4.2. Relationship between Project Management Methodologies and Project Success

Previous studies have demonstrated that structured project management practices improve project performance by enhancing planning, resource allocation, risk management, and decision-making. Methodologies provide project managers with standardized approaches that increase efficiency and reduce uncertainty.

Milosevic et al. [11] found that project management standardization improves project effectiveness, while Joslin and Müller [12] confirmed that project methodologies positively influence project success characteristics. Therefore, projects with higher levels of PMM implementation are expected to achieve better performance outcomes.

Accordingly, the second hypothesis is proposed:

H2: Implementing project management methodologies has a significant positive effect on project success.

1.4.3. Relationship between Project Claims and Project Success

Claims negatively affect project outcomes by increasing costs, extending schedules, reducing productivity, and creating conflicts among project stakeholders. Previous studies have consistently identified claims and disputes as major barriers to successful project completion.

Assaf and Al-Hejji [3] demonstrated that delays and related disputes significantly affect project performance. Similarly, Zaneldin [5] emphasized that claims represent a major source of financial and schedule impacts in construction projects.

Therefore, reducing claims is expected to improve project success. Based on this relationship, the third hypothesis is proposed:

H3: Project claims have a significant negative effect on project success.

2. Materials and Methods

2.1. Research Design and Approach

This study adopts a quantitative research approach to empirically examine the relationships among project management methodologies (PMMs), project claims, and project success in Iran's oil and gas downstream projects. Quantitative research is based on the positivist paradigm, which assumes that research phenomena can be objectively measured through systematic observation, numerical data collection, and statistical analysis. In this approach, theoretical relationships are transformed into testable hypotheses, and empirical evidence is used to validate the proposed research model.

The research design is non-experimental because the researchers did not manipulate any variables or intervene in the studied projects. Instead, the study investigates naturally occurring variations among projects and examines the relationships among the research constructs. According to Creswell [15], non-experimental correlational designs are appropriate when the objective is to determine the association between variables and explain the predictive relationships among them.

Furthermore, this research follows an explanatory correlational design because it aims to explain how the implementation of project management methodologies influences project claims and, consequently, project success. Explanatory research designs are commonly used when researchers seek to understand causal relationships among variables based on theoretical assumptions and empirical observations [15,16].

The conceptual framework of this study consists of three latent constructs: project management methodologies as the independent construct, project claims as the mediating construct, and project success as the dependent construct. The proposed model examines whether effective implementation of project management practices can reduce claim occurrence and improve overall project performance.

2.2. Population and Sampling Procedure

The target population of this study consisted of project managers involved in downstream oil and gas projects in Iran. These projects were selected because downstream oil and gas facilities, including refineries and petrochemical complexes, involve high financial investments, complex contractual relationships, and significant exposure to schedule and cost-related risks. Therefore, project managers involved in these projects represent appropriate respondents due to their practical experience in project management and claim-related issues.

A convenience sampling technique was applied in this study. Convenience sampling is a non-probability sampling method in which participants are selected based on their availability and willingness to participate in the research [17]. Although probability sampling provides stronger generalizability, convenience sampling is frequently applied in project management studies where access to experienced professionals is limited.

The questionnaire was distributed among 150 project managers working in oil and gas downstream projects. A total of 101 completed questionnaires were returned, resulting in a response rate of approximately 67%. This sample size

is considered acceptable for structural equation modeling (SEM), as previous studies have suggested that SEM analysis generally requires sample sizes between 100 and 150 observations depending on model complexity and the number of estimated parameters [18,19].

2.3. Research Instrument and Measurement of Variables

Data collection was conducted through a structured questionnaire consisting of three main sections: project management methodologies, project claims, and project success. All items were measured using a five-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree").

The measurement items for project management methodologies were developed based on the principles and processes presented in the Project Management Body of Knowledge (PMBOK Guide). The PMBOK framework provides a comprehensive set of project management practices covering planning, execution, monitoring, and controlling activities (Project Management Institute [6]. In this study, three major knowledge areas were considered because of their strong relationship with claim occurrence: project scope management, project schedule management, and project cost management.

The project management methodology construct was operationalized through 29 measurement items representing key practices such as scope definition, requirements management, work breakdown structure development, schedule planning, activity management, cost estimation, budget control, and change management. These dimensions were selected because previous studies have identified scope, time, and cost management as major sources of project disputes and claims [9].

The project claims construct was measured using five indicators representing the most frequent claim outcomes identified in previous studies. These indicators included extension of time, additional costs caused by time extensions, direct costs, claims related to discount rates and delayed payments, and reduction in efficiency and productivity. Previous research has shown that delays, cost increases, and changes are among the most common consequences of claims in construction and industrial projects [3,5].

Project success was measured using five indicators related to project performance criteria, including completion within the planned schedule, completion within the approved budget, achievement of technical objectives, competency of the project team, and the ability to manage unexpected problems. These dimensions are consistent with contemporary definitions of project success, which consider not only traditional constraints such as cost and time but also managerial and organizational capabilities [1,2].

2.4. Data Collection Procedure

The required data were collected using self-administered questionnaires. Survey research enables researchers to collect information from a sample population and generalize findings to the target population [15]. According to Fink [15], surveys are systematic procedures for collecting information from individuals in order to describe, compare, or explain their knowledge, attitudes, and behaviors.

Before distributing the questionnaires, the necessary authorization was obtained from the educational department of the National Iranian Oil and Gas Company. The questionnaires were distributed among experienced project managers involved in downstream oil and gas projects. Participants were informed about the purpose of the study and were assured that their responses would be used only for academic purposes.

2.5. Data Analysis Procedure

The collected data were analyzed using a two-stage analytical procedure. First, preliminary data screening and cleaning were conducted using SPSS software. Data cleaning procedures included checking missing values, identifying inconsistent responses, and verifying that all entered values were within the acceptable range. Data preparation is an essential step before statistical analysis because inaccurate or inconsistent data may negatively influence the reliability of research findings.

Second, structural equation modeling (SEM) was employed to test the proposed conceptual model and examine the hypothesized relationships among project management methodologies, project claims, and project success. SEM is a multivariate statistical technique that combines factor analysis and regression analysis to evaluate measurement models and structural relationships simultaneously [20].

SEM was selected because the research model contains latent constructs that cannot be directly measured and require multiple observed indicators. Furthermore, SEM enables researchers to examine direct and indirect relationships among variables while evaluating the overall model fit [21].

Following the two-step approach recommended by Anderson and Gerbing [22], the analysis was performed in two stages. In the first stage, the measurement model was evaluated through confirmatory factor analysis (CFA) to assess construct reliability and validity. In the second stage, the structural model was tested to examine the hypothesized relationships among the latent variables.

The SEM analysis was conducted using AMOS software. AMOS is widely used for covariance-based structural equation modeling and allows researchers to estimate relationships among latent variables and evaluate model adequacy through different goodness-of-fit indices.

3.6. Model Evaluation and Goodness-of-Fit Assessment

The adequacy of the proposed structural model was assessed using several goodness-of-fit indices. Model fit evaluation is a critical step in SEM because it determines whether the proposed theoretical model adequately represents the observed data[19].

The chi-square statistic (χ^2) was used as an absolute fit index to evaluate the difference between the observed covariance matrix and the estimated covariance matrix. Although chi-square is traditionally used as an overall model fit measure, it is sensitive to sample size and may reject acceptable models when large samples are used (Bentler & Bonett, 1980). Therefore, additional fit indices were considered.

The Root Mean Square Error of Approximation (RMSEA) was also used to assess model fit. RMSEA evaluates how well the model would fit the population covariance matrix while considering model complexity. Values below 0.08 generally indicate acceptable fit, while values close to 0.06 represent good model fit [23].

Other commonly recommended indices, including Comparative Fit Index (CFI), Goodness-of-Fit Index (GFI), and Normed Chi-square (χ^2/df), were also considered in evaluating the proposed model [20].

3. Results and Discussion

3.1. Descriptive Statistics of the Sample

A total of 150 questionnaires were distributed among project managers involved in downstream oil and gas projects in Iran. A total of 101 valid questionnaires were received, resulting in a response rate of 67%. The respondents represented both governmental and private sector projects. Among the collected responses, 95 questionnaires were related to governmental projects, while six responses belonged to private-sector projects.

The participants were selected from major organizations involved in Iran's oil and gas downstream industry, including Mapna, Iranian Central Oil Fields Company, National Iranian Oil Company, Novin, and other related organizations. Regarding project characteristics, the majority of projects had durations between one and two years (33.7%), followed by projects lasting between three and four years (20.8%). In terms of project type, refinery projects represented the largest proportion of the sample (34.7%), followed by South Pars Dome Gas-Condensate field improvement projects (31.7%), petrochemical projects (20.8%), and sour gas piping projects (12.9%).

The collected data provided an appropriate empirical basis for examining the relationships among project management methodologies (PMM), project claims, and project success in oil and gas downstream projects.

3.2. Structural Equation Modeling Results

Structural Equation Modeling (SEM) was employed to examine the proposed conceptual model and test the hypothesized relationships among project management methodologies, project claims, and project success. SEM is considered an appropriate analytical approach for investigating complex causal relationships involving latent constructs because it simultaneously evaluates measurement models and structural relationships while accounting for measurement errors [19,20].

The SEM analysis was performed using AMOS version 21. Following the recommended two-stage SEM procedure, the measurement model was first evaluated through validity and reliability assessments, followed by the evaluation of the structural model and hypothesis testing [21].

The proposed model consisted of three latent constructs: project management methodologies (PMM), project claims (C), and project success (PS). The PMM construct was measured through 29 indicators related to scope, time, and cost management processes based on project management practices. Project claims were measured through five dimensions, including extension of time, increased costs due to increased time, direct costs, discount rate and interest due to payment delays, and reduction in efficiency and productivity. Project success was evaluated using five indicators, including schedule performance, budget performance, achievement of technical objectives, project team capability, and ability to manage unexpected problems.

3.2. 1. Modification of Model

The model can be modified by eliminating some indicators or even variables to reach the best score in the goodness of t test. The next steps to decide what should be modified in the model are the convergent validity test and discriminant validity test. Convergent validity test results determine whether the indicators within all variables can be used to measure the variables and the discriminant validity test determines the correlation between all the variables. If the factor loading score for the indicator exceeds 0.5 then the indicator

describes the variable well. For the discriminant validity test, if the correlation score exceeds 0.5 between two variables in one model then the correlation between them is strong. The discriminant validity test result will not affect the modification of the model, but just shows the relationship between all variables [22].

Below is the result of the convergent validity test and discriminant validity test for the model.

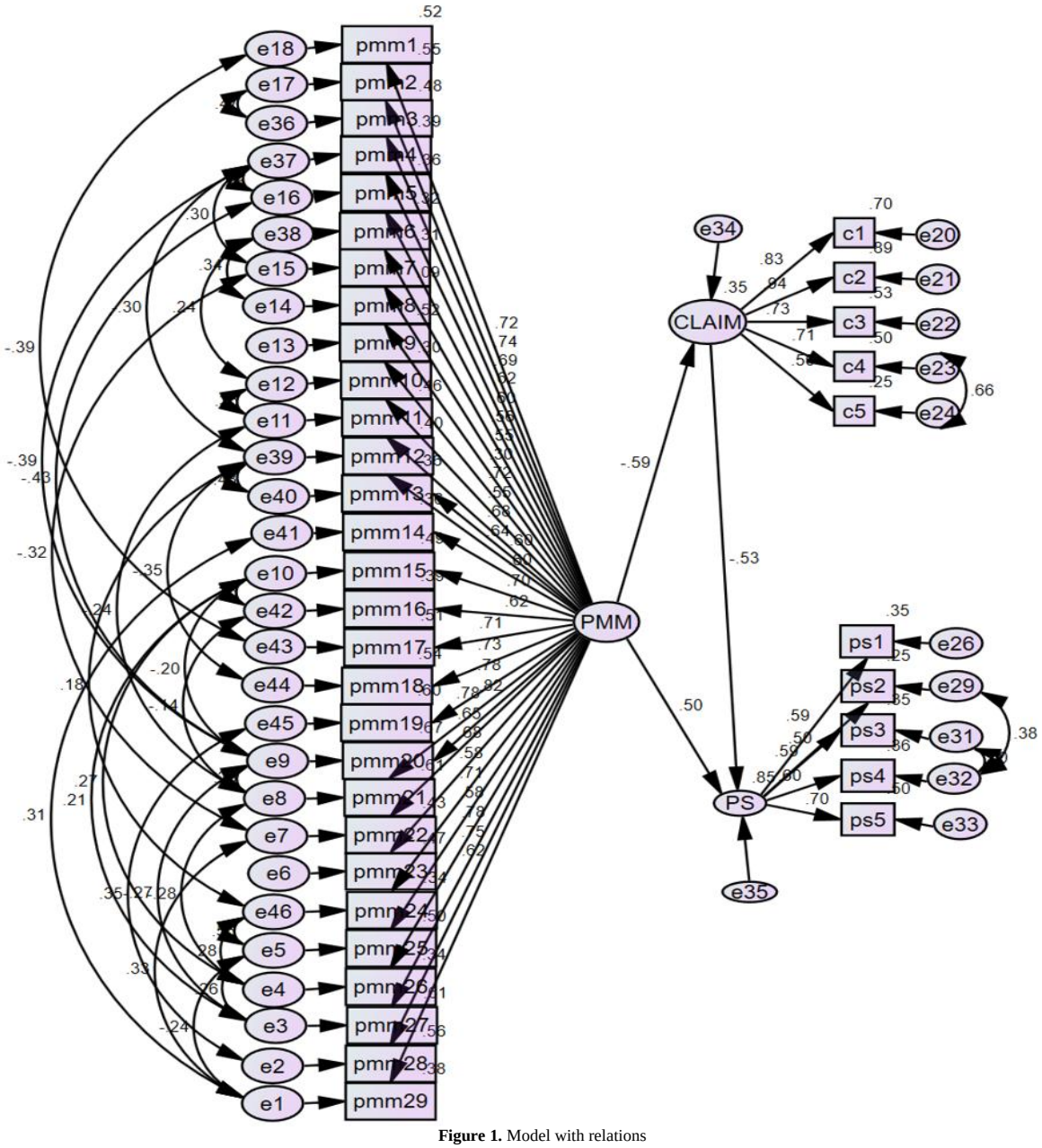


Figure 1. Model with relations

In this model all of the relation scores are upper than 0.5. It means that there is a strong relation among all of the remarked paths. Table 4.1and 4.2 show all the relations score.

As it is shown %35 of claim variable variance is explained by PMM or it is related to PMM. %85 of PS variable variance is explained by PMM and claim or it is related to them.

Numbers which are shown above the independent variables are reliable estimation for each variable.

Numbers which are shown above the arrows show relation coefficient between two variables.

As below tables show there is a significant relation between all two variables but pmm8 and PMM.

3.3. Evaluation of the Structural Model

The degree of freedom analysis indicated that the proposed model was over-identified, allowing further estimation and evaluation. In SEM analysis, an over-identified model with positive degrees of freedom provides sufficient information for parameter estimation and model assessment [24].

The initial model was examined through convergent validity and discriminant validity analyses. The results demonstrated acceptable factor loadings for the indicators, with all retained indicators exceeding the recommended threshold of 0.50, indicating adequate convergent validity [25].

The explanatory power of the structural model was evaluated through variance explained by the endogenous constructs. The results showed that project management methodologies explained approximately 35% of the variance in project claims. Furthermore, PMM and project claims jointly explained approximately 85% of the variance in project success. These results indicate that project management practices and claim management mechanisms represent important predictors of project outcomes.

3.4. Reliability and Validity Assessment

The reliability and validity of the measurement model were evaluated using Average Variance Extracted (AVE), Cronbach's alpha, and Composite Reliability (CR). The results are summarized in Table 1.

Table 1. Reliability and validity assessment

Construct	AVE	Cronbach's Alpha	Composite Reliability
Measurement model	0.532	0.93	0.93

The obtained AVE value (0.532) exceeded the recommended minimum value of 0.50, confirming convergent validity. Additionally, both Cronbach's alpha and composite reliability values were 0.93, which are substantially higher than the recommended threshold of 0.70, indicating strong internal consistency and reliability [25].

3.5. Assessment of Model Fit

The goodness-of-fit indices were examined to evaluate the adequacy of the proposed structural model. The main fit indices are presented in Table 2.

Table 2. Model fit indices

Fit Index	Obtained Value	Recommended Threshold	Result
RMSEA	0.056	≤0.10	Acceptable
CMIN/df	3.529	≤5	Acceptable

The obtained RMSEA value of 0.056 indicates a satisfactory level of approximate fit, while the CMIN/df value of 3.529 confirms an acceptable parsimonious fit. According to established SEM guidelines, these values demonstrate that the proposed model provides an adequate representation of the observed data [19,26].

3.6. Hypothesis Testing

The structural relationships among the three main constructs were examined using standardized path coefficients, critical ratios (CR), and significance levels. In SEM analysis, a critical ratio greater than ±1.96 indicates statistical significance at the 0.05 level [24].

The results of hypothesis testing are summarized in Table 3.

Table 3. Structural model hypothesis testing

Hypothesis	Relationship	Standardized coefficient	p-value	Result
H1	PMM → Claims	-0.59	<0.001	Supported
H2	PMM → Project Success	0.50	<0.001	Supported
H3	Claims → Project Success	-0.53	<0.001	Supported

The first hypothesis proposed that implementation of project management methodologies reduces project claims. The results confirmed a significant negative relationship between PMM and claims ($\beta = -0.59$, $p < 0.001$). This finding indicates that stronger implementation of structured project management processes contributes to reducing claim occurrence and severity.

The second hypothesis examined the effect of PMM on project success. The results demonstrated a significant positive relationship between PMM and project success ($\beta = 0.50$, $p < 0.001$), confirming that effective application of project management methodologies improves project performance outcomes.

The third hypothesis investigated the relationship between project claims and project success. The findings revealed a significant negative relationship ($\beta = -0.53$, $p < 0.001$), indicating that increased claims negatively influence project success.

3.7. Relationship Between Project Management Processes and Project Claims

Further regression analyses were conducted to identify which project management processes have the greatest influence on different categories of claims.

The findings demonstrated that scope management processes significantly influence claim occurrence. Among scope-related factors, scope baseline, accepted criteria, and requirement traceability matrix showed the strongest effects on reducing claims. For example, scope baseline demonstrated the highest influence on extension-of-time claims, indicating that unclear scope definition and uncontrolled scope changes are major contributors to contractual disputes.

Time management processes showed a strong relationship with claims, particularly increased costs due to delays. The results indicated that project schedule network diagrams, duration estimates, detailed timing schedules, and work performance information were among the most influential factors. These findings highlight the importance of accurate scheduling and monitoring mechanisms in minimizing delay-related claims.

Cost management processes also significantly affected project claims. Cost management plans and cost baselines were identified as the most influential factors affecting cost-related claims. The results suggest that insufficient cost estimation and weak cost control mechanisms increase the probability of financial disputes.

Overall, among the three PMM knowledge areas examined, time management demonstrated the strongest relationship with claim reduction, followed by scope management and cost management.

3.8. Relationship Between Project Management Processes and Project Success

The results further indicated that project management methodologies significantly contribute to project success dimensions.

Among scope management processes, scope baseline and accepted criteria showed the strongest positive relationships with project success indicators. Particularly, scope baseline had a significant influence on schedule performance and the ability to manage unexpected problems.

Time management processes demonstrated the strongest contribution to project success. Project management plan updates, duration estimates, work performance information, and scheduling processes significantly improved project success indicators. The highest explanatory power was observed for schedule performance, where time management processes explained approximately 88% of variance.

Cost management processes also positively influenced project success. Cost management plans and cost baselines were the most important predictors, particularly regarding schedule performance and budget-related outcomes.

These findings confirm that systematic implementation of project management methodologies improves project success by enhancing planning accuracy, controlling uncertainty, and reducing project disruptions.

3.9. Summary of Results

The results confirmed the validity of the proposed conceptual model. The SEM analysis demonstrated that project management methodologies have a significant negative effect on project claims and a significant positive effect on project success. Furthermore, project claims negatively affect project success. The findings indicate that effective implementation of scope, time, and cost management practices plays a critical role in minimizing contractual claims and improving project performance in Iran's oil and gas downstream projects. Among the investigated factors, time management practices showed the strongest influence on project outcomes, while scope baseline, schedule network diagrams, duration estimates, work performance information, and cost management plans were identified as key determinants of project success.

4. Conclusions

The present study developed and empirically tested a conceptual model to investigate the relationships among project management methodologies (PMMs), project claims, and project success in downstream oil and gas projects in Iran. Unlike previous studies that have primarily focused on identifying the causes, categories, and ranking of project claims, this research contributes to the existing body of knowledge by examining how the effective implementation of project management methodologies influences the occurrence of claims and subsequently affects project success. Claims are among the most critical sources of disputes, delays, cost overruns, and deterioration of relationships among project stakeholders, particularly in large-scale and complex projects such as oil and gas developments [27,28]. Therefore, establishing preventive mechanisms through systematic project management practices is essential for improving project outcomes.

Using structural equation modeling (SEM), the proposed research model was empirically validated based on data collected from project managers involved in governmental and private downstream oil and gas projects in Iran. SEM was selected because it enables simultaneous examination of multiple causal relationships among latent variables while considering measurement errors and complex interactions among constructs [29,30]. The results confirmed the proposed conceptual framework and demonstrated significant relationships among project management methodologies, project claims, and project success.

The findings revealed that project management methodologies have a significant negative effect on project claims ($\beta = -0.59$, $p < 0.001$). This result indicates that effective implementation of project management practices can substantially reduce the likelihood and severity of claims. This finding is consistent with previous research emphasizing that systematic planning, documentation, scope definition, schedule control, and cost management are fundamental mechanisms for preventing disputes and minimizing contractual claims [31,32]. In complex projects, especially those characterized by high uncertainty and multiple stakeholders, inadequate project management processes often create conditions that lead to claims related to delays, additional costs, and contractual disagreements. Therefore, strengthening project management practices can be considered an effective strategy for proactive claim prevention.

Furthermore, the results demonstrated that project management methodologies have a significant positive effect on project success ($\beta = 0.50$, $p < 0.001$). This finding confirms previous studies indicating that the application of standardized project management processes improves project performance by enhancing planning quality, resource allocation, communication effectiveness, and control mechanisms [33]. The implementation of structured methodologies, such as those proposed by the Project Management Institute (PMI), provides project teams with systematic procedures for managing scope,

schedule, cost, and stakeholder expectations, which ultimately contribute to achieving project objectives.

The study also identified a significant negative relationship between project claims and project success ($\beta = -0.53$, $p < 0.001$). This result confirms that increasing claims negatively affects project performance and reduces the probability of successful project completion. Previous studies have highlighted that claims frequently result in cost escalation, schedule delays, reduced productivity, and conflicts among project participants, all of which negatively influence project success criteria [34]. Consequently, effective claim management should not only focus on resolving existing disputes but also emphasize early identification and prevention of claim-generating conditions.

The structural model results further indicated that project management methodologies explain approximately 55% of the variance in project claims, while project management methodologies and claims together explain approximately 59% of the variance in project success. These results demonstrate the substantial predictive capability of the developed model and highlight the importance of project management practices as a key determinant of project performance in downstream oil and gas projects.

The analysis of individual project management processes showed that among the examined PMBOK-based practices, the most influential processes in the studied projects were schedule forecasts and project management plan updates, followed by cost estimates and cost baseline, activity lists, work performance information, and project document updates. These findings emphasize the critical role of accurate scheduling, cost control, and continuous updating of project information in reducing uncertainty and improving project performance. Previous studies have also reported that inadequate schedule and cost management are among the dominant factors contributing to claims in construction and engineering projects [35,36].

Regarding claim occurrence, the results showed that increased costs due to increased project duration was the most frequent type of claim, followed by extension of time, discount rate and interest due to delayed payments, direct costs, and productivity losses. This finding is consistent with previous research indicating that time-related and cost-related claims represent the most common categories of disputes in large engineering projects due to their direct impact on contractual obligations and financial performance [37].

From a practical perspective, the findings provide important implications for project owners, contractors, and project managers involved in oil and gas projects. Organizations should focus on strengthening project management maturity and ensuring the effective implementation of standardized project management methodologies before and during project execution. Particular attention should be given to scope definition, schedule development, cost estimation, performance monitoring, and document management because these areas have demonstrated significant relationships with claim occurrence and project success.

Despite its contributions, this study has several limitations. First, only three major project management knowledge areas, including scope management, schedule management, and cost management, were examined. Although these processes represent some of the most influential factors affecting project claims, other areas such as risk management, procurement management, communication management, and stakeholder management may also significantly influence claim development and project performance. The inclusion of all PMBOK knowledge areas may result in a more comprehensive model but requires a larger dataset and more complex analytical procedures.

Second, data collection was limited by the availability of experienced project managers with sufficient knowledge of both project management practices and claim management issues. Since claims involve technical, contractual, and managerial dimensions, future studies may benefit from collecting data from multiple stakeholder groups, including owners, contractors, consultants, and contract managers.

Future research can extend this study by incorporating additional project management processes, particularly risk management, which has been identified as an important contributor to claim occurrence in previous studies [88]. Moreover, comparative studies among different industries, countries, and project delivery systems could provide further validation of the proposed model. The application of advanced analytical approaches, such as partial least squares structural equation modeling (PLS-SEM), machine learning techniques, or longitudinal studies, may also provide deeper insights into the dynamic relationships between project management practices, claims, and project success.

In conclusion, this research demonstrates that effective implementation of project management methodologies plays a critical role in preventing claims and enhancing project success in downstream oil and gas projects. Projects characterized by stronger project management practices experience fewer claims and achieve better performance outcomes compared with projects where project management methodologies are insufficiently implemented. Therefore, improving project management maturity should be considered a strategic priority for organizations seeking to enhance project performance and reduce contractual disputes in complex industrial projects.

Author Contributions

All authors contributed equally to the conception, preparation and writing of this manuscript.

Conflict of Interest

The authors, while observing publication ethics in the referencing, declare the absence of interest of conflict.

Acknowledgement

The author gratefully acknowledges the support provided by the Petroleum University of Technology (PUT) in conducting this research.

AI-Assisted

The authors retain full responsibility for the accuracy, originality, integrity, legality, and ethical compliance of all text, data, tables, figures, analyses, references, and conclusions, and have verified all AI-assisted outputs. Any fabrication, falsification, manipulation, plagiarism, copyright infringement, or other misuse of AI remains solely the responsibility of the authors and does not transfer or diminish their accountability for the published work.

References

[1] T. Cooke-Davies. *International Journal of Project Management*, 2002, **20(3)**, 185–190.
[2] J. Fortune, & D. White. *International Journal of Project Management*, 2006, **24(1)**, 53–65.
[3] C. Semple,F. Hartman &G. Jergeas, *Journal of Construction Engineering and Management*, 1994, **120(4)**, 785–795.
[4] S. A. Assaf & S. Al-Hejji. *International Journal of Project Management*, 2006, **24(4)**, 349–357.
[5] E. K. Zaneldin. *International Journal of Project Management*, 2006, **24(5)**, 453–459.
[6] Project Management Institute (PMI), 2017, *A Guide to the Project Management Body of Knowledge*. 6th Edition.
[7] R. Joslin & R. Müller. *International Journal of Project Management*, 2016, **34(4)**, 613–624.
[8] H. Wells. *Project Management Journal*, 2014, **45(6)**, 43–58.
[9] M. Golabchi, M. Parchami Jalal, M. Bemanian, H. Talkhabi, *Management Research in Iran*, 2021, **18(4)**, 111–137.
[10] N. A. Bakhary, H. Adnan& A. Ibrahim. *Procedia Economics and Finance*, 2015, **23(6)**, 63–70.
[11] D. Milosevic, L. Inman & A. Ozbay. *Engineering Management Journal*, 2001, **13(2)**, 9–16.
[12] Joslin, R., & Müller, R. *International Journal of Project Management*, 2015, **33(2)**, 1377–1392.
[13] N. M. Yusuwan, H. Adnan, *Procedia Technology*, 2013, **9(5)**, 740-749.
[14] M. Carvalho, et al. *Project sustainability management and project success*, 2017, **35(6)**, 1124–1136.
[15] J. W. Creswell, *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Sage Publications, 2014.
[16] J. F. Hair, W. C. Black, B. J. Babin, & R. E. Anderson, *Multivariate Data Analysis eight edition*. Cengage Learning EMEA: United Kingdom, 2019.
[17] A. Fink, *How to Conduct Surveys: A Step-by-Step Guide*. Sage Publications, 2013.
[18] J. C. Loehlin, *Latent Variable Models: An Introduction to Factor, Path, and Structural Equation Analysis*. Lawrence Erlbaum, 2004.
[19] R. B. Kline,. *Principles and Practice of Structural Equation Modeling*. Guilford Press, 2016
[20] J. F. Hair, W. C. Black, B. J. Babin & R. E. Anderson, *Multivariate Data Analysis*. Pearson, 2019.
[21] R. B. Kline, *Principles and Practice of Structural Equation Modeling*, 2016.
[22] J. C. Anderson & D. W. Gerbing. *Psychological Bulletin*, 1988, **103(3)**, 411–423.
[23] L. T. Hu & P. M . Bentler. *Structural Equation Modeling*, 1999, **6(1)**, 1–55.
[24] B. M. Byrne, *Structural Equation Modeling with AMOS: Basic Concepts, Applications, and Programming, 3rd ed*. Routledge, 2016.
[25] J. F. Hair, G. T. M. Hult, C. M. Ringle & M. Sarstedt, *A Primer on Partial Least Squares Structural Equation Modeling*, Springer International Publishing, 2017.
[26] J. F. Hair, W. C. Black, B. J. Babin & R. E. Anderson, 2010. *Multivariate Data Analysis*, Prentice-Hall, 2010.
[27] M. M. Kumaraswamy & D. W. M. Chan. *Construction Management and Economics*, 1998, **16(1)**, 17–29.
[28] P. E. D. Love, P. R. Davis, S. O. Cheung & Z. Irani. *IEEE Transactions on Engineering Management*, 2011, **58(3)**, 400–412.

[29] J. F. Hair , W. C.Black, B. J. Babin & R. E. Anderson, *Multivariate Data Analysis*. Cengage, 2019.
[30] R. B. Kline, *Principles and Practice of Structural Equation Modeling*. Guilford Press, 2016.
[31] B. G. Hwang , X. Zhao & S. Y. Ng, 2013. *Journal of Construction Engineering and Management*, **139(12)**, 401-430.
[32] P. Fenn, D. Lowe, & C. Speck. *Construction Management and Economics*, 1997, **15(6)**, 513–518.
[33] F. A. Mir, & A. H. Pinnington, 2014. *International Journal of Project Management*, **32(1)**, 202–217.
[34] D. W. M. Chan & M. M. Kumaraswamy. *International Journal of Project Management*, 1997, **15(1)**, 55–63.
[35] B. Flyvbjerg. *Project Management Journal*, 2014, **45(2)**, 6–19.
[36] H. Doloi, A. Sawhney, K. C. Iyer & S. *International Journal of Project Management*, 2012, **30(4)**, 479–489.
[37] J. K. Yates & A. Epstein. *Journal of Professional Issues in Engineering Education and Practice*, 2006, **132(2)**, 60–67.