

Digital Project Management and Efficiency Outcomes: Integrating Project Management Systems and Organizational Culture in Project-Based Organizations

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Abstract

In the context of intricate projects, Project Management Systems (PMS) have become widely used in project-based organizations as they are increasingly depending on digital versions of their systems to improve their planning, coordination and monitoring processes as well as decision-making. Although it has been widely adopted, there is still inconsistency in empirical evidence on the effectiveness of PMS in enhancing project management efficiency. Delays in schedule, cost overruns, and loss of coordination are still witnessed in many organizations despite the adoption of technologically advanced project management platforms. These discrepancies demonstrate the necessity to look into the organizational circumstances in which the PMS lead to the efficiency results. Based on a socio-technical approach, the paper explores the connection between Project Management Systems and project management efficiency coupled with the mediating effect of organizational culture. This study will combine DeLone and McLean model of Information Systems Success with the Denison model of Organizational Culture to determine how the combination of technological capabilities and cultural conditions determine project management efficiency. Quantitative cross-sectional research design was used and the researcher collected data of professionals operating in project-based organizations in various sectors in Pakistan such as construction, information technology, engineering, and services. The hypothesized relationships between PMS and organizational culture and project management efficiency were tested using structural equation modeling (SEM). The results show that the Project Management Systems have a great influence on the efficiency of project management as it enhances the accuracy of planning, effectiveness of monitoring, and coordination among the stakeholders of the project. The findings also prove that PMS can have a beneficial effect on organizational culture due to their ability to foster transparency, accountability, and cooperative work practices. It also turned out that organizational culture has a positive impact on the efficiency of project management as well. Notably, mediation analysis shows that the correlation between PMS and efficiency is partially mediated by organizational culture, indicating that technological systems are the main contributory to performance results when they exist in friendly cultural contexts. These discoveries can be used in the literature because they present a combined socio-technical account on project management efficiency and also because they give an empirical report within the context of developing economies. The research has its practical implications in the organizations that aim to reconcile the digital project management system with the organizational culture to attain sustainable enhancement of the project performance.

Keywords: Project Management Systems, Project Management Efficiency, Organizational Culture, Information Systems Success Model, Denison Organizational Culture Model.

1. Introduction

During the last twenty years, project organizations underwent a great change due to the fast development of digital technologies and information systems. Project Management Systems (PMS) continue to be relied upon by organizations as a way to assist with planning, scheduling, monitoring as well as coordinating project processes throughout the project life cycle. These computer systems offer combined platforms whereby project managers and teams can monitor progress, allocate resources and real-time performance. The efficiency of project management has become one of the key factors in organizational competitiveness and performance as a result of their increasing complexity, time-sensitivity, and resource intensity (Kerzner, 2022; Loureiro et al., 2024).

Project management efficiency is the ability to waste less time, money and resources in the implementation of a project and at the same time ensure there is efficient coordination and control of the project. Effective project management practices will entail that project activities are accomplished on schedule, below the budget but with effective communication among the stakeholders. Efficiency is a key element in the achievement of profitability and strategic goals in organizations that are project-based and work within the construction sector, engineering, information technology, and services (Too and Weaver, 2014; Müller and Turner, 2017).

Organizations are adopting digital Project Management Systems in greater numbers to enhance efficiency and coordination to combine project information, standardize workflow, and encourage communication between project teams. The systems will give the project managers a real-time visibility regarding the activities of the project and thus will be able to notice possible delays, manage resources more efficiently, and make well-informed decisions. Empirical studies indicate that PMS may advance the accuracy of planning, decrease the information asymmetry, and enhance monitoring procedures in project-based settings (Coelho et al., 2023).

In spite of the possible advantages, there is still inconsistency in the empirical evidence on the effectiveness of PMS. Project inefficiencies still prevail in many organizations despite the implementation of project management systems that are of high level. Such problems as the schedule delays, cost overruns, lack of coordination, and inefficient use of resources are reported over time (Samardzic et al., 2025). Such contradictions undermine the belief that technological capability is the only matter that can enhance project performance.

More recent studies tend to follow a socio-technical approach in describing such inconsistencies. Under this view, the result of the interaction between organizational context and technological systems leads to outcomes of organizational performance. Digital systems bring new forms of organization in planning, monitoring, and coordination, yet their success is determined by how the systems are incorporated into routines and practices in organizations (Jeyararaj et al., 2023).

The DeLone and McLean Information Systems Success Model is considered one of the most powerful models of analyzing the performance implication of information systems. According to the model, system quality, information quality and service quality determine system use and user satisfaction which in turn determine the output of organizational performance (DeLone and McLean, 2003). Though the model is a very detailed description of information systems success, it is more inclined toward the technical aspects but not fully consider organizational factors governing the system usage and results of performance.

In the project-based organizations, the organizational culture has become an important contextual determinant to the efficacy of digital systems. Organizational culture is a set of shared values, norms, and behavioral expectations that regulate the interaction of the employees with technologies and organizational processes. Whether the digital systems are seen as a helpful tool in collaboration and

making decisions or as an administrative reporting tool is affected by the cultural attributes of employees (Denison, 2000).

The Denison Organizational Culture Model conceptualizes the concept of culture in four fundamental dimensions, which include involvement, consistency, adaptability, and mission. These dimensions reflect how much organizations are promoting participation in their employees, whether they have common values, adapt to changes in the environment, and whether they align their actions with strategic goals. These cultural attributes are quite relevant in determining the outcomes of project performance in the context of project-based environment that is characterized by uncertainty and interdependence (Denison and Mishra, 1995).

The literature has indicated that favourable cultural conditions can promote the efficient utilisation of digital project management systems by embracing teamwork, exchange of information and active problem solving. On the other hand, hierarchical and control-based cultures might inhibit the use of systems to other activities other than routine reporting, thereby hindering their impact on efficiency deliverables (Mohammed, 2025). All these observations suggest that organizational culture can serve as a tool with which technological systems can be used to determine the efficiency of project management.

Although there is an increased socio technological interest, empirical research work that compiles information systems success frameworks with organizational culture models is scarce. The available literature tends to analyze the independent predictors of performance outcomes like PMS and organizational culture but not the interdependent nature of the two. Thus, empirical evidence as to how the digital project management systems translate into better performance within particular organizational settings is scanty.

This research gap is marked especially in developing economies like Pakistan. Pakistan organizations in various fields such as construction, information technology, engineering and services have over the last ten years embraced the use of Project Management Systems owing to the aspect of globalization and competition exerted by the international world. The presence of project inefficiencies, however, is a well-spread issue, which causes doubts about the efficacy of the implementation of PMS within the local organizational setting (Ali et al., 2023).

A number of organizational traits that are prevalent in developing economies could affect the performance of PMS implementation. They are hierarchical organization structures, centralized decisions, predisposed to change of technology and a weak level of employee empowerment. These circumstances can limit the usefulness of the use of the system and minimize the possible efficiency advantages of the digital project management platforms.

With these issues, there is a necessity of empirical research that not only elaborates on the impact of Project Management Systems in project management efficiency under the background of the developing economy but also whether the organizational culture is an intervening force in the relationship. This research gap is important to not only advance theoretical insights into the socio-technical systems of project management but also offers feasible advice to organizations in their search of ways of promoting the effectiveness of their projects.

In this regard, this paper explores the correlation between the Project Management Systems, the organizational culture and project management efficiency within the project based organizations in Pakistan. Particularly, the research investigates the presence of the mediating role of organizational culture that exists in the connection between PMS and efficiency results. The study has incorporated the DeLone and McLean Information Systems Success Model and the Denison Organizational Culture Model to render a broad socio-technical paradigm of efficiency to project management.

This study is likely to make contributions to theory and practice. Theoretically, the study builds on the literature of project management and information systems by merging technology and culture points of view into one mediation framework. Practically, the research offers lessons to organizations that

would like to match the digital project management systems to organizational culture to deliver sustainable positive benefits on project management performance.

2. Literature Review

2.1 Project Management Systems Digitalization and change.

The digital transformation has greatly changed the way project management is carried out in the various industries and organizations now use the integrated Project Management Systems (PMS) to manage the various complex projects in a more efficient way. PMS platforms allow organizations to plan, monitor, coordinate and control project activities through centralized digital platforms that combine scheduling tools, collaboration platforms and performance dashboards. Since projects are becoming more complex and far away, PMS offer the means of real-time information sharing, resource management, and decision-making support.

Empirical studies indicate that the digital project management technologies enhance transparency of information and monitoring of projects as well as communication between the stakeholders. Research has revealed that digital systems enable integrated planning and information asymmetry in project settings, enabling the project managers to recognize risks and delays earlier in the project lifecycle (Fernandes et al., 2019; Coelho et al., 2023; Loureiro et al., 2024). These are skills that are especially useful in project-based organizations where the work of several different stakeholders must be coordinated to ensure the schedule is followed and resources are used effectively.

Yet, regardless of these possible benefits, there are inconsistent empirical results of the effect of PMS on project management efficiency. Multiple research works indicate that the implementation of digital project management tools enhances the coordination of the project and efficiency. However, some other research studies indicate that organizations often incur continued delays, cost over-runs and inefficiencies in the coordination even after installing technologically sophisticated systems. This discrepancy shows that the application of technology can not be a sure way of ensuring efficiency gains in project settings.

The latest studies also focus more on the socio-technical character of the project management systems. Based on this school of thought, digital project management tools are effective based on the both the technical aspects of the product and the organization that drives the implementation of the tools in practice. The effectiveness of integration of PMS into daily project activities depends on organizational processes, leadership practices and cultural norms.

2.2 Theoretical Underpinnings: Information Systems Success.

The DeLone and McLean Information Systems Success Model is one of the most popular models that can be used to assess the performance of information systems. The model asserts that system quality, information quality, and service quality has an impact on system use and user satisfaction, which in turn results to organizational performance outcomes, e.g., productivity and efficiency. The framework has extensively been used in studies that explore the topic of enterprise systems, digital platforms, and organizational information systems.

As per the model, system quality is the technical performance of an information system such as reliability, usability, response time. Information quality is defined as the accuracy, relevancy and timeliness of the information produced by the system. Service quality is used to denote the extent of assistance offered to the users in the implementation and use of a system. All of these dimensions have an effect on the effectiveness of user interaction with digital systems and whether there are measurable results in using a system.

Empirical studies that have used the DeLone and McLean model prove that the quality of the system and information quality have a very substantial impact on system usage and perceived benefit. In illustration, research on the principles of enterprise systems and digital management platforms reveals

that quality information systems enhance coordination, monitoring and decision-making processes in organizations.

In spite of its extensive use, the model has been criticized as paying too much emphasis on technical success factors and little attention to the organizational circumstance. Researchers are becoming stronger in contending that organizational aspects like leadership support, user involvement and cultural fit are key determinants of whether capabilities of a system can be converted into organizational performance outcomes.

This shortcoming is especially pertinent in the project-based setting when the usage of a system involves coordination of actions of several actors who are of different professional backgrounds. Within these settings, cultural practices and organizational culture can shape the manner in which the employees will engage with the digital systems and the level of efficiency with which project information will be accessed.

2.3 Culture and Project Climates in the organization.

It has been known that organizational culture is a major critical determinant of an organizational performance and technology adoption. Culture is a pattern of collective values, beliefs and behavioral patterns that govern how employees perceive organizational activities and react to the change. These cultural attributes have impacts on the feelings of employees towards new technologies, collaboration practices, and decision making processes.

Organization culture is particularly a crucial component of project-based organizations since project work presupposes cooperating with cross-functional teams which are initially exposed to the conditions of uncertainty. Participation, communication, and accountability cultural norms contribute to the effectiveness of coordinating the activity of the project teams and their responsiveness to the emergent challenges.

The Denison Organizational Culture Model is a popular model of analyzing how culture can have an impact on the performance of an organization. The model conceptualizes the culture with four major dimensions, which include involvement, consistency, adaptability, and mission. These dimensions measure how organizations promote participation of employees, uphold common values, adapt to the environment and balance action with strategic objectives.

Empirical studies by using the Denison model indicates that culture attributes play a major role in determining the effectiveness of the organization and adoption of technology. Firms with high involvement and adaptability cultures are likely to promote innovation, team work, and learning, which promote successful use of systems. On the other hand, organizations of strong hierarchies might not embrace change and limit the use of the system to functions of reporting to the administration.

The research on systematic reviews of the organizational culture points at its relevance regarding the formation of the organizational behavior and the performance outcomes across the sectors. Culture impacts the way in which workers exchange information, interact with other employees and operate the digital systems.

In the project management cases, the organizational culture has been associated with project performance, team working and project success. Studies reveal that societies that consider trust, group work, and responsibility enhance coordination of projects and minimise disagreements amongst the project stakeholders.

2.4 Project Management Efficiency

Project management efficiency is the capacity of organizations to undertake projects with the best allocation of time, costs and resources besides ensuring efficient coordination and monitoring. Efficiency puts emphasis on internal operational performance as opposed to broader measures of project success, which could entail strategic outcomes or stakeholder satisfaction.

The efficiency of a project-based organization is usually measured using the indicators of schedule compliance, resource use, communication efficiency, and monitoring precision. The effectiveness of the project management processes is such that tasks are accomplished in line with the planned schedules and resources are distributed efficiently during the lifecycle of the project.

Project management research indicates that efficiency depends on various factors, among which the project management methods, leadership practices, technological applications, and organizational processes are included. Indicatively, the research comparing hybrid project management practices shows that the combination of both agile and traditional project management methods can enhance project performance through the flexibility and structured project management practice.

On the same note, studies conducted on the topic of leadership and project performance show that leadership behaviors greatly determine project performance through teamwork and communication behaviors.

Even with such insights, project management effectiveness has been very elusive in most organizations because of the coordination difficulties as well as organizational constraints. These issues point out the necessity to study efficiency in terms of socio-technical approach which will focus on the technological systems and the organizational background.

2.5 Integrated Relationships among PMS, Culture, and Efficiency

The interrelationship between digital systems and the organizational environment has become a primary topic of the modern project management study. There has been an increasing argument that digital project management platforms are inexplicable only as technical solutions, but that they need to be considered within the bigger organizational contexts in which they are applied.

Socio-technically, PMS bring in formal planning, monitoring and reporting systems. What affects the interpretation and implementation of these structures by project teams are organizational culture, however. Collaboration, adaptability, and shared mission are some cultural attributes that affect the enthusiasm of employees when working with digital systems or using them as a bureaucracy reporting system.

Empirical research on the subject of digital transformation in project environments indicates that project management systems are highly contingent on organizational culture. In organizations with collaborative cultures, the digital systems are more easily incorporated into the project processes and, as a result, enhanced coordination and decision-making results.

On the other hand, companies that have strict hierarchical cultures can get minimal advantages of digital project management tools. The employees in such settings might not accept new technologies or even adopt them in their day-to-day project processes leading to minimal efficiency gains.

The above observations imply that organizational culture is extremely important in the translation of the technical capabilities of PMS into the results of operational efficiency.

2.6 Organizational Culture as a Mediation Process.

Recent studies are beginning to think more about organizational culture as a mediating variable that can be used to explain the effect of technological systems on organizational performance. Culture does not serve as a background variable that has no role in shaping how employees perceive digital systems and integrate them into everyday work-related activities.

In this regard, PMS can impact the efficiency indirectly by defining cultural standards of accountability, transparency and collaboration. Under the condition that digital systems encourage standardized workflows and data-driven decision-making, they can have a slow yet gradual impact on organizational culture by promoting new behavioral trends.

Nevertheless, the intensity of these cultural impacts lies in the implementation and support of systems by the leadership practices. Introduction of systems that have not been trained or supported by the organization might not be effective in bringing about any cultural change.

Mediation-based explanation is gaining more ground as empirical research on technology-performance associations is carried out. Through these studies, it is shown that organizational culture is the possible reason behind the differences in performance outcome of organizations with similar digital systems. Although these relationships are increasingly being acknowledged, explicit mediation testing has not yet been widely used in project management studies. Most of the research analyses on technology adoption and organizational culture exclusively instead of considering both within one analytical system.

2.7 Research Gaps

A number of significant gaps in research are observed in the existing literature. First, numerous researches investigate PMS and organizational culture separately, which leads to the piecemeal explanations of the efficiency of the project management. Second, there are limited empirical mediation models that explore the relationship between PMS and organizational culture. Third, the available literature is mostly done in developed economies and the context of developing countries remains untapped.

These are some of the gaps that are relevant especially in Pakistan where the organizations have a growing trend in adopting digital project management systems but inefficiencies in project management are still being realized. The absence of contextualized empirical studies restricts the comprehension of the interaction between PMS and the organizational culture with the results of efficiency in project-based organizations.

The solution to these gaps is an integrated socio-technical model that would help to understand the joint impact of PMS and organizational culture on the project management effectiveness. Our current research addresses this requirement by merging the DeLone and McLean Information Systems Success Model with the Denison Organizational Culture Model to explore how the organizational culture in the context of the relationship between PMS and the efficiency of project management mediate it.

3. The Development of Theoretical Framework and Hypotheses.

3.1 Theoretical Framework

This paper will take a socio-technical approach in explaining the impact of Project Management Systems on the project management efficiency in organization. In this light, organizational context and technological systems interact in order to influence performance outcomes. Project Management Systems are formal digital infrastructures, which facilitate planning, coordination, monitoring and reporting during the project life cycle. Nevertheless, the effectiveness outcomes that come with such systems are determined by the manner in which they are construed, embraced and applied by the organizational members.

The study combines two conceptually opposite theoretical bases, the DeLone and McLean Information Systems Success Model and the Denison Organizational Culture Model to represent the technological and organizational aspects of this relationship. DeLone and McLean model describes the impact of the characteristics of the information systems on the performance results in terms of the system qualities, information quality, and the quality of service. Project management systems that are of high quality allow effective scheduling, monitoring and management of resources in project environments through provision of reliable and timely project information.

But, the technological capability is not sufficient to guarantee an improvement in efficiency. The Denison Organizational Culture Model offers an organizational approach in the sense that it illustrates how organizational behavior and performance is influenced by cultural attributes. The model theorizes organizational culture as four dimensions, which include involvement, consistency, adaptability, and mission. Such cultural characteristics affect the way of interaction between employees with digital systems, the way of working in project teams, and employee reactions to organizational processes.

By incorporating these theoretical insights, one can have a complete socio-technical approach to the analysis of the efficiency of project management. In this context, Project Management Systems are technological assets that enable coordination and sharing of information between projects. Organizational culture is the contextual environment, which affects the way these technological capabilities are integrated into the day to day project practices. The result of the combination of these technological and cultural factors is project management efficiency, which is an outcome of operational performance.

In this respect, the given research model suggests that the Project Management Systems do have both direct and indirect impacts on the efficiency of project management through organization culture.

3.2 Project Management Systems and Project Management Efficiency.

Project Management Systems are created in order to enhance the efficiency of project management through facilitation of planning, scheduling, monitoring and coordination of project management. These systems will allow the project managers to monitor progress of the project, distribute the project resources effectively and detect possible delays before they degenerate to a significant project problem. Empirical research has shown that digital project management systems can be able to lead to better coordination of the project stakeholders and they have been known to improve decision making processes because they allow real time access to project information. Since project managers can monitor project activities more efficiently, such capabilities can enable project managers to change project plans in cases where it is essential. Such improvements are likely to result in better compliance with scheduled project activities and better project resource utilization.

The results of efficiency related to system of Project Management, however, differ among organizations. Other organizations realize drastic changes in project performance after the implementation of the system, and others have little or unequal impacts. These differences imply that adoption of technologies in isolation is not a sure way of achieving efficiency and that the environment of an organization is significant in defining the effectiveness of the systems.

Regardless of these differences, the general mass of findings suggested that successful implementation and application of Project Management Systems have a positive effect and impact on the efficiency of project management by developing an increase in the accuracy of planning, the effectiveness of communication, and the monitoring process. On the basis of this evidence, the hypothesis has been stated as follows:

H1: Project Management Systems positively and significantly affect Project Management Efficiency.

3.3 Management Systems and Organizational Culture Projects.

The digital systems do not solely have an impact on the operations, but can also impact the organization culture in the long term. Project Management Systems provide formal handling and standardized workflows that influence the manner in which the employees deal with project information and also how they cooperate with other employees. By repetition, these systems may have an impact on the common norms and expectations in terms of transparency, accountability, and decision-making based on data.

As an illustration, digital project management tools usually demand employees to refresh the development of tasks, exchange information among groups, and record project tasks in normalized formats. Such practices have the potential to support cultural values focusing on teamwork, responsibility, and sharing of information. The new behavioral patterns can be stagnated as the employees are more and more dependent on these systems, coordinating the projects it.

Nevertheless, the digital systems have a cultural influence based on how deeply they are entrenched into the operations of an organization. Project Management Systems have a higher chance of positively impacting the organizational culture when it is adopted by organizations that are willing to support the

adoption process through training and leaders. On the other hand, systems that are applied without adequate organizational support may not have a great impact on cultural norms.

Considering the possibilities of digital systems to affect the organizational behavior and the common norms, it is anticipated that the successful application of Project Management Systems can help develop the organizational cultures that will facilitate collaboration, coordination, and accountability. Therefore, the following hypothesis is proposed:

H2: Project Management Systems have a positive and significant impact on Organizational Culture.

3.4 Organizational Culture and Project Management Efficiency

Organizational culture plays a critical role in shaping project execution processes. Cultural attributes influence how project teams communicate, coordinate their activities, and respond to challenges during project implementation. In project-based organizations, where collaboration among diverse stakeholders is essential, cultural norms related to teamwork, adaptability, and accountability significantly affect project outcomes.

The Denison Organizational Culture Model suggests that cultures characterized by high levels of involvement encourage employee participation and shared responsibility for organizational goals. In project environments, such involvement facilitates effective coordination among team members and enables project teams to address issues proactively.

Adaptability-oriented cultures further contribute to project efficiency by enabling organizations to respond effectively to changes in project scope, resources, or external conditions. In dynamic project environments, the ability to adjust project plans and processes quickly is essential for maintaining schedule adherence and resource efficiency.

Similarly, cultures characterized by strong mission alignment provide clear direction for project activities and ensure that project teams remain focused on achieving organizational objectives. Consistency in shared values also supports efficient decision-making and coordination across project teams.

Given these characteristics, organizational culture is expected to play an important role in enhancing project management efficiency by facilitating collaboration, improving communication, and aligning project activities with organizational objectives.

Accordingly, the following hypothesis is proposed:

H3: Organizational Culture has a positive and significant impact on Project Management Efficiency.

3.5 Mediating Role of Organizational Culture

While Project Management Systems may directly influence project management efficiency, their effectiveness is often shaped by the organizational environments in which they are implemented. Organizational culture influences how employees interpret digital systems, whether they actively use system features, and how effectively system information is incorporated into project decision-making processes.

From a socio-technical perspective, Project Management Systems introduce technological capabilities that enable efficient planning and monitoring. However, organizational culture determines how these capabilities are enacted in practice. When cultural norms encourage collaboration, accountability, and data-driven decision-making, employees are more likely to integrate digital systems into daily project activities.

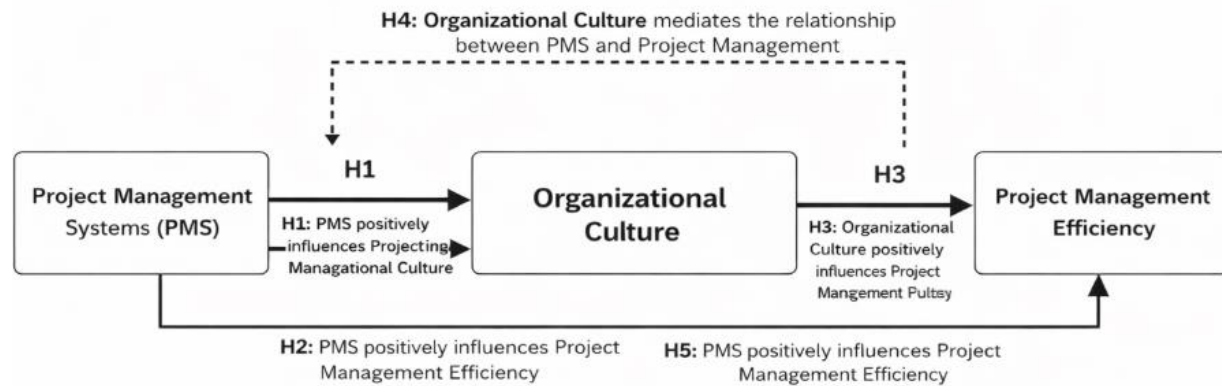
In such environments, Project Management Systems may strengthen cultural attributes related to transparency and coordination, which in turn enhance project management efficiency. Conversely, in organizations where cultural norms discourage collaboration or resist change, the potential efficiency benefits of digital systems may remain unrealized.

These observations suggest that organizational culture functions as an explanatory mechanism through which Project Management Systems influence project management efficiency. By shaping how digital

systems are interpreted and utilized by project teams, organizational culture mediates the relationship between technological capability and efficiency outcomes.

Based on this reasoning, the following hypothesis is proposed:

H4: Organizational Culture mediates the relationship between Project Management Systems and Project Management Efficiency.



The research model examined the relationships among Project Management Systems (PMS), Organizational Culture (OC), and Project Management Efficiency (PME). The model tested whether PMS directly influenced project management efficiency and whether PMS also affected organizational culture. The findings further assessed the impact of organizational culture on project management efficiency. Additionally, the model evaluated the mediating effect of organizational culture in explaining how PMS contributed to improved project management efficiency.

4. Methodology

4.1 Research Design

This study adopted a **quantitative research design** to empirically examine the relationships among Project Management Systems (PMS), organizational culture, and project management efficiency. Quantitative approaches are widely applied in project management and information systems research because they allow researchers to test theoretically derived relationships among constructs using statistical techniques. Given that the objective of the present study was to test the hypothesized relationships proposed in the conceptual framework, a quantitative methodology was considered appropriate.

A **cross-sectional survey design** was employed to collect data from professionals working in project-based organizations. Cross-sectional surveys are commonly used in organizational research because they allow researchers to capture respondents' perceptions regarding organizational practices, digital systems, and performance outcomes at a specific point in time. This approach enabled the study to examine how Project Management Systems and organizational culture jointly influence project management efficiency within project-based environments.

4.2 Population and Sample

The target population consisted of professionals working in **project-based organizations in Pakistan**, particularly within sectors where project management practices are extensively applied. These sectors include construction, engineering, information technology, manufacturing, and service industries. Organizations in these sectors frequently rely on Project Management Systems to coordinate complex project activities and manage multiple stakeholders.

The unit of analysis in this study was the **individual professional involved in project management activities**. Respondents included project managers, project engineers, project coordinators, IT specialists, and other professionals directly engaged in project planning, monitoring, and coordination

tasks. These individuals were selected because they possess practical experience with Project Management Systems and are familiar with organizational practices related to project execution.

A **purposive sampling technique** was used to select respondents who had experience working with Project Management Systems. This approach ensured that participants possessed relevant knowledge and could provide informed responses regarding the use of PMS and their influence on project management efficiency.

A total of **XXX questionnaires were distributed**, and **XXX valid responses were obtained**, resulting in a response rate of **XX%**. After data screening to remove incomplete and inconsistent responses, the final dataset was used for subsequent statistical analysis.

4.3 Data Collection Instrument

Data were collected using a **structured questionnaire** designed to measure the constructs included in the research model. The questionnaire consisted of four main sections. The first section captured demographic information such as respondents' professional roles, industry sector, and work experience. The remaining sections measured the study variables: Project Management Systems, organizational culture, and project management efficiency.

Prior to full data collection, the questionnaire was **pilot tested with a small group of professionals** to ensure clarity and relevance of the measurement items. Feedback obtained from the pilot test was used to refine the wording and structure of the questionnaire. This procedure helped improve the reliability and validity of the measurement instrument.

All measurement items were assessed using a **five-point Likert scale**, ranging from 1 (strongly disagree) to 5 (strongly agree). This scale format is widely used in management and organizational research because it effectively captures respondents' perceptions and attitudes toward organizational practices.

4.4 Measurement of Variables

The constructs used in this study were measured using **validated scales adapted from prior research** to ensure construct validity and reliability.

4.4.1 Project Management Systems

Project Management Systems were measured as a multidimensional construct reflecting the effectiveness of digital project management platforms in supporting project planning, scheduling, monitoring, and coordination. Measurement items were adapted from prior information systems research based on the **DeLone and McLean Information Systems Success Model**. These items captured key aspects of PMS performance, including system usability, accessibility of project information, reliability of the system, and support for project-related decision-making.

4.4.2 Organizational Culture

Organizational culture was measured using items derived from the **Denison Organizational Culture Model**, which conceptualizes culture through four dimensions: involvement, consistency, adaptability, and mission. These dimensions capture shared organizational values and norms that influence employee behavior and collaboration within project environments.

4.4.3 Project Management Efficiency

Project management efficiency was operationalized as an internal performance construct focusing on the effective utilization of time, resources, and coordination processes during project execution. Measurement items assessed respondents' perceptions regarding schedule adherence, effectiveness of project monitoring, coordination among project stakeholders, and efficient resource utilization.

4.5 Data Analysis Techniques

The collected data were analyzed using **Structural Equation Modeling (SEM)** to examine the relationships among the constructs included in the research model. SEM is widely used in management and information systems research because it enables researchers to test complex relationships among multiple latent variables simultaneously.

The data analysis followed a two-step procedure. First, **Confirmatory Factor Analysis (CFA)** was conducted to evaluate the reliability and validity of the measurement model. Reliability was assessed using Cronbach's alpha and composite reliability values, while convergent validity was evaluated using Average Variance Extracted (AVE). Discriminant validity was examined by comparing the square root of AVE values with inter-construct correlations.

Second, the **structural model** was analyzed to test the hypothesized relationships among Project Management Systems, organizational culture, and project management efficiency. The significance of structural paths was assessed using standardized regression coefficients and corresponding p-values.

To examine the **mediating effect of organizational culture**, bootstrapping procedures were applied to estimate indirect effects. Bootstrapping is widely recommended for mediation analysis because it provides robust estimates of indirect relationships among variables.

4.6 Ethical Considerations

Ethical standards were maintained throughout the research process. Participation in the study was voluntary, and respondents were informed about the purpose of the research prior to completing the questionnaire. Participants were assured that their responses would remain anonymous and confidential.

All collected data were used exclusively for academic purposes and were stored securely to prevent unauthorized access. These procedures ensured that the study adhered to established ethical guidelines for social science research.

5. Results

5.1 Descriptive Statistics

Descriptive statistics were first examined to understand the general distribution of responses related to Project Management Systems (PMS), organizational culture (OC), and project management efficiency (PME). The mean values indicate the overall perception of respondents toward the constructs measured in this study, while the standard deviation values reflect the variability in responses.

The results indicated that respondents generally perceived the use of Project Management Systems within their organizations to be moderately high. Similarly, respondents reported relatively positive perceptions regarding organizational culture and project management efficiency. The descriptive statistics suggest that digital project management platforms are widely used within project-based organizations and are perceived as contributing to improved coordination and monitoring processes.

Table 1: Descriptive Statistics

Variable	Mean	Standard Deviation
Project Management Systems	3.87	0.71
Organizational Culture	3.74	0.68
Project Management Efficiency	3.81	0.65

The results indicate relatively high average values for all constructs, suggesting that respondents generally perceive their organizations as having supportive cultural environments and effective digital project management practices.

5.2 Measurement Model Assessment

Before testing the structural relationships, the measurement model was evaluated to ensure the

reliability and validity of the constructs included in the study. The assessment followed established guidelines for Structural Equation Modeling.

Reliability Analysis

Internal consistency reliability was assessed using **Cronbach's alpha** and **composite reliability (CR)**. Values above 0.70 are generally considered acceptable for research purposes.

Table 2: Reliability Analysis

Construct	Cronbach's Alpha	Composite Reliability
Project Management Systems	0.89	0.91
Organizational Culture	0.88	0.90
Project Management Efficiency	0.87	0.89

All constructs demonstrated reliability values above the recommended threshold of 0.70, indicating satisfactory internal consistency.

Convergent Validity

Convergent validity was evaluated using **Average Variance Extracted (AVE)**. AVE values above 0.50 indicate that the construct explains more than half of the variance in its indicators.

Table 3: Convergent Validity

Construct	AVE
Project Management Systems	0.62
Organizational Culture	0.60
Project Management Efficiency	0.58

The AVE values exceeded the recommended threshold, confirming adequate convergent validity.

Discriminant Validity

Discriminant validity was assessed using the **Fornell–Larcker criterion**, which requires the square root of AVE values to be greater than the correlations between constructs.

Table 4: Discriminant Validity

Construct	PMS	OC	PME
PMS	0.79		
OC	0.63	0.77	
PME	0.58	0.61	0.76

The results indicate that the constructs are empirically distinct from one another, confirming discriminant validity.

5.3 Structural Model Analysis

After confirming the reliability and validity of the measurement model, the structural model was evaluated to test the hypothesized relationships among the study variables.

Model fit was assessed using several goodness-of-fit indices, including the Comparative Fit Index (CFI), Tucker–Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR).

Table 5: Model Fit Indices

Fit Index	Recommended Value	Model Value
CFI	≥ 0.90	0.94
TLI	≥ 0.90	0.93
RMSEA	≤ 0.08	0.057
SRMR	≤ 0.08	0.049

All model fit indices fall within acceptable ranges, indicating that the structural model adequately fits the observed data.

5.4 Hypothesis Testing

The hypotheses proposed in the research model were tested using structural path analysis.

Table 6: Hypothesis Testing Results

Hypothesis	Path	β	t-value	p-value	Result
H1	PMS \rightarrow PME	0.35	4.76	<0.001	Supported
H2	PMS \rightarrow OC	0.59	8.12	<0.001	Supported
H3	OC \rightarrow PME	0.41	5.88	<0.001	Supported

The results show that Project Management Systems have a significant positive effect on project management efficiency. PMS also significantly influence organizational culture, while organizational culture significantly improves project management efficiency.

5.5 Mediation Analysis

The mediating role of organizational culture was examined using bootstrapping procedures. The indirect effect of PMS on project management efficiency through organizational culture was statistically significant.

Table 7: Mediation Results

Relationship	Indirect Effect	t-value	p-value	Result
PMS \rightarrow OC \rightarrow PME	0.24	4.02	<0.001	Partial Mediation

The results indicate that organizational culture partially mediates the relationship between Project Management Systems and project management efficiency. This finding suggests that PMS influence efficiency both directly and indirectly through their impact on organizational culture.

5.6 Summary of Results

In general, the proposed research model is confirmed by the empirical analysis. Project Management Systems are also effective in enhancing the efficiency of project management besides shaping conducive organizational cultures. Organizational culture also increases the efficiency of the project management and acts as an intermediary between PMS and efficiency outcomes. The above findings underscore the need to develop technological systems based on supportive organizational cultures to bring about sustainable change in the efficiency of project management.

6. Discussion and Conclusion

6.1 Discussion of Findings

This study aimed to investigate the interrelations between Project Management Systems (PMS), the organization culture (OC), and the project management efficiency (PME) in the project-related organizations. Based on the DeLone and McLean Information Systems Success Model and the Denison Organizational Culture Model, the paper suggested a socio-technical model to describe the interaction between digital project management systems and the organizational culture in order to affect efficiency outcomes. The empirical results given can contribute significantly to the relationship between technological capabilities and organizational context to determine the performance of project management.

These findings of the study indicate that Project Management Systems are highly positive influence on project management efficiency. This observation indicates that online project management tools are used to achieve better accuracy of planning, monitoring and control of the project stakeholders. PMS allow project managers to monitor the project progress more efficiently and address the arising project challenges in a timely manner by offering centralized access to project information, as well as real-

time communication. These results are not new considering that previous studies show that the digital project management tools increase the efficiency of operations due to the increase in the project visibility and information exchange.

The findings also indicate that Project Management Systems have a tremendous impact on the organizational culture. The adoption of online project management systems seems to endorse cultural values of transparency, accountability, and problem-solving through teamwork. As the project teams constantly use PMS to plan their activities and monitor them, new types of behavior will appear with the focus on the organized coordination of actions and information-based decision-making. This observation is in line with the socio-technical school of thought that is proposing that technological systems do not only influence the way operations are conducted, but that it can also influence organizational norms and practices in the long run.

In addition, the analysis suggests that the organizational culture positively impacts on project management efficiency in a significant way. The involvement of employees, flexibility, and alignment with the mission are cultural factors that enhance better cooperation among the members of the project team and effective coordination of project operation. Cultural norms that promote communication and teamwork are especially critical in a project environment where there is uncertainty and interdependence to keep project schedules and to have efficient utilization of resources.

One of the findings of this study of the greatest importance refers to the mediating influence of the organizational culture. The findings imply that organizational culture mediates the association between Project Management Systems and project management efficiency partially. This observation creates an impression that digital project management systems affect efficiency not just directly due to technological capacities, but indirectly due to the formation of organizational culture. The PMS benefits can be maximized in organizations, in which cultural values facilitate teamwork, responsibility, and flexibility. On the other hand, the possible efficiency gains provided by the digital systems can be restricted under conditions of a less favorable culture.

Altogether, the results indicate that the consideration of technological and the organizational factors should be taken into account when analyzing project management efficiency. Although digital systems offer tools that can be used to work out project coordination, their influence is determined by the organizational environment under which they are applied.

6.2 Theoretical Implications

This research is important to the development of project management and information systems literature in a number of ways. To begin with, the study contributes to the literature on the Project Management Systems through the analysis of the impact on the project management efficiency in a socio-technical context. Although the earlier research has predominantly concentrated on the technical power of digital project management tools, the paper in point underlines the role of organizational setting to develop efficiency outcomes.

Second, the paper combines two powerful theoretical models: the DeLone and McLean and Information Systems Success Model and the Denison Organizational Culture Model to give a complete account on the interaction between technological systems and organizational culture to impact on project performance. With the integration of these points of view, the researches offer a more comprehensive view of how digital systems help in increasing efficiency in operations.

Third, the study can be incorporated in the expanding literature on mediation processes in technology-performance relationships. The results prove that an organizational culture is a significant explanatory variable that connects the Project Management Systems with the efficiency of project management. This observation fills a research gap in the previous literature, in which the organizational culture has been viewed as a situational element instead of a moderating variable.

Lastly, the research can be used in the research on project management in developing economies as it presents empirical evidence in Pakistan. Most of the literature available about the digital project

management systems has been done in the developed nations. This study increases the geographical reach of project management knowledge as it involves the study of socio-technical dynamics of implementing PMS in the context of a developing economy.

6.3 Practical Implications

The results of this research have a number of practical implications on organizations that would like to enhance the efficiency of project management using digital technologies. To begin with, organizations must understand that adoption of Project Management Systems is not enough to ensure that they experience improvements in their performances. Although digital systems offer new valuable technological functions, their value relies on their implementation in organizational processes and supported by organizational culture.

Second, organizations ought to make investments in those initiatives that foster cultural values that are consistent with effective project management practices. Employee involvement, adaptability, collaboration, and other cultural aspects are very important in ensuring that project teams can make use of digital systems. These cultural norms can be reinforced by the use of leadership practices that promote knowledge sharing, transparency and teamwork.

Third, companies adopting Project Management Systems must have a reasonable training and support to get the employees to learn how the systems work effectively. Employees can be motivated to adopt digital systems in their routine work practices by organizing training programs that provide them with the practical value of PMS in planning and coordination of projects.

Lastly, managers would need to understand that organizational change initiatives are to be implemented together with any digital transformation initiative. The integration of the technological systems with the favorable cultural environments can dramatically strengthen the opportunities of Project Management Systems and the efficiency of project management.

6.4 Limitations and Future Research.

Although this study has helped, it also has its limitations which deserve to be mentioned. To begin with, the research design used in the study was cross-sectional, and such a design hinders drawing causal relationships between the variables used. The longitudinal research designs can be used in the future research in order to analyze the development of relationships between Project Management Systems, organizational culture and project management efficiency over time.

Second, the research was about project-based organizations in Pakistan. Inasmuch as this context is informative to the understanding of digital project management practice within the context of developing economies, the results might not be entirely applicable elsewhere within the institutional setting. Future research would be able to reproduce the study in other nations and analyze whether such socio-technical dynamics can be found in other environments.

Third, the study based on self-reported survey data, which is also prone to response bias. Similar methods could be used in the future, but, in addition to surveys, the researcher could add more qualitative research methods like case studies or interviews aimed at learning more about the processes that go on within an organization in connection with the implementation of PMS.

Other variables that determine the effectiveness of Project Management Systems that can be examined in future research include leadership practices, digital skills and organizational learning capabilities. Exploring these aspects could give a better in-depth view into how companies can become sustainable in terms of improvement in project management efficiency.

6.5 Conclusion

This paper has discussed the connection between Project Management Systems, the organizational culture and the project management efficiency in project based organizations. Using the DeLone and McLean Information Systems Success Model and the Denison Organizational Culture Model, the study

came up with a socio-technical model used to describe the effects of digital project management system in efficiency outcomes.

The results show that Project Management Systems have a great impact on making project management more efficient, as well as on the establishment of constructive organizational cultures. The organizational culture also helps in improving effectiveness of project management and partly mediates between PMS and efficiency outcomes.

Based on these findings, the significance of integrating the technological systems with conducive organizational cultures is emphasized to ensure the implementation of sustainable progress in project management performance. Organizations, which manage to combine digital project management tools and collaborative and adjustive cultural settings, have higher chances to obtain the complete efficiency advantages of digital transformation initiatives.

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