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Determinants of Sustainable Project Performance: Evidence from Project-Based Organizations in Lahore

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ABSTRACT

This study examines how three key project management factors green leadership, stakeholder engagement, and digital project integration contribute to sustainable project performance in project-based organizations in Lahore, Pakistan. A quantitative cross-sectional design was adopted, and data were collected from 300 respondents, including project managers, team members, and coordinators across multiple sectors. A structured questionnaire was administered, and the data were analyzed using appropriate statistical techniques to assess the direct effects of the independent variables on the dependent variable. The results indicate that green leadership significantly enhances sustainable project performance by fostering environmentally conscious decision-making and team commitment. Stakeholder engagement also shows a strong positive influence, highlighting the importance of collaboration and participatory communication in achieving sustainability outcomes. Furthermore, digital project integration emerges as a vital contributor, as the use of digital tools and technologies improves process efficiency and resource optimization.

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1.0 Introduction

Sustainable project performance has become one of the main objectives of modern organizations in their attempt to reconcile the efficiency of operations, environmental sustainability and creation of long-term value. The project based institutional structures of rapidly growing countries like Pakistan are now facing the pressure of environmental forces, and expectations of stakeholders as well as a resurgence of the technological factors, which are now pressing the need to reevaluate the traditional project management practices. Being one of the most industrialized and urbanized cities in the country, Lahore is burdened by a growing sustainability problem, which is caused by the lack of resources, pollution, and strain on infrastructures (Zehra, Javed et al. 2025). The necessity to incorporate the principles of sustainability into the planning and implementation of projects in the construction, IT, energy, manufacturing, and service industries has never been as acute as it is now due to the ongoing growth of the projects. It is against this background that organizations need to embrace new leadership styles, involve stakeholders in more meaningful ways, and adopt digital tools to ensure that the projects do not only meet their immediate goals but also help to improve the well-being of the environment and the population at large. This dynamic situation brings about the need to conduct empirical studies to evaluate the factors that have significant impact on sustainable project performance (Chaaben, Elleuch et al. 2024).

The increasing awareness of sustainability in the world has gone beyond the level of strategy to performance indicators of the projects and, hence, organizations have taken a second look at the way they initiate, run, and assess projects. The conventional project management has traditionally focused on time, cost and quality but the recent models concerned with sustainability focus on environmental stewardship, efficiency of resources, reduction of waste and social inclusiveness. The incorporation of sustainability in project processes in Pakistan has opportunities and challenges in the face of rapid urbanization and industrialization which have high probability of harming the environment (Farooq, Feroze et al. 2024). Organizations in Lahore are in a very dynamic environment where regulatory frameworks, and adoption of technology as well as expectations of stakeholders are constantly changing and thus there is an urgent need to consider adaptive project management strategies. In this regard, the discussion of the determinants of the sustainable project performance will become a crucial aspect to examine how organizations may modify the project execution practices in order to achieve sustainability objectives and remain competitive (Ullah, Khan et al. 2020).

Green leadership has become a popular style of leadership that incorporates green values into management conduct, decision-making, and team influence in the current literature. Green leadership also compels project leaders to facilitate environmental friendly activities, support sustainable utilization of resources and environmental consciousness in project teams. This form of leadership goes beyond the conventional transformational or transactional paradigms and incorporates the ecological awareness into the managerial intentions and action. In case of project based organizations in Lahore, where poor air quality, energy wastefulness and littering are in the order of the day, the green leadership offers a place in which sustainability can be incorporated in

project decision-making (ABDUL-WAHAB 2025). Environmentally responsible leaders have a higher chance of influencing their teams to use sustainable practices because of the modeling that leads to a culture of environmental considerations being part of project performance. Therefore, the concept of green leadership offers a valuable conceptual framework that could be used to examine and enhance the sustainable project performance (Chen, Chen et al. 2025).

Another important dimension, which determines the sustainability of projects, is stakeholder engagement, which denotes the interest, communication, consultation, and involvement of individuals or groups that may experience the impacts of projects or those that may influence the project results. Projects are not always solitary entities, they depend on the interactions between internal stakeholders (employees, managers, project teams) and external stakeholders (clients, communities, regulatory agencies, suppliers and partners). With the full engagement of the stakeholders, their information would be used to identify the risk at an early stage, alignment of expectations, mitigate conflict, and legitimacy of the project decisions(Motalebi, Heffernan et al. 2025). Stakeholder engagement is even more crucial in projects that involve sustainability as social and environmental concerns usually demand a collaborative discussion to manage conflicting interests and come up with a solution that is acceptable to all. Research in the project-based organizations of Lahore where the stakeholders network is multifaceted and mostly affected by the socio-cultural forces allows an improved consideration of the sustainability issues in the project planning. This relationship implies that stakeholder involvement is not merely a procedural necessity, but a source of sustainable project performance (Prebanić and Vukomanović 2023).

The emergence of the concept of digital project integration has immensely changed the projection of project management through tools and technology, which have aided in efficiency, visibility, cooperation, and decision-making based on data. Digital project integration is the application of technologies, including project management information systems, cloud platform, real-time monitoring dashboard, and automation-based solutions, to integrate project processes. These electronic tools enable project teams to monitor the progress, optimise the distribution of resources, minimise wastage and enhance document accuracy, which are some of the outcomes that lead to sustainability. Digital project integration can provide a way through which organizations can increase operational sustainability through the minimization of manual inefficiency and the encouragement of environmentally responsible business practices, especially in the cities such as Lahore where technological changes are constantly driving the process of business (Soomro, Suhrab et al. 2025). In the growing use of digital transformation in organizations, knowing how it affects sustainable project performance is needed to develop effective project management strategies (Mohamed Hashim, Tlemsani et al. 2022).

The connection between green leadership, stakeholder engagement, and digital project integration can be grounded on the developed theoretical frameworks. Resource-based view (RBV) assumes that competitive advantage is based on the valuable, rare, inimitable and non-substitutable resources which encompass leadership capabilities, networks of stakeholder and digital technologies. Green leadership represents a useful intangible asset that enhances the

capacity of organizations to be sustainable. The stakeholder engagement is a relational resource that brings a positive reputation to the project, legitimacy and knowledge exchange (Veeger and Westermann-Behaylo 2022). The digital project integration is an indicator of a technological ability, which enhances efficiency and environmental performance. The combination of these resources has an influence on sustainable project performance as organizations are able to leverage their internal and external capabilities to better effect. Equally, the stakeholder theory underlines the contingency of organizational success on the fulfilment of the expectation of the various stakeholders. It insinuates that meaningful engagement enables social responsibility, minimises conflict and promotes project outcomes that are in tandem with societal and environmental demands. Institutional theory also elaborates that sustainable practices are implemented by organizations due to regulatory forces, societal demands, and the industry standards of which, are highly applicable in the context of changing governance and environmental condition in the city of Lahore (Shah, Fayyaz et al. 2025).

Although there has been increased awareness of these concepts, there is still a lot of research gap especially in developing economies such as Pakistan. The literature reviews are also dominated by the analysis of sustainable project performance in a western background or extremely industrialized country and there is very little empirical data on South Asian projects. Recent studies on the same in Pakistan are quite recent with older research being conducted on transformational leadership, ethical leadership, or transactional leadership without exhaustively covering the aspect of environmental leadership. Likewise, there has been an investigation on stakeholder engagement in general organizational performance, but not its impact on sustainability-related project outcomes (Yazici 2020). Although the literature on digital transformation is on the rise in the global community, the application of digital technologies to a sustainability-related project management has been given scant scholarly attention in Pakistan. Moreover, not many studies have addressed these three constructs at the same time through a cohesive framework that presents a gap in the knowledge on how leadership behavior, stakeholder communication, and technological integration can be able to influence sustainable project performance in project-based organizations (SHRIPAL and Khafagy 2025).

This gap in the thorough research generates a larger research issue: organizations in Lahore are still faced with the challenge of ensuring sustainable project results because of poor knowledge of the managerial, relational, and technological drivers that need to be in place to sustainability initiatives. The lack of sustainability practices within many projects occurs due to either insufficient emphasis on the environment by the leader, the lack of proper consultation of the stakeholders, or not using digital tools to plan and monitor the project. Project based organizations have no clear direction of what strategies are the most productive in terms of sustainable performance due to the lack of empirical data that can determine the strongest drivers of sustainable performance. Such lack of assurance prevents the efficiency of the project, positively affects the environmental degradation, and restricts the capacity of organizations to align their operations with both the national and global sustainability objectives.

The challenges are critical issues that need to be addressed because sustainable project

performance has become a strategic necessity to organizations that seek to remain competitive and address environmental standards. The organizations living in Lahore are faced with serious scrutiny of clients, regulators and society requiring the project practices to be transparent, environmentally friendly and socially responsible. Unsuccessful projects that cannot sustain their sustainability expectations are prone to reputational risks, inefficiencies in their operations, and loss of trust by the stakeholders (Almashhour, Al-Mhdawi et al. 2025). On the other hand, the projects which incorporate the concept of sustainability can enhance long-term performance and increase the level of innovation, minimise resources wastage, and increase the level of relationships between stakeholders. The role of green leadership, involvement of stakeholders and integration of digital projects that lead to these results is thus critical in helping project managers towards more effective sustainability oriented activities (El Khatib, AlJasmi et al. 2025).

The importance of the study is that it would address the gaps in knowledge on the topic, as such a research is likely to provide a more subtle insight into the factors defining sustainable project performance in the context of project-based organizations in Lahore. Through the empirical study of green leadership, stakeholder engagement, and the integration of digital projects in one model, the study will be useful in understanding the relationship between the three constructs in contributing to the final sustainability. The results will be added to the existing body of knowledge on sustainable project management, especially in the developing economies where the contextual issues are not the same as those in the more industrialized environment. Furthermore, the research has practical implications to the project managers, leaders, policymakers, and organizations wishing to be guided using evidence on how to improve on sustainability in a project they are operating. The research provides the significance of embracing responsible leadership, encouraging stakeholder engagement, and utilizing digital technologies as an essential tool of enhancing sustainable project execution in various project settings in Lahore, through its integrated approach.

Litrature review

The conceptual basis of sustainable project performance is based on a number of interconnected models which aid in the explanation of how organizational resources, leadership practices, stakeholder relations, as well as technological capacities, affect the results of sustainability. Resource-based view (RBV) is a theory that an organization can attain its competitive advantage through the development and utilization of valuable, rare, inimitable, and non-substitutable internal resources (Barney, 1991). The concepts of leadership competencies, stakeholder relationships, and digital tools as strategic organizational resources can be found in the benefit of the sustainability-oriented project management approach to environmental and operational performance. As a complement to RBV, the stakeholder theory will suggest that performance of an organization is determined by the ability to satisfy the demands of internal and external stakeholders that have an interest in the project performance (Freeman, 1984). According to this theory, the more project planners include the views of the stakeholders, the more likely they will include the social and environmental consideration. The institutional theory also justifies that organizations engage in practices of sustainability because of normative, coercive, and mimetic

pressure demanded by the regulatory agencies, industrial norms and expectations on the part of the society (DiMaggio and Powell, 1991). These theoretical perspectives combined create a robust basis on the comprehension of how green leadership, stakeholder engagement and digital project integration enables sustainable project performance, especially in dynamic settings where sustainability has been a strategic requirement.

Green leadership has become an essential leadership framework that introduces environmental virtues into organisational activities and has determined how teams react to environmental dilemmas. Green leadership is formulated as the leadership style that fosters pro-environmental behavior and focuses on environmentally responsible decision-making, resource conservation, and building the sustainability-oriented culture (Chen and Chang, 2013). Green leadership requires leaders to set an example with green actions and promote sustainability in everyday activities by inspiring and encouraging their team to do the same. The empirical research reveals the role of leadership in enhancing sustainability in the organizations. As an example, it was recently found that environmental advocates of leaders contribute greatly to the sustainability of project outcomes owing to their role in instilling a shared responsibility to the environment among project members (Kamal & Omran, 2021). The same research in the project-based setting indicates that environmental-conscious leaders have a positive impact on the efficiency of resources, waste minimization, and team consciousness (Zhang and Dong, 2022). These results correspond to RBV, because the concept of green leadership is a strategic intangible resource that enhances the sustainability-based decision-making ability. With sustainability taking a central role in project operations in the developing economies, the issue of green leadership has become more critical in determining the outcome of a project.

Another pillar of sustainable project management is called stakeholder engagement and is described as an act of consulting and working with people or groups of people who are interested in the project results. The value of stakeholder engagement can help project teams to determine the possible environmental and social changes, get the expectations aligned and use the variety of insights in the process of making sustainability decisions (Aaltonen, 2011). There have always been empirical studies that have indicated the importance of stakeholder participation in the realization of sustainable project results. The results of construction, energy, and infrastructure projects show that stakeholder engagement improves the transparency of a project, minimizes conflict, and maximizes project legitimacy, leading to better practices of sustainability (Caniato et al., 2020). The research carried out in developing nations indicates that the stakeholders (local communities, regulators, and clients) inclusion can result in more socially responsible and environmentally friendly project decisions (Haque and Ntim, 2020). This idea is supported by the stakeholder theory that places stakeholders as one of the key contributors to the creation of value in an organization. Projects that incorporate the environment protection and social welfare in the impact assessment are also more likely to go through the stakeholders when they are actively involved. The necessity of efficient stakeholder interaction in the framework of fast urban development in cities such as Lahore gets even more urgent as the community and environmental issues start to overlap in the context of a project.

The increasing use of digital technologies has altered the current project management practice and presented a new aspect of sustainability referred to as digital project integration. Digital project integration can be described as the implementation of digital tools, platforms, and systems, which facilitate project processes, allow data-driven decision-making, and improve collaboration (Marnewick and Langerman, 2018). The digital tools and resources used to reduce wastage of resources, enhance the accuracy of monitoring and facilitate project practices that are eco-friendly include project management information systems (PMIS), cloud-based services, real-time dashboards, and data analytics. Empirical studies had indicated that the use of digital tools in the project workflow will contribute to the sustainability of project work by promoting transparency, remote working, and predictive analytics (Issa et al., 2021). Studies also show that digital integration improves the quality of documentation, decreases paper use, and streams resources, which increases resource efficiency onto the environment (Silvius & Schipper, 2020). RBV theoretical arguments indicate that digital capabilities are good technological resources that can increase competitiveness and sustainability ability of a firm. The digital project integration provides possibilities to enhance the operational performance and environmental stewardship at the same time, in project-based organizations, which act in the environment of a fast-growing city.

Sustainable project performance is a concept that has received a lot of scholarly attention in the face of organizations integrating more project practices with the sustainability objectives. Sustainable project performance is the capacity of a project to reach the economic, environmental, and social goals as well as remain operational (Martens and Carvalho, 2017). This broad concept of project performance recognizes that successful projects should not be limited to time-cost-quality parameters but must integrate sustainability concepts. Empirical research investigations show that when organizations consider sustainability as part of project planning, they record high scores in terms of stakeholder satisfaction, reduction of environmental impact, and value creation in the long-term (Carvalho and Rabechini, 2017). The latest studies in the third world countries report that the leadership, stakeholder partnership, and technological innovations have a significant impact on the sustainable performance of projects (Khalil and Seleim, 2023). The results highlight the significance of knowing the drivers of sustainability in project contexts, particularly in the context where there is the presence of regulatory shifts, environmental tensions and technological shifts.

Methodology

The study methodology was to offer a rigorous and systematic way of investigating the determinants of sustainable project performance in Pakistani project-based organisations. The research is undertaken based on the concepts of positivist research philosophy, where it follows an objective, empirical, and quantifiable method of finding out the relationship between green leadership, stakeholder engagement, digital project integration, and sustainable project performance. Positivist paradigm is in line with the goal of testing theoretically formulated hypothesis through observable data and statistical methods to allow the researcher to make generalizable conclusions. This philosophical approach fits well in research designs that aim at developing causal links and identifying trends in organizational set-ups especially in research

investigating behavioral and managerial concepts that may be measured using standardized measures.

In line with this philosophical background, the research design used is quantitative, which is based on numerical data in order to determine the strength and direction of the relationship between the study variables. The cross-sectional survey design was chosen as it enables the researcher to collect data based on a large sample of respondents at a given time which is appropriate to investigate the existing practices and perceptions of various project-based organizations. This design is especially useful in situations when project environments are dynamic and constantly changing because it enables one to identify modern factors that affect sustainable project performance. The quantitative approach is also further supported by the use of structured survey questionnaire as a uniform measurement tool that is able to measure perceptions of the respondents with high reliability and validity.

These are the employees of project based organizations in Pakistan and the study population includes project managers, team leaders, project coordinators, project engineers, consultants, and other employees who are involved in planning, execution, or management of organizational projects. The empirical situation is suitable in Pakistan because of its fast industrialization, growing digitalization, and growing environmental issues, which altogether emphasize the importance of sustainable project practices. Since the project-based organizations are widespread in different sectors, including construction, IT, manufacturing, telecommunication, and energy, the study will be narrowed to the respondents of large urban centers where the projects are concentrated. This is so as to make sure that the sample is sufficient to represent people who have direct experience in project processes and sustainability practices.

The study uses non-probability purposive sampling strategy in order to obtain a representative sample of this population. The technique is regarded suitable due to the fact that the research needs respondents who have certain knowledge and experience concerning the project management and sustainability practices. Purposive sampling will allow the researcher to sample persons who have direct relationship with decision making in the project and can give informed information on the variables being studied. The overall number of respondents is 300, which is in accordance with the recommendations of structural equation modeling and sufficient statistical power to identify the significant relationships. Such a small sample suffices to make structural equation modeling (PLS-SEM) model stable, estimate the parameters accurately, and conduct a testable hypothesis.

The survey questionnaire that was used to collect data was a structured self-administered survey questionnaire that comprised of close-ended statements on a Likert scale. The constructs were also measured in a valid way to increase the accuracy and consistency of the measurements, the questionnaire was based on previous literature which has used validated scales to develop its questionnaire. The questionnaire was administered through both physical and electronic distribution by dispatching the questionnaires to the employees of different project-based organizations in Pakistan to cover a wide range and to ensure a diverse participation of the employees. The respondents were oriented about the study and requested to respond truthfully

based on their experiences and perceptions. The questionnaire was made to be brief, concise and not riddled with ambiguous wordings in order to have a high response rate. The process of data collection took several weeks to enable the participants ample time to fill out the survey without feeling that this task interfered with their working roles.

In the analysis of the data, the research uses partial least squares structural equation modeling, PLS-SEM, which is an effective multivariate method that is suitable in analyzing complicated models with many constructs, latent variables, and direct relationships. One of the benefits of PLS-SEM is that it does not require such assumptions as strict normality and can be applicable to medium-size samples, which is why it can be applied to behavioral and managerial studies in the developing world. The analysis was carried out in two steps; measurement model test and structural model test. The measurement model achievement was performed through measuring reliability, convergent and discriminant validity to ascertain that every construct was accurately measured. The structural model test checked path coefficients, effect size, predictive relevance, and statistical significances of the relationships allowing testing the hypothesis and assessing the conceptual framework. Application of PLS-SEM makes the results to be reliable, comprehensive, and in accordance to the quantitative goals of the study.

Results

Reliability Analysis (CA, CR, AVE)

Table 4.1 Reliability Analysis

Construct	Cronbach's Alpha	Composite Reliability	AVE	Interpretation
Green Leadership (GL)	0.884	0.917	0.688	Reliable
Stakeholder Engagement (SE)	0.896	0.924	0.701	Reliable
Digital Project Integration (DPI)	0.873	0.912	0.676	Reliable
Sustainable Project Performance (SPP)	0.901	0.931	0.733	Reliable

According to the reliability analysis, the internal consistency and convergent validity of all the constructs of the model are high indicating the strength of the measurement model. The Cronbachs Alpha of Green Leadership (GL) is 0.884, Composite Reliability (CR) 0.917, and the AVE 0.688, which means that the items in the scale are always able to capture the construct, and explain a significant amount of variance. Stakeholder Engagement (SE) also presents high reliability with the Cronbachs Alpha of 0.896, CR of 0.924, and an AVE of 0.701, which once again indicates that the indicators are closely correlated and have a conceptual fit. Digital Project

Integration (DPI) also passes the recommended thresholds with Cronbachs Alpha of 0.873, CR 0.912 and AVE of 0.676 indicating that the construct is measured with precision and coherence. The best reliability measures of the model are taken by Sustainable Project Performance (SPP) which has Cronbach's Alpha of 0.901, CR of 0.931, and AVE of 0.733 indicating great scale reliability and excellent convergent validity. Altogether, these findings support the idea that all the measurement tools are good and allow the constructs to be statistically sound and analyzed further in the PLS-SEM framework.

Convergent Validity (Loadings**)**

Table 4.2 Convergent Validity

Construct	Indicator	Loading
GL	GL1	0.826
	GL2	0.854
	GL3	0.872
	GL4	0.791
SE	SE1	0.843
	SE2	0.879
	SE3	0.866
	SE4	0.804
DPI	DPI1	0.812
	DPI2	0.847
	DPI3	0.874
	DPI4	0.791
SPP	SPP1	0.861
	SPP2	0.892
	SPP3	0.873
	SPP4	0.817

All the factor loadings used to reflect all the constructs suggest that there is high convergent validity and that all indicators are useful in reflecting the underlying latent variable. In the case of Green Leadership (GL), the four indicators load strongly on the construct with the range of 0.791 to 0.872 indicating that behaviors to do with environmental commitment and environmentally friendly project practices are always represented by the items. The indicator loading of Stakeholder Engagement (SE) has an even higher loading of between 0.804 and 0.879, which shows that communication, involvement and collaboration with stakeholders are being adequately measured. Equally, the Digital Project Integration (DPI) indicators have a loading range of 0.791 to 0.874, which proves that digital instruments, technology integration, and data-driven project processes are adequately measured. Sustainable Project Performance (SPP) also demonstrates strong loadings with all items of more than 0.81, thus demonstrating that the items of environmental, social, and economic aspects of project sustainability are well-accommodated by the corresponding measurement items. All these findings emphasize the fact that all indicators are higher than the recommended value of 0.70, which confirms the usefulness and accuracy of the measurement model and the applicability of the constructs to structural path analysis.

Discriminant Validity (HTMT Ratio)

Table 4.3 Discriminant Validity

Constructs	GL	SE	DPI	SPP
GL	1	—	—	—
SE	0.692	1	—	—
DPI	0.643	0.674	1	—
SPP	0.711	0.698	0.667	1

As shown by the HTMT results, all of the constructs in the model have high discriminant validity which means that every construct is empirically different than the rest. The values of HTMT between Green Leadership (GL) and Stakeholder Engagement (SE) (0.692), Green Leadership (GL) and Digital Project Integration (DPI) (0.643) are much lower than the acceptable threshold of 0.85, which proves the dependence of environmental responsibility-driven leadership behavior on interactions with stakeholders and the application of digital integration in the project. Likewise, the difference in values of the HTMT of SE and DPI (0.674) also confirms the individuality of each construct, indicating that the processes of stakeholder involvement are not too close to the use of digital technologies in the project environment. The correlation between the independent variables and Sustainable Project Performance (SPP) reflected in the HTMT values of between 0.667 to 0.711 also do not exceed the acceptable thresholds implying that though the independent variables are related to each other, which is expected in a sustainability context, they have different quantifications of project performance. In general, the findings confirm the fact that the constructs have well-defined conceptual boundaries, which guarantee the integrity of the structural model.

Multicollinearity Assessment (VIF)

Table 4.4 Multicollinearity Assessment

Construct	VIF
GL	2.14
SE	2.28
DPI	2.06

VIF values of all constructs are within comfortable ranges enhancing the result that multicollinearity is not an issue with the structural model. The VIFs are 2.14 for Green Leadership (GL), just higher, at 2.28 with Stakeholder Engagement (SE), and finally, Digital Project Integration (DPI) with a VIF of 2.06; all very much below 5, which is the threshold and 3, the more conservative limit. These findings indicate that the independent variables would not have problematic overlap or redundancy when explaining Sustainable Project Performance. The constructs play their own significant role in the model without inflating standard errors or biases regression estimates. Based on this, the interpretation of the structural relationships can be made confidently since the predictors offer different explanatory power and do not hinder the reliability or stability of the SEM analysis.

Model Fit Indices

Table 4.5 Model Fit Indices

Fit Index	Value	Threshold	Interpretation
SRMR	0.047	<0.08	Good Fit
NFI	0.928	>0.90	Good
RMS Theta	0.091	<0.12	Acceptable

The measures of fit to the model reveal that the measurement and structural model have a satisfactory overall fit. The SRMR of 0.047 is considerably lower in the recommended value of 0.08 indicating that the hypothesized model fits well with the observed data. On the same note, the value of 0.928 is even greater than the 0.90 requirement, which indicates that the proposed model fits much better than a null or a baseline model. The RMS Theta value of 0.091 falls short of the threshold of 0.12 which implies that there are no significant levels of correlation residuals among the indicators and thus that there are no incidences of significant misspecifications in the model.

R^2 and Q^2 Values

Table 4.6 R^2 and Q^2 Values

Endogenous Variable	R^2	Interpretation	Q^2	Interpretation
SPP	0.621	Substantial	0.398	Predictive Relevance

Sustainable Project Performance (SPP) is the endogenous variable and has a good explanatory and predictive capacity in the model. A value of 0.621 shows that the cumulative impact of Green Leadership, Stakeholder Engagement, and Digital Project Integration accounts

62.1% of the total variance in SPP, which is a very high degree of variance as per the generally-accepted thresholds. Also, the number of 0.398 exceeds zero thus affirming that the model has a good predictive relevance and is able to predict SPP with a high level of accuracy in new or unmonitored data. Collectively, these findings indicate that the independent variables that were proposed have a significant role to play in sustainable projects and that the model is both explanatory and pragmatic in explaining determinants of project sustainability in project-based organizations.

Structural Model Results (Path Coefficients)

Hypothesis	Path	β	t-value	p-value	f^2	Decision
H1	GL → SPP	0.312	5.842	<0.001	0.102	Supported
H2	SE → SPP	0.284	5.113	<0.001	0.087	Supported
H3	DPI → SPP	0.341	6.224	<0.001	0.118	Supported

The findings of the structural model show that all proposed relationships are statistically testable and have a positive correlation with Sustainable Project Performance (SPP). The impact of Green Leadership (GL) on the SPP ($t = 5.842$, $p < 0.001$) is positive and significant with a medium effect size ($f 2 = 0.102$) implying that the environmentally conscious leadership practice has a significant impact on the project sustainability outcomes. On the same note, Stakeholder Engagement (SE) also has a positive impact on SPP ($t = 5.113$, $p < 0.001$, $f 2 = 0.087$), which implies that active collaboration and participatory communication with stakeholders play an important role in ensuring the realization of sustainable project goals. The most effective effect is shown by Digital Project Integration (DPI) ($t = 6.224$, $p = 0.001$, $f 2 = 0.118$), indicating that the successful usage of digital tools and technologies has a great influence on the project efficiency, efficiency of resources, and performance of sustainability. All of these results prove that each of the three independent variables is crucial to increasing sustainable project performance, and they help to prove the idea underpinning the conceptual framework and corroborate the hypotheses formulated.

Discussion

The outcome of this research offers a lot of information regarding the factors that determine the sustainability of project performances in the project-based organizations in Lahore, Pakistan. The findings show that Green Leadership (GL) has a major impact on sustainable performance of a project and that leaders whose decision-making is more focused on the environment, sustainability-oriented practices, and ethical project management influence the project outcomes.

This conclusion is consistent with the leadership theories of the modern world that propose that transformational and green-oriented leadership practices do not only motivate teams but also incorporate the sustainability concepts in the project plan and implementation. Green leaders can inspire their teams to become more sustainable and resource efficient by promoting a culture of environmental responsibility and concern, and making sure that project objectives are aligned with the larger environmental agenda. This shows that leadership plays a critical role not only in the guiding processes of the project but also in determining the organizational values that put more emphasis on long term ecological and social benefits other than the economic benefits.

In the same manner, Stakeholder Engagement (SE) was found to be a strong indicator of sustainable project performance, which indicates the importance of inclusive cooperation, participative communication and direct stakeholder engagement in meeting the sustainability goals. Good interaction can make the expectations, concerns, and views of the internal and external stakeholders' part of the project planning and decision-making to reduce risks, increase transparency, and resource allocation. The beneficial influence of the stakeholder engagement indicates that the projects that prioritize the collaborative approach, feedback systems, and trust-building activities have a higher chance of attaining the sustainable results in the holistic manner. This is in tandem with the stakeholder theory, where it is important to consider the needs and interests of various stakeholders in ensuring that organizations gain legitimacy, project success in the long term, and creation of value to the society. The results suggest that the establishment of positive relations and the promotion of open communication relationships are not only procedural requirements but also strategic forces of sustainable performance.

Another key point that the study describes is the relevance of the Digital Project Integration (DPI) to the achievement of sustainable project performance. The high positive correlation between DPI and this means the digital tools, technological platform, and integrated project management system is more likely to plan, monitor and implement the sustainability initiatives better. Digital integration enhances efficiency of the processes, empowers the use of real-time data to make decisions, and facilitates the use of resources, which are essential in creating environmentally, socially, and economically sustainable results. The findings are in line with the emerging evidence on the importance of digital transformation and smart project management technologies in sustainability. Practically, organizations, which use digital platforms to track projects, collaborate and report, are in a more advantageous position to ensure that they achieve their sustainability goal and remain efficient and operational without wastage.

In sum, the R 2 value 0.621 used to describe sustainable project performance suggests that the integrated effect of green leadership, stakeholder engagement and digital project integration explains a high percentage change in project sustainability results. The predictive relevance (Q 2 = 0.398) further establishes that the model can yield useful forecasts in sustainable project performance implying that it can have practical uses by project managers and leaders in organizations. The f 2 values show that although each of the three determinants has a significant impact, digital project integration has the greatest influence then closely followed by green leadership and stakeholder engagement. This hierarchy indicates the growing significance of

technology enabled project management in delivering sustainability coupled with human centered leadership and collaboration practice.

To sum up, the research proves that leadership orientation, stakeholder management, and digital integration play an essential role in sustainable project performance. Green leadership promotes an environmentally conscious and ethical project implementation, stakeholder engagement supports decision-making and trust-building via collaborative decision-making, and integration of the project digitally increases efficiency and data-driven sustainability monitoring. These results confirm the conceptual framework and support the concept that sustainability in project-based organizations is a multidimensional concept that involves the combination of human, relational, and technological aspects.

It is possible to deduce a number of recommendations based on the results to practitioners and policymakers. To begin with, the organizations are supposed to invest in equipping the skills of the green leadership with specific training, mentorship schemes, and performance measurement scales, which focus on sustainability. Managers should be trained to lead teams, make sound decisions with respect to the environment, and instill a culture of sustainability. Second, project managers ought to be proactive in the application of stakeholder engagement strategies such as formal communication plans, participatory workshops, and feedback loop to ensure that all the involved stakeholders are notified and involved during the project lifecycle. Third, companies are to implement and incorporate innovative digital project management maturity and systems, which allow monitoring, optimization of resources, and sustainability performance reporting. The only way to utilize these tools is by encouraging digital literacy and the culture of technology adoption.

The theoretical and practical implications of the study are remarkable. In theory, the investigation further expands the knowledge base on the sustainable project performance by empirically integrating the aspects of green leadership, stakeholder engagement, and digital project integration to present an all-encompassing analytical framework that incorporates human, relational, and technological determinants. In practice, the results given can be used practically to guide project-based organizations in order to achieve better sustainability results, as it is suggested that sustainable project performance can be ensured not only through leadership and stakeholder strategies but also through technological enablers. These insights can be used by policymakers and organizational decision-makers to develop policies, training programs, investment strategies that are able to sustain sustainable project practices hence encouraging long term environmental, social and economic gains. All in all, this research points to collaborative leadership, collaboration and technology as interdependent in achieving sustainable project success thereby providing a roadmap to the inquiry aspect on projects as well as the practice aspect on a managerial level in achieving sustainable development in the organizational setting of projects.

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