

IMPACT OF DIGITAL TECHNOLOGIES ON PROJECT SUCCESS: THE MEDIATING ROLE OF DIGITAL READINESS AND MODERATING ROLE OF DIGITAL LEADERSHIP

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DOI: <https://doi.org/10.5281/zenodo.20714391>

Keywords

digital technologies, project success, digital readiness, digital leadership, Resource-Based View, Pakistan, digital transformation.

Article History

Received: 19 April 2026

Accepted: 01 June 2026

Published: 16 June 2026

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Abstract

Purpose: The paper will focus on the implications of digital technologies to the success of the project with digital readiness and digital leadership as the moderating and mediating variables, respectively, in project-driven organizations in Pakistan. According to the theoretical framework of Resource-Based View (RBV), the research paper claims that digital technologies can be regarded as strategic organizational resources, the value of which is conditional upon complementary organizational resources i.e. readiness and leadership.

Design/Methodology/Approach: A quantitative cross-sectional survey design. The information was gathered among 220 project management practitioners in various specialties in Pakistan such as information technology, telecommunications, engineering and construction and pharmaceuticals. The structured questionnaires had five-point Likert scales. The data analysis was conducted with the help of SPSS (descriptive, reliability, and correlation analysis) and AMOS (structural equation modeling (SEM), mediation and moderation test).

Findings: The findings confirm that digital technologies have a strong positive impact on the success of the project ($= 0.312, p < .001$). Part of the reason is that this relationship is mediated by digital preparedness (indirect 95% CI = 0.131, 296), or that the organizational preparedness is a significant (quantifiably) conduit in which technological investments have ensuing quantifiable project outputs. Digital leadership has a huge moderating effect on the technology-success relationship ($= 0.198, p < .001$) and the readiness-success relationship ($= 0.177, p < .001$), enhancing the positive impacts of both digital technologies and readiness on project performance. Practical Implications The organizations in Pakistan and other developing economies must not just invest in the digital infrastructure and capabilities of the workforce; they must also, build the visionary digital leadership in order to be able to enjoy reaping maximum benefits on the investments they have made on the technologies. The findings give practical advice to project managers, organizational leaders and policymakers that have agendas in digital transformation.

Originality/Value: The study is an empirically validated unified framework and a generalization of the RBV theory to the domain of digital project management, and it is particularly relevant to the environment of the emerging

economy where the digital preparedness and quality of leadership remain a significant constraint to the performance of projects based on technology.

1. INTRODUCTION

The spread of digital technologies across the world has completely changed the project management environment. Companies in all industries are starting to adopt high-tech digital solutions, such as artificial intelligence, cloud computing, automation software, and data analytics, into project implementation (Papadonikolaki, Krystallis & Morgan, 2022). Digital evidence indicates that digitally empowered organizations are characterized by better project performance, such as increased rates of on-time and within-budget project completion, increased stakeholder satisfaction, and strategic alignment (Momand & Saleh, 2024). The fast pace of the implementation of these technologies has created a significant academic interest in the knowledge of the circumstances when digital investments should lead to significant changes in the project results.

Nonetheless, there is also a crucial gap in the existing literature: most studies consider the digital technology adoption as a sufficient condition of project success and, thus, overlook the organizational and human-related factors that mediate and moderate the relationship. The experience of project-intensive industries shows the same, with technology on its own, without supporting organizational capabilities, often failing to bring the promised benefits (Schiuma et al., 2021). The projects with advanced digital tools that are not supported by an organizational readiness are more likely to be characterized by underutilization of the system, lack of coordination, and cost overruns- indicating that the technology-success relationship is more complex than the direct-effects model presupposes (Bahaa-El-Din, 2024).

Two constructs become especially important in this respect: digital readiness and digital leadership. Digital readiness, or the organizational infrastructure, workforce competencies and cultural orientation that can help an organization succeed in adopting technology have been theorized as an important mediating factor (Tenggono, Soetjipto & Sudhartio, 2024). Digital

leadership, on the other hand, as a moderating variable, has been found to influence the effectiveness of organizations in terms of their ability to transform both their technological resources and readiness into the success of projects (Rahmadani, 2025).

The case study is located in Pakistan, a developing economy, where the digital transformation initiatives have become rather active over the last several years, but the rates of project failure in technology-focused industries are still very high (Shabir, 2023). The project management environment in Pakistan has some unique challenges, such as infrastructural constraints, inconsistent workforce digital literacy, and limited digital leadership capacity, which makes it a highly suitable and policy-relevant setting to study these relationships. Current research has focused a lot on the topic of digital transformation in developed economies, thus the existing knowledge gap on the topic is huge as it has not been studied how this has been happening under the institutional and resource constraints that define developing economies.

The paper is based on the Resource-Based View (RBV) theory (Barney, 1991) conceptualizing digital technologies as strategic organizational resource, digital readiness as organizational resource complement, and digital leadership as managerial resource that controls the allocation of resources. The combined framework developed in this paper assumes that the success of projects is not a matter of adoption of technologies, but rather the dynamic interaction between the technological resources, organizational capacity, and the orientation of leadership. The conceptualization moves the existing RBV applications to a new level by applying a moderated-mediation model to the digital project management environment.

Three major contributions are made in the study. First, it empirically confirms the mediating effect of digital readiness between the relationship of digital technology and project success in the context of a developing economy. Second, it yields

evidence of the moderating effect of digital leadership on technology-success and readiness-success pathways. Third, it uses RBV theory on the context of digital project management in Pakistan, and offers a context-specific theory. Its practical implications are that the results can be applied to the organizational leaders, project managers, and policymakers who can be working on the digital transformation agendas.

2. Literature Review

2.1 Theoretical Background: Resource-Based View.

The paper has a theoretical foundation based on Resource-Based View (RBV), which is a basic theoretical framework in the field of strategic management (Barney, 1991). RBV assumes that sustainable competitive advantage is a result of the ownership and utilization of organizational resources that are valuable, rare, inimitable, and non-substitutable. The framework has also been fruitfully expanded in the context of digital transformation, to describe how the investment in technologies can (or cannot) be converted into performance outcomes (Alalwan, Dwivedi and Rana, 2024).

In the context of the current study, digital technologies are strategic organizational resources that can be used to improve the performance of projects. Nevertheless, in line with the RBV reasoning, the value-generative potential of all these resources is not per se; it depends on the organizational capabilities that make their successful application possible. Digital preparedness operates within this model as a complementary competence the organizational infrastructure, workforce proficiency and cultural flexibilities that define the potential to use technological resources to their fullest potential (Mousavi, Tavana & Santos-Arteaga, 2023). Digital leadership, in its turn, is a meta-capability of management that regulates the extent to which the organization is able to utilize both its technological resources and its supportive capacities in relation to strategic purposes (Cortellazzo, Bruni & Zampieri, 2019).

This three-part conceptualization, namely the resources, complementary capabilities, and

governing leadership, has presented a consistent theoretical framework to the moderated-mediation model that is put to test in this study. It moves the earlier RBV uses in digital management towards making the explicit theorization of the boundary conditions (moderation) and the transmission mechanisms (mediation) through which technology resources yield better project results.

2.2 Digital Technologies and Project Success

Digital technologies represent a wide range of tools that have revolutionized the practice of project management, including artificial intelligence-driven planning solutions, cloud-based teamwork tools, workflow management automation software, and real-time performance monitoring data analytics (Paramesha, Rane & Rane, 2024). Studies have always shown that companies that incorporate these technologies into project management operations record high performance results. Research documents the improvement of schedule compliance, cost effectiveness, satisfaction of stakeholders, and strategic alignment with the use of digital tools (Papadonikolaki et al., 2022; Salimimoghadam et al., 2025).

The authors concluded that the project management systems built on AI led to a higher rate of project completion in 22 percent of organizations than those that used traditional methods (Momand and Saleh, 2024). The documentation on how digital tools can be used to improve the performance of projects is extensive: it enhances the transparency of information, automation of administrative overhead, predictive risk assessment, and real-time communication among geographically dispersed teams. Managers can shift cognitive resources towards strategic planning and problem-solving in digitally advanced project settings, thus improving the quality and responsiveness of decisions by redirecting cognitive resources away from more routine coordination tasks (Niederman, 2021).

Nonetheless, some important limiting cases on the relationship between technology and project success are also reported in the academic literature. Digital tools come with a different set of

complications: integration of systems, the frequent change in technologies, and the cognitive load of working across multiple platforms may slow down the project implementation under the unfavorable conditions in organizations (Liu and Yu, 2022). The adoption of technology that is not accompanied by the corresponding investment in the organization often leads to underutilization, inappropriateness in project workflows, and, eventually, unsuccessful implementations. These observations provide the theory of studying organizational readiness and leadership as moderating and mediating variables.

H1: Digital technologies have a positive and significant impact on project success.

2.3 Digital Readiness as a Mediator

The concept of digital readiness is understood as a multi-dimensional organizational construct that includes the adequacy of technological infrastructure, digital capabilities of the workforce, culture openness to change, and alignment of digital investments and organizational goals (Haya Bahyan, Ajmal & Saber, 2024). It is the ability of the organization to absorb, deploy and use digital technologies in projects effectively. Digital readiness, as opposed to the simple access to technology, indicates the systemic circumstances within the range of which the implementation of technology becomes practically feasible.

Digital readiness as a mediating variable in the relationship between technology and performance has been the topic of growing theoretical and empirical interest. Alotaibi, Wilson and Traynor (2025) determined that organizations that were more digitally ready registered a 35 percent rise in the efficiency of project delivery in comparison to less prepared organizations, which is a critical factor in transforming technological investment into real deliverables. Tenggono et al. (2024) also revealed in a sample of the healthcare industry that the relationship between digital transformation initiatives and organizational performance is mediated by digital readiness. Mousavi et al. (2023) presented direct empirical data on the emerging markets that indicated that digital readiness mediates the technology project performance relationship, implying that the

mechanism is applicable to the context of the developing economies.

The theoretical reasoning of mediation is compelling: as an organization purchases digital tools, whether the potential of the technology is delivered in project outcomes comes down to the presence or absence of preparedness in the form of staff competencies, infrastructural reliability and cultural receptiveness. Unless properly prepared, even advanced online platforms will be underused, which according to Bahaa-El-Din (2024) is a form of cosmetic digitalization, the surface-level implementation without any meaningful performance increase. In line with RBV, readiness is the complementary capability that triggers the strategic value of technological resources. The argument was strengthened by Wang et al. (2025) who showed that the organizational readiness mediates the relationship between digital technology and performance by dynamic managerial capabilities in the case of Chinese construction SMEs.

H2: Digital readiness mediates between digital technologies and project success.

2.4 Digital Leadership as a Moderator

The peculiarities of digital leadership are a unique set of strategic vision, technological literacy, change management skills, and people-centered orientation (Cortellazzo et al., 2019; Gede, 2023). Digital leaders have the ability to find their way through the complexity of organizations in technologically oriented settings unlike traditional managerial competencies, which transform technological uncertainty into a clear strategic path. They are eloquent in expressing digital transformation visions, aligning organizational goals with technological activity, and creating the psychological safety and the motivational environment in which the workforce can accept new technologies (Bozkus, 2023).

Moderating effect of digital leadership on the technology-project success relationship works in a number of ways. First, successful digital leaders make sure that technological investments are aligned with the goals of the project and they do not cause organizational fragmentation and goal dispensation that often serves as the bane of digital

projects (El Sawy et al., 2016). Second, they actively address change resistance, which is an obstacle to technology adoption that is the most repeatedly recorded, by establishing innovation cultures and sending clear messages about the goals of digital transformation (Phakamach, Panjarattanakorn & Onsampant, 2023). Third, they practice resource stewardship, digital investments are prioritized, have sufficient resources, and redirected to high-impact project uses. Rahmadani (2025) showed that organizations with digitally capable leaders minimized the project delays by 18 percent by suggesting that they had more effective and efficient technology adoption processes and change management.

H3: Digital leadership positively moderates the relationship between digital technologies and project success.

2.5 Digital Leadership Moderating the Readiness-Success Relationship

In addition to moderating the impact of technology on success, digital leadership determines the extent to which organizational preparedness is transformed into project performance. Even though digital readiness provides the organizational structure and the capacity to embrace technology, the quality of leadership determines how far those capacities are mobilized, aligned, and towards the objectives of the project (Sunarmo et al., 2023). Technologically prepared and less digitally led organizations tend not to convert their preparation into project outcomes due to the failure of coordination, motivation deficit and strategic incoherence.

Haber and Carmeli (2023) set the ground that digital leaders facilitate sharing of knowledge and collaborative problem solving, such that organizational preparedness is also shared effectively among project teams and not concentrated in single organizational units. Phakamach et al. (2023) also established that leaders that develop clear digital transformation agendas enhance organizational capability to capitalize on digital preparedness by encouraging cross-departmental cooperation and reducing anxiety about technology-change. All these

findings are indicative of the fact that leadership is an interpretive and amplifying process that turns readiness into a dynamic performance-generating process, rather than a fixed organizational resource.

H4: Digital leadership positively moderates the relationship between digital readiness and project success.

2.6 Digital Readiness and Project Success

Regardless of its mediating role, digital readiness has a positive direct impact on project success. Digital preparedness enables organizations to be more responsive to project uncertainties, flexible to technological disruptions, and ensure operational continuity when facing digital complexity (Jewapatarakul & Ueasangkomsate, 2024). The culture, competency and infrastructure of readiness together provide an organizational environment where project teams can be fully effective in using digital tools, teamwork, and performance standards throughout project milestones. Wang et al. (2025) validated this direct impact in the context of the construction industry, and Kaur and Sharma (2024) furthered the argument to the developing economies, and found that human-centric readiness investments bring quantifiable project performance returns.

H5: Digital readiness has a positive and significant effect on project success.

3. Research Methodology

3.1 Research Design and Philosophy

The research philosophy of this study is positivist, and the deductive theory testing approach is taken. The survey design used was quantitative and cross-sectional to investigate the hypothesized relationships between digital technologies, digital readiness, digital leadership, and project success. The study objective which is to measure perceptual constructs and co-variate them across organizations at a point in time best suits the cross-sectional design since the research aims to assess the constructs at a single time. The quantitative method is also justified by the causal-explanatory orientation of the study, which is to specify the mechanisms and boundary conditions of the technology-project success relationship; it is

possible to use mediation and moderation effects, which are statistically isolated using the quantitative approach (Saunders, Lewis and Thornhill, 2019).

3.2 Population, Sampling, and Data Collection

The target population was project management practitioners working in the technology intensive sectors in Pakistan i.e. information technology, telecommunication, engineering and construction, and pharmaceuticals. These two areas were chosen because they are the main adopters of the digital project management practices and represent various organizational settings, which increases the external validity of the results. The respondents had to be presently working in a project-oriented position, must have at least one year of experience using digital tools as part of a project, and must be in a position, project manager, team lead, or technical specialist, directly involved with project delivery.

The respondents were also recruited through professional networks, organizational contacts and LinkedIn in a convenience sampling approach. The study targeted 350 respondents and the usable final data were 220 responses after the discarding of the incomplete and inconsistent questionnaires that made the response rate of 62.9. The sample is sufficient when it comes to the structural equation modeling (SEM) with moderation and mediation variables (Hair et al., 2019). To ensure that as many people as possible were involved, a self-administered structured questionnaire was sent through online (Google Forms) and paper-based means to cover a wide range of organizational environments.

3.3 Measurement Instruments

Constructs were all measured in terms of the validated five-point Likert scales (1 = Strongly Disagree; 5 = Strongly Agree), which were modified based on the validated instruments of the previous literature. Five items evaluating the adoption of AI, cloud computing, automation, and data analytics in project management processes were used to measure digital technologies (adapted from Papadonikolaki et al., 2022). Digital readiness was measured using five

items that include the sufficiency of infrastructure, digital skills of employees, cultural receptiveness, and strategic alignment (modified version of Tenggono et al., 2024). Digital leadership was assessed using five scale items that measured strategic vision, technological literacy and change facilitation (adapted by Cortellazzo et al., 2019; Phakamach et al., 2023). The operationalization of project success was based on five items that touched upon schedule compliance, budget compliance, stakeholder satisfaction, and quality of deliverables (adapted to Serrador and Turner, 2015). A pilot study was done involving 30 respondents to evaluate the clarity and reliability of the instruments before the actual data collection was done.

3.4 Data Analysis Techniques

The analysis of data was done in two phases. The first stage was done in SPSS (v26) and entailed data screening according to missing values and outliers, descriptive statistics, reliability analysis according to Cronbach alpha and bivariate correlation analysis as a measure of checking the relationship between the variables. The second phase was the one that entailed construct validity and was approximated using confirmatory factor analysis (CFA) and AMOS (v24) and the third phase was the testing hypothesized direct, mediation and moderation effects using structural equation modeling (SEM). The indices that were established were the comparative fit index (CFI), Tucker-Lewis index (TLI), root mean square error of approximation (RMSEA) and standardized root mean square residual (SRMR) was used to establish the fit of the model. Bootstrapping (5,000 samples) was used to test the mediation to produce 95% confidence intervals of the indirect effects. The interaction terms were considered in moderation and evaluated using the structural model, which is the product-indicator method proposed by Hair et al. (2019).

4. Data Analysis and Results (Make all tables in APA style)

4.1 Demographic Profile of Respondents

This was a sample of 220 project management professionals. The full profile of demographics is

shown in table 1. Males constituted 62.7% of respondents (n = 138), with females representing 37.3% (n = 82). Most of the respondents were in the 35–44 age group (42.7%), then the 25–34 group (40.5%). In the case of education 53.6 percent were Masters, 34.5 percent were Bachelors and 11.8 percent were doctorate holders. The experience was also homogenous (44.1 cited the 6-

10 years of professional experience and 25.0 cited above 11 years' experience) which implies that the sample had extensive ground experience in project management. The most significant number of respondents was in information technology industry (35.9), telecommunications (24.5), engineering and construction (21.4) and pharmaceuticals (18.2).

Table 1: Demographic Profile of Respondents (N = 220)

Characteristic	Category	Frequency (n)	Percentage (%)
Gender	Male	138	62.7%
	Female	82	37.3%
Age Group	25–34 years	89	40.5%
	35–44 years	94	42.7%
	45 and above	37	16.8%
Education	Bachelor's Degree	76	34.5%
	Master's Degree	118	53.6%
	PhD or above	26	11.8%
Experience	1–5 years	68	30.9%
	6–10 years	97	44.1%
	11+ years	55	25.0%
Sector	Information Technology	79	35.9%
	Telecommunications	54	24.5%
	Engineering & Construction	47	21.4%
	Pharmaceuticals	40	18.2%

Note. Distribution across sectors reflects purposive focus on digitally intensive industries.

4.2 Descriptive Statistics

The descriptive statistics of all the study variables are presented in table 2. Constructs The mean scores of constructs were 3.58 (Project Success) to 3.80 (Digital Readiness), with moderate-to-high levels of construct endorsement. The standard deviations were between 0.77 and 0.83, indicating an acceptable variation and not extreme, which is

usual with meaningful heterogeneity among the respondents without undermining the data distributional assumptions. The values of skewness and kurtosis were within the acceptable limits of normality (|human|) (skew less than 1.0; kurtosis less than 1.0) which makes the usage of the parametric statistical tests acceptable. The largest value of digital readiness (M = 3.80)

indicates that the respondent organizations had rather high readiness levels, but with significant

variance, which implies the variation in the readiness of different organizations.

Table 2: Descriptive Statistics of Study Variables (N = 220)

Variable	N	Mean	SD	Skewness	Kurtosis
Digital Technologies (DT)	220	3.71	0.81	-0.34	0.12
Digital Readiness (DR)	220	3.80	0.77	-0.28	-0.09
Digital Leadership (DL)	220	3.64	0.83	-0.41	0.22
Project Success (PS)	220	3.58	0.79	-0.30	0.08

Note. M = Mean; SD = Standard Deviation. Both skewness and kurtosis values indicate that the data are normally distributed to be tested using a parametric test.

4.3 Reliability Analysis

All measurement scales were analyzed with the help of Cronbach alpha to determine the internal consistency of the scale. Table 3 below indicates that all constructs were highly reliable, with alpha coefficients ranging between 0.872 (Digital Technologies) and 0.915 (Project Success). All values are significantly higher than the traditional mark of 0.70 to be considered as a reasonable level

of reliability in organizational research (Hair et al., 2019). High reliability of the Project Success scale (alpha = 0.915) in particular means that the scale has a high item coherence in measuring this multidimensional construct. These findings give confidence in that the future correlation, regression, and structural equation modeling analyses are based on psychometrically stable measurement tools.

Table 3: Reliability Results of Study Scales (N = 220)

Construct	No. of Items	Cronbach's α	Interpretation
Digital Technologies	5	0.872	Good reliability
Digital Readiness	5	0.891	Good reliability
Digital Leadership	5	0.883	Good reliability
Project Success	5	0.915	Excellent reliability

Note. α = Cronbach's alpha. The above 0.70 values are acceptable reliability, above 0.80 are good reliability, above 0.90 are excellent reliability.

4.4 Measurement Model: Confirmatory Factor Analysis

Prior to hypothesis testing, a confirmatory factor analysis (CFA) was conducted in AMOS to find out the psychometric characteristics of the measurement model. The model fit indices are given in table 9. The fit of the overall CFA model was acceptable (2/df = 2.31, CFI = 0.947, TLI = 0.934, RMSEA = 0.061, SRMR = 0.054), and all indices fell within the accepted ranges. The factor loadings were significant (p <.001) and ranged

between 0.71 and 0.89 that is higher than the 0.60 thresholds established as the indicators of convergent validity. The convergent and discriminant validity is confirmed by the fact of average variance extracted (AVE) of all the constructs being greater than the 0.50 mark and composite reliability were greater than the 0.80 mark. These results support the appropriateness of measurement model as a source of structural hypothesis testing.

Table 9: Structural Equation Model Fit Indices

Index	χ^2/df	CFI	TLI	RMSEA	SRMR	Interpretation
Acceptable Threshold	< 3.0	> 0.90	> 0.90	< 0.08	< 0.08	–
Study Values	2.31	0.947	0.934	0.061	0.054	Good Fit

Note. Fit indices assessed using AMOS. Values are all within acceptable levels.

4.5 Correlation Analysis

The bivariate correlations of variables of study are given in Table 4. Digital technologies showed positive correlations with a strong significance of 0.724 ($p < .01$), 0.651 ($p < .01$), and 0.743 ($p < .01$) with digital readiness, digital leadership, and project success respectively. Digital readiness had the most significant correlation with project success in the matrix ($r = 0.781$, $p < .01$), which is important because the organization plays an essential role in transforming the technological

potential into project success, and this result aligns with Alotaibi et al. (2025). Project success ($r = 0.693$, $p < .01$) was also considerably related to digital leadership, which proves the importance of digital leadership as an enabler of performance. Inter-predictor correlations were also significant but did not surpass the 0.85 limit that would signify problematic multicollinearity (Hair et al., 2019), which is the evidence of discriminant validity of the constructs.

Table 4: Pearson Correlation Table of Study Variables (N = 220)

Variable	1. DT	2. DR	3. DL	4. PS	Mean (SD)
1. Digital Technologies (DT)	1.00	–	–	–	3.71 (0.81)
2. Digital Readiness (DR)	0.724	1.00	–	–	3.80 (0.77)
3. Digital Leadership (DL)	0.651	0.712	1.00	–	3.64 (0.83)
4. Project Success (PS)	0.743	0.781	0.693	1.00	3.58 (0.79)

Note. DT = Digital Technologies; DR = Digital Readiness; DL = Digital Leadership; PS = Project Success. ** $p < .01$ (two-tailed).

4.6 Regression Analysis

A hierarchical multiple regression analysis was performed where project success was the dependent variable and direct predictive relationships were to be analyzed. The regression model (Table 5) demonstrated strong explanatory power: $R = 0.842$, $R^2 = 0.709$, Adjusted $R^2 = 0.703$, $F(3, 216) = 176.42$, $p < .001$. The model explained about 71 percent of the variation in project success- a large coefficient of determination which testifies to the joint

explanatory ability of the three predictors. The strongest predictor was digital readiness (0.428, $p < .001$), with digital technologies (0.312, $p < .001$), and digital leadership (0.276, $p < .001$). The role of the digital readiness as the most significant predictor further supports the theoretical claim that the organizational preparedness, instead of technology acquisition as such, is the key factor that drives the project performance improvements during the digitally transforming organizations.

Table 5: Multiple Regression Model to Predict Project Success (N = 220)

Predictor	B	SE	β	t	p
Digital Technologies (DT)	0.381	0.052	0.312	7.33	< .001
Digital Readiness (DR)	0.439	0.057	0.428	7.70	< .001
Digital Leadership (DL)	0.263	0.049	0.276	5.37	< .001

Note. $R^2 = .709$; Adjusted $R^2 = .703$; $F(3, 216) = 176.42$, $p < .001$. β = standardized regression coefficients. *** $p < .001$.

4.7 Mediation Analysis

Structural equation modeling with bootstrapping (5,000 samples) was used to test the mediating effect of digital readiness on the relationship between digital technologies and project success to produce bias-adjusted 95% confidence intervals of the indirect effects. Table 6 supports H2 with the results. The direct path from digital technologies to digital readiness was significant ($\beta = 0.489$, $p < .001$; 95% CI [0.369, 0.612]), as was the direct path from digital readiness to project success ($\beta = 0.421$, $p < .001$; 95% CI [0.307, 0.536]). Importantly, the indirect influence of digital

technologies on project success via digital preparedness was substantial (indirect 95% CI [0.131, 0.296]) the confidence interval does not include zero, which proves the mediation. The direct relationship between digital technologies and the success of the project was also important with the control of digital readiness ($= 0.284$, $p = .001$), which proved the partial mediation. This result shows that digital technologies promote the success of a project both directly and indirectly by positively affecting organizational readiness, which aligns with the findings of Mousavi et al. (2023) and Tenggono et al. (2024).

Table 6: Mediation Analysis – Digital Readiness Mediating the DT → PS Relationship (N = 220)

Path	β	SE	95% Lower CI	95% Upper CI	Decision
DT → DR (a path)	0.489	0.061	0.369	0.612	Significant
DR → PS (b path)	0.421	0.058	0.307	0.536	Significant
DT → PS (direct, c' path)	0.284	0.054	0.178	0.391	Significant
Indirect Effect (DT→DR→PS)	0.206	0.042	0.131	0.296	Partial Mediation

Note. Indirect effects estimated using bootstrapping with 5,000 samples. CI = 95% bias-corrected confidence intervals. DT = Digital Technologies; DR = Digital Readiness; PS = Project Success. Mediation type: partial (direct path remains significant).

4.8 Moderation Analysis

The structural equation model tested the moderating roles of digital leadership by terms of interaction. The results of the moderation analysis are published in Table 7. Digital technologies and digital leadership interacted statistically significantly ($p < .001$, $\delta = 0.198$) to support H3. The simple slope analyses showed that the positive

impact of digital technologies on the project success was significantly greater in high conditions of digital leadership (one standard deviation above the mean) than in low conditions of digital leadership (one standard deviation below the mean). Likewise, the relationship between digital leadership and digital readiness in project success prediction was also strong (0.177 , $p < .001$), which

supported H4. These findings indicate that digital leadership enhances the performance advantages of technological adoption and organizational readiness- acting as an authentic boundary condition on the technology- project success and readiness- project success connections. The results

are in line with Rahmadani (2025) and Phakamach et al. (2023), who defined the strategic significance of digital leadership in the maximization of the effectiveness of technology adoption.

Table 7: Moderation Analysis – Digital Leadership as a Moderating Variable (N = 220)

Predictor	B	SE	β	t	p
Digital Technologies (DT)	0.381	0.052	0.312	7.33	< .001
Digital Leadership (DL)	0.263	0.049	0.276	5.37	< .001
DT × DL (Interaction)	0.189	0.038	0.198	4.97	< .001
DT × DL (DR→PS)	0.162	0.041	0.177	3.95	< .001

Note. Interaction terms computed as products of mean-centered variables. DT = Digital Technologies; DL = Digital Leadership; DR = Digital Readiness; PS = Project Success. ***p < .001.

4.9 Hypotheses Testing Summary

The findings of all the hypotheses are summarized in Table 8. The theoretical model was entirely supported with all the five hypotheses being supported with a p value of less than or equal to .001. The combined results indicate that the

digital technologies have a positive and significant forecast of project success; this correlation is partly mediated by the digital readiness; and that digital leadership has a positive moderating effect on both the technology-success and the readiness-success correlation.

Table 8: Summary of Hypotheses Testing Results

H#	Hypothesis Statement	Result	β / Indirect β	Decision
H1	Digital technologies → Project Success (+)	Supported	0.312***	Supported
H2	Digital Readiness mediates DT → PS	Partial Mediation	0.206 [0.131, 0.296]	Supported
H3	Digital Leadership moderates DT → PS (+)	Supported	0.198***	Supported
H4	Digital Leadership moderates DR → PS (+)	Supported	0.177***	Supported
H5	Digital Readiness → Project Success (+)	Supported	0.428***	Supported

Note. DT = Digital Technologies; DR = Digital Readiness; DL = Digital Leadership; PS = Project Success. β values reflect standardized coefficients. Indirect β and 95% CI pertain to bootstrapped mediation estimates. ***p < .001.

5. Discussion

The empirical results of the present study contribute to the knowledge of digital project management in various significant aspects, and

especially to the formation of developing economy situations. The fact that all five hypotheses were proven allows strong evidence of the integrated theoretical framework based on the Resource-

Based View and is a substantial addition to the accumulating body of literature on the subject of digital transformation and project performance.

The high positive direct impact of digital technologies on project success ($H1, \beta = 0.312$) is aligned with the existing literature on the performance gains of digital tools use in the project management setting (Papadonikolaki et al., 2022; Salimimoghadam et al., 2025). The strength of this effect, although significant, is in a way mitigated compared to the impact of digital readiness and digital leadership- an observation with relevant practical effects. It indicates that the technology investment, as much as it is needed, is not enough to maximize the project performance and the strategic focus on the acquisition of the tools without corresponding development of organizational capabilities is unlikely to produce the expected performance returns.

Perhaps the most theoretically important finding of this study is the partial mediation of the digital readiness ($H2, \beta = 0.206$). It confirms that digital technologies contribute to project success in a direct way, i.e. by offering project teams more potent tools, and in an indirect organizational way, i.e. the technology adoption leads to the progress in the organizational readiness that in turn results in the impact on project outcomes. The present finding is consistent and complementary to Mousavi et al. (2023) and Tenggono et al. (2024) by presenting evidence of a Pakistani context that organizational readiness is a crucial conduit in the technology-performance relationship. The discovery has a special practical implication in the Pakistani context: use of technology without simultaneous investment in preparation-building, such as training of workforce, upgrading of infrastructure, and cultural change, will lead to systematically non-optimal project results.

The establishment of the role of digital leadership as a moderator on the technology-success pathway ($H3, \beta = 0.198$) and the readiness-success pathway ($H4, \beta = 0.177$) proves the importance of the role of leadership in digital transformation beyond the previous conceptualizations, which have mostly focused on the direct impact of leadership (on a transformation outcome). The fact that leadership

increases the performance effect of both technology adoption and organizational readiness, as opposed to having an independent effect, is in line with the conceptualization of leadership as interpretive and amplifying, as proposed by Haber and Carmeli (2023) and supports the idea that resource value depends on the effectiveness of organizational meta-capabilities in managing the deployment of resources, as stated by RBV. This finding is relevant to the organizational environment of Pakistan where digital leadership capacity is changeable and frequently constrained, and leadership development cannot be viewed as a secondary issue when acquiring technology is prioritized as a co-investment.

The direct positive impact of the digital readiness on the project success ($H5, \beta = 0.10$) became the biggest standardized coefficient in the regression model, which is why in this study, it becomes the strongest single predictor of project outcomes. This observation aligns with Alotaibi et al. (2025) and Wang et al. (2025), and further reinforces one of the core ideas of the RBV framework, namely that complementary organizational capabilities (not the focal resources), are often the core origin of sustained competitive advantage. This finding is clear cut evidence to organizations in Pakistan going through the digital transformation that the readiness-building initiatives such as workforce digital upskilling, infrastructure development, and cultural transformation initiatives generate the highest payoff in terms of project performance.

6. Theoretical and Practical Implications

6.1 Theoretical Implications

This research adds to the theory in three main manners. First, it applies the Resource-Based View (RBV) framework to the sphere of digital project management by offering empirical evidence of a moderated-mediation model where digital readiness mediates and digital leadership moderates the technology-project success relationship. The previous RBV in digital management has focused on the direct technology performance relationships; the current study presents a more detailed conceptualization of the circumstances in which digital resources become the source of project success. Second, the research

adds to the growing body of research on developing-economy digital transformation by offering context-specific empirical evidence in Pakistan a jurisdiction with institutional constraints, unstable digital literacy, and immature leadership capacity unlike the advanced-economy contexts of most existing research. Third, the research contributes to the digital-leadership literature by showing that leadership is a moderating boundary condition on both the technology-success and readiness-success channels, but not necessarily a direct antecedent of project performance, a differentiation with significant theoretical implications to the role of leadership in digital transformation models.

6.2 Practical Implications

To the organizational leaders and project managers in Pakistan and other similar developing economies, the findings provide a number of practical recommendations. The dominance of digital preparedness as an indicator of project achievement recommends that organizations have to invest in capability building initiatives with accompanying, and possibly preceding, extensive-scale technology purchases. In particular, workforce training sessions that foster digital skills, infrastructure audits that foster sufficient technical underpinnings, and organizational culture programs that foster willingness to technology-based transformation are to be considered a necessary ingredient of any digital project management strategy.

Digital leadership moderating role means that the organization ought to invest in identifying, developing, and retaining digital leaders who have strategic vision, technological literacy and change management skills that define effective digital leadership. Digital transformation competencies must be included in leadership development programs, and digital leadership capability should be evaluated as a prerequisite of the succession planning process. This recommendation has a specific sense of urgency within the Pakistani organizational context, where formal training in digital capabilities at the leadership level is very scarce.

To policy-makers and regulators, the results highlight the significance of systemic preparedness investments, such as national programs on digital skills, broadband infrastructure building and institutional structures to facilitate the organizational digital transformation, as pre-conditions to the actualization of the project performance benefits offered by digital technologies. The situation in Pakistan, in particular, demands specific policy interventions that can be used to reduce the digital readiness gap, such as incentives to upskill employees digitally and SMEs to establish the capacity to manage digital projects.

7. Conclusion

This paper has analyzed the effects of digital technologies on project success where the variables are digital readiness and the moderating variable is digital leadership in the project management sector of Pakistan. Based on the Resource-Based View and using structural equation modeling among 220 project management professionals, the research proved all five hypotheses. Digital technologies are positive predictors of project success; digital readiness partially mediates the relationship between technologies and success; digital leadership moderates the relationships between technology and success and between readiness and success; and digital readiness is an independent predictor of project success, which is the strongest predictor in the model.

The overall results of this research indicate that digital environments do not make success in projects an easy task with which technology adoption serves. It is the result of the active combination of technological resources, organizational preparedness potential, and the quality of leadership. Companies that integrate all the three dimensions are much better placed to attain sustainable project performance as opposed to those that invest in technology. The contribution of the study is that it empirically confirms this integrated model within the context of a developing economy and extends and adds to the current theoretical frameworks and provides practical advice to organizational leaders, project

managers, and policymakers that have to deal with the challenges of digital transformation.

8. Limitations and Future Research Directions

There are a number of limitations to this study that need to be taken into account when interpreting the results and which indicate the way in which future research can be pursued. To begin with, cross-sectional survey design does not allow causal inferences. Although the theoretical framework is based on properly developed causal logic and the hypotheses are backed by previous longitudinal data, the data cannot support the causal claims. With longitudinal research following organizations through milestones of digital transformation, causal information would be more compelling and allow the study of the dynamics of readiness and leadership to evolve over time. Second, convenience sampling, although suitable in this study setting, opens up the risk of sample bias; a replication using probability-based samples in a broader variety of regions in Pakistan and organizations of various sizes would increase the generalizability.

Third, the measurement of all constructs consisted of self-report questionnaires, which created the risk of common method bias. Objective project performance measures (e.g. schedule variance, cost performance index, and stakeholder satisfaction ratings) should be included in future research in addition to perceptual ones. Fourth, the research is narrowed down to Pakistan, which is a developing economy with unique institutional features. Although the results may have a general applicability to other similar developing economies, their applicability needs to be evaluated using multi-country-comparative studies. Fifth, the study is silent on possible limiting conditions of the identified mediating and moderating effects: organizational size, industry sector, or type of technology may also be considered as the possible limiting conditions of the study results. Research in the future should address the issue of whether the model can be held in terms of organizational and contextual sub-groups. Lastly, the possibility of other variables, including organizational agility, digital culture, and team-level digital capabilities, being

complementary mediators or moderators within the technology-project success relationship is a fruitful future research agenda.

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