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Digital Transformation of HRM, Organizational Agility and Operational Efficiency in Education Sector of Pakistan

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ABSTRACT

This study aims to investigate the effect of Digital Transformation of Human Resource Management on enhancing organizational agility and improving operational efficiency in education sector of Pakistan. Adopting quantitative research approach, primary data were collected through structured questionnaires from conveniently selected sample of teachers, HR professionals, and administrative staff working in secondary schools. School with no, partial and fully digitalized HR Systems were selected from private, public and non-governmental organizations (NGOs) sectors. The data were analyzed statistically to test the hypothesized relationships and draw conclusions. The results revealed that digital transformation in HRM significantly enhances organizational agility which in turn improves operational efficiency acting as mediator. Furthermore Organizational readiness was found to moderate the relationship between organizational agility and operational efficiency. The study highlights practical pathways for organizations to optimize performance through digitalization and provides valuable insights for HR policymakers and leaders seeking to foster more agile and efficient organizational environments.

Introduction

(Panjaitan, 2023/04/11)(UNESCO)., 2021)The transformative role of digital technologies is reshaping organizational structures, professional practices, and competitive dynamics across industries. Emerging technologies such as Artificial Intelligence (AI), big data analytics, cloud computing, automation, and block chain have enabled organizations to streamline processes, enhance decision-making, and improve service delivery. In today's interconnected global environment, agility, speed, and technological integration are essential for sustainability and long-term success. The integration of digital technologies such as Human Resource Information Systems (HRIS), Applicant Tracking Systems (ATS), Performance Management Systems (PMS), and HR analytics has shifted HRM

toward a more strategic, data-driven function , The post-COVID-19 environment has further accelerated the demand for digital HR solutions to support remote collaboration, flexible work models, and real-time workforce management .

The education sector, traditionally considered conservative in adopting innovation, is increasingly embracing digital transformation to modernize administrative systems, enhance service quality, and improve institutional outcomes. Within this transformation, Human Resource Management (HRM) has evolved from a purely administrative function into a strategic driver of responsiveness and operational effectiveness. In the context of Pakistan's education sector, digital HRM has become critical for improving accountability, talent retention, remote work integration, and performance management .

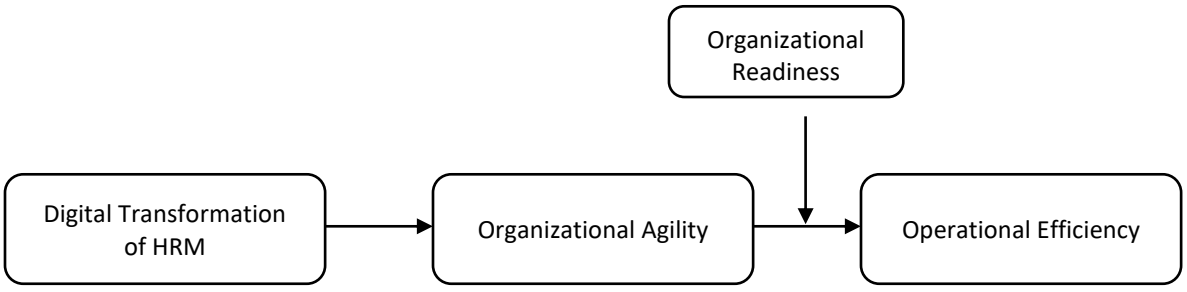
Traditionally, HRM in educational institutions focused on administrative tasks such as payroll, recruitment, record-keeping, and compliance, often relying on manual or fragmented systems prone to inefficiency and human error. Many schools use paper-based employee records as well as traditional teacher's attendance books and teacher's own judgement to access students' attendance, which may result in administrative overload, inaccuracies, and decision making becomes low (15. 2025) . Moreover, poor workforce planning, low level of professional development, and lack of HR analytics can make it more challenging to pinpoint teacher's need, track performance and to get the best out of human resources. The issues could be more severe in resource limited school due to lack of adequate technological facilities, digital skills, and financial resources for implementing modern HR practices. As a result, when HRM is followed, it may be a challenge for organizations to be agile, to operate efficiently, and to effectively meet evolving educational needs within the school. Thus, embracing digital HRM practices can contribute to better administration, robust teacher performance management, and assist with evidence-based decision making in secondary schools in Pakistan(1. 2025) .

(Ijaz, M., Bokhari, I. H., & Aslam, Z, 25-03-2026)Despite global advancements, the adoption of digital HRM in Pakistan's education sector remains uneven, particularly in public institutions facing infrastructural and resource constraints. These limitations contribute to slow decision-making, limited organizational agility, and reduced operational efficiency, thereby highlighting the need for empirical investigation into how digital HR transformation can address the systemic challenges . Grounded in the Resource-Based View (RBV), Contingency Theory, and the electronic Human Resource Management (e-HRM) scholarships, this study examines the relationship between digital transformation in HRM, organizational agility, and operational efficiency aiming to determine how digitally enabled HR practices enhance institutional responsiveness, adaptability, and operational performance in Pakistan's education sector. The study investigates whether digital HRM positively influences organizational agility, whether agility improves operational efficiency, whether digital HRM directly affects efficiency, and whether agility mediates this relationship, while being moderated by organizational readiness.

Although a number of studies have been undertaken in the fields of digital Human Resource Management (HRM), organizational agility and operational efficiency, the constructs have been investigated impartially while showing limited evidence from developing countries like Pakistan. Additionally, HRM systems are being studied across various industries but education sector has found least researched particularly in terms of digitalization outcomes in comparison with conventional results. Besides, literature reveals that organizational readiness for change is vital in supporting the successful digital transformation, but the moderating role of organizational readiness for change on the agility to operational efficiency relationship is not empirically evidenced. Overall, a significant research gap is found in the literature concerning the integrated relationships between digital HRM, organization agility, operational efficiency, and readiness for change within organizations. This study aims to fill the gap by determining the direct and indirect effects of digital HRM on operational efficiency through organizational agility and to understand how the organizational readiness for change effects the agility to operational efficiency relationship during digitalization process.

(Mahmoud, M.H., Ali, A.A., Alrifae, A.A. et al, 2025)

Theoretical Framework



Literature Review

Digitization of HRM has evolved into a strategic priority as organizations respond to rapid technological advancement, globalization, and intensified competition. HR functions are no longer confined to administrative tasks but are increasingly supported by technologies such as Human Resource Information Systems (HRIS), Artificial Intelligence (AI), cloud-based platforms, automation tools, and data analytics. Digital transformation in HRM is conceptualized not merely as technological adoption but as a fundamental restructuring of HR processes to enhance value creation, workforce responsiveness, and alignment with organizational goals. Internationally, organizations are shifting toward data-driven HR practices, including digital onboarding, AI-based recruitment, e-learning systems, and performance analytics dashboards, with global reports such as Deloitte's Human Capital Trends highlighting widespread investment in digital HR technologies to improve agility and productivity.

Pakistan's education sector has historically relied on traditional, paper-based HR systems characterized by slow processes, fragmented data management, and limited strategic workforce planning. While progressive institutions have begun adopting digital tools such as biometric attendance systems, online recruitment portals, digital payroll systems, Google Workspace, and Learning Management Systems (LMS), overall implementation remains uneven. Barriers to digital transformation include limited infrastructure, inconsistent policy implementation, resistance to change, low digital literacy among HR professionals, budget constraints, and inadequate IT support, particularly in rural institutions. Cultural preference for manual record-keeping and face-to-face processes further slows adoption. Although the Higher Education Commission (HEC) and government initiatives have promoted digital reforms under national visions and e-governance frameworks, gaps in monitoring, coordination, and funding continue to hinder widespread implementation.

Theoretical this study is grounded primarily in the Resource-Based View (RBV) and Dynamic Capabilities Theory (DCT). RBV posits that sustainable competitive advantage arises from valuable internal resources such as technological infrastructure and human capital (Barney, 1991). Digitally transformed HR systems, therefore, function as strategic assets that enhance institutional agility and efficiency. Dynamic Capabilities Theory (19. 1997)further explains how organizations adapt and reconfigure resources in rapidly changing environments, highlighting the role of HRM in building adaptive skills, continuous learning, and workforce flexibility. Despite extensive global research on digital HRM, a significant research gap exists in examining its combined impact on agility and operational efficiency within Pakistan's education sector. In a nutshell, while global evidence supports the transformative benefits of digital HRM, empirical investigation in the Pakistani educational context remains limited, thereby justifying the need for the present study.

Digital HRM comprises several core components, including employee self-service portals, cloud-based HR systems, performance management dashboards, online training platforms, e-recruitment systems, and predictive workforce analytics. These tools enhance transparency, automate routine processes, and enable real-time access to workforce data. Within the education sector, especially after the COVID-19 pandemic, digital HR systems have supported remote workforce management, online faculty recruitment, virtual training, and performance monitoring. UNESCO (2021) emphasized that digital HR practices were instrumental in maintaining educational continuity during global disruptions. Through automation and analytics, institutions can streamline payroll, attendance tracking, recruitment, and workforce planning, reducing administrative burden while improving accuracy and speed of decision-making.

Relationship Between Digital Transformation of HRM and Organizational Agility

Digital Transformation of Human Resource Management (HRM) refers to the integration of digital technologies into HR processes to improve the way human resources are managed, information is processed, and organizational decisions are made. Digital HRM can reduce dependence on traditional manual procedures, improve access to real-time information, and support faster communication and decision-making. These capabilities are particularly important for organizational agility because agility represents an organization's ability to sense changes, respond quickly, and reconfigure resources according to changing environmental requirements. Recent research in Pakistan found that digital transformation drivers, including digital employee experience, digital leadership development, e-HRM, and digital culture transformation, positively contribute to organizational agility. Journal of Social Research Development Similarly, evidence from Pakistani higher education institutions indicates that digital leadership and ICT adoption significantly support organizational agility by improving institutional adaptability and responsiveness. Based on the above discussion the first hypothesis is:

H1: Digital Transformation of HRM positively influences Organizational Agility**.**

Relationship Between Digital Transformation of HRM and Operational Efficiency

Traditional HR practices often involve time-consuming manual procedures that can delay recruitment, employee records management, performance evaluation, training administration, and other organizational activities. Digital HR systems can automate such processes and provide timely information to managers, thereby improving the efficiency and quality of organizational operations. Recent empirical evidence demonstrates that digital transformation has a positive and significant effect on HR efficiency, with digital technologies supporting automation, data-driven decision-making, and more efficient HR processes. Springer Research in educational administration has also reported that digital transformation contributes to improved organizational performance and the development of electronic services. Science Direct In the context of Pakistan's education sector, where institutions manage large numbers of employees and administrative processes, effective digital transformation of HRM can therefore contribute to improved operational efficiency by reducing processing time, improving coordination, and facilitating better utilization of organizational resources. Based on the above discussion the second hypothesis is:

H2: Digital Transformation of HRM positively influences Operational Efficiency.

Relationship Between Organizational Agility and Operational Efficiency

Organizational Agility refers to an organization's ability to rapidly sense changes, make timely decisions, and respond effectively by reconfiguring its resources and processes. In the education sector, agility is particularly important because educational institutions must continuously respond to changes in technology, employee requirements, student expectations, regulatory requirements, and operational challenges. An agile organization can adjust its processes more quickly, reduce delays, and allocate resources according to emerging requirements, thereby improving operational efficiency. A systematic review of 249 empirical studies found relatively strong and consistent evidence that organizational agility contributes to organizational performance across different contexts. IDEAS/RePEc More specifically, recent research has linked organizational agility with operational performance, while studies of digital innovation in higher education indicate that organizational agility positively affects operational efficiency. DOI Thus, when educational institutions possess greater agility, they are better positioned to respond rapidly to operational challenges, streamline processes, and maintain efficient service delivery Based on the above discussion the third hypothesis is:

H3: Organizational Agility positively influences Operational Efficiency.

Mediating Role of Organizational Agility

The relationship between Digital Transformation of HRM and Operational Efficiency may not be entirely direct because the availability of digital technologies alone does not guarantee improved organizational outcomes. Organizational Agility can serve as an important mechanism through which digital transformation is translated into operational improvements. Digital HRM provides organizations with technological capabilities, timely information, automation, and improved communication; however, organizations must possess the ability to utilize these capabilities rapidly and effectively. Organizational agility enables institutions to convert digital capabilities into faster decision-making, flexible resource allocation, and responsive organizational processes. Empirical research supports this mechanism: a study of e-HRM found that e-HRM positively affects communication pace and processing-time reduction through organizational agility, demonstrating the importance of agility as a mediating mechanism. Emerald Publishing Similarly, recent research in higher education reported that digital innovation significantly increases organizational agility, which subsequently improves operational efficiency, supporting the role of agility as an important pathway between digitalization and organizational outcomes. EurekaMag Therefore, in the education sector of Pakistan, Digital Transformation of HRM is expected to improve Operational Efficiency partly by strengthening the organization's ability to adapt, respond, and reconfigure its processes. Accordingly, the following mediation fourth hypothesis is proposed:

H4: Organizational Agility mediates the relationship between Digital Transformation of HRM and Operational Efficiency.

Moderating Role of Organizational Readiness

Organizational Readiness for Change represents the extent to which organizational members are prepared and willing to implement change and believe that the organization possesses the capability and resources required to implement it successfully. Readiness is important because the effectiveness of organizational capabilities may depend on whether employees and management are prepared to accept and implement new ways of working. Weiner's theory explains organizational readiness in terms of shared commitment to change and shared confidence in the organization's collective capability to implement that change; higher readiness increases the likelihood of effective implementation. PubMed Central (PMC) In the context of the present study, Organizational

Agility enables an educational institution to respond quickly and flexibly, while Organizational Readiness determines how effectively that agility can be translated into operational improvements. When readiness for change is high, employees and management are more likely to support new processes, adapt to changing requirements, and utilize agile practices effectively. Conversely, low readiness may limit the ability of organizational agility to produce improvements in operational efficiency. Recent research also emphasizes that digital transformation requires organizational capabilities and an adaptive environment to translate technological investments into efficiency gains. Springer Therefore, Organizational Readiness is expected to strengthen the positive relationship between Organizational Agility and Operational Efficiency. Hence, the following hypothesis is proposed:

H5: Organizational Readiness strengthens the positive relationship between Organizational Agility and Operational Efficiency, such that the relationship is stronger when Organizational Readiness is high.

Summary of Relationships and Hypotheses

The literature reviewed above establishes an integrated relationship among the four constructs of the proposed framework. First, Digital Transformation of HRM is expected to enhance Organizational Agility by providing digital capabilities that facilitate faster information processing, decision-making, communication, and adaptation. Second, Digital Transformation of HRM is expected to directly improve Operational Efficiency through automation, process improvement, and better utilization of organizational resources. Third, Organizational Agility is expected to improve Operational Efficiency because agile educational institutions can respond more rapidly to operational and environmental changes. Fourth, Organizational Agility is proposed as a mediating mechanism, explaining how Digital Transformation of HRM is translated into improved Operational Efficiency. Finally, Organizational Readiness is proposed as a moderating condition, strengthening the positive effect of Organizational Agility on Operational Efficiency when the organization is more prepared and capable of implementing change. Collectively, these relationships provide the theoretical and empirical foundation for the proposed conceptual framework and the hypotheses tested in this study.

Methodology

The study followed positivist research philosophy with the assumptions of objective reality, measurable, and observable through empirical observation. Subsequently, a quantitative research method was used to test the hypothesized relationships and to obtain statistically valid findings employing cross-section design due to the time and resource limitations (Almogren, 2022). The target population comprised the employees of education institutions in Lahore Region such as the HR professionals, administrators, faculty members, and departmental heads of public and private institutions. Due to the constraints of non-availability of sampling frame, and limited research culture, nonprobability based convenience and purposive sampling techniques were used. 250 questionnaires were distributed and 213 questionnaires were received & analyzed. The primary data was gathered through surveys using structured, close-ended questionnaire that allowed measuring the main constructs of Digital Transformation of HRM, Organizational Agility, and Operational Efficiency. The survey method was chosen because it is the most efficient, cost-effective, and appropriate method for quantitative research on a large scale (Bryman & Bell, 2008). Established measures were adapted and the responses were recorded on five-point Likert scale for their clarity, reliability and acceptability in social science research. Before data collection, the measures were pilot tested for face and content validity through expert and literature based reviews and internal consistency through Cronbach's alpha limiting the alpha value to .70 or above.

Both descriptive and inferential statistical analysis were applied for the results. Descriptive statistics summarized demographic characteristics and response patterns, while inferential statistics including correlation analysis, regression analysis were employed to test hypotheses. Overall, the methodological approach ensured coherence between the philosophical stance, research design, data collection strategy, and analytical procedures, thereby strengthening the rigor and credibility of the study.

Results and Analysis

Table 1: Demographic characteristics of respondents (N = 213)

Demographic Variable	*Category*	*Frequency (%)*
Gender	Male	53.1
	Female	45.5

Demographic Variable	*Category*	*Frequency (%)*
Age	21–40 years	76.6
Educational Qualification	Master's degree	48.4
	MPhil degree	26.3
Department	HRM	45.5
	Education	41.8
Job Position	Manager	36.6
	Faculty	27.7
Work Experience	More than 10 years	44.6

The sample was reasonably well-balanced and was slightly skewed towards male (53.1%) over female (45.5%) as seen in the demographic profile. The respondent were mostly young to middle age with 76.6% of the respondents in the age group 21-40 years indicating a relatively young workforce. The sample was also well educated with 48.4% having Master's degree and 26.3% having MPhil degree, giving about three quarters of respondents post graduate qualifications. When asked about the departments distribution, the majority of respondents from HRM (45.5%) and Education (41.8%) while by job position the respondent's majority were manager (36.6%) followed by the faculty members (27.7%). Lastly, 44.6% of respondents had over 10 years of experience with their jobs, suggesting that there were experienced professionals involved in the study. In general respondents were young, well-qualified, and experienced, hence the data obtained on the variables of the study are credible.

Table 2: Institution Distribution of Respondents

Institution	*Percentage (%)*
Ghazali Education Foundation (GEF)	23.0
Government Schools	23.0
Army Public School (APS)	15.0
Aghosh AKF	10.8
Leading Private SchoolsOther Institutions	28.2
Total	**100.0**

The institutional distribution reveals that the respondents were sampled from a wide variety of educational institution, therefore, the representativeness of the sample is strengthened. Ghazali Education Foundation (GEF), and Government Schools accounted for 23.0% of the respondents, respectively followed by the Army Public Schools 15.0% and Aghosh AKF 10.8%. approximately 28.2% was from Leading private Schools and other institutions which covered a cross-section of public , semi-government and private sector approaches. In general, there was no single institution that dominated the sample and this will minimize institutional bias and enhance the generalizability of the finding.

Table 3: Extent of Digitalization in Human Resource Management

Level of Digitalization	*HRM Digitalization (%)*	*HR Functions Digitalization (%)*
Fully digitalized	21.6	17.8

Level of Digitalization	*HRM Digitalization (%)*	*HR Functions Digitalization (%)*
Partially digitalized	43.7	34.3
Somewhat digitalized	27.7	—
Moderately digitalized	—	47.9
Total reported	**93.0**	**100.0**

The table indicates that digitalization of HRM is still in the development phase. 21.6% of respondents said HRM is fully digitalized, 43.7% of respondents said it is partially digitalized, and 27.7% of respondents said it is somewhat digitalized. The picture is the same for HR functions: 17.8% said they were fully digitalized, 34.3% partially and the majority (47.9%) said they were moderately digitalized. Generally speaking, organizations are only implementing digital tools to a degree or in a moderate fashion, and the level of digital integration is relatively low, especially in terms of individual HR functions. This is a clear sign that there is ample opportunity for technological innovation in HR.

Table4: Inter-item Consistency (Reliability)

Variables	***Cronbach's Alpha***	***N of Items***
DT	.823	6
OA	.811	5
OE	.822	6
ORN	.791	6

The results of the reliability analysis show that the reliability score of all study variables good with internal consistency ranging from 0.791 to 0.823, which is greater than the minimum required level of .70. DT shows the highest reliability (α = .823), followed by OE (.822), OA (.811), and ORN (.791). All alpha values indicate that the items for each construct consistently measure their respective variables.

Table5: Descriptive Statistics and Correlation Analysis

S. #.	***Variables***	***n***	***M***	***SD***	**1**	**2**	**3**	**4**
1	*DT*	*213*	*3.1559*	1.20773	1			
2	*OA*	*213*	*3.2995*	1.15736	.525**	1		
3	*ORN*	*213*	*3.3718*	1.16572	.654**	.700**	1	
4	*OE*	*213*	*3.0493*	1.29071	.618**	.670**	563**	1

**Correlation is significant at the 0.01 level (2-tailed).

The descriptive statistics indicate the sample size (N) of 213 respondents and slightly above the midpoint of the scale for all four variables: Digital Transformation (DT) mean score = 3.155 (SD = 1.21), Organizational Agility (OA) mean score = 3.29 (SD = 1.157), Organizational Resilience/Readiness (ORN) mean score = 3.37 (SD = 1.17), Organizational Effectiveness (OE) mean score = 3.05 (SD = 1.29). This means that there is a moderate level of agreement among the respondents, with Organizational Readiness being the highest rating and Operational Efficiency the lowest rating, and also that there is a relatively large standard deviation (above 1.15) for each of the ratings, indicating a large amount of variance in ratings. The correlation results showed that all of the variables were positively and significantly correlated at 0.01 level. DT was strongly correlated with OA (r = .525), ORN (r = .654), and OE (r = .618), while OA showed a strong relationship with ORN (r = .700) and OE (r = .670), and ORN was also positively related to OE (r = .563). The highest correlation was found between OA and ORN (r = .700) and the lowest was between DT and OA (r = .525) which were still moderate to strong. In general, the results indicate that both a high level of digital transformation, agility and

resilience correlate with high organizational effectiveness, with no very high correlation (any below .80) being a concern due to multicollinearity.

***Table6: Regression Coefficients of* Digital *on* TransformationOrganizational Agility**

Variable	***B***	**β**	***SE***	***t***	***P***
Constant	0.603		0.126	6.385	0.000
DT	0.591	0.625	0.037	21.234	0.000

R2 = .585, F = 450.871, N=213,P<0.05

The influence of the Digital Transformation (DT) on Organizational Agility was evaluated in the regression analysis using the data of 213 respondents. Results show that Digital Transformation is positively related with Organizational Agility and the correlation is statistically significant (B = 0.591, β = 0.625, t = 21.234, p < 0.001). That is, for every 1-unit increase in Digital Transformation, the Organizational Agility increases by 0.591 units, when all other factors are constant. The standardized coefficient (β = 0.625) indicates the relationship between the two variables is very strong. In addition, the model accounts for 68.5% of the variability of Organizational Agility (R^2 = 0.625), which is quite high. The overall regression model is statistically significant (F = 450.871, p < 0.001), showing that Digital Transformation is indeed a statistically significant predictor of Organizational Agility. These results indicate that companies which successfully embrace and execute digital transformation efforts are more likely to improve their agility, adaptability, and responsiveness to evolving business contexts.

Table 7: Regression Coefficients of Organizational Agility on Operational Efficiency

Variable	***B***	**β**	***SE***	***t***	***P***
Constant	0.585		0.199	2.933	0.004
OA	0.747	0.670	0.057	13.103	0.000

R2 = .449, F = 171.695, N=213, P<0.05

Interpretation

A regression analysis was done to analyze the influence of Organizational Agility (OA) on Operational Efficiency on 213 respondents. The findings show that there is a positive and statistically significant relationship between Organizational Agility and Operational Efficiency (B = 0.747, β = 0.670, t = 13.103, p < 0.001). That is, when holding all other variables constant, an increase of one unit in Organizational Agility results in an increase of 0.747 units in Operational Efficiency. The standardized coefficient (β = 0.670) indicates that there is a strong positive correlation between the two variables. The model accounts for 44.9% of the variance in Operational Efficiency (R^2 = 0.449) and an Adjusted R^2 = 0.446, which suggests that Organizational Agility is a significant predictor of Operational Efficiency. In addition, the overall regression model is statistically significant (F = 171.695, p < 0.001), which indicates that the regression model is robust. Given these insights, companies that are more agile would seem to be more likely to enhance operational processes, better use resources and operate more efficiently.

Table 8: *Regression Coefficients of Digital* Transformation *on* Operational Efficiency

Variable	***B***	**β**	***SE***	***t***	***p***
Constant	0.964		0.195	4.934	0.000
DT	0.661	0.618	0.058	11.430	0.000

R^2 = .382, F = 130.655, N=213, P<0.05

The regression analysis was conducted to assess the effect of Digital Transformation (DT) on Operational Efficiency among 213 respondents. The findings indicate that Digital Transformation has a positive and statistically significant influence on Operational

Efficiency (B = 0.661, β = 0.618, t = 11.430, p < 0.001). This suggests that a one-unit increase in Digital Transformation is associated with a 0.661-unit increase in Operational Efficiency, holding other factors constant. The standardized coefficient (β = 0.618) reflects a strong positive relationship between the two variables. The model explains 38.2% of the variance in Operational Efficiency (R^2 = 0.382), while the Adjusted R^2 value of 0.379 indicates that the model maintains good explanatory power after adjusting for sample size and predictors. Moreover, the overall regression model is statistically significant (F = 130.655, p < 0.001), confirming that Digital Transformation is a significant predictor of Operational Efficiency. These results suggest that organizations that embrace digital technologies and transformation initiatives are more likely to enhance their operational performance by improving process effectiveness, resource utilization, and overall efficiency.

Table 9: ***Regression Coefficients of Digital Transformation, Organizational Agility on Operational Efficiency***

Variable	B	β	SE	t	p
Constant	0.516		0.200	2.583	0.010
DT	0.220	0.206	0.096	2.295	0.023
OA	0.558	0.500	0.100	5.579	0.000

R^2 = .462, F = 90.216, N=213, P<0.05

Digital Transformation (DT) and Organizational Agility (OA) were used as the independent variables, while Operational Efficiency (OE) was the dependent variable. A multiple regression analysis was used to analyze the combined influence of Digital Transformation (DT) and Organizational Agility (OA) on Operational Efficiency (OE) among 213 respondents. The overall model is statistically significant (F = 90.216, p < 0.001), which shows that the overall model is able to predict Operational Efficiency when both DT and OA are considered. The model accounts for 46.2% of the variance in Operational Efficiency (R^2 = 0.462) and has an Adjusted R^2 of 0.457 (moderate). The operational efficiency was positively predicted by both predictors with significant results. Digital Transformation has a positive influence on Operational Efficiency (B = 0.220, β = 0.206, t = 2.295, p = 0.023), indicating that when digital transformation is increased, the operational efficiency is improved. Similarly, Organizational Agility is found to have positive and significant effect on Operational Efficiency (B = 0.558, β = 0.500, t = 5.579, p < 0.001), suggesting that the more agile the organization the more likely it is to be more efficient. The standardized beta coefficients reveal that the Organizational Agility is a better predictor of Operational Efficiency than Digital Transformation (0.500 vs. 0.206). The results indicate that digital transformation positively affects operational efficiency, but only if backed by organizational agility, which reinforces the need to include agile practices in overcoming the obstacles to making digital initiatives a successful factor in operational efficiency

Table 10: ***Mediation Analysis of the Effect of DT (X) on OE (Y) through OA (M)***

	Estimate	*SE*	*t*	*p*	*95% CI Lower*	*95% Cl Upper*
Total Effect of DT on OE	0.661					
Direct Effect of DT on OE	0.220	0.096	2.29	.023	0.031	0.409
Indirect Effect of DT on OE through OA	0.441	0.093			0.256	0.619

The mediation analysis reveals that the total effect of DT on OE is significant (c = 0.661) and that this effect is mediated by OA. The indirect effect of DT on OE through OA is significant (B = 0.441, SE = 0.093, 95% CI [0.256, 0.619]), as the confidence interval does not include zero. The direct effect also remains significant after accounting for OA (B = 0.220, SE = 0.096, *t* = 2.29, *p* = .023, 95% CI [0.031, 0.409]). Both the indirect and direct effects are important and OA is partially mediating the effect of DT on OE. The remaining one-third of the total effect is a direct effect, with the rest coming through OA (≈ 67% 0.4410.661). To put it simply, a higher DT is predictive of a higher OE, in part because DT improves the OA which improves OE.

Table 11:*Moderation Analysis*

Predictor	*B (Coeff.)*	*SE*	*t*	*p*	*95% CI (LLCI)*	*95% CI (ULCI)*
Constant	1.2744	0.4495	2.8348	0.0050	0.3882	2.1606
OA	0.1265	0.1954	0.6474	0.5181	-0.2587	0.5118
ORN	0.0686	0.1877	0.3653	0.7153	-0.3015	0.4386
OA × ORN	0.0913	0.0446	2.0462	0.0420	0.0033	0.1793

The results of the moderation analysis indicate that the ORN × OA interaction is statistically significant (B = 0.09, SE = 0.04, t = 2.05, p = .042, 95% CI (0.003, 0.18), which suggests that the effect of OA on the outcome is significantly moderated by ORN. This is also supported by the fact that the confidence interval does not contain zero. A positive coefficient means that the more that ORN increases, the stronger the effect of OA. The main effects of OA (B = 0.13, p = .518) and ORN (B = 0.07, p = .715) are not significant on their own. The effect of OA is not independent of the level of ORN but is overall.

Discussion

The aim of this study was to explore the relationship between Digital Transformation (DT), organizational Agility (OA) and Operational Efficiency while investigating the mediating role of organizational agility and the moderating role of organizational readiness for change in education sector in Pakistan. The results suggest digital transformation and organizational agility have a positive relationship with operational efficiency, and organizational readiness for change further enhances the positive relation between agility and efficiency. The finding indicates that technological resources alone can not transform institutional performance, but it also needs the ability of an institution to adapt its process and implement changes effectively. This is in the line with the dynamic capabilities view, which argues that it is important to align and reconfigure the resources of the organization to meet the demands of the environment. (Teece,2007).

Organizational Agility & Operational Efficiency

The organizational agility was positively correlated with operational efficiency with significant result (beta = 0.670, p<0.001), accounting for 44.9% of the variance in the reported analysis. This suggest that institutions that can act quickly and effectively to meet changing needs and coordinate well their operations, may have their better operational results. The use of agility in education can help make decisions faster, coordinate between departments, and adapt to changing students and regulatory needs. In a dynamics capabilities context, responsiveness allow firm to reconfigure processes, rather than solely be dependent on routines (Teece, 2007).

Lack of proper resources, decision making power and coordination can lead to regular changes of organization which can complicate the situation rather than make it more efficient. The results thus indicate that agility is a critical organizational competency that needs to be implemented in organization to make it effective.

Digital Transformation and Operational Efficiency

Additionally, digital transformation was found to be positively correlated with operational efficiency (beta = 0.618), (p<0.001) and explained 38.2% of the variance in operational efficiency. Digital system can enhance accessibility to inform, improve administrative process and minimize duplication in process like admissions, students' management, and financial management. However, take up of technology does not mean successful digital transformation. The benefits expected might be hindered by poorly integrated system and unaltered administrative practices. Thus, it can be concluded that, technological investments with organizational process and institutional goals are more likely to be a factor for operational efficiency and thus, contribute to digital transformation. This understanding aligns with studies that highlights the connection between digital transformation , IT alignment and organizational agility (Al Jabir et. al..,2024)

Relative Contribution of Digital Transformation and Operational Agility

Because of the nature of their work, the relative contribution of Digital Transformation and Organizational Agility, will be examined and discuss. A combination of digital transformation and organizational agility still had impact on operational efficiency, except

that organizational agility had a stronger standardized coefficient (beta = 0.500) than the digital transformation (beta = 0.206). the discovery indicates that the use of technological resources and adaptation of the work may be crucial for efficiency gains in an institution. Digital technologies offer instruments for information processing and coordination, while organizational agility impacts the effectiveness of translating these into operational responses.

This decrease in the digital transformation coefficient once agility was added in is consistent with the hypothesis that agility is a part of the association between digital transformation and operational efficiency. The reduction in coefficient, however, is not sufficient to make mediation a stand alone finding. The relationship between organizational agility and operational efficiency must be examined indirectly by conducting an appropriate mediation analysis to assess if organizational agility has a significant mediation effect on the relationship between digital transformation and operational efficiency.

The Mediating Role of the Organizational Agility

This agility is an organization and is a potential mechanism by which digital transformation can help with operational efficiency, in theory. While digital technologies can help to increase the availability of information, this does not mean they are transforming institutions themselves, and it depends on institutions reacting to this information, organizing their activities, and adjusting their procedures. This is the same argument as the dynamic capabilities perspective that separates the use of resources from the ability to effectively deploy and reconfigure them (Teece, 2007). For instance, in educational institutions, digital admissions information can contribute to resource planning, but it can only do that if managers are able to translate it into decisions they make in a timely fashion.

However, the mediation hypothesis should be granted only if the indirect effect meets (or is likely to meet) the criteria for statistical significance, and preferably with bootstrapped confidence intervals. The indirect-effect statistics were not provided with the results so the mediation claim needs to be verified before finalizing the manuscript.

The Moderating Role of Organizational Readiness for Change

The Moderating Effect of Organizational Readiness for Change on the Relationship between the Two Variables

There was the positive and statistically significant interaction between the organizational agility and organizational readiness for change ((\beta = 0.0913), (p = 0.042)). This suggests that there is a positive relationship between agility and operativeness that becomes more positive the more ready people are to adapt. Within the institution, agile management can discover chances for better administration and while this may be valuable for schools, the advantages may be constrained in the event that staff members are reluctant to embrace new routines or the resources to carry them out are insufficient. Being more prepared can help to convert adaptive decisions into operational changes.

The result implies that agility and readiness to change are complementary, with agility aiding in responsiveness, and readiness aiding in organizational changes. The interaction coefficient, however, is not particularly large and it is nearing the conventional threshold of significance of 0.05. Conditional effects and confidence intervals should then be reported to determine the character and significance of the moderating effect.

Overall Implications

The results overall underscore how complementary digital transformation, organizational agility and readiness for change can be towards improving operational efficiency in the education sector in Pakistan. Based on the standardized coefficient of agility in the simultaneous regression, it is recommended that technology investment needs to be supported by the willingness of decision-making, process redesign, and effective organizational coordination. A further sign of the benefits associated with agility being linked to institutional readiness for change is shown in the moderation result. These results go beyond the technology adoption discussion and focus on the organizational skills and circumstances that go along with operational results. However, the conclusions of the mediation hypothesis need to be formally tested statistically, and the applicability of the results must be interpreted with caution, taking into account variations in institutional resources, governance and technological infrastructure.

Conclusion

This study examined the relationship between the digital transformation of Human Resource Management (HRM), organizational agility, and operational efficiency in Pakistan's education sector, with particular attention to the moderating role of organizational readiness for change. The findings indicate that HRM digitalization is positively associated with operational efficiency and

organizational agility, while organizational agility demonstrates a stronger standardized association with operational efficiency when both predictors are considered simultaneously. Furthermore, organizational readiness for change strengthens the positive relationship between organizational agility and operational efficiency, highlighting the importance of institutional preparedness in translating adaptive capabilities into operational outcomes.

The findings suggest that the value of HRM digitalization extends beyond automating routine personnel activities. Digital HRM systems can provide opportunities to streamline recruitment, maintain employee records, facilitate performance management, improve access to workforce information, and support timely HR-related decision-making. However, the realization of these potential benefits depends on an institution's capacity to integrate digital HRM practices with its organizational processes and respond effectively to changing operational requirements. Organizational agility may therefore be particularly important in enabling educational institutions to translate digital HRM capabilities into improved coordination and administrative efficiency, while readiness for change may facilitate the implementation of associated organizational adjustments.

From a managerial perspective, educational institutions in Pakistan should consider HRM digitalization as part of a broader organizational development strategy rather than as an isolated technological investment. Aligning digital HRM systems with employee capabilities, responsive administrative structures, and effective change-management practices may help institutions improve the efficiency of their HR operations. Nevertheless, the findings should be interpreted within the context of the study, and further research across public and private educational institutions could establish whether these relationships vary according to institutional resources, governance arrangements, and levels of digital maturity. Future studies could also employ longitudinal designs to investigate how digital HRM implementation influences organizational agility and operational efficiency over time. Overall, the study highlights the importance of aligning HRM digitalization with organizational agility and readiness for change to support operational efficiency in Pakistan's education sector.

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