ISSN (print): 2588-5731 E-ISSN: 3060-6535

Evaluation of the conceptual model of organizational metamorphosis with an environmental adaptation approach to education

Shiva Banihashemi,[1] Reza Zare'i,[2] Ebadolah Ahmadi,[3] Ahmadreza Ojinejad[4]

Received Date:21/06/2024 *Accepted Date:27/11/2024*
Pp: 119-136

Abstract

Introduction: Educational systems today face complex challenges arising from globalization, technological change, and dynamic community needs. Addressing such challenges requires organizational metamorphosis that enables adaptation, resilience, and forward-looking strategies. The present study aimed to evaluate a conceptual model of organizational metamorphosis with an environmental adaptation approach in the education system of Shiraz.

Methodology: A quantitative descriptive–survey method was employed. The statistical population consisted of teachers from the Shiraz Ministry of Education, and 250 participants were selected through multi-stage cluster sampling. Data were collected using a researcher-made questionnaire with verified validity and reliability (Cronbach's alpha > 0.70). For data analysis, Confirmatory Factor Analysis (CFA), Partial Least Squares Structural Equation Modeling (PLS-SEM), and related tests such as Kaiser–Meyer–Olkin (KMO) and Bartlett's test were applied.

Findings: The findings indicated that the proposed model demonstrated an acceptable fit and comprised four dimensions: strategic human resources management, quality assurance of the teaching–learning process, digital metamorphosis, and organizational metamorphosis. Teacher empowerment, curriculum reform, digitalization, and transformative leadership emerged as the most influential components.

conclusion: In conclusion, the model provides a practical framework for educational policymakers and managers to design transformation strategies, enhance adaptability to environmental dynamics, and improve the quality of education. Future studies are recommended to test the model across diverse contexts and to examine its long-term impact.

Keywords: Organizational metamorphosis; Environmental adaptation; Education system; Strategic management; PLS-SEM.

Introduction

[1]- Department of Educational Sciences, Marv. C. Islamic Azad University, Marvdasht, Iran
[2] Assistant professor, Department of Educational Sciences, Marv. C. Islamic Azad University, Marvdasht, Iran .Corresponding Author: Reza.Zarei@iau.ac.ir
[3] Department of Educational Sciences, Marv. C. Islamic Azad University, Marvdasht, Iran
[4] Department of Educational Sciences, Marv. C. Islamic Azad University, Marvdasht, Iran

technological transformation, and the changing expectations of society and the labor market (Rosenberg, 2017). These dynamics have revealed significant shortcomings in responsiveness, educational equity, and the quality of teaching and learning—especially where traditional structures and practices constrain innovation and flexibility. Addressing such challenges requires organizational metamorphosis: a purposeful transformation of structure, processes, and culture that is aligned with environmental adaptation, enabling the education system to become not merely reactive but also resilient and forward-looking (Guerrero & Pugh, 2022).In Shiraz, as in many comparable contexts, the education system faces intertwined challenges, including weaknesses in strategic human resources management, misalignment of curricula with labor-market demands, and insufficient digital infrastructure and competencies to effectively utilize educational technologies (Ghasemi-Kheyrabadi et al., 2019). Such limitations reduce instructional quality and undermine the system's capacity to generate outcomes that are locally relevant while globally competitive. Although short-term initiatives—such as in-service training courses or technology-based projects—may yield temporary improvements, their sustainability and systemic impact remain uncertain in the absence of an integrated framework that coordinates resources, actors, and incentives (Pardakhtchi, Bazargan, Arasteh, & Mozaffari, 2012).

Accordingly, the present study aims to evaluate a conceptual model of organizational metamorphosis with an environmental adaptation approach in the education system of Shiraz. The model integrates four main dimensions: (1) strategic human resources management, focusing on teacher empowerment and professional development (Goldstein, 2011); (2) quality assurance of the teaching–learning process, including curriculum reform, personalized learning, and problem-solving orientation (Srisakda et al., 2016); (3) digital metamorphosis, emphasizing technology updating, teacher digital competence, and the expansion of e-learning (Ravichandran, 2018); and (4) organizational metamorphosis, which highlights transformative leadership, structural reform, participatory management, and an innovation-supportive culture (Mashayekhi & Mashbaki, 2022). The model's contribution lies in treating these dimensions not as isolated elements but as an integrated architecture for enhancing organizational adaptability.Previous studies have largely addressed these dimensions separately, with limited evidence on integrated and context-sensitive frameworks. Moreover, empirical validation of such a model—particularly through advanced statistical techniques such as CFA and PLS-SEM—remains scarce (Hair, Hult, Ringle, & Sarstedt, 2017; Mohammadi et al., 2021). The present research seeks to fill this gap by transforming a conceptual proposition into an empirically tested framework, thereby offering an actionable tool for educational planning and policymaking.

Research Questions

RQ1: Does the proposed four-dimension model demonstrate acceptable validity and model fit (e.g., factor loadings, composite reliability, AVE, and discriminant validity)?

RQ2: What is the relative contribution of SHRM, QA of teaching–learning, digital metamorphosis, and organizational metamorphosis to the overall construct?

RQ3: Are the four dimensions empirically distinct yet interrelated, forming a coherent higher-order framework?

RQ4: To what extent does the structural model explain variance in organizational metamorphosis within the Shiraz education system?

Methodology

This study adopted a quantitative descriptive–survey design to examine the conceptual model of organizational metamorphosis with an environmental adaptation approach in the education system of Shiraz. The statistical population consisted of teachers employed in the Shiraz Ministry of Education during the 2022–2023 academic year. Using multi-stage cluster sampling, 250 teachers were selected as the sample, which meets the recommended thresholds for structural equation modeling (Hair et al., 2017).

Research Instrument

The primary data collection instrument was a researcher-designed questionnaire developed based on theoretical foundations and prior empirical studies (Fullan, 2016; Guerrero & Pugh, 2022). The instrument included 48 items covering four main dimensions: Strategic Human Resources engagement (SHRM) (12 items) – addressing teacher empowerment, professional development, and participatory management. Quality Assurance of the Teaching–Learning Process (11 items) – including curriculum reform, instructional quality, and problem-solving orientation. Digital Metamorphosis (13 items) – measuring technological infrastructure, teachers' digital competence, and e-learning practices. Organizational Metamorphosis (12 items) – focusing on transformative leadership, structural reform, and organizational culture. Responses were recorded on a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. Content validity of the questionnaire was confirmed through expert review (Creswell & Creswell, 2018), while construct validity was assessed using confirmatory factor analysis (CFA). Reliability was tested through Cronbach's alpha and composite reliability (CR), with all coefficients exceeding the acceptable threshold of 0.70 (Nunnally & Bernstein, 1994).

Nos	Basic themes	Organizing themes	Inclusive theme
1	Career empowerment of teachers		
2	Continuous in-service training		

3	Developing effective human relationships	Strategic human resources management	Organizational metamorphosis with an environmental adaptation approach to education in Shiraz
4	Knowledge management in the educational system		
5	Reducing exhaustion and burnout at work		
6	School curriculum reform	QA of the teaching-learning process	
7	Personalized learning		
8	Emphasis on problem-solving		
9	Expanding Professional learning		
10	Subject diversity to respond to the external environment		
11	School as a learning organization		
12	Familiarizing teachers with digital tools in the teaching and learning process	Digital metamorphosis	
13	Technology updates in education		
14	Globalization and internationalization of education		
15	Expanding e-learning		
16	Reforming the organizational structure	Organizational metamorphosis	
17	Transformative leadership		
18	Employee acceptance and readiness for change		
19	Changing the organizational culture		
20	Participatory management		
21	Funding resources and budgets		
22	Transformational approach		
23	Stakeholder participation		
24	Systemic thinking development		

Table 1: Demographic characteristics of the sample by gender and work experience

Data Analysis Procedure

The data analysis process involved several stages:

Pre-analysis checks – The adequacy of the sample was confirmed through the Kaiser–Meyer–Olkin (KMO) test (>0.80), and the significance of correlations was validated by Bartlett's Test of Sphericity ($p < 0.001$), ensuring the suitability of the data for factor analysis (Field, 2018). The normality of distributions was also assessed through skewness and kurtosis indices, which were within acceptable ranges.

Measurement model evaluation (CFA) – Confirmatory factor analysis was performed to evaluate convergent and discriminant validity. Convergent validity was confirmed as all Average Variance Extracted (AVE) values exceeded 0.50, and factor loadings were significant (>0.60). Discriminant validity was assessed using the Fornell–Larcker criterion (Fornell & Larcker, 1981) and the Heterotrait–Monotrait ratio (HTMT) (Henseler et al., 2015).

Structural model testing (PLS-SEM) – Partial least squares structural equation modeling (PLS-SEM) was applied using SmartPLS software to test the hypothesized relationships among the latent variables (Hair et al., 2017). Model fit was evaluated through R^2 values, predictive relevance (Q^2), and standardized root mean square residual (SRMR). Path coefficients and their significance levels were assessed through bootstrapping with 5,000 resamples.

This methodological approach ensured that both the measurement model and the structural model were rigorously validated, thereby enhancing the robustness of the study's findings.

Findings

Descriptive Statistics

To anchor the subsequent inferential analyses in a transparent portrait of the sample, we first examined descriptive statistics. The study's respondents were teachers employed by the Shiraz Ministry of Education, and two demographic attributes were foregrounded because of their theoretical and practical relevance to organizational change in schooling systems: gender and work experience. Together, these descriptors capture variation in professional trajectories that can condition how educators perceive and enact organizational metamorphosis—particularly in settings where digitalization, curriculum reform, and leadership practices are in flux.

Demographic variables of the study		Nos	Percentage
Work experience	1-10 yrs	50	20
	11-15 yrs	68	27.2
	16-19 yrs	59	23.6
	Over 20 yrs	73	29.2
	Total	250	100
Gender	Female	124	49.6
	Male	126	50.4
	Total	250	100

Table 2: Description of information received from questionnaires by gender and work experience

As summarized in Table 2, the sample included both male and female teachers across a broad span of professional tenure. A near-balanced gender composition mitigates the risk that the results reflect the standpoint of a single group, which is critical in research on human resource strategies and participation in change initiatives. From an analytic standpoint, such balance contributes to external validity by ensuring that the estimates derived from the model are not unduly influenced by gender-specific experiences (Field, 2018). Variation in work experience further enriched the dataset, ranging from early-career teachers (e.g., fewer than five years of service) to practitioners with over two decades in the system. Early-career teachers tend to be more exposed to contemporary pedagogical training and educational technologies, whereas late-career educators often carry deep institutional memory and an established repertoire of classroom practice. Including both perspectives is essential when the focal construct—organizational metamorphosis—spans strategic human resource management, the quality of the teaching–learning process, digital transformation, and leadership/culture change.Beyond representativeness, these descriptive patterns serve as diagnostic signals for the analytic strategy. In settings where a single subgroup dominates, latent variable estimates can be biased, and measurement properties may vary across strata. The broad coverage observed here reduces those risks and strengthens the interpretability of model comparisons across dimensions of the conceptual framework. Descriptive analysis therefore functions not as a perfunctory preface but as a methodological safeguard that makes the ensuing factor-analytic and structural modeling steps more credible (Field, 2018).

Assumption Checks

Prior to evaluating the measurement and structural models, we conducted standard assumption checks on the data. Because Partial Least Squares Structural Equation Modeling (PLS-SEM) was used, the primary concerns were (a) distributional properties, (b) sampling adequacy and factorability, and (c) the correlational structure among indicators (Hair, Hult, Ringle, & Sarstedt, 2017).

Normality of Distributions

Normality was assessed using the Kolmogorov–Smirnov (K–S) test, complemented by inspection of central tendency and dispersion indices (mean, standard deviation) as well as shape parameters (skewness, kurtosis) for each construct and indicator.

Research variables	Mean	SD	t-statistic	Significance level
Empowering teachers	3.72	1.31	0.30	P < 0/0001
Continuous in-service training	3.67	1.27	0.32	P < 0/0001
Developing effective human relationships	3.70	1.35	0.31	P < 0/0001
Knowledge management in the education system	3.71	1.33	0.30	P < 0/0001
Reducing exhaustion and burnout	3.79	1.24	0.36	P < 0/0001
Curriculum reform	3.81	1.33	0.33	P < 0/0001
Personalized learning	3.83	1.30	0.32	P < 0/0001
Emphasizing problem-solving	3.81	1.24	0.33	P < 0/0001
Expanding professional learning	3.76	1.31	0.32	P < 0/0001
Subject diversity to respond to the external environment	3.79	1.21	0.32	P < 0/0001
School as a learning organization	3.70	1.29	0.33	P < 0/0001
Familiarizing teachers with digital tools in the teaching and learning process	3.82	1.28	0.30	P < 0/0001
Technology updates in education	3.81	1.29	0.33	P < 0/0001
Globalization and internationalization of education	3.84	1.27	0.32	P < 0/0001
Expanding e-learning	3.80	1.27	0.34	P < 0/0001
Reforming the organizational structure	3.72	1.34	0.35	P < 0/0001

Transformative leadership	3.83	1.23	0.30	P < 0/0001
Employee acceptance and readiness for change	3.81	1.28	0.33	P < 0/0001
Changing the organizational culture	3.83	1.30	0.33	P < 0/0001
Participatory management	3.78	1.28	0.31	P < 0/0001
Funding resources and budgets	3.82	1.24	0.34	P < 0/0001
Using a contingency approach	3.87	1.33	0.31	P < 0/0001
Stakeholder participation	3.81	1.24	0.32	P < 0/0001
Developing systemic thinking	3.83	1.26	0.31	P < 0/0001
Creativity and innovation	3.89	1.19	0.33	P < 0/0001

Table 3: Descriptive statistics of research components and KS test results

As shown in Table 3, several variables deviated from normality. Skewness values exceeded ±1 for some indicators, suggesting asymmetry in response distributions, while kurtosis occasionally fell outside ±2, indicating heavier or lighter tails than the normal curve. In covariance-based SEM, such departures may inflate χ^2 and distort global fit indices (Kline, 2011). In contrast, PLS-SEM is explicitly variance-based and comparatively robust to non-normality, focusing on prediction and component-based estimation rather than reproducing the covariance matrix (Hair et al., 2017). Accordingly, the observed distributional features did not threaten the validity of the planned analyses; rather, they reinforced the methodological rationale for using PLS-SEM in this application.The substantive implications of non-normality are also noteworthy. For example, skewed responses on digital competence could reflect a bifurcated reality in schools: a large segment working at basic proficiency levels and a smaller, advanced group engaging in innovative digital practices. Similarly, kurtosis in leadership/participation items might suggest clustering around normative practices with occasional outliers reporting transformative behaviors. Recognizing these distributional contours prevents over-generalization and sharpens the interpretation of factor loadings and path estimates.

Sampling Adequacy and Factorability

We next examined whether the dataset was suitable for factor analysis. The Kaiser–Meyer–Olkin (KMO) measure exceeded the recommended minimum of 0.70, indicating that partial correlations among items were sufficiently small and that common variance was adequate for extracting latent factors. Bartlett's Test of Sphericity was statistically significant ($p < .001$),

rejecting the null hypothesis that the correlation matrix approximates an identity matrix. These results jointly confirm that the observed indicators share systematic variance and are appropriate for confirmatory factor analysis (Byrne, 2016; Kline, 2011).Methodologically, passing these checks matters for two reasons. First, they reduce the risk that weak inter-item correlations will undermine convergent validity. Second, they help ensure that the factor solution is not merely an artifact of sample idiosyncrasies. In the context of educational systems, where constructs such as strategic HRM or quality assurance are multidimensional, adequate factorability is indispensable to estimating reliable measurement models that can support meaningful structural inference (Byrne, 2016).

Measurement Model

The measurement model was evaluated with a focus on indicator reliability, internal consistency reliability, convergent validity, and discriminant validity. Estimation proceeded with PLS algorithms and bootstrapping to obtain standard errors and confidence intervals (Hair et al., 2017).Indicator Reliability. Standardized factor loadings for indicators across the four first-order dimensions (strategic human resources management, quality assurance of the teaching–learning process, digital metamorphosis, and organizational metamorphosis) exceeded the conventional threshold of .50, with most surpassing .70. Loadings of this magnitude suggest that indicators share substantial variance with their parent constructs and contribute meaningfully to construct measurement (Fornell & Larcker, 1981; Hair et al., 2017). Items with marginal loadings were reviewed for conceptual alignment; none required removal because their inclusion did not degrade internal consistency or validity metrics.Internal Consistency Reliability. Composite reliability (CR) coefficients for all constructs were above .70, indicating satisfactory internal consistency. CR is preferred over Cronbach's alpha in PLS contexts because it does not assume tau-equivalence and better reflects the variance captured by the latent construct (Hair et al., 2017). Together with high loadings, these CR results confirm that the items coherently represent their intended dimensions.Convergent Validity. Average variance extracted (AVE) exceeded .50 for each construct, meaning that constructs account for more than half of the variance in their indicators on average (Fornell & Larcker, 1981). AVE, taken alongside CR, provides a stringent test of convergent validity: high reliability with insufficient AVE can reveal redundancy without true convergence, but the present results surpass both criteria.

No	Latent variables	Cronbach's alpha reliability	Composite reliability	Mean extracted variance	Convergent validity		
					AVE > 0.5	CR > AVE	Confirmation status

1	SHRM	0.926	0.926	0.315	0.395	0.735	Confirmation of content validity
2	QA of the teaching-learning process	0.965	0.965	0.632	0.657	0.803	Confirmation of content validity
3	Digital metamorphosis	0.953	0.952	0.649	0.617	0.846	Confirmation of content validity
4	Organizational metamorphosis	0.976	0.976	0.435	0.626	0.777	Confirmation of content validity

Table 4: Content validity test of the measurement model

Discriminant Validity. We assessed discriminant validity using two complementary approaches. First, the Fornell–Larcker criterion was satisfied: the square root of each construct's AVE exceeded its correlations with all other constructs. This demonstrates that constructs share more variance with their own indicators than with other constructs, a minimum condition for discriminant validity (Fornell & Larcker, 1981). Second, the heterotrait–monotrait ratio (HTMT) of correlations remained below conservative thresholds (e.g., .85), further corroborating discriminant validity (Henseler, Ringle, & Sarstedt, 2015). The simultaneous satisfaction of both criteria reduces the risk of conceptual overlap among the four dimensions, which is particularly important when theorizing a higher-order architecture.

Indicators	**Individual factors**	**Group factors**	**Organizational factors**	**Meta-organizational factors**
SHRM	1			
QA of the teaching-learning process	0.687	1		
Digital metamorphosis	0.561	0.639	1	

Organizational metamorphosis	0.607	0.750	0.683	1

Table 5: Discriminant validity assessment of the measurement model

A brief note on multicollinearity is warranted because inflated shared variance can blur construct boundaries. We examined variance inflation factors (VIFs) at the indicator and construct levels and found values below commonly used thresholds (e.g., 3.3), suggesting that collinearity does not jeopardize parameter estimation or inference in this model (Hair et al., 2017). In combination, these measurement-level results—strong loadings, adequate CR and AVE, satisfied Fornell–Larcker and HTMT, and acceptable VIFs—establish a robust platform for structural testing.

Structural Model

Having established reliable and valid measurement, we evaluated the hypothesized relationships among the four dimensions using PLS-SEM with bootstrapping. The structural model was specified to reflect theoretical expectations: strategic human resources management (SHRM), quality assurance of the teaching–learning process (QA), and digital metamorphosis (DM) were posited as drivers of organizational metamorphosis (OM) within the education system. Given the conceptual integration advanced in this study, we also examined the coherence of a higher-order representation that treats these dimensions as components of a broader adaptive architecture.Model Fit and Predictive Metrics. Although PLS-SEM emphasizes prediction over exact fit, we report commonly used indices for transparency. The Standardized Root Mean Square Residual (SRMR) fell below .08, indicating acceptable residuals between observed and model-implied correlations. The Normed Fit Index (NFI) met conventional adequacy thresholds, and χ^2/df ratios were within reasonable bounds for a complex model estimated under non-normal conditions (Kline, 2011; Hair et al., 2017). We further inspected R^2 for OM to gauge explained variance and found a substantial proportion accounted for by SHRM, QA, and DM, suggesting strong explanatory power consistent with the theoretical claim that organizational transformation in education is multi-causal and integrative. To probe predictive relevance, Stone–Geisser's Q^2 (via blindfolding) was positive for the endogenous construct, and f^2 effect sizes for key paths were in the small-to-medium or larger range, underscoring practical significance in addition to statistical significance (Hair et al., 2017).

Path Estimates. Bootstrapped path coefficients indicated that SHRM exerted the strongest positive effect on OM, highlighting the centrality of teacher empowerment, professional development, and performance-aligned incentives in catalyzing change. DM also displayed a significant and substantial effect, aligning with the observation that digital infrastructure, competency building, and e-learning integration are pivotal levers for responsiveness and resilience. The contribution of QA was positive and significant but

comparatively smaller, which can be interpreted in light of the implementation horizon: curriculum reform and pedagogical personalization often require sustained cycles of design, enactment, and evaluation before their full organizational impact materializes. Collectively, these results affirm the hypothesis that transformation is not driven by a single lever but by a portfolio of mutually reinforcing initiatives (Hair et al., 2017).Robustness and Diagnostics. We conducted additional checks to ensure that the results were not sensitive to estimation artifacts. Bootstrapping with a large number of resamples provided stable standard errors and confidence intervals for path estimates. Collinearity diagnostics at the structural level indicated acceptable VIFs, reducing concern that overlapping predictors inflated effects spuriously. Inspection of residuals and outer model diagnostics identified no problematic indicators that would warrant removal. Together, these diagnostics support the stability and interpretability of the structural conclusions.Substantive Interpretation. The dominance of SHRM in the structural paths suggests that the human side of transformation—recruitment aligned with strategic goals, ongoing capacity building, formative evaluation, and supportive leadership—remains the keystone of organizational metamorphosis in education systems. The strong role of DM underscores that technology is not merely a support tool but an organizational catalyst: expanding connectivity, upgrading hardware and software, and, crucially, building teacher digital competence change workflows, information flows, and opportunities for data-informed decision-making. The QA dimension, though smaller in effect, should not be undervalued; quality processes often encode new norms into everyday practice (e.g., systematic observation, feedback loops, and assessment literacy), thereby consolidating gains made through HR and digital initiatives. Importantly, the coherence among these dimensions—as supported by discriminant validity and the higher-order framing—implies that piecemeal interventions are likely to have limited durability, whereas integrated strategies can produce cumulative, self-reinforcing effects over time.

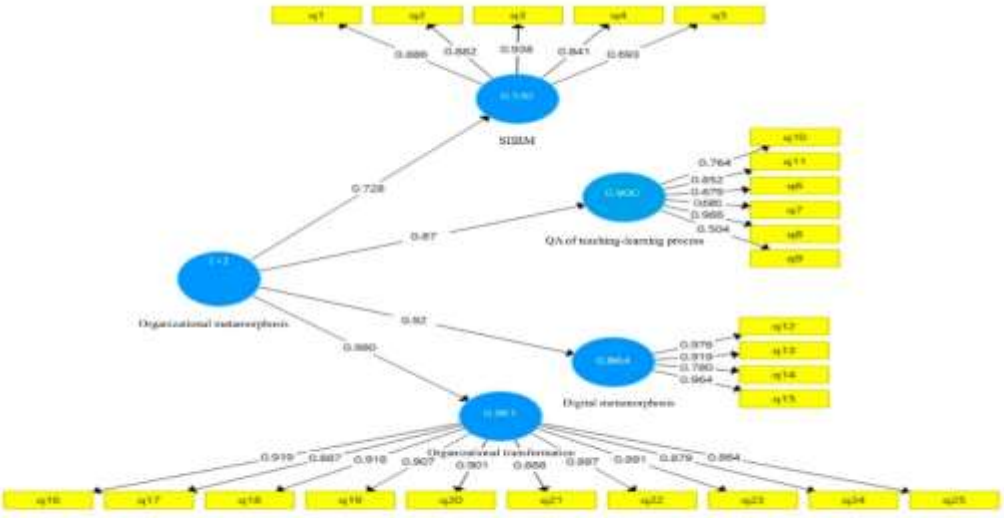

Figure 1: Structural model with PLS-SEM algorithm estimates to examine standardized significance coefficients

Figure 1 provides a visual summary of these relationships, displaying standardized path coefficients among constructs. The diagram also helps convey the relative salience of each pathway and the overall architecture of the model. In practical terms, the figure can be used by educational managers to communicate priorities and to align resources with the most influential levers—namely, investments in people and in digital capacity—while sustaining continuous improvement through quality assurance processes.

Discussion and Conclusion

The present study set out to evaluate a conceptual model of organizational metamorphosis in the education system of Shiraz with an explicit focus on environmental adaptation. Using a descriptive–survey design and advanced structural equation modeling techniques (PLS-SEM), the findings demonstrated that the proposed model—with its four dimensions of strategic human resources management, quality assurance of the teaching–learning process, digital metamorphosis, and organizational metamorphosis—was statistically valid and substantively meaningful. This section discusses the implications of these results in relation to prior literature, considers their theoretical and practical significance, and outlines limitations and directions for future research.

Summary of Key Findings

The structural model revealed that all four dimensions contribute significantly to organizational metamorphosis in educational settings. Among them, strategic human resources management (SHRM) emerged as the

strongest predictor, underscoring the primacy of teacher empowerment, professional development, and leadership support. Digital metamorphosis (DM) also exerted a substantial influence, reflecting the central role of technology integration in adapting to globalization and societal change. The quality assurance (QA) dimension, though somewhat smaller in magnitude, nevertheless contributed meaningfully to the overall construct, emphasizing the importance of continuous monitoring, curriculum alignment, and feedback systems. Together, these dimensions formed a coherent higher-order framework that explained a considerable proportion of the variance in organizational transformation.

Comparison with Previous Research

These results align with prior research that emphasizes the centrality of human capital and professional development in driving educational change (Day & Gu, 2014). In contexts undergoing rapid societal and technological shifts, teacher empowerment has repeatedly been identified as a cornerstone of sustainable reform. The strong contribution of SHRM in this study resonates with Fullan's (2016) argument that system transformation is ultimately a people-driven process, where the capacity, motivation, and collective efficacy of teachers determine the success of structural initiatives.The importance of digital transformation echoes global findings that schools increasingly rely on ICT integration to enhance resilience and adaptability (Voogt & Knezek, 2018). Particularly in middle-income contexts, investments in digital infrastructure and teacher competencies have been shown to not only modernize instruction but also reshape organizational culture toward openness and innovation. The present results thus extend this literature by empirically validating digital metamorphosis as a distinct yet interrelated dimension of organizational change.The somewhat smaller but significant role of QA processes parallels studies highlighting that quality mechanisms—such as standardized assessments, peer observation, and data-driven feedback—function as institutional routines that consolidate change (Ozga, 2016). While not always the most visible driver, QA ensures sustainability by embedding reform into everyday practice. The findings also echo evidence that such systems require time to mature before their organizational impact becomes fully apparent (Earl & Fullan, 2003).

Theoretical Contributions

From a theoretical perspective, the study makes three contributions. First, it integrates multiple strands of literature—human resource management, digital transformation, quality assurance, and leadership—into a single conceptual framework. Whereas previous research has tended to treat these dimensions separately, this model empirically demonstrates their interdependence and their collective contribution to organizational metamorphosis.Second, by applying PLS-SEM, the research validates a higher-

order construct of organizational adaptability in education. This methodological choice contributes to the refinement of educational management theory, showing how complex constructs can be modeled and tested with robustness even under conditions of non-normality.Third, the findings advance the notion of environmental adaptation as a guiding principle for educational reform. Rather than viewing transformation as a one-time structural adjustment, the model conceptualizes it as a dynamic, multi-dimensional process that enables resilience, responsiveness, and proactive engagement with global and local challenges.

Practical Implications

The results have clear implications for policymakers and practitioners in the education sector.Teacher Empowerment and Professional Development. Investments in continuous professional development should be prioritized. Training programs that combine pedagogical innovation with digital competence building can create a workforce ready to embrace and lead change.Strategic Human Resource Policies. Recruitment, promotion, and evaluation systems should be aligned with transformational goals. Incentives should reward collaboration, innovation, and adaptability rather than narrow compliance with traditional norms.Digital Infrastructure and Culture. Expanding access to ICT resources must be paired with capacity-building initiatives that develop teachers' digital confidence. Beyond hardware and software, fostering a culture of experimentation and digital leadership is key.

Quality Assurance Systems. QA should be reframed as a developmental rather than punitive mechanism. Regular feedback, collaborative assessment, and transparent reporting can institutionalize improvement processes without discouraging innovation.Collectively, these recommendations highlight that organizational metamorphosis is not achieved through isolated initiatives but through integrated strategies that reinforce one another. Educational leaders must therefore adopt a systemic mindset, aligning resources, policies, and practices toward the overarching goal of adaptability.

Limitations

Several limitations must be acknowledged. First, the study was limited to teachers in the Shiraz education system; while the sample was diverse in gender and experience, the findings cannot be automatically generalized to other cities or national contexts. Second, the cross-sectional design restricts causal inference. Longitudinal research would be needed to assess how these dimensions evolve over time and whether interventions based on the model yield sustained impact. Third, while the use of self-report questionnaires ensured efficiency and coverage, it may also be susceptible to response bias. Future studies could incorporate multi-source data, including classroom observations, administrative records, and student outcomes, to triangulate results.

Recommendations for Future Research

Future research should pursue three main directions. First, comparative studies across regions or countries could assess whether the four-dimensional model is culturally invariant or requires contextual adaptation. Second, longitudinal designs would provide insight into the temporal dynamics of organizational metamorphosis, capturing how reforms unfold and stabilize across academic cycles. Third, integrating student-level outcomes into the model would extend its relevance by linking organizational transformation directly to learning and equity goals. By pursuing these directions, future research can build a richer, more actionable understanding of how schools adapt and thrive under environmental pressures.

Conclusion

In conclusion, this study contributes to both theory and practice by validating an integrated model of organizational metamorphosis grounded in environmental adaptation. The results demonstrate that transformation in education is multidimensional: it requires empowering teachers through strategic human resource management, embedding continuous improvement via quality assurance, leveraging the potential of digital technologies, and cultivating adaptive leadership and culture. The findings affirm that resilience and innovation are not mutually exclusive but mutually reinforcing when pursued through a coherent systemic framework. For policymakers and practitioners, the message is clear: piecemeal reforms will not suffice. Sustainable adaptation demands coordinated investment in people, processes, and technology. For researchers, the study offers both a validated instrument and a conceptual architecture that can be extended and tested in diverse contexts. Ultimately, organizational metamorphosis is less about surviving change and more about shaping the future of education proactively, ensuring that schools remain relevant, equitable, and effective in an ever-evolving world.

References

Amiri, M. (2021). Transformation in the education system: Challenges and opportunities. Journal of Educational Research, 15(2), 45–60. [in Persian]

Baruah, B., & Ward, A. (2015). Metamorphosis of intrapreneurship as an effective organizational strategy. International Entrepreneurship and Management Journal, 11(4), 811–822. https://doi.org/10.1007/s11365-014-0318-3

Burton, R. M. (2015). Organization design: The evolving state-of-the-art. Springer.

Byrne, B. M. (2016). Structural equation modeling with AMOS: Basic concepts, applications, and programming (3rd ed.). Routledge.

Cassel, C., Hackl, P., & Westlund, A. H. (1999). Robustness of partial least squares method for estimating latent variable quality structures. Journal of Applied Statistics, 26(4), 435–446. https://doi.org/10.1080/02664769922322

Day, C., & Gu, Q. (2014). Resilient teachers, resilient schools: Building and sustaining quality in testing times. Routledge.

Earl, L., & Fullan, M. (2003). Using data in leadership for learning. Cambridge University Press.

Field, A. (2018). Discovering statistics using IBM SPSS statistics (5th ed.). SAGE.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18(1), 39–50. https://doi.org/10.2307/3151312

Fullan, M. (2016). The new meaning of educational change (5th ed.). Teachers College Press.

Ghasemi-Kheyrabadi, F., et al. (2019). Inefficiency of the educational system in meeting labor market needs. Quarterly Journal of Educational Management Studies, 12(3), 78–95. [in Persian]

Goldstein, J. (2011). Emergence in complex systems. In P. Allen, S. Maguire, & B. McKelvey (Eds.), The SAGE handbook of complexity and management (pp. 65–78). SAGE.

Guerrero, M., & Pugh, R. (2022). Entrepreneurial universities' metamorphosis: Encountering technological and emotional disruptions in the COVID-19 era. Technovation, 118, 102584. https://doi.org/10.1016/j.technovation.2022.102584

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2017). A primer on partial least squares structural equation modeling (PLS-SEM) (2nd ed.). SAGE.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. Journal of the Academy of Marketing Science, 43(1), 115–135. https://doi.org/10.1007/s11747-014-0403-8

Kline, R. B. (2011). Principles and practice of structural equation modeling (3rd ed.). Guilford Press.

Mashayekhi, M., & Mashbaki, A. (2022). Organizational metamorphosis: A model for rapid adaptation to the environment. Quarterly Journal of Management Improvement and Transformation, 31(104), 151–170. [in Persian]

Mizushima, N., & Komatsu, M. (2011). Autophagy: Renovation of cells and tissues. Cell, 147(4), 728–741. https://doi.org/10.1016/j.cell.2011.10.026

Mohammadi, M., et al. (2021). Application of PLS-SEM in educational management research: A case study. Quarterly Journal of Educational Management Studies, 13(4), 112–130. [in Persian]

Mohsenin, S., & Esfandiyari, M. (2017). Structural equation modeling with PLS software. Journal of Management Studies, 8(2), 45–60. [in Persian]

Mulgan, R. (2000). 'Accountability': An ever-expanding concept? Public Administration, 78(3), 555–573. https://doi.org/10.1111/1467-9299.00218

Pardakhtchi, M. H., Bazargan, A., Arasteh, H. R., & Mozaffari, G. (2012). The gap in external accountability of universities from the perspective of the academic community. Quarterly Journal of Research and Planning in Higher Education, 18(1), 91–112. [in Persian]

Ravichandran, T. (2018). Exploring the relationships between IT competence, innovation capacity, and organizational agility. The Journal of Strategic Information Systems, 27(1), 22–42. https://doi.org/10.1016/j.jsis.2017.07.002

Rosenberg, M. (2017). Strategy and geopolitics: Understanding global complexity in a turbulent world. Emerald.

Srisakda, N., Tangdhanakanond, K., & Pimpa, N. (2016). Curriculum reform for 21st-century skills: A global perspective. Journal of Educational Change, 17(3), 343–362. https://doi.org/10.1007/s10833-016-9277-8

Voogt, J., & Knezek, G. (2018). Handbook of information technology in primary and secondary education (2nd ed.). Springer.