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Smart Human Resource Architecture in Higher Education: Design and Validation of a Model at Islamic Azad University

ABSTRACT

Digital transformation and the expansion of artificial intelligence have made the redesign of human resource systems increasingly necessary. However, existing models have paid limited attention to the integrated alignment of strategy, structure, processes, technology, data governance, and human competencies. The present study aimed to design and validate a smart human resource architecture model aligned with the strategic plan of Islamic Azad University. In terms of purpose, the study was applied, and in terms of approach, it employed an exploratory sequential mixed-methods design conducted in three stages. In the qualitative stage, 17 semi-structured interviews were conducted using purposive and snowball sampling, and the data were analyzed through thematic analysis based on Braun and Clarke's six-phase framework using MAXQDA software. The model was subsequently validated through two rounds of the Delphi technique with the participation of 15 experts. In the quantitative stage, 278 valid questionnaires were collected from a total of 300 distributed questionnaires and analyzed using structural equation modeling and SmartPLS software. The final model comprised eight organizing themes encompassing strategic, structural, process-related, technological, data-related, human, and organizational readiness dimensions. The Delphi results confirmed the model, and all ten structural relationships were statistically significant. The strongest relationship was observed between data and technological requirements and the integration of information systems and intelligent decision-making (β = 0.547). Smart human resource architecture is formed through the systematic interaction of strategic, structural, process-related, technological, data-related, and human dimensions. The application of the proposed model can facilitate the alignment of the human resource system with the university's strategic plan and support the management of digital transformation in higher education.

Keywords: smart human resource architecture, digital human resource management, strategic alignment, higher education, Islamic Azad University

Introduction

The rapid expansion of digital technologies, artificial intelligence, data analytics, automation, and intelligent information systems has fundamentally altered the logic through which organizations design work, manage people, allocate capabilities, and make strategic decisions. Human resource management is no longer confined to traditional administrative functions such as recruitment, compensation, training, and performance appraisal; rather, it is increasingly expected to operate as an integrated, data-informed, technology-enabled, and strategically aligned organizational system. This transition has intensified the need to rethink the architecture of human resources in ways that connect organizational strategy, structural arrangements, work processes, digital platforms, data governance, and human competencies within a coherent framework. Strategic human resource management research has long emphasized that the value of HR systems depends on their alignment with organizational objectives and their ability to create differentiated human capital configurations that support

performance and competitive advantage [1]. At the same time, contemporary developments suggest that such alignment can no longer be achieved through conventional HR structures alone, because organizations increasingly operate in environments characterized by technological acceleration, data abundance, changing skill requirements, and continuous organizational adaptation.

The concept of human resource architecture provides an important theoretical foundation for understanding how different categories of human capital, employment relationships, HR configurations, and organizational mechanisms can be arranged to support strategic priorities. Earlier applications of human resource architecture demonstrated that organizations need differentiated yet integrated systems for managing diverse groups of employees according to the strategic value and uniqueness of their knowledge and capabilities [2]. Over time, the architecture perspective has evolved from a relatively static configuration of employment modes and HR practices toward a more dynamic conception concerned with organizational fit, adaptability, knowledge integration, and strategic responsiveness. A comprehensive review of the human resource architecture literature shows that the field has expanded substantially over the past two decades and increasingly requires attention to contextual change, organizational complexity, and the interaction among different HR subsystems [3]. This evolution is especially relevant in contemporary organizations, where digital transformation has changed not only HR tools but also the assumptions underlying human resource design itself.

Digital transformation in human resource management represents more than the adoption of isolated technologies. It reflects a broader reconfiguration of HR processes, roles, capabilities, decision mechanisms, and relationships with employees and organizational stakeholders. Research on the future of HRM and technology has therefore argued that technological change should not be studied merely as the implementation of electronic HR systems, but as a phenomenon that reshapes the nature, boundaries, and value-creation mechanisms of the HR function [4]. Subsequent reviews have reinforced this argument by showing that digital transformation in HRM affects service delivery, employee experience, analytics, decision-making, organizational design, and the strategic positioning of HR [5]. In the same direction, the concept of digital human resource management has been clarified as a form of HRM in which digital technologies influence HR actors, processes, structures, and outcomes in an interconnected manner [6]. Therefore, a smart human resource architecture should be understood not as a digitalized version of traditional HRM, but as an integrated organizational design in which technology, data, human judgment, and strategic priorities are deliberately connected.

One of the most significant drivers of this transition is the growing role of artificial intelligence in human resource management. AI-based systems are increasingly used in recruitment, talent assessment, workforce planning, learning, employee monitoring, performance management, and decision support. Such applications create substantial opportunities for improving efficiency, prediction, personalization, and strategic insight, yet they also introduce significant managerial and ethical challenges. Artificial intelligence in HRM raises questions regarding algorithmic transparency, fairness, accountability, bias, explainability, data quality, managerial responsibility, and the appropriate balance between automated recommendations and human judgment [7]. Earlier work on AI in strategic HRM similarly emphasized that the value of artificial intelligence depends on the extent to which organizations embed AI capabilities within broader strategic and organizational systems rather than treating them as standalone technologies [8]. Emerging technologies can therefore generate value only when they are incorporated into an architecture that defines their purpose, governance, interconnections, and relationship with human competencies [9].

The increasing importance of data further strengthens the need for a comprehensive architecture. Contemporary HR departments generate and access extensive data on workforce characteristics, employee behavior, competencies, performance, engagement, learning, career development, and organizational outcomes. Human resource analytics has consequently emerged as a central mechanism for converting these data into evidence for managerial decision-making. Evidence-based studies have shown, however, that HR analytics creates value only when organizations possess appropriate analytical capabilities, data quality, managerial commitment, technological infrastructure, and mechanisms for linking analysis to strategic decisions [10]. Human capital analytics can support organizational competitive advantage, but its credibility depends on the quality of measurement, causal reasoning, analytical competence, and the organizational ability to translate analytical findings into action [11]. The broader HR analytics literature likewise indicates that the field encompasses technological, methodological, strategic, behavioral, and organizational dimensions and therefore requires systemic rather than fragmented implementation [12].

Data-driven human resource management also requires explicit governance arrangements. The value of integrated HR platforms and analytical systems depends not only on access to large volumes of data but also on clear rules concerning ownership, quality, access, security, responsibility, standardization, and use. Data governance literature emphasizes that organizations need defined decision rights and accountability structures to ensure that data are managed as organizational assets [13]. Within human resource systems, these concerns become particularly important because personnel data are often sensitive, distributed across multiple platforms, and used in decisions with substantial consequences for employees. Recent research on data-driven innovation in HRM similarly suggests that successful adoption of human resource analytics requires organizational readiness, technological capability, data integration, analytical culture, and management support [14]. Accordingly, an intelligent HR architecture must incorporate data governance as a foundational dimension rather than treating it as a technical issue subordinate to information systems.

The shift toward smart HR architecture also changes the competency requirements of HR professionals and organizational leaders. The HR function is increasingly expected to combine strategic understanding with digital literacy, analytical reasoning, technological awareness, change management capability, and the ability to translate data into organizational decisions. Competency-based perspectives on the future of HR have emphasized that HR professionals must operate beyond internal administrative boundaries and develop capabilities that allow them to understand external conditions, contribute to organizational strategy, build capability, and facilitate change [15]. In digital environments, these competencies expand further to include the ability to collaborate with data scientists, information technology specialists, AI systems, and business leaders. As a result, the human dimension remains central even in increasingly automated HR systems, because the effectiveness of smart architecture ultimately depends on the capacity of individuals to interpret, govern, adapt, and use technological resources.

These issues are particularly important in higher education. Universities are knowledge-intensive, professionally complex, and institutionally distinctive organizations in which academic, administrative, technological, and governance systems coexist. Digital transformation in higher education has already changed teaching, learning, communication, service delivery, and administrative processes, while also creating considerable variation in the adoption and use of digital technologies among institutional actors [16]. The expansion of artificial intelligence in higher education has further accelerated this transformation, although research has often focused more heavily on technological applications than on educators,

institutional structures, and organizational implications [17]. This imbalance is important because the successful digital transformation of universities depends not only on educational technologies but also on the institutional capacity to manage people, roles, skills, data, and organizational change.

Higher education institutions face several HR-related pressures that make an architectural perspective increasingly necessary. These include changing academic roles, emerging digital competencies, growing reliance on data-based decision-making, competition for specialized talent, the need for flexible structures, increasing expectations for accountability, and the expansion of intelligent administrative systems. In such conditions, fragmented HR practices can limit institutional responsiveness because recruitment, development, performance management, digital systems, workforce planning, and organizational strategy may evolve independently. A smart architecture offers the possibility of integrating these elements by linking human resource systems with institutional strategy and by creating a coordinated mechanism through which technological, structural, and human changes can reinforce one another.

The need for such integration is especially significant in large, multi-unit university systems. Islamic Azad University represents a complex higher education institution with geographically dispersed units, diverse academic and administrative functions, substantial human resources, multiple information systems, and strategic priorities that require coordination across organizational levels. Its strategic plan emphasizes institutional development, organizational effectiveness, technological advancement, responsiveness to societal needs, and movement toward more advanced forms of university governance [18]. Achieving these priorities requires an HR system capable of translating strategy into workforce requirements, integrating information across units, supporting data-informed decisions, developing future competencies, and adapting structures and processes to changing organizational conditions.

Previous research within Islamic Azad University has already shown that human resource architecture is influenced by multiple organizational and managerial factors and that the design of HR systems in this context requires attention to strategic, structural, environmental, and human considerations [19]. However, the acceleration of digital transformation creates new requirements that extend beyond earlier architectural models. Recent Iranian research has proposed intelligent human resource architecture as a structural response to digital transformation, emphasizing the need to integrate technology, organizational design, and HR mechanisms in knowledge-based organizations [20]. Similarly, systematic reviews of digital HRM have identified a broad range of dimensions, including digital infrastructure, organizational culture, competencies, processes, data, and strategic alignment, highlighting the multidimensional nature of digital HR transformation [21]. These developments suggest that a contemporary model suitable for higher education should not focus on a single dimension such as technology or HR analytics, but should combine strategic, structural, process-related, technological, data-related, and human components.

Despite the growth of research on digital HRM, HR analytics, AI, and human resource architecture, important conceptual and empirical gaps remain. Much of the existing literature examines these domains separately. Human resource architecture studies often emphasize employment configurations and strategic human capital systems, digital HRM research commonly focuses on technology-enabled HR practices, HR analytics research emphasizes data and decision support, and AI research concentrates on algorithmic applications and associated risks. What remains less developed is an integrated architecture that explains how strategy, leadership, organizational readiness, structure, processes, information systems, data governance, technological infrastructure, human competencies, and intelligent decision-making operate together as a coherent system.

This fragmentation creates a practical problem as well as a theoretical one: institutions may invest in digital technologies without achieving integration, collect extensive data without building analytical capacity, develop analytics without establishing data governance, or introduce AI tools without aligning them with organizational strategy and workforce capabilities.

The literature also indicates that digital transformation succeeds only when technological change is accompanied by organizational redesign and capability development. The growing impact of emerging technologies on HRM reinforces the importance of reconsidering the structure and functions of HR systems [9]. Digital HRM frameworks increasingly emphasize that digital transformation involves organizational, technological, and human dimensions simultaneously [21]. Human resource analytics studies similarly demonstrate that technological infrastructure alone does not guarantee evidence-based management unless organizational actors trust, understand, and use analytical outputs [10, 11]. AI research likewise warns that algorithmic systems require appropriate governance and human oversight [7]. These converging streams of evidence point toward the need for a systems-level architecture that can connect these otherwise fragmented elements.

In addition, the multidimensional nature of smart HR transformation requires attention to organizational readiness and change management. Even technically sophisticated HR systems may fail when organizational culture, leadership commitment, employee acceptance, communication, and change capability are insufficient. Digital transformation is therefore not solely a technology implementation project but an organizational transition that affects established routines, authority relationships, competencies, and decision structures. Research on digital HRM emphasizes that technology reshapes organizational relationships and HR roles rather than merely automating existing practices [5, 6]. Consequently, architecture must be sufficiently dynamic and flexible to allow adaptation as technologies, workforce expectations, strategic priorities, and environmental conditions evolve.

This requirement is particularly salient for universities, where professional autonomy, distributed decision-making, multiple stakeholder groups, and diverse organizational units can complicate standardized transformation. Findings from higher education digitalization research show that perceptions, usage patterns, and levels of digital engagement vary across institutional actors [16]. At the same time, the expanding use of AI in higher education creates new institutional challenges relating to governance, capacity, and organizational preparedness [17]. Therefore, a model designed for higher education must balance standardization with flexibility, integration with local responsiveness, and technological intelligence with human and organizational judgment.

From a strategic perspective, the central challenge is to ensure that smart HR systems contribute directly to institutional objectives. Strategic HRM scholarship has consistently emphasized that HR systems generate value when they are aligned with organizational strategy and when they contribute to the development of capabilities that are difficult to replicate [1]. The human resource architecture perspective further suggests that different HR mechanisms must be coordinated according to the strategic importance and characteristics of human capital [3]. In the context of Islamic Azad University, this implies that digital tools, analytics, competencies, processes, structures, and governance mechanisms should be deliberately configured in accordance with the university's strategic direction rather than implemented independently.

Accordingly, the theoretical and practical problem addressed in the present study concerns the absence of a validated, integrated model of smart human resource architecture specifically suited to the context of higher education and aligned with the strategic requirements of Islamic Azad University. Existing studies provide important foundations in strategic HRM,

human resource architecture, digital HRM, analytics, AI, and data governance, but these foundations need to be synthesized into an architecture that reflects the realities of a large university system. Such a model should explain not only what components are required but also how they interact, which dimensions function as drivers or enabling conditions, and how strategic, human, data-related, technological, structural, and process-related elements contribute to intelligent human resource management.

Therefore, the aim of this study was to design and validate a smart human resource architecture model aligned with the strategic plan of Islamic Azad University.

Methodology

The present study was applied in terms of purpose and adopted an exploratory sequential mixed-methods approach with the aim of designing and validating a smart human resource architecture model aligned with the strategic plan of Islamic Azad University. Given the multidimensional and interdisciplinary nature of the subject, the study was designed in three interconnected stages. First, the components and relationships of the model were identified through qualitative analysis of expert interviews. Second, the resulting structure was refined and validated by experts using the Delphi method. Finally, the finalized model was empirically tested using quantitative data and partial least squares structural equation modeling (PLS-SEM). Accordingly, the quantitative phase followed the qualitative findings and Delphi results and was used to empirically test the relationships among the components of the model.

In the qualitative stage, participants were selected from academic and executive experts possessing relevant knowledge and experience in human resource management, human resource architecture, digital transformation, information technology, artificial intelligence, data analytics, data governance, and university management and planning. Purposive and snowball sampling methods were employed, and theoretical saturation was used as the criterion for determining sample adequacy. In total, 17 semi-structured interviews were conducted and analyzed. The data were analyzed using thematic analysis based on Braun and Clarke's six-phase framework, and MAXQDA software was used for data organization, coding, and management. To enhance the trustworthiness of the qualitative findings, the criteria of credibility, transferability, dependability, and confirmability were considered.

After the initial structure of the model was extracted, the Delphi stage was conducted with the participation of 15 experts from relevant fields. This stage was implemented in two rounds and, in addition to assessing the degree of agreement, enabled the collection of experts' explanatory feedback and the refinement of the definitions, conceptual boundaries, and structural configuration of the components. Percentage agreement and the interquartile range (IQR) were used to assess expert consensus, and the structure resulting from this stage formed the basis for developing the quantitative instrument.

In the quantitative stage, the statistical population consisted of managers, experts, and employees of Islamic Azad University whose occupational and professional responsibilities were related to areas such as human resources, information technology, digital transformation, organizational planning and development, and information and intelligent systems. Purposive sampling was employed, and a total of 300 questionnaires were distributed. After screening and excluding incomplete questionnaires, 278 questionnaires were retained for analysis. The data collection instrument was a researcher-developed questionnaire formulated on the basis of the structure obtained from the qualitative and Delphi stages and measured using a five-point Likert scale. Prior to the main administration, the content validity of the instrument was assessed

using expert judgment and the content validity ratio (CVR) and content validity index (CVI). Quantitative data were analyzed using partial least squares structural equation modeling and SmartPLS software. In the assessment of the measurement model, construct reliability and validity were evaluated using factor loadings, Cronbach's alpha, composite reliability (CR), average variance extracted (AVE), and the heterotrait-monotrait ratio (HTMT). In the evaluation of the structural model, path coefficients, the coefficient of determination (R^2), effect size (f^2), and predictive relevance (Q^2) were examined, and the significance of the relationships was assessed through bootstrapping. Thus, the research model emerged from a sequential process in which qualitative analysis was used to discover the components, the Delphi technique was used to refine and stabilize the structure, and quantitative analysis was used for the empirical testing of the final model.

Findings and Results

The findings are presented in three interconnected stages. In the first stage, the dimensions and components of smart human resource architecture were identified through qualitative analysis of expert interviews. In the second stage, the resulting structure was evaluated and refined by experts using the Delphi technique. In the third stage, the relationships among the model constructs were tested using partial least squares structural equation modeling. Accordingly, the quantitative findings followed the results of the two exploratory and expert-based stages, and the final research model was ultimately developed through the integration of evidence obtained from all three stages.

Thematic analysis of the 17 semi-structured expert interviews, following the extraction, comparison, integration, and classification of the initial codes and basic themes, resulted in the identification of eight organizing themes. These themes encompass different dimensions of smart human resource architecture and demonstrate that human resource digital intelligence at Islamic Azad University is not merely a technological phenomenon; rather, it emerges through the interaction of strategic, organizational, human, structural, process-related, data-related, and technological factors. The most important findings of this stage are presented in Table 1.

Table 1

Organizing Themes and Major Evidence from the Qualitative Stage

Role in the Research Model	Major Qualitative Evidence	Code Frequency	Organizing Theme
Explaining the necessity and drivers of movement toward smart architecture	Mission orientation and the university's role in societal development (76.5%); university governance and effectiveness (64.7%)	89 (11.81%)	Drivers of Smart Human Resource Architecture Implementation
Transforming data and information into managerial insight and decisions	Human resource analytics and intelligent decision support (23.5%); system integration; transition from information recording to analysis	111 (14.74%)	Integration of Information Systems and Intelligent Decision-Making
Creating adaptability and architectural reconfiguration capability	Standardized and flexible architecture within the university's multi-unit structure (50%); organizational reconfiguration capability	83 (11.02%)	Dynamic and Flexible Human Resource Architecture
Providing the organizational and cultural foundation for architecture implementation	Organizational interactions and communication (70.6%); organizational acceptance; culture and change management	83 (11.02%)	Organizational and Cultural Readiness and Change Management
Providing the human capacity required for an intelligent environment	Professional training and capability development (62.5%); future human resource competencies (56.3%); characteristics of the desired workforce (50%)	115 (15.27%)	Future Human Capital Capabilities and Competencies
Directing the architecture based on university goals and strategies	Management stability and the fourth-generation and entrepreneurial university (each 21.4% in the reported section); translation of strategy into human resource requirements	53 (7.03%)	Strategic Alignment and Organizational Leadership
Providing the data and technological infrastructure for the architecture	Technology infrastructure and intelligent systems (68.8%); data quality and integration; information security and governance	127 (16.86%)	Data, Technology, and Information Governance Requirements
Organizing human resource structures and processes within the smart architecture	Human resource architecture as a learning system (58.8%); linking performance appraisal to human capital development and linking human resource planning to strategy and data (each 47.1%)	92 (12.21%)	Structural and Process Architecture of Smart Human Resources

Among the organizing themes, “Data, Technology, and Information Governance Requirements” had the highest frequency, with 127 codes (16.86%), followed by “Future Human Capital Capabilities and Competencies” with 115 codes (15.27%) and “Integration of Information Systems and Intelligent Decision-Making” with 111 codes (14.74%). However, code frequency alone does not indicate the theoretical importance of a theme; rather, its role within the overall structure and its relationship with other dimensions were also considered in interpreting the findings.

In substantive terms, the qualitative findings demonstrated that smart human resource architecture is a multidimensional and interconnected structure. The implementation drivers explain the necessity of moving toward smart architecture, while strategic alignment and organizational leadership determine the direction of this movement. Alongside these two dimensions, data, technology, and information governance requirements provide the necessary infrastructure, whereas the integration of information systems and intelligent decision-making establishes the link among data, technology, and managerial decision-making. At the organizational level, readiness, culture, and change management create the conditions necessary for acceptance and implementation of the architecture. Finally, structural and process architecture, dynamic and flexible architecture, and human capital capabilities shape the realization and continuity of this transformation. These findings indicate that human resource digital intelligence cannot be reduced to the implementation of new technologies; rather, its realization requires coordination among strategy, structure, processes, data, technology, and human capabilities.

The eight themes extracted from the qualitative stage were presented to 15 experts in two rounds. In addition to measuring the level of agreement, the Delphi process aimed to examine experts’ explanatory feedback concerning the titles, definitions, and conceptual boundaries of the themes. In the first round, all themes met the acceptance criteria; however, based on expert feedback, several conceptual refinements were introduced to clarify the roles of the components. These included a clearer distinction among data, technology, and information governance requirements, greater emphasis on organizational acceptance and change management, and clarification of the distinction between structure and process. None of the themes was removed at this stage.

Table 2

Results of the Two Delphi Rounds and Final Status of the Themes

Final Status	Round 2 Agreement	Round 2 Mean	Round 1 Agreement	Round 1 Mean	Organizing Theme
Confirmed and retained	93.3%	4.60	86.7%	4.47	Drivers of Smart Human Resource Architecture Implementation
Confirmed and retained	93.3%	4.67	93.3%	4.53	Integration of Information Systems and Intelligent Decision-Making
Confirmed and retained	93.3%	4.53	86.7%	4.33	Dynamic and Flexible Human Resource Architecture
Confirmed and retained	93.3%	4.60	86.7%	4.40	Organizational and Cultural Readiness and Change Management
Confirmed and retained	93.3%	4.67	93.3%	4.47	Future Human Capital Capabilities and Competencies
Confirmed and retained	100%	4.73	93.3%	4.60	Strategic Alignment and Organizational Leadership
Confirmed and retained	100%	4.73	93.3%	4.67	Data, Technology, and Information Governance Requirements
Confirmed and retained	93.3%	4.60	86.7%	4.40	Structural and Process Architecture of Smart Human Resources

Source: Research findings.

As shown in Table 2, in the second round, the mean ratings of the themes ranged from 4.53 to 4.73, while the level of expert agreement ranged from 93.3% to 100%. The interquartile range for all themes was 1 or less. The highest level of

agreement was obtained for “Strategic Alignment and Organizational Leadership” and “Data, Technology, and Information Governance Requirements,” both of which achieved 100% agreement. Therefore, while confirming the eight identified themes, the Delphi results also contributed to clarifying their conceptual boundaries and the role of each theme within the model structure.

In the quantitative stage, of the 300 distributed questionnaires, 286 were returned. After excluding 8 incomplete or invalid questionnaires, 278 valid questionnaires, representing 92.7% of the distributed questionnaires, were included in the analysis. Model assessment was conducted using partial least squares structural equation modeling in SmartPLS. First, the measurement model was evaluated in terms of reliability and validity, followed by evaluation of the structural model in terms of explanatory power, effect size, predictive relevance, and the statistical significance of the relationships.

Table 3

Summary of Measurement Model Assessment Indices

Status	Observed Range/Value	Index
Acceptable	0.71–0.92	Factor Loadings
Desirable	0.876–0.919	Cronbach’s Alpha
Desirable	0.915–0.944	Composite Reliability (CR)
Acceptable	0.644–0.711	Average Variance Extracted (AVE)
Acceptable	Maximum = 0.861	HTMT

The results presented in Table 3 showed that the factor loadings of all items ranged from 0.71 to 0.92, while Cronbach’s alpha and composite reliability values for the constructs were also within desirable ranges. The AVE values for all constructs exceeded the minimum expected threshold, and the maximum HTMT value was 0.861. Therefore, evidence from the measurement model confirmed construct reliability as well as the convergent and discriminant validity of the model. Bootstrapping was used to test the statistical significance of the relationships. The significance criteria were an absolute t value greater than 1.96 and a p value less than .05. The complete results of the structural relationships are presented in Table 5.

According to the data presented in Table 4, in the structural model assessment, the R^2 values for the constructs with predicted relationships in the model ranged from 0.592 to 0.728. The highest value was observed for “Structural and Process Architecture of Smart Human Resources,” with $R^2 = 0.728$, indicating the relatively high explanatory power of the model for this construct. In addition, the reported Q^2 values for the endogenous constructs were positive, thereby confirming the predictive relevance of the model. Among the relationships, the largest effect size was observed for the effect of “Data and Technology Requirements” on “Systems Integration,” with $f^2 = 0.421$.

Table 4

Explanatory Power and Predictive Relevance of Endogenous Constructs

Q^2	R^2	Construct
0.462	0.684	Integration of Information Systems and Intelligent Decision-Making
0.391	0.617	Dynamic and Flexible Human Resource Architecture
0.348	0.592	Organizational and Cultural Readiness and Change Management
0.503	0.728	Structural and Process Architecture of Smart Human Resources

The results in Table 5 indicate that all ten tested relationships had positive path coefficients and were statistically significant. The strongest relationship in the model was observed between “Data and Technology Requirements” and “Integration of Information Systems and Intelligent Decision-Making” ($\beta = 0.547$), indicating that the quality of data and

technological infrastructure plays an important role in establishing information integration. This was followed by the relationship between systems integration and intelligent decision-making (β = 0.421) and the relationship between structural and process architecture and smart human resource architecture (β = 0.392). This pattern indicates that technology and data lead to intelligence only when they are linked to decision-making processes through information integration and are simultaneously embedded within actual human resource structures and processes.

Table 5

Path Coefficients, Statistical Significance, and Effect Sizes

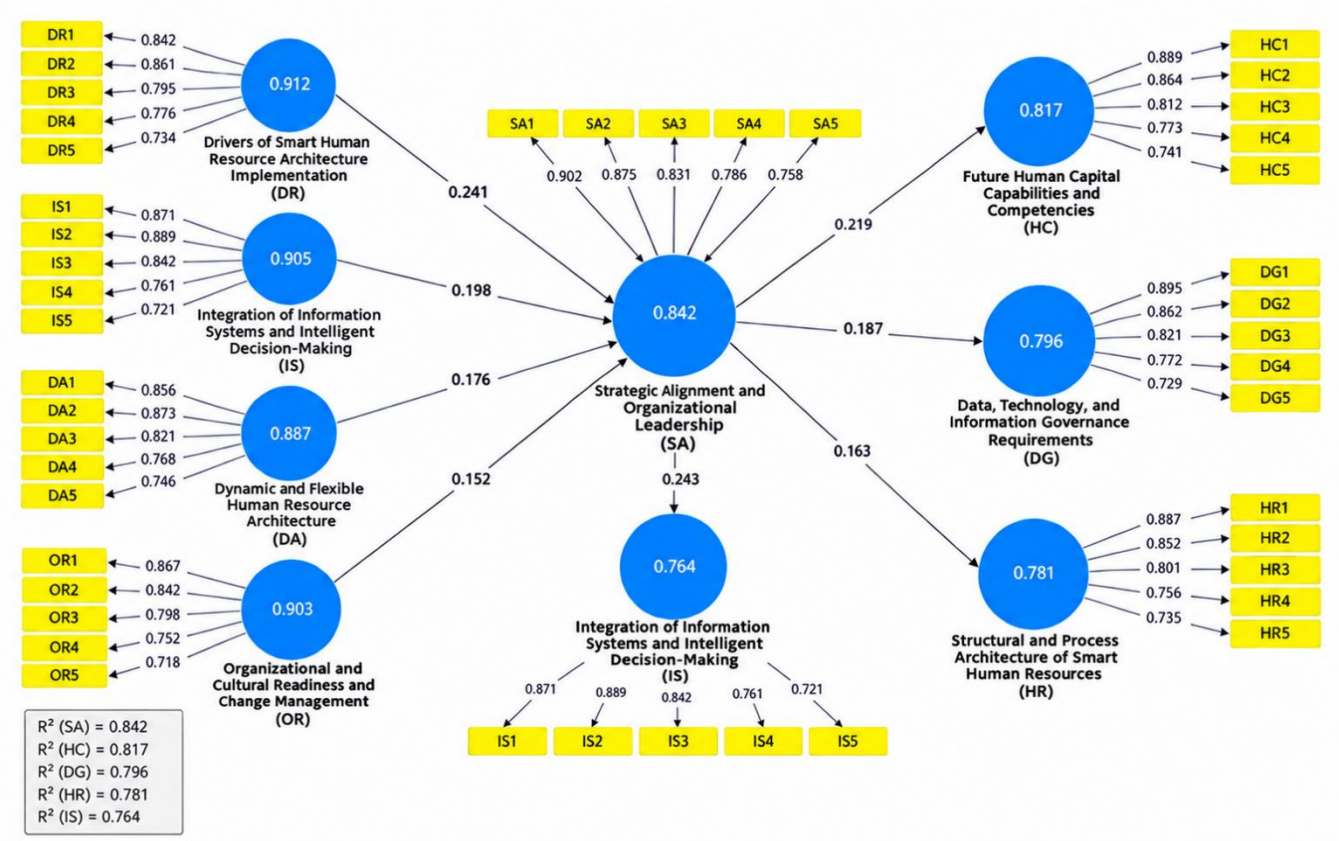
f^2	p	t	β	Relationship
0.142	< .001	3.84	0.286	Implementation Drivers → Structural and Process Architecture
0.196	< .001	4.27	0.318	Strategic Alignment → Structural and Process Architecture
0.421	< .001	8.16	0.547	Data and Technology Requirements → Systems Integration
0.229	< .001	5.93	0.421	Systems Integration → Intelligent Decision-Making
0.173	< .001	4.88	0.364	Organizational Readiness → Dynamic and Flexible Architecture
0.118	< .001	3.76	0.291	Human Capital Capabilities → Dynamic and Flexible Architecture
—	< .001	4.52	0.337	Strategic Alignment → Organizational Readiness
0.241	< .001	5.47	0.392	Structural and Process Architecture → Smart Human Resource Architecture
0.127	< .001	3.91	0.274	Dynamic and Flexible Architecture → Smart Human Resource Architecture
—	< .001	4.76	0.351	Integration of Information Systems and Intelligent Decision-Making → Smart Human Resource Architecture

Furthermore, the significant relationship between strategic alignment and organizational readiness (β = 0.337) and between strategic alignment and structural and process architecture (β = 0.318) demonstrates that strategy is not merely a contextual factor in the model; rather, it is directly associated with the way the architecture is formed and with the organization's readiness for transformation. The relationship between human capital capabilities and dynamic and flexible architecture was also significant (β = 0.291), emphasizing the role of human capacities in creating architectural adaptability and reconfiguration capability.

Figure 1 presents the structural relationships of the model in an integrated manner. The pattern of paths indicates that data and technological infrastructures are connected to intelligent decision-making through strengthening systems integration; strategic alignment is associated with organizational readiness and structural and process architecture; and organizational readiness and human capital capabilities also contribute to the development of dynamic and flexible architecture. At the final level, structural and process architecture, dynamic and flexible architecture, and the integration of information systems and intelligent decision-making contribute to the formation of smart human resource architecture. Therefore, the quantitative results provide empirical support for the multidimensional and integrated structure identified in the qualitative and Delphi stages.

Figure 1

Research Structural Model and Path Coefficients in SmartPLS



Discussion and Conclusion

The present study aimed to design and validate a smart human resource architecture model aligned with the strategic plan of Islamic Azad University. The findings showed that smart human resource architecture is a multidimensional and integrated system formed through the interaction of strategic, structural, process-related, technological, data-related, human, and organizational readiness dimensions. The qualitative phase identified eight organizing themes, namely drivers of smart human resource architecture implementation, integration of information systems and intelligent decision-making, dynamic and flexible human resource architecture, organizational and cultural readiness and change management, future human capital capabilities and competencies, strategic alignment and organizational leadership, data, technology, and information governance requirements, and structural and process architecture of smart human resources. These themes were confirmed through the Delphi process and subsequently supported by the quantitative results. The structural model indicated that all ten hypothesized relationships were positive and statistically significant, confirming the internal coherence of the proposed architecture and providing empirical support for the multidimensional conceptualization derived from the qualitative phase.

One of the most important findings was the central role of data, technology, and information governance requirements. In the qualitative phase, this theme had the highest code frequency, and in the quantitative phase, the strongest structural relationship was observed between data and technology requirements and the integration of information systems and

intelligent decision-making (β = 0.547). This result suggests that smart HR architecture depends fundamentally on the existence of integrated technological infrastructure, reliable data, interoperable systems, and clear governance mechanisms. The finding is consistent with the view that digital HRM is not achieved merely through digitizing existing HR activities but requires an integrated technological environment in which data can circulate across processes and support managerial decisions [5, 6]. It also supports the data governance perspective, according to which the value of organizational data depends on clearly defined responsibilities, decision rights, standards, and accountability mechanisms [13]. In this regard, the present finding extends previous work by showing that data governance and technological infrastructure function not as peripheral enablers but as structural prerequisites for intelligent HR decision-making.

The strong relationship between data and technology requirements and systems integration is also consistent with research on HR analytics. Effective HR analytics depends on the availability, quality, consistency, and accessibility of data across organizational systems, as well as the organization's capacity to transform data into actionable insight [10]. Similarly, credible human capital analytics require not only sophisticated analytical tools but also organizational mechanisms that ensure data reliability and enable evidence-based interpretation [11]. The findings of the present study therefore reinforce the argument that smart HR architecture cannot be created through isolated analytical applications. Instead, analytics must be embedded within a broader architecture in which technological infrastructure, information integration, and data governance operate together. This interpretation is also aligned with recent research emphasizing the role of data-driven innovation, organizational readiness, technological capability, and managerial support in the adoption of HR analytics [14].

Another important finding concerned the role of systems integration in intelligent decision-making. The relationship between systems integration and intelligent decision-making was significant and relatively strong (β = 0.421), indicating that technological intelligence becomes meaningful only when fragmented HR information systems are connected and their outputs are translated into decision support. This finding is consistent with the broader digital HRM literature, which emphasizes integration as one of the defining features of digital transformation in HRM [4, 6]. It also supports the view that artificial intelligence and analytics in HRM create value only when embedded in coherent organizational systems rather than used as independent technical solutions [8]. The result is particularly relevant to higher education institutions, where data related to faculty, staff, performance, learning, development, workload, and organizational planning are often distributed across different administrative systems. Integrating these sources can improve the quality, timeliness, and strategic relevance of HR decisions.

The findings also demonstrated the importance of strategic alignment and organizational leadership. Strategic alignment had significant effects on both structural and process architecture (β = 0.318) and organizational readiness (β = 0.337). This indicates that strategy operates as an active architectural force rather than merely as a contextual factor. In other words, smart HR architecture is more likely to emerge when institutional strategy is translated into explicit HR structures, processes, capabilities, and transformation priorities. This result strongly aligns with strategic human resource management research emphasizing that HR systems generate organizational value when they are aligned with strategic priorities and contribute to the development of capabilities that support organizational performance [1]. The finding also supports the human resource architecture perspective, which views the configuration of HR systems as dependent on the strategic value and characteristics of human capital [3].

The importance of strategic alignment is especially meaningful in the context of Islamic Azad University. As a large, multi-unit higher education institution, the university requires coordination between institution-wide strategic priorities and local operational practices. The strategic plan of Islamic Azad University emphasizes organizational effectiveness, technological development, responsiveness to societal needs, and advancement toward more developed models of university governance [18]. The present findings suggest that these priorities can be operationalized through a smart HR architecture in which strategic objectives are translated into HR processes, technological systems, data requirements, capability development, and organizational readiness. This is consistent with previous research conducted within Islamic Azad University, which identified multiple strategic, structural, and organizational factors affecting human resource architecture [19]. The present study extends that work by incorporating the additional dimensions required under conditions of digital transformation.

The significant relationship between organizational readiness and dynamic and flexible architecture (β = 0.364) further demonstrates that digital HR transformation is inseparable from cultural and organizational change. A technically advanced architecture may fail if employees, managers, and organizational units are not prepared to accept new roles, processes, decision systems, and forms of accountability. This finding is compatible with digital HRM research showing that digital transformation alters not only tools but also roles, relationships, and organizational routines [5]. It also aligns with systematic studies of digital HRM that identify organizational culture, change readiness, leadership support, and employee acceptance as essential components of successful transformation [21]. Accordingly, the present model appropriately positions readiness and change management as central mechanisms connecting strategic direction to architectural flexibility.

The role of human capital capabilities was another significant finding. Future human capital capabilities and competencies had a positive relationship with dynamic and flexible HR architecture (β = 0.291), indicating that adaptability depends on the capabilities of the people who operate, interpret, and redesign HR systems. This finding supports competency-based perspectives on the future of HR, which emphasize that HR professionals increasingly need strategic, analytical, technological, and change-oriented competencies [15]. It also reinforces the argument that digital transformation does not reduce the importance of human capabilities; rather, it changes the type of capabilities required. In smart environments, HR professionals must be able to work with data, understand technological systems, interpret analytical outputs, collaborate with technical experts, and translate strategic priorities into workforce policies and practices.

The growing use of artificial intelligence further increases the importance of these capabilities. AI-based HR tools can support recruitment, workforce planning, performance assessment, and talent management, but they also create risks related to bias, opacity, accountability, and overreliance on automated recommendations [7]. Therefore, a smart HR architecture requires professionals who can exercise informed judgment and ensure that technological outputs are interpreted within ethical, strategic, and organizational contexts. The findings are also consistent with research emphasizing that artificial intelligence should be integrated into strategic HRM through appropriate organizational structures and human oversight rather than treated as a purely technical innovation [8]. The same logic applies to broader emerging technologies, whose impact on HRM depends on organizational capacity, managerial competence, and architectural integration [9].

Another major result was the significant effect of structural and process architecture on smart human resource architecture (β = 0.392). This finding confirms that smart HRM must ultimately be embedded in concrete organizational structures and operational processes. Technology, analytics, and strategic alignment are unlikely to create sustained value if recruitment, performance management, development, workforce planning, and other HR processes remain fragmented or

disconnected from the broader architecture. This result is consistent with earlier human resource architecture research, which emphasizes the importance of designing coherent HR configurations rather than isolated practices [2, 3]. It also aligns with more recent work on intelligent HR architecture, which conceptualizes digital transformation as a structural phenomenon involving the redesign of HR functions, systems, and relationships [20].

The effect of dynamic and flexible architecture on smart HR architecture was also significant (β = 0.274). Although smaller than the effect of structural and process architecture, this relationship is theoretically important because it highlights adaptability as a defining feature of smart architecture. In environments characterized by rapid technological change, fixed architectures may quickly become obsolete. Smart HR architecture must therefore be capable of reconfiguration in response to changes in strategy, technology, workforce requirements, and external conditions. This is consistent with the literature on digital transformation, which views flexibility and continuous adaptation as core organizational capabilities [4, 5]. It also corresponds with systematic analyses of digital HRM showing that organizations increasingly require flexible processes, adaptive structures, and responsive workforce systems [21].

The explanatory and predictive indicators of the structural model provide additional support for the adequacy of the proposed architecture. The R^2 values for endogenous constructs ranged from 0.592 to 0.728, indicating that the model explained a substantial proportion of variance in key components. The highest explanatory power was observed for structural and process architecture (R^2 = 0.728), while all reported Q^2 values were positive, supporting the predictive relevance of the model. These findings suggest that the model captures meaningful interdependencies among the constructs and is not merely a descriptive classification of themes. The significant relationships collectively show that smart HR architecture emerges from the coordinated operation of strategic direction, organizational readiness, human capabilities, technology, data governance, systems integration, and structural and process design.

The findings also have particular significance for higher education. Previous research has shown that digital transformation in universities is uneven and that institutional actors differ in their use and perception of digital technologies [16]. Research on artificial intelligence in higher education has similarly shown that technological applications have developed more rapidly than institutional and organizational research on their implementation [17]. The present study contributes to addressing this gap by shifting attention from isolated technologies to an integrated institutional architecture for managing human resources in a digitally transformed university. This is especially important because higher education institutions combine academic autonomy, administrative complexity, distributed decision-making, and diverse professional roles, making the coordination of digital transformation more difficult than in many conventional organizations.

Overall, the findings support the view that smart human resource architecture should be understood as a systemic organizational capability rather than a collection of digital HR tools. The proposed model integrates traditional strategic HRM principles with newer perspectives on digital transformation, analytics, AI, and data governance. It confirms that strategy provides direction, organizational readiness creates the conditions for adoption, human capabilities provide adaptive capacity, data and technology form the infrastructure, systems integration enables intelligent decision-making, and structural and process architecture embeds these elements into organizational practice. In this sense, the model extends previous research by integrating previously fragmented streams of scholarship into a coherent architecture suitable for higher education. It also supports the argument that successful digital HR transformation depends on the simultaneous alignment of technology, data, organization, and people rather than the prioritization of any single dimension [12, 20].

This study has several limitations that should be considered when interpreting the findings. First, the empirical context was limited to Islamic Azad University, and the organizational characteristics of this large, multi-unit university system may differ from those of public universities, smaller private institutions, or higher education systems in other countries. Second, although the mixed-methods design strengthened the depth and validity of the findings, both the qualitative and quantitative phases relied largely on expert and employee perceptions, which may be influenced by subjective judgment and organizational experience. Third, the quantitative phase used a cross-sectional design; therefore, the findings demonstrate statistically significant relationships but do not establish causal effects over time. Fourth, purposive sampling was appropriate for accessing respondents with relevant knowledge, but it may limit the statistical generalizability of the findings. Finally, the rapid evolution of artificial intelligence, analytics, and digital HR technologies means that some technological dimensions of the proposed architecture may require periodic revision as new tools, governance challenges, and competency requirements emerge.

Future studies should test the proposed model in other public, private, and international higher education institutions to evaluate its generalizability across different governance structures and organizational environments. Comparative studies across universities, regions, and national higher education systems could identify which components of smart HR architecture are universal and which are context-dependent. Longitudinal research is also recommended to examine how smart HR architecture develops over time and whether improvements in integration, readiness, and human capability lead to measurable organizational outcomes. Future studies could additionally incorporate objective indicators such as HR process efficiency, employee performance, turnover, digital adoption, service quality, and institutional effectiveness. Researchers may also examine mediating and moderating mechanisms, including digital culture, leadership style, organizational learning, trust in AI, technological maturity, and employee resistance to change. Finally, future research should investigate emerging issues such as algorithmic governance, ethical AI, explainability, workforce surveillance, and the impact of generative AI on HR roles and competencies.

For practice, university leaders should treat smart human resource architecture as an institution-wide transformation program rather than as an isolated HR technology project. The first priority should be to align HR architecture explicitly with institutional strategy and translate strategic objectives into measurable workforce, competency, process, and technology requirements. Universities should establish integrated HR information infrastructures and clear data governance mechanisms to improve data quality, interoperability, security, and accountability. HR processes such as recruitment, performance management, development, succession planning, and workforce planning should be redesigned around integrated data and intelligent decision support. At the same time, investment in digital and analytical competencies should extend beyond HR staff to include managers and decision-makers across the institution. Organizational readiness should be strengthened through communication, participation, change management, and leadership support. Finally, governance mechanisms should ensure that AI-supported HR decisions remain transparent, reviewable, ethically responsible, and subject to meaningful human oversight.

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Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants. Written consent was obtained from all participants in the study.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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