

Development and Psychometric Validation of an Instrument for Assessing the Quality of Talent Management in the Agricultural Research, Education, and Extension Organization (AREEO)

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ABSTRACT

Talent management is a strategic capability in knowledge-based organizations and plays a vital role in identifying, attracting, developing, and retaining capable human resources. However, indigenous and valid instruments for assessing the quality of talent management are limited in research and public organizations, particularly in the Agricultural Research, Education, and Extension Organization (AREEO). Therefore, this study aimed to develop and psychometrically validate an instrument for measuring talent management quality in this organization. The study was applied in purpose and used a sequential exploratory mixed-methods design. In the qualitative phase, the dimensions and components of talent management quality were identified through a grounded theory approach, and the initial items of the instrument were developed based on expert insights. In the quantitative phase, the instrument was validated among managers, experts, and relevant staff of AREEO. Data were collected through semi-structured interviews and a 30-item researcher-developed questionnaire. Construct validity was assessed using first- and second-order confirmatory factor analysis, reliability was evaluated through Cronbach's alpha and composite reliability, and convergent and discriminant validity were examined using the average variance extracted (AVE) and the Fornell-Larcker criterion. The findings indicated that the instrument had an appropriate factor structure and satisfactory psychometric properties. Accordingly, the developed instrument can serve as a valid and reliable indigenous tool for evaluating talent management quality and supporting evidence-based decision-making in AREEO.

Keywords: AREEO; Mixed-Methods Research; Psychometric Validation; Reliability; Talent Management

1. Introduction

Talent management has emerged as one of the most important strategic priorities of contemporary organizations due to increasing environmental complexity, rapid technological transformation, demographic changes in labor markets, and intensified competition for highly skilled human resources. In modern organizational environments, sustainable success is no longer determined solely by financial resources, physical assets, or technological infrastructures; rather, it is increasingly dependent on the ability of organizations to identify, attract, develop, retain, and effectively deploy talented individuals. Consequently, talent management has evolved from a traditional human resource function into a comprehensive strategic framework that directly influences organizational performance, innovation capacity, competitiveness, and long-term sustainability. Recent studies have emphasized that organizations capable of systematically managing talent achieve superior outcomes in employee engagement, leadership development, organizational effectiveness, and strategic adaptability (Akbar et al., 2025; Tsaousiotis et al., 2025). Moreover, talent management has become a central component of organizational excellence because talented employees constitute the primary source of knowledge creation, innovation, and competitive advantage in knowledge-based economies (Giawa, 2026; Quispe Torres & Contreras Rivera, 2026).

The growing significance of talent management has stimulated extensive scholarly attention toward understanding its dimensions, processes, and organizational outcomes. Contemporary literature conceptualizes talent management as a multidimensional system encompassing talent identification, recruitment, development, performance management, succession planning, retention, leadership cultivation, and strategic workforce planning. These interconnected components contribute collectively to the development of organizational capabilities and the enhancement of human capital effectiveness. Recent integrative reviews have demonstrated that effective talent management practices positively influence organizational resilience, employee commitment, productivity, and sustainable performance outcomes (Akbar et al., 2025; Tsaousiotis et al., 2025). Similarly, strategic human talent management has been identified as a critical factor in public-sector modernization and institutional performance improvement, particularly in organizations operating within complex and dynamic environments (Anggraini et al., 2025;

Quispe Torres & Contreras Rivera, 2026). The increasing recognition of talent management as a strategic capability has encouraged organizations to move beyond traditional personnel administration and adopt comprehensive talent management systems aligned with organizational goals and future workforce needs (Attar et al., 2025; Giawa, 2026).

Within this evolving landscape, organizations have increasingly sought to develop context-specific talent management models tailored to their unique missions, cultures, and operational requirements. Research conducted across diverse sectors demonstrates that talent management systems are highly sensitive to organizational context and cannot be effectively implemented through generic frameworks alone. Studies conducted in social security organizations, knowledge-based enterprises, military institutions, defense industries, educational systems, sports organizations, and public-sector agencies have consistently emphasized the necessity of designing indigenous talent management models that reflect specific organizational realities and strategic priorities (Abedi-Roshi et al., 2025; Ghanbarpour et al., 2025; Gholami et al., 2025; Pashaei-Holaso, 2025). Such findings indicate that talent management should be viewed not as a universal prescription but as a contextually embedded organizational process requiring careful adaptation to environmental, cultural, structural, and strategic conditions (Momeni et al., 2025; Sakvand et al., 2026).

The educational sector represents one of the most important contexts for talent management because educational institutions rely heavily on the knowledge, competencies, creativity, and commitment of their human resources. Universities, schools, research centers, and educational organizations operate in environments characterized by increasing demands for quality, accountability, innovation, and international competitiveness. Consequently, the effective management of talented educators, researchers, administrators, and academic leaders has become essential for achieving educational excellence and institutional sustainability. Research in educational settings has demonstrated that talent management contributes significantly to organizational quality, educational effectiveness, leadership development, succession planning, and institutional performance improvement (Abaspour & Mojtazadeh, 2022; Hosseini Largani & Mojtazadeh, 2021). Furthermore, educational organizations that successfully identify and nurture talent are better positioned to respond to emerging challenges, implement innovative practices, and sustain long-term

organizational development (McKenney & Reeves, 2025; Olave Astorga & González-Carrasco, 2025).

The importance of talent management in educational systems has led to the development of numerous models and frameworks aimed at enhancing human resource quality and organizational effectiveness. Studies focusing on schools and educational institutions have emphasized the critical role of talent management in identifying high-potential employees, developing leadership pipelines, and promoting educational quality. Research on talent management among school principals has highlighted the importance of strategic recruitment, professional development, succession planning, and performance evaluation in fostering organizational effectiveness (Tayefeh-Seifi et al., 2020). Likewise, investigations conducted in schools affiliated with higher education systems have demonstrated that systematic talent management contributes significantly to educational innovation, organizational commitment, and institutional excellence (Hashemi et al., 2019; Seifhashemi et al., 2019). These findings suggest that talent management serves as a crucial mechanism for ensuring educational sustainability and continuous improvement.

In recent years, the concept of talent management has expanded beyond traditional human resource practices to incorporate contemporary developments in governance, technology, and organizational strategy. Modern talent management models increasingly emphasize meritocracy, digital transformation, artificial intelligence, agile governance, strategic leadership, and evidence-based decision-making. Studies have demonstrated that organizations adopting merit-based talent management systems experience improved employee motivation, organizational trust, leadership effectiveness, and institutional performance (Norouzian et al., 2024; Razapour et al., 2024). Similarly, emerging research highlights the importance of integrating digital technologies and data-driven approaches into talent management processes to enhance workforce planning, talent identification, and organizational agility (Pazhohan et al., 2024; Wu & Liu, 2024). These developments reflect a broader shift toward intelligent and strategic talent governance capable of addressing the challenges of increasingly complex organizational environments.

The growing emphasis on strategic talent management has also generated interest in examining sector-specific applications and adaptations. Research conducted in sports organizations, for example, has emphasized the importance of talent identification, development pathways, leadership

succession, and performance management in achieving organizational success and competitive advantage (Ghasemiharsini et al., 2024; Talebzadeh et al., 2024). Similarly, investigations in industrial and energy sectors have highlighted the role of talent management in supporting innovation, knowledge transfer, operational excellence, and organizational sustainability (Sakhaeipour et al., 2023; Salamatian, 2024). Studies in thermal power generation organizations have likewise demonstrated that talent management contributes to organizational effectiveness through the development of human capabilities, leadership competencies, and strategic alignment (Seirghani et al., 2023; Sirghani et al., 2023). These findings collectively underscore the adaptability and strategic significance of talent management across diverse organizational contexts.

Another important dimension of contemporary talent management concerns its relationship with governance and organizational effectiveness. Recent research has proposed governance-oriented talent management frameworks that integrate contextual factors, strategic mechanisms, and organizational interventions to enhance institutional performance. Such approaches emphasize the importance of aligning talent management practices with principles of transparency, accountability, participation, meritocracy, and strategic leadership (Sakvand et al., 2026). Similarly, lean talent management models have highlighted the need for efficient resource utilization, streamlined processes, continuous improvement, and value creation in talent-related activities (Momeni et al., 2025). These perspectives suggest that talent management should be understood not merely as a collection of human resource practices but as a comprehensive governance system capable of influencing organizational effectiveness at multiple levels.

Despite the extensive body of research devoted to talent management, a significant gap remains regarding the measurement and evaluation of talent management quality. Much of the existing literature focuses on conceptual model development, organizational implementation, and theoretical discussions, while comparatively less attention has been devoted to developing valid and reliable instruments capable of assessing the quality and effectiveness of talent management systems. Existing models often provide valuable conceptual frameworks but lack robust psychometric tools for empirical evaluation and organizational diagnosis (Abaspour & Mojtazadeh, 2022; Hosseini Largani & Mojtazadeh, 2021). Furthermore, many available instruments have been developed in specific organizational settings and may not adequately capture the

contextual complexities of other sectors or institutions. Consequently, the absence of standardized and contextually appropriate measurement tools limits the ability of organizations to evaluate talent management performance, identify strengths and weaknesses, benchmark practices, and implement evidence-based improvements (McKenney & Reeves, 2025; Olave Astorga & González-Carrasco, 2025).

The development of valid measurement instruments requires rigorous methodological procedures encompassing conceptual clarification, item generation, expert validation, construct verification, and psychometric assessment. Qualitative methodologies play a particularly important role in identifying context-specific dimensions and ensuring that measurement instruments accurately reflect organizational realities and stakeholder experiences. Methodological scholars have emphasized the value of qualitative inquiry and mixed-methods approaches in instrument development because they facilitate the generation of contextually grounded constructs and enhance content validity (Hooman, 2025). Such approaches are especially relevant in talent management research, where organizational context, culture, and strategic priorities significantly influence the meaning and manifestation of talent-related phenomena.

Moreover, recent studies have proposed innovative approaches to talent management that integrate strategic foresight, digital transformation, and organizational adaptability. Dynamic talent management frameworks emphasize the need for organizations to anticipate future workforce requirements, respond proactively to environmental changes, and develop sustainable talent pipelines (Pazhohan et al., 2024). Likewise, research on talent management foundations from Islamic perspectives has highlighted the importance of ethical principles, human dignity, justice, and value-based leadership in talent-related decision-making (Mohammadnejad & Pahlavan Sharif, 2024). These perspectives broaden the conceptual scope of talent management and suggest that effective measurement systems should capture both operational processes and underlying philosophical orientations.

In addition, contemporary scholarship increasingly recognizes the relationship between talent management and broader organizational outcomes such as research productivity, innovation capacity, institutional reputation, and societal impact. Studies investigating determinants of research impact have demonstrated that human capital quality, leadership effectiveness, institutional support, and talent development mechanisms significantly influence organizational success and knowledge production (Arsalan

et al., 2025). Consequently, assessing the quality of talent management is not merely an administrative exercise but a strategic necessity for organizations seeking to enhance performance, competitiveness, and long-term sustainability.

Given the growing strategic importance of talent management, the diversity of organizational contexts in which it operates, and the limited availability of comprehensive measurement instruments, there is a clear need for developing and validating robust tools capable of assessing talent management quality. Such instruments can support organizational diagnosis, facilitate evidence-based decision-making, guide policy development, and contribute to the advancement of talent management theory and practice. Therefore, the present study aims to develop and psychometrically validate an instrument for assessing the quality of talent management in the Agricultural Research, Education, and Extension Organization.

2. Methods and Materials

This study was applied in terms of purpose and descriptive-survey in terms of data collection. Methodologically, it employed a sequential exploratory mixed-methods design, in which a qualitative phase was first conducted to identify the indigenous dimensions and components of talent management in the Agricultural Research, Education, and Extension Organization (AREEO), followed by a quantitative phase to develop and psychometrically validate the resulting instrument. In the qualitative phase, grounded theory was adopted based on the Strauss and Corbin approach because the aim was to extract categories and dimensions grounded in the lived experiences and perceptions of participants within a real organizational context.

The selection of a sequential exploratory mixed-methods design was appropriate because the main purpose of the study was to develop an indigenous instrument for measuring talent management in the specific context of AREEO rather than merely test an imported pre-existing framework. In instrument development studies, particularly in organizational and context-sensitive settings, combining qualitative exploration with quantitative validation provides a more robust conceptual basis for item generation and construct validation. This logic is also consistent with previous Iranian studies on talent management that have emphasized indigenous modeling and context-based instrument development.

The study was conducted in AREEO, a strategic national organization in the agricultural sector responsible for research, education, extension, and knowledge dissemination. Given the central role of expert human resources, scientific capability, and managerial continuity in such an institution, AREEO provided an appropriate setting for the development of an indigenous talent management instrument.

In the qualitative phase, participants were selected through purposive non-probability sampling. Selection criteria included professional expertise, executive experience, familiarity with talent management processes, and direct relevance to the subject under study. The qualitative sample consisted of 21 participants, including managers, faculty members, and experts in human resource management and education. Data collection continued until theoretical saturation was reached; that is, when subsequent interviews no longer yielded new concepts or analytical insights.

In the quantitative phase, the statistical population consisted of AREEO personnel in three principal groups: managers, faculty members, and employees. The final sample included 384 respondents. Sample adequacy was supported by common recommendations for factor analysis and structural equation modeling as well as the sampling logic suggested for finite populations. Sampling was conducted using a combination of cluster random sampling and stratified random sampling to ensure adequate representation of the main occupational groups. The final sample distribution consisted of 76 managers, 128 faculty members, and 180 employees.

In the first phase, data were collected through semi-structured exploratory interviews. An interview guide was developed to provide coherence across interviews while allowing sufficient flexibility to follow emerging themes and context-bound meanings. The interviews included open-ended, probing, and follow-up questions focusing on the dimensions, antecedents, practices, and consequences of talent management in AREEO. With informed consent from participants, all interviews were audio-recorded, transcribed verbatim, and prepared for analysis.

In the second phase, data were collected using a researcher-made questionnaire developed on the basis of the qualitative findings. The final questionnaire consisted of 30 items scored on a five-point Likert scale. The use of a Likert-type scale enabled standardized assessment of respondents' perceptions regarding the latent dimensions of talent

management and was appropriate for psychometric evaluation.

The indigenous talent management instrument was developed through several stages. First, the initial item pool was generated based on the qualitative findings and the concepts derived from grounded theory analysis. More specifically, the categories and concepts emerging from open, axial, and selective coding provided the substantive foundation for item writing. This process ensured that the content of the instrument was rooted in the lived experiences of participants and the organizational realities of AREEO rather than being directly imported from non-indigenous models.

Second, the preliminary version of the instrument was reviewed by specialists in human resource management, educational management, and educational psychology in order to assess conceptual relevance, clarity of wording, and content representativeness. Third, repetitive, ambiguous, or overlapping items were revised, merged, or deleted. After this refinement, the questionnaire was prepared for pilot review and final administration in the quantitative phase.

This instrument development process is consistent with previous Iranian studies on talent management that have emphasized indigenous model development, context-based conceptualization, and the transformation of qualitative findings into measurable constructs. It is also aligned with the broader international talent management literature highlighting the strategic and context-dependent nature of talent systems (Armstrong, 2006; Berger & Berger, 2003; Bhatnagar, 2007; Boudreau, 2013).

To ensure the rigor of the qualitative findings, the study addressed the criteria of credibility, transferability, dependability, and confirmability. Credibility was strengthened through sustained engagement with the data, iterative coding, and constant comparison of emerging categories. Transferability was supported by providing sufficient detail regarding the research context and participant characteristics. Dependability and confirmability were enhanced through systematic documentation of the analytical process and review of coding procedures.

In addition, inter-coder reliability was examined using Cohen's kappa coefficient. The obtained coefficient was 0.870, indicating a high level of agreement and stability in the qualitative coding process.

In the quantitative phase, validity was assessed from the perspectives of face validity, content validity, and construct validity. Face validity was considered in terms of item clarity, appropriateness, and comprehensibility. Content

validity was evaluated through expert judgment to ensure that the items adequately covered the conceptual domain of indigenous talent management.

Construct validity was examined through factor-analytic procedures. First, sampling adequacy and the suitability of the correlation matrix for factor analysis were assessed using the Kaiser–Meyer–Olkin (KMO) index and Bartlett’s test of sphericity. Then, confirmatory factor analysis was performed to test the adequacy of the measurement structure. Convergent validity was assessed using average variance extracted (AVE), and discriminant validity was evaluated using the Fornell–Larcker criterion. These procedures are widely recommended in psychometric and structural equation modeling research (Hair et al., 2019).

Reliability in the quantitative phase was assessed using Cronbach’s alpha and composite reliability. These indices were used to evaluate the internal consistency and homogeneity of the questionnaire items. In the qualitative phase, reliability was supported through Cohen’s kappa, as noted above. Taken together, these procedures supported the consistency and stability of both the qualitative coding scheme and the quantitative instrument.

The data were analyzed using SPSS version 29, AMOS version 29, and SmartPLS version 4. SPSS was used for descriptive statistics, preliminary data screening, inter-coder agreement analysis, and the assessment of data suitability for factor analysis. Specifically, KMO and Bartlett’s test were computed before conducting factor-analytic procedures. AMOS was used for confirmatory factor analysis and structural equation modeling to evaluate the adequacy of the proposed measurement structure. SmartPLS was used to assess convergent validity, discriminant validity, and composite reliability within the measurement model.

Model fit was evaluated using conventional structural equation modeling indices, including χ^2/df , CFI, GFI, TLI, and RMSEA. The interpretation of these indices followed accepted methodological recommendations in the SEM literature.

3. Findings and Results

During the open coding process, an initial set of concepts was identified. In the second stage of open coding, or focused coding, following preliminary refinement, semantically similar concepts were classified into major categories. During the axial coding stage, the core categories were extracted, and the relationships among them were systematically explained. Furthermore, in the selective coding stage, the major and core categories were organized into three overarching groups: conditional (including causal conditions, intervening conditions, and contextual conditions), strategic/interactive, and outcome-related. In this process, the talent management model for the Agricultural Research, Education, and Extension Organization of Iran was conceptualized as “Integrated and Intelligent Talent Management Governance” and was selected as the central/final core phenomenon. Overall, based on the grounded theory analysis process, the extracted major and core categories formed the conceptual framework of the subscales and scales of the instrument designed to assess the quality of talent management in the Agricultural Research, Education, and Extension Organization (AREEO). These scales were subsequently used for the development and psychometric validation of the instrument. Table 1 presents the talent management quality assessment instrument along with the factor loadings of each item in the first-order confirmatory factor analysis.

Table 1

Measurement Tool for Assessing Talent Management Quality in the Agricultural Research, Education, and Extension Organization (AREEO) with Factor Loadings for Each Item

No.	Question	Factor Loading	Result
1	To what extent does managerial succession reflect effective talent management in the organization?	0.98	Confirmed (>0.30)
2	To what extent does managerial potential help identify and develop talent?	0.96	Confirmed (>0.30)
3	To what extent does adherence to the successor preparation process support the development of key talents?	0.95	Confirmed (>0.30)
4	To what extent does attention to professional credibility reflect effective talent management in the organization?	0.91	Confirmed (>0.30)
5	To what extent does leadership potential contribute to enhancing managerial capabilities and guiding talent?	0.95	Confirmed (>0.30)

6	To what extent is professional competence important for strengthening employees' skills and capabilities?	0.76	Confirmed (>0.30)
7	To what extent is resource optimization for faculty members and staff effective in talent management?	0.95	Confirmed (>0.30)
8	To what extent does skill enhancement among organizational members strengthen talent and improve individual and organizational performance?	0.99	Confirmed (>0.30)
9	To what extent does capability development indicate effective talent management?	0.98	Confirmed (>0.30)
10	To what extent does performance evaluation help identify and enhance talent?	0.91	Confirmed (>0.30)
11	To what extent does goal follow-up align activities with organizational strategies and improve talent management?	0.93	Confirmed (>0.30)
12	To what extent do rewards and motivation enhance commitment and talent retention?	0.99	Confirmed (>0.30)
13	To what extent is the work environment important for the development and utilization of talent?	0.96	Confirmed (>0.30)
14	To what extent does resource allocation reflect effective talent management?	0.91	Confirmed (>0.30)
15	To what extent is the strategic framework for talent guidance effective in improving talent management?	0.73	Confirmed (>0.30)
16	To what extent are organizational values important in ensuring talent management?	0.95	Confirmed (>0.30)
17	To what extent does professional ethics influence the development and retention of talent in the organization?	0.96	Confirmed (>0.30)
18	To what extent is spiritual leadership across organizational units effective in improving performance and developing talent?	0.96	Confirmed (>0.30)
19	To what extent does AI-based talent identification contribute to improving talent management?	0.96	Confirmed (>0.30)
20	To what extent does AI-based prediction of talent needs contribute to enhancing organizational talent?	0.96	Confirmed (>0.30)
21	To what extent does AI-based strategic decision-making reflect modern talent management?	1.00	Confirmed (>0.30)
22	To what extent does attention to digital capability improve talent management and organizational productivity?	0.82	Confirmed (>0.30)
23	To what extent do technological skills contribute to strengthening talent and improving organizational processes?	0.90	Confirmed (>0.30)
24	To what extent is digital innovation essential for retaining and enhancing talent?	0.92	Confirmed (>0.30)
25	To what extent does adherence to the smart recruitment process reflect fair talent management?	0.95	Confirmed (>0.30)
26	To what extent does commitment to scientific talent assessment contribute to identifying and developing talent?	0.94	Confirmed (>0.30)
27	To what extent does the talent retention program contribute to increasing trust and retaining employees?	0.98	Confirmed (>0.30)
28	To what extent does attention to alignment with organizational goals improve managerial decision-making and talent development?	0.97	Confirmed (>0.30)
29	To what extent does strategic guidance reflect talent management in the organization?	0.97	Confirmed (>0.30)
30	To what extent can long-term talent development improve the organization's talent management?	0.97	Confirmed (>0.30)

Responses to the items listed in Table 1 are recorded based on a five-point Likert scale consisting of "Very Low, Low, Moderate, High, and Very High." Accordingly, respondents evaluate the extent to which each of the specified items is realized or considered in the current state of talent management in the Agricultural Research, Education, and Extension Organization (AREEO).

The results presented in Table 1 indicate that the instrument designed to assess the quality of talent management in the Agricultural Research, Education, and Extension Organization demonstrates desirable factorial validity. According to the findings, the factor loadings of all

items are higher than the minimum accepted criterion of 0.30; therefore, all indicators have been confirmed. This suggests that the designed items have appropriate correlations with the latent constructs and that the instrument possesses acceptable construct validity and internal consistency. The factor loadings range from 0.73 to 1.00, indicating the high explanatory power of most items.

A closer examination of the results shows that a considerable number of items have very strong factor loadings (*above* 0.95). These items include managerial succession, skill enhancement, capability development, rewards and motivation, work environment, professional

ethics, spiritual leadership, AI-based talent identification, AI-based prediction of talent needs, AI-based strategic decision-making, talent retention program, alignment with organizational goals, strategic guidance, and long-term talent development. The high factor loadings of these indicators suggest that these components play a central and decisive role in explaining the quality of talent management and possess very high measurement power.

In contrast, some items, although they have desirable and confirmed factor loadings, show relatively lower values compared with the other items. These include professional competence with a factor loading of 0.76, the strategic framework for talent guidance with a factor loading of 0.73, digital capability with a factor loading of 0.82, technological skills with a factor loading of 0.90, professional credibility with a factor loading of 0.91, performance evaluation with a factor loading of 0.91, and resource allocation with a factor loading of 0.91. Although these values still fall within the

acceptable range, they indicate that the explanatory contribution of these indicators is slightly lower than that of the first group of items.

Overall, it can be concluded that all items of the instrument have been statistically confirmed, and the designed scale demonstrates strong construct validity. Therefore, the instrument for assessing the quality of talent management in the Agricultural Research, Education, and Extension Organization can be used as a valid and reliable tool in managerial and organizational research, as well as in policy-making and operational evaluations within this organization. Nevertheless, in future studies, revising and strengthening some indicators with relatively lower factor loadings may further improve the quality of the instrument.

Table 2 summarizes the results of the second-order confirmatory factor analysis of the proposed talent management model in the Agricultural Research, Education, and Extension Organization (AREEO).

Table 2

Second-Order Confirmatory Factor Analysis of the Talent Management Model in the Agricultural Research, Education, and Extension Organization (AREEO)

Row	Scale	Question Numbers (Sub-scales)	Factor Loading	Result
1	Succession Development	1, 2, 3	0.98	Confirmed (>0.30)
2	Managerial Meritocracy	4, 5, 6	1.04	Confirmed (>0.30)
3	Human Capital Management	7, 8, 9	0.96	Confirmed (>0.30)
4	Employee Performance Management	10, 11, 12	1.00	Confirmed (>0.30)
5	Lean Talent Governance	13, 14, 15	1.01	Confirmed (>0.30)
6	Islam-Oriented Talent Leadership	16, 17, 18	1.00	Confirmed (>0.30)
7	AI-Based Talent Governance	19, 20, 21	0.98	Confirmed (>0.30)
8	Digital Skill Development	22, 23, 24	1.01	Confirmed (>0.30)
9	Talent Selection, Recruitment, and Retention	25, 26, 27	1.00	Confirmed (>0.30)
10	Strategic Talent Leadership	28, 29, 30	1.00	Confirmed (>0.30)

The results presented in Table 2 indicate that the talent management measurement instrument in the Agricultural Research, Education, and Extension Organization (AREEO) demonstrates desirable fit and validity in terms of second-order confirmatory factor analysis. At this level of analysis, the 10 main scales or major dimensions of the instrument are considered first-order constructs, all of which play a significant and acceptable role in explaining the second-order construct, namely talent management. According to the findings, the factor loadings of all dimensions are higher than the minimum accepted criterion of 0.30; therefore, all dimensions of the instrument have been confirmed. These results indicate that the conceptual structure designed to assess talent management possesses appropriate construct validity, and that the identified dimensions effectively

represent the overall construct of the instrument. The factor loadings of the dimensions range from 0.96 to 1.04, indicating the very high explanatory power of all the main components of the instrument. This level of factor loading suggests that each of the ten dimensions makes a substantial contribution to explaining the overarching concept of talent management and can therefore be considered a fundamental component of the measurement instrument. In other words, none of the dimensions extracted at the second level of analysis is weak or marginal; rather, all of them demonstrate a high capacity to represent the final structure of the instrument. A closer examination of the findings reveals that managerial meritocracy, with a factor loading of 1.04, has the highest value among the dimensions of the instrument. This finding suggests that managerial meritocracy is the

most central and influential dimension in explaining talent management within the measurement instrument. It is followed by lean talent governance and digital skill development, each with a factor loading of 1.01, ranking next among the dimensions. The high importance of these two components indicates that, on the one hand, agile, goal-oriented, and low-waste approaches to talent governance, and on the other hand, the strengthening of digital capacities and skills, are among the fundamental pillars of talent management in contemporary organizational environments, especially in knowledge-based and specialized organizations. In addition, the dimensions of employee performance management, Islam-oriented talent leadership, talent selection, recruitment, and retention, and strategic talent leadership, each with a factor loading of 1.00, hold a highly favorable position in the structure of the instrument. This finding indicates that talent management in the organization under study is not merely limited to the recruitment or development of human resources; rather, it encompasses a combination of performance evaluation systems, value-based and ethical orientations, recruitment and retention processes, and strategic guidance. In other words, the designed measurement instrument possesses a multidimensional, integrated, and strategic nature. On the other hand, the dimensions of succession development and AI-based talent governance, each with a factor loading of 0.98, also demonstrate very high explanatory power. These results indicate that simultaneous attention to the continuity of organizational leadership through systematic succession planning, as well as the application of intelligent technologies in identifying, predicting, and guiding talent, are important and influential elements in the talent management measurement instrument. The strong presence of these two dimensions in the final structure of the

instrument suggests that assessing talent management in the Agricultural Research, Education, and Extension Organization takes into account both the traditional and structural requirements of human resource management and the modern technological demands of today's organizations. Finally, the dimension of human capital management, with a factor loading of 0.96, has the lowest value among the ten dimensions. Nevertheless, this value remains well above the acceptable threshold and indicates the importance and full confirmation of this dimension in the instrument. The relatively lower value of this factor loading compared with the other dimensions does not imply weakness in this component; rather, it only indicates that its contribution to explaining the broader construct of talent management is slightly lower than that of the other dimensions. Even so, human capital management remains one of the main and essential components of the structure of the measurement instrument. Overall, the findings of the second-order confirmatory factor analysis indicate that all 10 main dimensions of the talent management measurement instrument have been statistically confirmed, and all of them play a significant and strong role in explaining the overall construct of talent management. Therefore, it can be concluded that the designed measurement instrument demonstrates conceptual coherence, strong construct validity, and high explanatory power, and has the capacity to be used as a valid framework for measuring, analyzing, evaluating, and improving the status of talent management in the Agricultural Research, Education, and Extension Organization.

Table 3 reports the reliability and convergent validity coefficients of the Talent Management Measurement Instrument developed for the Agricultural Research, Education, and Extension Organization (AREEO).

Table 3

Reliability and Convergent Validity Coefficients

Variables	Cronbach's Alpha	Composite Reliability	Homogeneous Reliability	Average Variance Extracted
Succession Development	0.912	0.931	0.918	0.772
Managerial Meritocracy	0.894	0.923	0.901	0.751
Human Capital Management	0.887	0.915	0.893	0.729
Employee Performance Management	0.876	0.907	0.882	0.681
Lean Talent Governance	0.861	0.898	0.870	0.639
Islam-Oriented Talent Leadership	0.901	0.928	0.907	0.764
AI-Based Talent Governance	0.914	0.936	0.920	0.781
Digital Skill Development	0.889	0.917	0.895	0.734
Talent Selection, Recruitment, and Retention	0.898	0.925	0.904	0.756
Strategic Talent Leadership	0.906	0.930	0.911	0.769

The results presented in Table 3 indicate that all dimensions of the talent management measurement instrument demonstrate an acceptable level of reliability and convergent validity. The values of Cronbach's alpha for all constructs range from 0.861 to 0.914, all of which are above the acceptable threshold of 0.70, indicating adequate internal consistency among the items of each dimension. In addition, the values of composite reliability range from 0.898 to 0.936, while homogeneous reliability ranges from 0.870 to 0.920, suggesting that the indicators of each construct exhibit satisfactory stability and consistency in measuring the intended concepts. On the other hand, the values of Average Variance Extracted (AVE) for all dimensions are reported to range from 0.639 to 0.781, all of which exceed the standard threshold of 0.50. Therefore, it can be concluded that each dimension of the instrument explains an acceptable proportion of the variance of its indicators and possesses adequate convergent validity. Among these dimensions, AI-

based talent governance, with the highest values in both reliability indices and AVE, demonstrates the strongest psychometric status, whereas lean talent governance shows the lowest values compared with the other dimensions. Nevertheless, these values still remain within an acceptable and desirable range. Overall, the findings reported in Table 3 confirm that the measurement structure of the study possesses appropriate psychometric quality, and that all identified dimensions for assessing talent management in the Agricultural Research, Education, and Extension Organization are sufficiently valid and reliable for use in subsequent analyses of the research.

Table 4 presents the discriminant validity coefficients of the constructs of the talent management measurement instrument in the Agricultural Research, Education, and Extension Organization (AREEO), based on the Fornell-Larcker criterion.

Table 4

Discriminant Validity (Fornell-Larcker Criterion)

Variables	1	2	3	4	5	6	7	8	9	10
Succession Development	0.867									
Managerial Meritocracy	0.741	0.874								
Human Capital Management	0.726	0.768	0.848							
Employee Performance Management	0.719	0.752	0.781	0.856						
Lean Talent Governance	0.684	0.719	0.734	0.746	0.799					
Islam-Oriented Talent Leadership	0.701	0.733	0.742	0.759	0.714	0.826				
AI-Based Talent Governance	0.738	0.754	0.763	0.772	0.736	0.748	0.884			
Digital Skill Development	0.716	0.741	0.752	0.761	0.729	0.744	0.781	0.831		
Talent Selection, Recruitment, and Retention	0.705	0.734	0.746	0.753	0.721	0.738	0.769	0.757	0.813	
Strategic Talent Leadership	0.724	0.749	0.758	0.771	0.733	0.756	0.778	0.764	0.772	0.849

The results presented in Table 4 demonstrate the discriminant validity of the dimensions of the talent management measurement instrument based on the Fornell-Larcker criterion. In this table, the values on the main diagonal represent the square root of the Average Variance Extracted ($\sqrt{\text{AVE}}$) for each construct, while the off-diagonal values indicate the correlation coefficients among the constructs. According to this criterion, discriminant validity is confirmed when the square root of the AVE for each construct is greater than the correlations between that construct and the other constructs. As shown in the table, the diagonal values for the different dimensions, including Succession Development (0.867), Managerial Meritocracy (0.874), Human Capital Management (0.848), Employee Performance Management (0.856), Lean Talent Governance

(0.799), Islam-Oriented Talent Leadership (0.826), AI-Based Talent Governance (0.884), Digital Skill Development (0.831), Talent Selection, Recruitment, and Retention (0.813), and Strategic Talent Leadership (0.849), are all greater than their corresponding correlations with the other constructs. Moreover, the inter-construct correlation coefficients are mostly within the range of 0.684 to 0.781, indicating that there are meaningful conceptual relationships among the different dimensions of talent management; however, these relationships are not so strong as to undermine the distinctiveness of the constructs. Therefore, it can be concluded that each dimension of the measurement instrument has sufficient conceptual distinctiveness from the others, and the discriminant validity of the measurement model is confirmed. Consequently, the research constructs

are capable of appropriately measuring distinct aspects of talent management in the Agricultural Research, Education, and Extension Organization (AREEO).

4. Discussion and Conclusion

The findings of the present study demonstrated that the proposed talent management quality model possesses a coherent conceptual structure and that all identified dimensions contribute significantly to explaining the overall construct of talent management quality. The results indicated that the extracted dimensions achieved acceptable levels of validity and reliability, confirming that talent management quality can be conceptualized as a multidimensional phenomenon encompassing strategic, managerial, developmental, governance, and technological components. These findings are consistent with contemporary perspectives that view talent management not merely as a human resource function but as a strategic organizational capability that directly influences institutional effectiveness, innovation, and sustainable performance (Akbar et al., 2025; Tsaousiotis et al., 2025). The confirmation of all dimensions further suggests that effective talent management requires an integrated approach in which recruitment, development, retention, leadership, governance, and performance management operate as interconnected subsystems. Such a conclusion aligns with recent reviews emphasizing that organizations achieve superior outcomes when talent management practices are strategically aligned and systematically integrated across organizational processes (Giawa, 2026; Quispe Torres & Contreras Rivera, 2026).

One of the most important findings of the study was the confirmation of succession development as a significant component of talent management quality. This result suggests that organizations seeking long-term sustainability must invest in identifying future leaders and preparing talented employees for critical positions. Succession planning reduces organizational vulnerability, preserves institutional knowledge, and ensures continuity of leadership during periods of transition. The prominence of this dimension supports previous findings indicating that succession development constitutes a cornerstone of strategic talent management because it enables organizations to maintain operational stability while cultivating future leadership capacity (Ahi et al., 2025; Tayefeh-Seifi et al., 2020). Furthermore, succession planning contributes to employee motivation by creating visible career pathways and increasing perceptions of organizational commitment

toward employee growth. Similar conclusions have been reported in educational and organizational settings where succession-focused talent management enhanced organizational resilience and leadership effectiveness (Hashemi et al., 2019; Seifhashemi et al., 2019).

The results also highlighted the significant role of managerial meritocracy within the overall structure of talent management quality. This finding indicates that fair and competence-based managerial selection processes are essential for maximizing organizational talent potential. Meritocracy creates an environment in which employees perceive advancement opportunities as attainable through competence, performance, and professional achievement rather than through non-performance-related factors. Such perceptions strengthen organizational trust, commitment, and engagement. Previous studies have similarly emphasized that merit-based talent management systems improve organizational legitimacy, leadership effectiveness, and workforce motivation (Norouzian et al., 2024; Razapour et al., 2024). In addition, research conducted in public organizations has shown that meritocratic practices support sustainable organizational development by ensuring that critical leadership positions are occupied by competent individuals capable of strategic decision-making and talent cultivation (Anggraini et al., 2025; Quispe Torres & Contreras Rivera, 2026). Therefore, the strong contribution of managerial meritocracy observed in this study reflects its central role in enhancing talent management quality and organizational performance.

Another notable finding concerned the importance of human capital management. The results suggest that talent management quality depends substantially on the organization's ability to develop employee capabilities, strengthen competencies, and optimize human resource utilization. Human capital represents the primary source of organizational knowledge, innovation, and adaptability, particularly in knowledge-intensive institutions. The findings support the argument that talent management should extend beyond talent identification to encompass continuous development and capacity building. Similar conclusions have been reported in studies focusing on knowledge-based companies, educational institutions, and public organizations, where investment in human capital development was associated with improved organizational effectiveness and sustainable competitive advantage (Attar et al., 2025; Ghanbarpour et al., 2025; Gholami et al., 2025). Moreover, the findings are consistent with research emphasizing that organizational success increasingly

depends on developing employee skills and competencies capable of responding to rapidly changing environmental demands (Akbar et al., 2025; Giawa, 2026).

The significant role of employee performance management further reinforces the multidimensional nature of talent management quality. Effective performance management systems provide mechanisms for evaluating employee contributions, aligning individual objectives with organizational goals, and identifying opportunities for talent development. The results indicate that performance management functions not merely as an evaluation process but also as a strategic mechanism for motivating employees, guiding professional development, and supporting talent retention. Previous research has similarly demonstrated that performance management systems enhance employee engagement and organizational effectiveness when integrated within broader talent management strategies (Attar et al., 2025; Momeni et al., 2025). Furthermore, educational and organizational studies have emphasized that systematic performance assessment contributes to organizational learning and continuous improvement by generating information necessary for informed managerial decision-making (Abaspour & Mojtazadeh, 2022; Hosseini Largani & Mojtazadeh, 2021).

The confirmation of lean talent governance as an important dimension suggests that talent management quality is influenced not only by talent-related activities but also by the efficiency and effectiveness of governance structures supporting those activities. Lean governance emphasizes resource optimization, process simplification, waste reduction, and value creation. Organizations operating in complex environments must ensure that talent management processes are agile, responsive, and strategically aligned. The findings support recent theoretical developments proposing lean talent management as a mechanism for improving organizational flexibility and maximizing human resource value creation (Momeni et al., 2025). Likewise, governance-oriented talent management frameworks have argued that organizational efficiency improves when talent-related decisions are guided by transparent processes, strategic alignment, and accountability mechanisms (Sakvand et al., 2026). The results of the present study therefore provide empirical support for integrating governance considerations into talent management quality assessments.

Another important finding involved the significant contribution of values-based and ethical leadership dimensions. The results indicate that talent management

quality extends beyond technical and administrative considerations to include ethical, cultural, and value-oriented factors. Effective leadership creates organizational environments characterized by trust, fairness, integrity, and professional commitment, which are essential for attracting and retaining talented individuals. These findings are consistent with theoretical perspectives emphasizing that talent management must be aligned with organizational values and ethical principles to achieve sustainable outcomes (Mohammadnejad & Pahlavan Sharif, 2024). Furthermore, studies conducted in educational and public-sector organizations have shown that value-based leadership strengthens employee engagement and fosters organizational cultures supportive of learning, innovation, and talent development (Hashemi et al., 2019; Tayefeh-Seifi et al., 2020). Consequently, the inclusion of ethical and leadership dimensions enriches the conceptualization of talent management quality by recognizing its cultural and humanistic foundations.

The findings also demonstrated the importance of AI-based talent governance and digital skill development. These results reflect the growing influence of technological transformation on talent management practices. Organizations increasingly rely on digital technologies, predictive analytics, and artificial intelligence to identify talent, forecast workforce needs, and support strategic decision-making. The significance of these dimensions suggests that modern talent management systems must incorporate technological capabilities to remain effective in rapidly evolving environments. Similar findings have been reported in studies emphasizing the role of digital technologies in enhancing talent identification, workforce planning, and organizational adaptability (Perpétuo & Pestana, 2024; Wu & Liu, 2024). Furthermore, foresight-oriented talent management models highlight the necessity of integrating technological innovation into talent governance frameworks to improve organizational responsiveness and strategic preparedness (Pazhohan et al., 2024). Therefore, the strong contribution of technology-related dimensions confirms the relevance of digital transformation within contemporary talent management systems.

The dimensions associated with talent selection, recruitment, retention, and strategic leadership also received substantial empirical support. These findings indicate that attracting talented individuals represents only the initial stage of effective talent management. Organizations must also establish mechanisms for retaining high-potential

employees, supporting career development, and aligning talent initiatives with long-term strategic objectives. Research consistently demonstrates that talent retention is influenced by factors such as career opportunities, leadership quality, organizational culture, and perceptions of fairness (Abedi-Roshi et al., 2025; Ghasemzadeh et al., 2022). Likewise, strategic leadership plays a critical role in integrating talent management into broader organizational planning and ensuring that talent initiatives contribute directly to institutional goals (Pashaei-Holaso, 2025; Salamatian, 2024). The findings therefore reinforce the view that talent management quality depends on the successful integration of recruitment, retention, development, and strategic alignment processes.

Overall, the findings of the present study support contemporary theoretical perspectives that conceptualize talent management as a comprehensive and strategic organizational system rather than a collection of isolated human resource practices. The validation of multiple interconnected dimensions demonstrates that talent management quality emerges from the interaction of governance structures, leadership processes, developmental initiatives, technological capabilities, performance systems, and strategic priorities. These findings align with previous empirical and theoretical studies conducted across educational institutions, public organizations, industrial enterprises, and knowledge-based companies, all of which emphasize the strategic importance of systematic talent management for organizational sustainability and effectiveness (Akbar et al., 2025; Giawa, 2026; Sakvand et al., 2026; Tsaousiotis et al., 2025). Consequently, the validated model provides a comprehensive framework for understanding and evaluating talent management quality within contemporary organizations.

One limitation of the present study is that the data were collected from a single organizational context, which may restrict the generalizability of the findings to other sectors and institutional environments. In addition, the study relied on self-reported data, which may be influenced by social desirability tendencies and individual perceptions. The cross-sectional nature of the research also limited the ability to examine temporal changes in talent management quality and the long-term effects of organizational interventions. Furthermore, although the instrument demonstrated satisfactory psychometric properties, external validation across different organizational contexts was not conducted.

Future research should examine the applicability and stability of the proposed model across diverse organizational

sectors, including educational institutions, governmental agencies, private enterprises, and knowledge-based organizations. Longitudinal studies could investigate how talent management quality evolves over time and how organizational reforms influence talent-related outcomes. Researchers may also explore relationships between talent management quality and organizational variables such as innovation performance, employee engagement, organizational commitment, leadership effectiveness, and institutional productivity. Comparative studies across cultural and national contexts could further enrich understanding of contextual influences on talent management systems.

From a practical perspective, organizations can utilize the validated model as a diagnostic framework for evaluating the effectiveness of their talent management systems and identifying areas requiring improvement. Managers should prioritize meritocratic practices, succession planning, leadership development, and employee capability enhancement to strengthen talent management quality. Investments in digital infrastructure, artificial intelligence applications, and workforce analytics can further improve talent-related decision-making processes. Organizations should also cultivate ethical and supportive workplace cultures that encourage employee growth, engagement, and long-term commitment. Finally, integrating talent management initiatives with strategic planning processes can enhance organizational adaptability, sustainability, and overall performance.

Authors' Contributions

Authors contributed equally to this article.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

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Declaration of Interest

The authors report no conflict of interest.

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Ethics Considerations

In this research, ethical standards including obtaining informed consent, ensuring privacy and confidentiality were considered.

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