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Research Article

PICE as a competency-based extension of Authentic Leadership: internal consistency, convergent validity, and developmental utility beyond the ALQ

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Keywords: authentic leadership; PICE-ALQ; competency-based assessment; convergent validity; reliability; leadership development; PICE leadership development system;

……....

ABSTRACT

Background

Authentic Leadership has gained prominence in organizational research due to its association with sustainable outcomes and its explicit ethical component. However, its most widely used instrument—the Authentic Leadership Questionnaire (ALQ)—captures four broad dimensions that support global diagnosis but offer limited guidance for

individualized developmental interventions. This paper presents PICE (Personal, Interpersonal, Cognitive, Ethical) as a competency-based system that operationalizes the four authentic leadership dimensions into 50 trainable and assessable elements (10 personal competencies, 14 interpersonal competencies, 14 cognitive competencies, and 12 ethical values), enabling a direct link between assessment results and competency-based training pathways.

Methods

A mixed-method research program was implemented in three sequential phases: (1) an exploratory literature review to select Authentic Leadership as the reference model and to justify the need for competency-level traceability; (2) a large-scale quantitative field study using the ALQ across 139 companies (875 participants: 139 leaders and 736 followers), with leader self-ratings and follower ratings; and (3) a quantitative validation study comparing PICE and ALQ in 22 companies (133 participants: 22 leaders and 111 followers). Internal consistency was assessed using Cronbach's alpha by factor and rating source (self vs. follower). Convergent validity was examined via factor-level correlations and simple linear regressions per factor (ALQ as dependent; PICE as predictor).

Results

PICE demonstrated adequate internal consistency: Cronbach's alpha (self/follower) was 0.69/0.63 for Personal, 0.74/0.86 for Interpersonal, 0.76/0.87 for Cognitive, and 0.77/0.79 for Ethical. Convergent validity with ALQ was high in three factors and moderate in Cognitive: correlations (r) in self-ratings were 0.78 (Personal), 0.65 (Interpersonal), 0.53 (Cognitive), and 0.81 (Ethical); in follower ratings 0.70, 0.76, 0.60, and 0.84, respectively. Explanatory power was meaningful (R^2 self: 0.61, 0.42, 0.28, 0.65; follower: 0.49, 0.58, 0.36, 0.71). In Phase 2, ALQ results showed overall high levels (around 80%) and a small average self–follower gap, with relatively greater variability in the Cognitive component—supporting the practical rationale for competency-level disaggregation.

Conclusion

Findings support PICE as a coherent extension of Authentic Leadership that maintains

theoretical alignment with ALQ while offering greater diagnostic granularity and developmental usefulness. The lower convergence in the Cognitive factor is consistent with differences in depth (ALQ's compact measurement vs. PICE's 14-competency operationalization). PICE enables assessment-to-training traceability, supporting individualized development plans grounded in observable competencies and ethical values.

INTRODUCTION

Authentic Leadership has become a central construct in contemporary leadership research, partly due to its positive associations with follower outcomes and the sustainability of organizational results. Its conceptual core integrates self-awareness, relational transparency, balanced processing, and an internalized moral perspective. Despite its conceptual clarity and empirical relevance, a recurrent gap remains between measurement and intervention. The ALQ—widely used to assess Authentic Leadership—provides a robust factor-level profile, yet its breadth may limit practical translation into specific development targets. In applied settings, leaders and organizations often need to know not only which dimension is weaker, but which behaviors and capabilities should be trained to close the gap.

Competency-based management frameworks have long argued that development is most effective when anchored in observable behaviors, supported by assessment evidence, and translated into targeted training and workplace transfer. Within this perspective, PICE was developed as a competency-based extension aligned with Authentic Leadership. It preserves the four-factor structure (Personal, Interpersonal, Cognitive, Ethical) while disaggregating each factor into trainable and measurable elements—50 competencies and values—to enable actionable development plans and evidence-based learning pathways. This article reports the research progress supporting PICE by: (a) describing the three-phase research design; (b) presenting ALQ results from a large sample as a foundation for

the competency model; and (c) reporting reliability and convergent validity evidence for PICE against ALQ using correlations and regression models.

MATERIALS AND METHODS

Overall design: a three-phase research program

This study followed a mixed-method program with three sequential phases designed to move from theory to large-scale field evidence and finally to psychometric validation of a competency-based system.

Technical file of the research

Concept

Contents

Study Title

Key competencies for leadership in organizational contexts

Subtitle

Design and validation of the PICE model for the evaluation of competencies for organizational leadership

Methodological design

Mixed approach (qualitative and quantitative)

Descriptive cross-sectional study

General objective

Define an organizational leadership model that improves business outcomes

Specific objectives

Determine a leadership model with contrasted literature of its impact and positive results in the organizational context that has a validated evaluation instrument

Design and validate an evaluation model for leadership competencies in the organizational context, integrating theoretical and practical references

Evaluate the applicability and usefulness of the model in real processes of evaluation, training and leadership development

Hypotheses raised

H1: Leadership with higher evaluations of emotional intelligence generates higher levels of employee engagement

H2: Leadership can be assessed and therefore developed to meet your performance needs.

Research phases

Phase 1: Literature review and model selection

Phase 2: Study with ALQ (139 leaders and 736 followers in 139 companies)

Phase 3: PICE validation (22 leaders and 111 followers in 22 companies)

Instruments

ALQ (Phase 2)

ESCI, CIM, CVA (Phase 3)

Sampling and sampling

Non-probabilistic by odds

139 companies, 875 participants (phase 2)

22 companies, 133 participants (phase 3)

Temporality

Phase 2: April 2020-June 2024

Phase 3: July 2024-October 2025

Data analysis

Reliability (Cronbach's α)

Correlations

Comparison between ALQ and PICE models

Concluding remark

Cross-sectional study that combines theoretical analysis, empirical application and statistical validation

Phase 1 (exploratory): literature review and model selection

A focused literature review was conducted to identify a leadership model with consistent empirical support regarding organizational outcomes and with a validated assessment instrument. This phase justified the selection of Authentic Leadership as the reference framework and highlighted a practical limitation of broad factor-level assessment: limited traceability for individualized training interventions.

Phase 2 (quantitative): large-scale ALQ field study

The ALQ was administered using dual sources—leader self-assessment and follower ratings—to describe Authentic Leadership levels in real organizational contexts and to provide empirical grounding for the development of a competency-level diagnostic framework.

Phase 3 (quantitative validation): PICE development and convergent validation against ALQ

PICE was developed as a competency-based assessment system aligned with Authentic Leadership, operationalizing the four factors into 50 competencies and values. Phase 3 tested internal consistency and convergent validity between PICE and ALQ using correlations and simple linear regressions at the factor level, separately for self and follower ratings.

PARTICIPANTS

Phase 2 (ALQ, large sample)

Phase 2 included 139 companies (77 with international presence and 62 national), totaling 875 participants: 139 leaders and 736 followers. Demographic and professional descriptors (e.g., age, gender, role, tenure, and leadership experience) were collected for sample characterization and descriptive triangulation.

Phase 3 (PICE validation, smaller sample)

Phase 3 included 22 companies (12 international and 10 national) and 133 participants: 22 leaders and 111 followers. The same dual-source approach (self and follower ratings) was maintained, ensuring confidentiality and anonymity in data collection.

MEASURES

Authentic Leadership Questionnaire (ALQ)

The ALQ measures Authentic Leadership across four related dimensions. A Likert-type response format is used, and factor-level scores are computed for self and follower assessments.

PICE assessment system

PICE is a competency-based system aligned with Authentic Leadership, structured into four operational factors—Personal, Interpersonal, Cognitive, and Ethical—disaggregated into 50 assessable elements: 10 personal competencies, 14 interpersonal competencies, 14 cognitive competencies, and 12 ethical values. The system is designed to provide profiles at global, factor, and competency/value levels and to connect results to individualized competency-based training plans.

PROCEDURE

In Phase 2, the ALQ was administered to leaders (self-ratings) and followers (leader ratings) across participating companies. In Phase 3, both ALQ and PICE assessments were administered within the same organizational contexts, maintaining the dual-source approach. Data collection followed confidentiality and anonymity criteria, and feedback was returned in aggregated format; when applicable, individual feedback was provided with a developmental orientation.

Data analysis

1. Internal consistency: Cronbach's alpha per PICE factor and rating source (self vs. follower).
2. Convergent validity: Pearson correlations between equivalent PICE and ALQ factor scores, separately for self and follower ratings.
3. Explanatory models: Simple linear regressions per factor ($ALQ = \beta_0 + \beta_1 \cdot PICE + \varepsilon$), reporting β coefficients and R^2, separately for self and follower ratings.

RESULTS

Phase 1 outcomes: rationale for a competency-based extension

The literature review supported Authentic Leadership as a suitable framework due to its integration of personal, relational, cognitive, and ethical components. From an applied standpoint, Phase 1 also highlighted a recurring limitation in factor-level assessment systems: while they offer robust global diagnosis, they often provide insufficient precision for translating results into individualized training targets. This practical insight motivated the development of a competency-based system aligned with Authentic Leadership, enabling assessment-to-training traceability at the level of specific competencies and ethical values

ALQ large-sample field evidence

In Phase 2, ALQ was administered to 875 participants (139 leaders; 736 followers) across 139 companies. Overall results indicated high Authentic Leadership levels in the sample, with global means close to 80% for both leader self-perception and follower ratings, and a relatively small mean self–follower difference.

Factor-level patterns showed meaningful variability across cases and dimensions, with the Cognitive component displaying relatively greater sensitivity to discrepancies between self and follower ratings. From a developmental perspective, these findings reinforced the need for a disaggregated system that can identify specific training levers, particularly within broad components such as cognitive processing, where different behaviors may be collapsed into a single factor score.

Additionally, the author's published evidence on Authentic Leadership and sustainable profit (72 Spanish companies) reported that leaders scoring above a defined threshold across ALQ dimensions and exhibiting a low leader–follower gap were associated with sustained profitability, with Ethical scores being particularly high. This reinforces the applied value of moving from measurement to targeted development interventions—precisely the gap addressed by PICE.

Phase 3 results: PICE internal consistency and convergent validity with ALQ

Internal consistency (PICE)

Cronbach's alpha coefficients supported adequate internal consistency across PICE

factors. Self/followeralphaswere:

 Personal: 0.69 / 0.63

 Interpersonal: 0.74 / 0.86

 Cognitive: 0.76 / 0.87

 Ethical: 0.77 / 0.79

Notably, Interpersonal and Cognitive factors showed stronger consistency in follower ratings, consistent with the higher observability of relational behaviors and decision-related conduct in everyday work interactions.

Convergent validity (PICE–ALQ correlations)

Correlations between equivalent PICE and ALQ factors indicated strong convergence in three factors and moderate convergence in Cognitive:

 Self-ratings (r): Personal 0.78; Interpersonal 0.65; Cognitive 0.53; Ethical 0.81.

 Follower ratings (r): Personal 0.70; Interpersonal 0.76; Cognitive 0.60; Ethical 0.84.

 Simple linear regression (predicting ALQ from PICE)

PICE factor score ful proportion of variance in ALQ scores

 Self-ratings (R^2): Personal 0.61; Interpersonal 0.42; Cognitive 0.28; Ethical 0.65.

 Follower ratings (R^2): Personal 0.49; Interpersonal 0.58; Cognitive 0.36; Ethical 0.71.

SUMMARY TABLES

The following table summarizes the results of the consistency and reliability analysis of the model with Cronbach's alpha.

Table 1. Internal consistency (Cronbach’s alpha) for PICE by factor and rating source (Phase 3)

PICE Factor	Cronbach’salpha (Self-rating)	Cronbach’salpha (Follower-rating)
Personal	0.69	

0.63

Interpersonal

0.74

0.86

Cognitive

0.76

0.87

Ethical

0.77

0.79

Note. Self-rating refers to leader self-assessment; follower-rating refers to follower evaluation of the leader (Phase 3 sample: 22 leaders; 111 followers).

The following table summarizes the results of the correlation analysis between both models (PICE and ALQ) as well as their linear regression or predictability.

Table 2. Convergent validity between PICE and ALQ by factor: correlations (r) and simple linear regression explanatory power (R^2) (Phase 3)

Factor (PICE ↔ ALQ)

r (Self-rating)

R^2 (Self-rating)

r (Follower-rating)

R^2 (Follower-rating)

Personal

0.78

0.61

0.70

0.49

Interpersonal

0.65

0.42

0.76

0.58

Cognitive

0.53

0.28

0.60

0.36

Ethical

0.81

0.65

0.84

0.71

Note. r = Pearson correlation between PICE and ALQ factor scores. R^2 is from simple linear regression models estimated separately by factor and source (ALQ factor score as dependent variable; PICE factor score as predictor). Self-rating refers to leader self-assessment; follower-rating refers to follower evaluation.

DISCUSSION

This paper reports evidence supporting PICE as a competency-based extension of Authentic Leadership that preserves conceptual alignment with the ALQ while improving developmental utility. Across Phase 3 analyses, PICE demonstrated adequate internal consistency and meaningful convergent validity with ALQ at the factor level in both self-ratings and follower ratings. Phase 2 results, in turn, provide a practical rationale for moving from broad factor-level diagnosis to competency-level traceability, particularly when the aim is to translate assessment into individualized training plans.

Three findings are particularly relevant.

First, the internal consistency results are appropriate for applied organizational

assessment. Reliability was strongest for Interpersonal and Cognitive factors in follower ratings, which is consistent with the nature of these domains: many interpersonal and decision-related behaviors are publicly observable in meetings, coordination routines, and day-to-day leadership interactions. In contrast, the Personal factor—often tied to self-awareness and internal regulation—showed comparatively lower alphas, especially in follower ratings. This pattern is not unexpected: internal states and reflective processes are less directly observable by others and may be inferred through behavioral proxies. From an applied standpoint, the implication is that Personal competencies may benefit from combining multi-source ratings with reflective evidence (e.g., structured self-observation, guided debriefs), rather than relying exclusively on external observation.

Second, convergent validity results support the idea that PICE is not redefining the construct but operationalizing it. Convergence was high for Ethical and Personal factors and substantial for Interpersonal; Cognitive convergence was moderate. Importantly, the Cognitive factor is where one would expect convergence to be somewhat lower, because ALQ captures “balanced processing” and related cognition with a compact set of general items, whereas PICE expands cognition into a richer competency set. In other words, lower linear convergence in this factor may reflect depth and specificity rather than conceptual mismatch. In applied terms, the advantage of PICE is precisely that it transforms a broad diagnostic category into actionable training levers: rather than telling a leader to “improve balanced processing,” the system can highlight which cognitive competencies require development (e.g., critical thinking, information management, structured problem solving, decision quality under ambiguity).

Third, regression results indicate that PICE explains a meaningful portion of variance in ALQ scores, especially in Ethical and Personal factors. The Ethical factor showed the highest explanatory power in follower ratings ($R^2 = 0.71$), reinforcing the centrality of values and moral consistency in how Authentic Leadership is perceived. This aligns with prior evidence reported in the author’s published work linking higher ALQ profiles—combined with lower leader–follower perception gaps—to sustainable profitability. Together, these

results suggest a coherent applied hypothesis: when ethical consistency and authentic leadership behaviors are not only measured but also converted into targeted development interventions, the organization may be better positioned to sustain trust, climate, and long-term performance.

From a developmental design perspective, PICE's main contribution is the assessment-to-training traceability enabled by competency disaggregation. By producing profiles at global, factor, and competency/value levels, PICE allows leaders to identify precise strengths and development needs.

Moreover, because the system is designed to link competencies to training pathways, it supports an evidence-based development cycle:

This is a practical response to a common organizational problem: leaders receive assessment feedback, but the feedback does not translate into a clear and measurable improvement plan.

Several limitations should be acknowledged. The validation results are based on a smaller sample (Phase 3) than the large ALQ field study (Phase 2), and sectoral variability may influence factor expression andrating dynamics. Additionally, multi-source ratings can be affected by contextual variables (team climate, relationship quality, organizational culture), which can be a feature (reflecting real leadership impact) but also a potential source of noise. Future work should therefore include segmentation analyses (industry, company size, ownership type) and measurement invariance testing across demographic and organizational groups. Finally, longitudinal designs are needed to evaluate whether competency-based training grounded in PICE produces sustained improvements in both leadership scores and external criteria (e.g., engagement, turnover, performance indicators).

CONCLUSION

This article presents PICE as a competency-based extension of Authentic Leadership

designed to enhance the practical usefulness of leadership assessment. Across a three-phase research program, Phase 2 ALQ evidence in a large organizational sample highlighted the practical limitation of broad factor-level diagnosis for individualized development, while Phase 3 provided psychometric support for PICE as a coherent and reliable system aligned with ALQ.

PICE demonstrated adequate internal consistency across its four factors and meaningful convergent validity with ALQ, particularly in Ethical, Personal, and Interpersonal domains. The more moderate convergence in the Cognitive factor is consistent with differences in measurement depth: ALQ captures cognition in a compact manner, whereas PICE operationalizes this domain through a broader set of specific competencies. Beyond measurement, PICE's primary contribution is developmental: by disaggregating the four authentic leadership factors into 50 competencies and values, it enables actionable feedback and individualized training pathways grounded in observable behaviors and ethical alignment.

Future research should test PICE across organizational segments, examine measurement invariance, and establish criterion validity using external outcomes. Longitudinal intervention studies are also required to determine whether PICE-guided competency development produces sustained improvements in leadership behavior and organizational performance.

ACKNOWLEDGEMENTS

The author would like to thank the participating organizations and all leaders and employees who contributed their time and feedback to this research. The author also acknowledges the academic supervision and methodological guidance provided by the doctoral advisors throughout the design, development, and validation of the PICE model.

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