The Impact of Human Capital on Achieving Leadership Excellence: A Case Study of Sonelgaz Institution, Laghouat Province

L'impact du capital humain sur la réalisation de l'excellence en leadership : Étude de cas de l'institution Sonelgaz, wilaya de Laghouat

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Abstract: *This study investigates the influence of human capital on leadership excellence at Sonelgaz in Laghouat, Algeria, A quantitative approach was employed, using a structured questionnaire administered to both employees and managers, The findings indicate a strong and statistically significant positive relationship between human capital and leadership excellence, Overall, the study emphasizes the crucial role of investing in human capital as a key driver of improved performance in Algerian public institutions.*

Keywords: *human capital; leadership excellence; Sonelgaz; organizational performance.*

Jel Classification Codes: J24; M12; M54; O15.

Résumé: *Cette étude examine l'influence du capital humain sur l'excellence du leadership au sein de Sonelgaz à Laghouat, en Algérie, Une approche quantitative a été adoptée à travers un questionnaire structuré administré aux employés et aux cadres, les résultats révèlent une relation positive forte et statistiquement significative entre le capital humain et l'excellence du leadership, dans l'ensemble, l'étude souligne le rôle essentiel de l'investissement dans le capital humain comme levier clé d'amélioration de la performance dans les institutions publiques algériennes.*

Mots clés : *capital humain ; excellence en leadership ; Sonelgaz ; performance organisationnelle.*

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1. INTRODUCTION

Human capital has emerged as a central pillar of organizational competitiveness in the knowledge economy. As intangible assets — encompassing employees' education, skills, expertise, and innovation capacity — become increasingly decisive determinants of firm performance, the relationship between human capital investment and leadership quality has attracted substantial scholarly attention (Becker, 1994; Schultz, 1961). In developing economies where public enterprises face simultaneous pressures of globalization, energy transition, and institutional reform, this relationship acquires even greater strategic significance.

Algeria's energy sector presents a particularly instructive context for this inquiry. Sonelgaz (Société Nationale de l'Electricité et du Gaz), the national electricity and gas distribution company, operates as a critical infrastructure institution serving over 10 million customers nationwide. With an ongoing reform agenda, substantial workforce diversity, and mounting demands for operational excellence, Sonelgaz's Laghouat Directorate offers a compelling organizational case for examining how human capital configurations translate into leadership effectiveness.

Leadership excellence — defined as the ability of organizational leadership to guide the institution efficiently through effective management styles characterized by vision clarity, motivational capacity, transparency, and commitment to continuous development (Yukl, 2013) — has become an increasingly prominent governance objective for Algerian public corporations. Yet empirical studies exploring its determinants within the Algerian energy sector remain sparse.

This study addresses this gap by investigating the hypothesis that human capital — measured across dimensions of recruitment quality, competency retention, training investment, knowledge transfer, and innovation enablement — significantly predicts leadership excellence within Sonelgaz's Laghouat Directorate. The primary research question is: To what extent does human capital contribute to the achievement of leadership excellence in Sonelgaz Corporation, Laghouat Province?

The study contributes to organizational behavior and human resource management (HRM) literature in four ways. First, it provides original empirical evidence from a rarely studied sub-national unit of Algeria's dominant public utility. Second, it operationalizes both constructs using validated multi-item scales grounded in established theory. Third, it employs robust quantitative methodology to establish predictive relationships. Fourth, it generates actionable policy implications for HRM in Algerian public enterprises navigating institutional transformation.

2. THEORETICAL FRAMEWORK AND LITERATURE REVIEW

2.1 Human Capital Theory

The concept of human capital was systematically formalized by Schultz (1961) and Becker (1964), who argued that individuals' investments in education, training, and health yield economic returns analogous to physical capital investment. Becker (1994) distinguished between general human capital — portable skills applicable across organizations — and firm-specific human capital, which produces returns primarily within a particular organizational context. This distinction is especially relevant for public enterprises such as Sonelgaz, where firm-specific knowledge accumulated through long service constitutes a critical operational asset.

Subsequent scholarship broadened the human capital concept to encompass not only formal education but also experiential learning, tacit knowledge, social competencies, and creative capacity (Hitt, Bierman, Shimizu, & Kochhar, 2001). Wright, McMahan, and McWilliams (1994) extended the resource-based view (RBV) of the firm to argue that human capital constitutes a source of sustainable competitive advantage when it is valuable, rare, inimitable, and non-substitutable. This VRIN framework aligns well with the Algerian public energy sector, where specialized technical and managerial expertise is difficult to replicate.

More recently, Ployhart and Moliterno (2011) proposed a multilevel theory of human capital emergence, arguing that individual-level knowledge, skills, and abilities aggregate into unit-level human capital through social interaction and organizational processes. This perspective highlights the

role of leadership in mobilizing and leveraging distributed human capital resources — a dynamic central to the present study.

2.2 Leadership Excellence in Organizational Theory

Leadership excellence has been conceptualized through multiple theoretical lenses. Transformational leadership theory (Bass & Avolio, 1994) emphasizes leaders' ability to inspire followers through vision articulation, intellectual stimulation, individualized consideration, and idealized influence. Servant leadership perspectives (Greenleaf, 1977; van Dierendonck, 2011) foreground leaders' orientation toward follower development. Strategic leadership theory (Hambrick & Mason, 1984; Finkelstein & Hambrick, 1996) focuses on the role of top management teams in shaping organizational strategy and performance.

For the purposes of this study, leadership excellence is operationalized as a multidimensional construct encompassing five dimensions: (1) clarity of vision and mission; (2) justice and equity in employee treatment; (3) support for change and continuous development; (4) motivational capacity for superior performance; and (5) commitment to transparency and integrity.

2.3 Empirical Evidence on Human Capital and Leadership

Empirical research consistently demonstrates positive associations between human capital indicators and leadership effectiveness. Hitt et al. (2001) found that human capital was positively related to professional service firm performance, with leadership quality as a mediating mechanism. Carmeli and Tishler (2004) demonstrated that intangible assets, including human capital, significantly predicted perceived organizational performance across Israeli local authorities.

In the MENA context, Al-Ajlouni (2017) examined the relationship between human capital dimensions and organizational leadership quality across Jordanian public sector institutions, finding significant positive effects of training investment ($\beta = 0.48$) and knowledge management practices ($\beta = 0.39$) on leadership competency scores. Benali and Abdelmoumene (2020) investigated similar dynamics in Algerian

manufacturing enterprises, reporting that human capital management practices explained 37% of variance in managerial excellence indicators.

Rahimi, Kheirandish, and Fathi (2016) conducted structural equation modeling of human capital and transformational leadership in Iranian public energy companies, demonstrating direct effects ($\beta = 0.61$, $p < 0.001$). The present study directly extends this body of evidence to the Algerian public energy sector, which has remained largely understudied in the international HRM literature.

2.4 Human Capital Dimensions in Focus

Based on the literature synthesis, this study focuses on seven dimensions of human capital most theoretically relevant to leadership excellence: (HC1) competency-based recruitment (Lepak & Snell, 1999); (HC2) institutional competency levels (Wright et al., 1994); (HC3) continuous training and development (Becker, 1994); (HC4) inter-generational knowledge transfer (Ployhart & Moliterno, 2011); (HC5) fair promotion systems (Carmeli & Tishler, 2004); (HC6) retention of skilled employees (Hitt et al., 2001); and (HC7) innovation-enabling work environment (Wright et al., 1994).

3. CONCEPTUAL FRAMEWORK AND RESEARCH HYPOTHESIS

Drawing on human capital theory and the reviewed empirical literature, this study proposes the following conceptual model: Human Capital (independent variable) → Leadership Excellence (dependent variable). Human capital, operationalized across seven items, is hypothesized to exert a significant positive direct effect on leadership excellence, operationalized across five items measuring vision clarity, employee equity, support for change, motivational capacity, and integrity.

> **H_1:** *Human capital has a statistically significant positive impact on leadership excellence within Sonelgaz Corporation's Laghouat Directorate ($p < 0.05$).*

4. RESEARCH METHODOLOGY

4.1 Research Design and Approach

This study adopts a quantitative, deductive research design rooted in the positivist paradigm. The primary data collection instrument is a structured questionnaire administered to employees and executives of Sonelgaz's Laghouat Directorate. This approach aligns with established practice in organizational HRM research (Sekaran & Bougie, 2016) and enables systematic testing of the proposed directional hypothesis through inferential statistical analysis.

4.2 Population and Sampling

The target population comprises all employees of Sonelgaz's Laghouat Directorate (N = 182). A proportional stratified sampling approach was employed. A total of 100 questionnaires were distributed; 78 were returned and deemed valid for analysis, yielding an effective response rate of 78.0%. The final analytical sample is n = 78.

4.3 Measurement Instrument

The questionnaire comprised two sections. The first section collected demographic and professional information (gender, age, education level, years of service, and job category). The second section contained 12 Likert-scale items (1 = Strongly Disagree to 5 = Strongly Agree): 7 items measuring human capital (HC1–HC7) and 5 items measuring leadership excellence (LE1–LE5). Item content was developed based on validated instruments from the Arabic organizational behavior literature (Al-Zahrani, 2018; Benali & Abdelmoumene, 2020).

4.4 Reliability, Validity, and Statistical Analysis

Internal consistency reliability was assessed using Cronbach's alpha (Cronbach, 1951). Content validity was established through expert review by three academics specializing in management sciences. Data were analyzed using: (1) descriptive statistics (means and standard deviations); (2) Cronbach's alpha for reliability assessment; (3) Pearson correlation to assess bivariate association; and (4) simple linear regression to test the directional hypothesis, with the human capital composite score (mean of

HC1–HC7) as the independent variable and the leadership excellence composite score (mean of LE1–LE5) as the dependent variable ($\alpha = 0.05$).

4.5 Sample Profile

Table 1 presents the demographic characteristics of the study sample.

Table 1: Sample Demographic Profile (n = 78)

Variable	Category	Frequency	Percentage (%)
Gender	Male	66	84.6%
	Female	12	15.4%
Age	30–40 years	30	38.5%
	41–49 years	35	44.9%
	≥50 years	12	15.4%
Education Level	University (BSc/MSc)	51	65.4%
	Vocational / Secondary	18	23.1%
	Postgraduate	9	11.5%
Years of Service	11–15 years	24	30.8%
	5–10 years	17	21.8%
	16–20 years	16	20.5%
	>20 years	14	17.9%
Job Category	Executive / Senior executive	52	66.7%
	Supervisory staff	18	23.1%
	Operational worker	8	10.3%

Note. Source: Authors' primary data analysis (2025).

The sample is predominantly male (84.6%), reflecting the gender composition of Sonelgaz's technical workforce. The majority of respondents are between 41 and 49 years of age (44.9%), indicating a mature workforce. University-level education is the dominant educational attainment (65.4%). Executives and senior executives constitute the largest functional category (66.7%).

5. RESULTS

5.1 Reliability Analysis

Table 2 reports Cronbach's alpha coefficients for both study constructs. Both scales demonstrate excellent internal consistency reliability, substantially exceeding the threshold of 0.70 (Nunnally, 1978) and approaching the 0.90 threshold indicative of high reliability (Hair, Black, Babin, & Anderson, 2019).

Table 2: Reliability Analysis (Cronbach's Alpha)

Construct	Items	Cronbach's Alpha (α)	Level
Human Capital (HC)	7	0.892	Excellent
Leadership Excellence (LE)	5	0.897	Excellent

Note. $\alpha \geq 0.90$ *= Excellent;* $0.80 \leq \alpha < 0.90$ *= Good;* $0.70 \leq \alpha < 0.80$ *= Acceptable (Hair et al., 2019).*

5.2 Descriptive Statistics

Table 3 presents item-level and composite descriptive statistics. Scale interpretation: 1.00–2.33 = Low; 2.34–3.67 = Moderate; 3.68–5.00 = High.

Table 3: Descriptive Statistics for Study Variables

Item	Description	Mean	SD	Level
HC1	Recruitment based on qualifications	4.000	0.883	High
HC2	Institutional competency levels	4.026	0.805	High
HC3	Continuous training & development	3.910	0.885	High
HC4	Knowledge transfer mechanisms	3.667	1.051	High
HC5	Fair promotion systems	3.538	1.028	High
HC6	Retention of skilled employees	3.679	1.075	High
HC7	Innovation-enabling environment	3.410	1.133	Moderate
HC Overall	Human Capital Composite	3.747	0.749	High
LE1	Clear vision and mission	3.821	0.936	High
LE2	Fairness toward employees	3.372	0.968	Moderate
LE3	Support for change & development	3.679	0.904	High
LE4	Motivation for superior performance	3.551	1.077	High
LE5	Transparency and integrity	3.564	1.052	High
LE Overall	Leadership Excellence Composite	3.597	0.836	High

Note. n = 78. SD = Standard Deviation. 5-point Likert scale. Source: Authors' analysis.

The overall human capital composite mean of 3.747 (SD = 0.749) indicates a high level of human capital within the organization. The highest-rated dimension is HC2 (M = 4.026), reflecting confidence in institutional competency levels. HC7 (M = 3.410) received the lowest rating, suggesting the innovation-enabling environment is a relative area of weakness. The leadership excellence composite (M = 3.597) also falls in the high range, with vision clarity (LE1, M = 3.821) being the highest-rated leadership dimension and perceived fairness (LE2, M = 3.372) the lowest.

5.3 Correlation and Regression Analysis

The Pearson correlation coefficient r = 0.667 ($p < 0.001$) indicates a strong, statistically significant positive linear relationship between human capital and leadership excellence composites, providing initial empirical support for the study hypothesis. Table 4 presents the full regression results.

Table 4: Simple Linear Regression — Human Capital Predicting Leadership Excellence

Statistic	Value
R (Pearson Correlation)	0.667
R^2 (Coefficient of Determination)	0.445
Adjusted R^2	0.437
F statistic (df = 1, 76)	61.49
p-value (Sig.)	< 0.001
Constant (b_0)	0.892
Beta Coefficient (b_1, Human Capital)	0.722
Standard Error	0.093
t-value	7.84

Note. Dependent variable: Leadership Excellence. Independent variable: Human Capital. n = 78.

The regression model is statistically significant ($F(1,76) = 61.49$, $p < 0.001$). $R^2 = 0.445$ indicates that human capital explains 44.5% of variance in leadership excellence — a substantively meaningful effect size (Cohen, 1988). The unstandardized coefficient $b_1 = 0.722$ (SE = 0.093, $t = 7.84$, $p < 0.001$) indicates that for each one-unit increase in the human capital composite score, leadership excellence increases by 0.722 units. The regression equation is:

$$\textit{Leadership Excellence} = 0.892 + 0.722 \times (\textit{Human Capital})$$

These results provide strong empirical support for H_1. Table 5 summarizes the hypothesis test outcome.

Table 5: Hypothesis Testing Summary

Hypothesis	Description	β	p-value	Decision
H_1	Human capital → Leadership excellence	0.722	< 0.001	Supported ✓

6. DISCUSSION

6.1 Interpretation of Key Findings

The central finding — that human capital significantly and substantially predicts leadership excellence ($\beta = 0.722$, $R^2 = 0.445$, $p < 0.001$) — aligns with and extends the theoretical predictions of Becker (1994) and Wright et al. (1994), and the empirical findings of Al-Ajlouni (2017), Rahimi et al. (2016), and Benali and Abdelmoumene (2020). The magnitude of the effect exceeds the 37% variance explanation reported by Benali and Abdelmoumene (2020) in Algerian manufacturing contexts, confirming the robustness of the human capital–leadership link across different organizational settings within Algeria.

The finding that HC2 (institutional competency levels, M = 4.026) and HC1 (competency-based recruitment, M = 4.000) are the highest-rated human capital dimensions is theoretically coherent with strategic HRM theory

(Huselid, 1995; Lepak & Snell, 1999), which holds that competency-aligned hiring creates talent pipelines from which leadership excellence emerges. Conversely, the lower scores on HC7 (innovation climate, M = 3.410) and HC5 (fair promotion, M = 3.538) suggest structural impediments to maximizing human capital's contribution to leadership development. Amabile's (1996) componential theory of creativity indicates that organizational climate for innovation is a critical enabler of the higher-order thinking associated with leadership excellence.

On the leadership excellence side, the fairness dimension (LE2, M = 3.372) being the weakest is noteworthy. Organizational justice theory (Colquitt, 2001) posits that perceived procedural and distributive fairness is foundational to employee motivation and trust — both prerequisites for sustained leadership effectiveness. This finding thus has immediate practical implications for Sonelgaz's HRM policies.

6.2 Theoretical and Practical Contributions

Theoretically, this study makes three contributions. First, it provides rare empirical confirmation of the human capital–leadership excellence link within an Algerian public utility, extending the geographic scope of human capital theory. Second, by operationalizing leadership excellence as a multidimensional construct encompassing equity, vision, motivational capacity, change orientation, and integrity, the study enriches leadership measurement frameworks in the MENA organizational research tradition. Third, $R^2 = 0.445$ establishes an empirical benchmark for future studies in the Algerian energy sector.

For practitioners, the study generates several actionable recommendations: (1) prioritizing innovation climate development through creativity programs and cross-functional assignments to address the HC7 gap; (2) strengthening promotion system transparency and merit-linkage to address HC5; (3) institutionalizing procedural fairness mechanisms to address the LE2 weakness. Given that nearly half of leadership excellence variance is explained by human capital, strategic alignment between HRM investment decisions and leadership development programs appears both justified and potentially high-yield.

7. CONCLUSION

This study has investigated the impact of human capital on achieving leadership excellence within Sonelgaz Corporation's Laghouat Directorate. Using a structured questionnaire administered to 78 employees and executives and analyzed through simple linear regression, the study demonstrated that human capital is a strong, statistically significant positive predictor of leadership excellence ($\beta = 0.722$, $R^2 = 0.445$, $p < 0.001$), confirming H_1 and supporting human capital theory (Becker, 1994; Schultz, 1961) and the VRIN framework (Wright et al., 1994).

Both constructs exhibit high reliability ($\alpha_HC = 0.892$; $\alpha_LE = 0.897$) and elevated mean scores (HC: M = 3.747; LE: M = 3.597), indicating a solid baseline while revealing specific improvement opportunities in innovation climate, promotion equity, and leadership fairness. The study's limitations include its cross-sectional design, single-site sampling, and self-report measurement approach. Future research should employ longitudinal designs, multi-site comparative samples, and structural equation modeling to examine mediating mechanisms.

Notwithstanding these limitations, the study confirms that building and sustaining organizational human capital — through competency-aligned recruitment, systematic training, knowledge transfer, merit-based promotion, and innovation climate development — is not merely an administrative function but a strategic imperative for achieving the leadership excellence that Algeria's energy transition demands.

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