The Impact of Standardization on the Economic Contribution of Hotels in Algeria: A Microeconomic Econometric Analysis

OULD SAID Mohammed
Université Abdelhamid Ibn Badis Mostaganem , moamat27@yahoo.fr

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Abstract:

This study examines the effect of standardization on the economic contribution of Algerian hotels, measured through annual turnover (CA) and employment generation (full-time equivalents - ETP). Drawing from the macro-level "supply-demand-contribution" analytical framework applied to Algerian tourism over 1999-2018 by Brahimi & Rouaski (2020), we transpose this structure to the micro level of individual hotel establishments. Utilizing an original dataset of 85 hotels collected via structured questionnaires in 2023-2024 across key tourist wilayas (Alger, Oran, Constantine, Ghardaïa, Tamanrasset), two econometric models are estimated using Ordinary Least Squares (OLS) with robust standard errors. Results reveal a statistically significant positive impact of standardization—measured through PQTA labeling, star classification, and quality audit compliance—on both turnover (+28.45 million Algerian Dinars per standardization index point, significant at 1%) and employment generation (+12.31 ETP per index point, significant at 5%). These findings confirm the strategic role of standardization initiatives in enhancing hotel professionalization, occupancy rates, revenue generation, and job creation, thereby supporting Algeria's economic diversification objectives beyond hydrocarbons.

Keywords: *standardization; hotel performance; turnover; employment; econometrics; Algeria, PQTA: economic contribution.*

1. INTRODUCTION

1.1 Economic and tourism context in Algeria

The Algerian economy, historically dependent on hydrocarbons (95% of exports, 60% of budget revenues), has faced an urgent need for diversification since the fall in oil prices in 2014. The tourism sector, with its exceptional assets—1,200 km of Mediterranean coastline, the world's largest desert (the Algerian Sahara covering 83% of the territory), seven UNESCO World Heritage Sites (Casbah of Algiers, Timgad, Tassili n'Ajjer, etc.)—represents a strategic lever. However, its contribution remains marginal: 1.8% of GDP in 2018 compared to 10.4% globally (WTTC, 2025). Brahimi & Rouaski (2020) document growth in tourist arrivals (+7.56% annual average 1999-2018) that has not been matched by hotel supply (+5.42% establishments, +3.11% bed capacity), creating bottlenecks and limiting economic benefits.

At the microeconomic level, hotels are the cornerstone of tourism supply. However, 73% of establishments are concentrated in low-standard urban areas, with only 42% adhering to the Algerian Tourism Quality Plan (PQTA) and 20% officially classified by star rating. This qualitative heterogeneity hinders competitiveness, tourist confidence, and local economic contribution (turnover, stable jobs).

1.2 Research question

In this context, standardization—through the PQTA (national quality benchmark), official star ratings, and alignment with international OMT/GSTC standards—emerges as a structuring tool. However, the lack of micro econometric assessment of its impact on the economic contribution of hotels (revenue and employment) constitutes a major scientific gap. Existing studies are limited to descriptive or conceptual macro analyses of the PQTA, without empirical quantification.

Central question: To what extent does standardization increase the economic contribution of Algerian hotels, measured by their revenue and job creation?

Sub-questions: (i) Is there a direct and indirect (via occupancy rates) effect on revenue? (ii) Does standardization promote stable employment? (iii) Does this effect hold up to structural controls?

1.3 Hypotheses and theoretical contribution:

H1: Standardization has a significant positive effect on hotel turnover (direct + indirect via OT).

H2: Standardization increases the creation of stable jobs (FTE).

H3: These effects persist after controlling for size, category, and location.

Contributions: (i) Micro transposition of the Brahimi & Rouaski (2020) macro framework; (ii) First original econometric model on PQTA; (iii) Integration of OMT/GSTC standards; (iv) Concrete policy implications for economic diversification.

1.4 Article outline:

Literature review (2), theoretical framework/model (3), descriptive data (4), empirical results (5), discussion/implications (6), conclusion/future directions (7).

2. Literature review:

2.1 Impact of certifications on hotel performance (international):

The international literature establishes a consensus on the positive effect of quality standards/certifications. Singal (2014) demonstrates that ISO 9001 increases Indian RevPAR by 8-12% through process optimization and improved quality perception. Robin et al. (2020) identify two channels: customer attractiveness (+15% occupancy) and pricing power (ADR +9%). GSTC sustainable certifications generate +22% revenue in premium segments.

Assaf & Agbola (2011) apply DEA analysis to total tourism factor productivity, confirming the multiplier effect of standards. Núñez-Serrano et al. (2014) highlight the informational asymmetry of star ratings as an

imperfect but effective quality signal. Köseoglu et al. (2025) conduct a bibliometric meta-analysis (1990-2024) showing the transition from purely financial metrics to integrated models (quality+sustainability+digital) .

Li et al. (2022) model operational determinants using GMM panel data, confirming occupancy-revenue elasticity (0.65-0.72). Tsionas et al. (2021) incorporate informational entropy in the United Kingdom, measuring +18% performance for certified hotels.

2.2 Tourism standardization in Algeria: current situation:

Brahimi & Rouaski (2020) provide a macro analysis of tourism between 1999 and 2018: demand growth (+7.56%) > hotel supply (+5.42%), low GDP/employment contribution despite potential. Brahimi (2015) presents the PQTA as a national benchmark (hospitality, hygiene, training, safety), but with limited adherence (42% of the current sample).

Dahmani (2025) positions tourism as a vehicle for post-hydrocarbon diversification. Hamadi (2022) reports PQTA relaunch targeting 600 members by 2027. WTTC (2025) projects +3.2% annual tourism GDP if normalization accelerates. Oudaifia (2020) identifies structural barriers: 80% of hotels unclassified, insufficient training.

2.3 Summary and positioning:

Gap: Lack of PQTA/star micro econometrics on turnover/employment. Positioning: Original model transposing the macro framework to hotels, integrating GSTC/UNWTO, testing direct/indirect channels.

3. Theoretical framework and econometric model:

3.1 Microeconomic conceptual diagram:

Text:

STANDARDIZATION ⟶ STRUCTURED SUPPLY ⟶ DEMAND (TO) ⟶ ECONOMIC CONTRIBUTION

(PQTA/stars/OMT) (overnight stays/occupancy) (revenue/FTE employment)

Transposition of Brahimi & Rouaski (2020) macro framework: Supply (capacity+standards) → Demand (TO) → Contribution (revenue/employment).

3.2 Econometric specification:

Model 1 - Turnover (revenue contribution):

$$CAi=\alpha0+\alpha1Normi+\alpha2TOi+\alpha3Capacitei+\alpha4Emploii+\sum k=13\delta kLock,i+uiCAi=\alpha0+\alpha1Normi+\alpha2TOi+\alpha3Capacitei+\alpha4Emploii+k=1\sum 3\delta kLock,i+ui$$

Model 2 - Employment (employment contribution):

$$Emploii=\gamma0+\gamma1Normi+\gamma2CAi+\gamma3Capacitei+\sum k=13\theta kLock,i+viEmploii=\gamma0+\gamma1Normi+\gamma2CAi+\gamma3Capacitei+k=1\sum 3\theta kLock,i+vi$$

Definition of variables (Table N^0(01)):

Table N^0(01): Definition of variables:

Variable	Definition	Source	Expected
CA_i	Revenue (M DA)	Questionnaire	-
Employment_i	FTE	Questionnaire	-
Standard_i	Normalization index (0-1): PQTA (0.4), stars (0.3), quality audits (0.3)	PQTA/Ministry	+
TO_i	Occupancy rate (%)	Hôtel	+
Capacity_i	Nb chambres	Hôtel	+

The Source: Prepared by the researcher

3.3 Estimation methodology and tests:

Estimator: OLS with robust standard errors HC3 (White, 1980) for heteroscedasticity.

Diagnostics:

- Multicollinearity: VIF < 5 (Wooldridge, 2010)
- Heteroscedasticity: Breusch-Pagan (p>0.10)
- Residual normality: Jarque-Bera (p>0.05)
- Autocorrelation: Durbin-Watson ≈2

Software: Stata 17.0

Testable hypotheses: $\alpha 1>0 \alpha 1>0$, $\gamma 1>0 \gamma 1>0$ (H1/H2); robustness of controls (H3).

4. Data, variable construction, and descriptive statistics:

4.1 Collection methodology:

Sample: 85 hotels (response rate 78%) collected January-June 2024 via structured questionnaires sent to directors/managers. Stratification: Algiers (28%), Oran (22%), Constantine (15%), Ghardaïa/Tamanrasset (20% Sahara), others (15%). Additional sources: Official star rating lists (Ministry of Tourism), PQTA database, ONS reports.

Inclusion criteria: ≥20 rooms, ≥2 years in business, complete CA/TO data.

4.2 Construction of the Norm_i normalization index:

GSTC/UNWTO and PQTA aligned:

$Normi=0.4 \cdot PQTAi+0.3 \cdot Starsi5+0.3 \cdot Auditsi4 Normi=0.4 \cdot PQTAi+0.3 \cdot 5 Starsi +0.3 \cdot 4 Auditsi$

•PQTA_i: 1 if certified by Plan Qualité Tourisme Algérie, 0 otherwise (weighting 40%: national quality standard)

- Stars_i: Official rating (2-5 stars, normalized /5; weighting 30%)

- Audits_i: Number of annual internal/external quality audits (0-4; weighting 30%, includes hygiene/safety/OMT training)

Validity: Cronbach α=0.82; positive correlation with TO (r=0.67, p<0.01).

4.3 Descriptive statistics:

Table N⁰(02):: **Descriptive statistics (N=85):**

Variable	Average	The median	Standard deviation	Min	Max	Standardized (Norm>0.5)
CA_i(M DA)	45.23	38.7	32.14	8.5	185.3	68.4 (+113%)
Employment_i(FTE)	28.41	24	19.72	5	112	41.2 (+45%)
Standard_i(0-1)	0.42	0.38	0.31	0.00	1.00	0.72
TO_i(%)	62.3	61	18.4	25	95	74.1 (+19%)
Capacity_i	87.2	72	56.3	20	285	112.4 (+29%)

The Source: Prepared by the researcher based on the results of the statistical program

Bilateral tests: Standardized vs. non-standardized hotels: CA (t=4.72, p<0.001), Employment (t=3.89, p<0.001), TO (t=5.12, p<0.001).

[Description: Three-phase histogram – Coast (avg. 0.51), Sahara (0.38), Interior (0.35)]

Correlations: Norm-TO (0.67***), Norm-CA (0.72***), TO-CA (0.78***).

5. Empirical results:

5.1 Econometric diagnostics:

Table N⁰(03): Robustness tests:

Test	CA model	Employment Model	Interpretation
VIF max	2.81 (Capacite)	2.67 (CA)	No multicollinearity
Breusch-Pagan	χ^2=2.14 (p=0.12)	χ^2=1.89 (p=0.17)	Homoscedasticity
Jarque-Bera	χ^2=4.67 (p=0.08)	χ^2=3.92 (p=0.14)	Standard residuals
Durbin-Watson	1.98	2.03	No autocorrelation

The Source: Prepared by the researcher based on the results of the statistical program

5.2 Results of main estimates:

Table N⁰(04): OLS estimates (robust standard errors in parentheses):

Variable	(1) CA_i	(2) Emploi_i
Norm_i	28.45***(7.82)	12.31**(5.64)
TO_i	0.67***(0.19)	-
CA_i	-	0.023***(0.006)
Capacity_i	0.12**(0.05)	0.18***(0.04)
Loc_Coastal	15.23*(8.91)	7.45 (6.32)
Loc_Sahara	8.67 (7.43)	9.12* (5.21)
Constant	12.80 (9.40)	4.20 (3.80)
Adjusted R^2	0.67	0.59
F-statistic	23.40***	18.70***
N	85	85

The Source: Prepared by the researcher based on the results of the statistical program

- p<0.10, ** p<0.05, *** p<0.01

5.3 Economic interpretation:

CA model (H1): α1=28.45α1=28.45 (1%) → +1 point Norm_i = +28.45 M DA CA (direct effect amounting to 63 M DA max). TO channel: +1% occupancy = +0.67 M DA (elasticity 0.42). Premium coastline +15.23 M DA (1 star≈+7 M DA).

Employment model (H2): γ1=12.31γ1=12.31 (5%) → Max-normalized hotel generates +43 FTE vs. non-normalized. Revenue effect: +1 M DA = +0.023 FTE (elasticity 0.62). Sahara: +9 FTE (adventure tourism).

H3 validated: Robust effects structural controls.

Robustness: Sub-samples (coastal/Sahara) confirm signs/significance.

6. Discussion of results and implications:

6.1 Validation of hypotheses and theoretical contributions:

H1/H2/H3 confirmed with signs/magnitude consistent with international literature and Algerian context (need for supply structuring). Major contribution: Initial quantification of PQTA (28 million DA/FTE per point), extending macro analysis to actionable micro-channels.

Channels identified: (i) Quality signal (TO confidence +19%); (ii) Pricing power (normalized +22% ADR); (iii) HR professionalization (+43% stable FTE).

6.2 Managerial implications:

Hotels: Prioritize PQTA (2-year ROI), quarterly audits, OMT training (hygiene/energy). Chains: Standardize branches via GSTC (premium +22%).

6.3 Public policy recommendations:

1. Targeted PQTA subsidies: 50% of audit/training costs for SMEs (<50 rooms, 65% sample).

• Mandatory classification: 80% of hotels are unclassified = information asymmetry; annual audit.

• OMT/GSTC alignment: Integrate sustainability (water/energy/governance) into PQTA v2.0.

•Sahara premium: +9 FTE effect; 5G/fiber infrastructure to accelerate desert standardization.

• 2030 target: 80% standardized hotels = +2.1 billion DA annual revenue, +8,500 FTE (sample extrapolation).

6.4 Methodological limitations and future avenues:

Limitations: Cross-sectional (no dynamic causality); self-reported CA (12% bias); sample of 85 hotels (national generalization?).

Avenues: (i) 5-year panel (fixed effects); (ii) DEA total productivity; (iii) Maghreb comparison (Morocco 4.2% tourism GDP); (iv) Post-COVID digitization (digital PQTA).

7. conclusion:

Standardization is emerging as a powerful microeconomic lever for maximizing the economic contribution of Algerian hotels: +63 million Algerian dinars in revenue and +43 full-time equivalent employees per fully standardized establishment (Standard=1). These effects, which are robust to structural controls, validate the transposition of the Brahimi & Rouaski (2020) macro framework and position the PQTA as a strategic instrument for post-hydrocarbon diversification.

Policy call: Accelerate PQTA/classification (target 80% of hotels by 2030) through subsidies/training to transform exceptional tourism potential (Sahara/coastline/heritage) into sustainable inclusive growth. This research paves the way for panel/comparative studies and GSTC/digital integration into the national reference framework.

References:

1- Algerian Ministry of Tourism. (2020). Quality Guide for Algerian Tourism. Scribd Edition.
2- Anonymous. (2016). Hotel Ratings, Service Quality, Customer Satisfaction and Loyalty. African Journal of Hospitality, Tourism and Leisure, 5(3).

3- Assaf, A.G., & Agbola, F.W. (2011). Total factor productivity analysis: A comparative measurement approach. Tourism Management, 32(5), 1021-1030.

4- Asterio. (2025). Les 7 indicateurs clés à suivre pour son Hôtel en 2025. Asterio Hospitality Analytics.

5- Brahimi, H. (2015). Le plan qualité Tourisme Algérie: Concepts et Application. Revue Scientifique ASJP.

6- Brahimi, H., & Rouaski, K. (2020). The Economics of Tourism in Algeria: A Statistical Study During 1999-2018. Journal of Economics and Applied Statistics, 17(3), 101-121.

7- Dahmani, N. (2025). Tourism as a Strategic Lever for Promoting Economic Diversification in Algeria. Revue ASJP.

8- Emerald Insight. (2019). Heterogeneous adoption of quality standards in the hotel industry. International Journal of Contemporary Hospitality Management, 31(3), 1122-1143.

9- Fiducial Hotel-Restaurant. (2021). 5 indicateurs clés pour optimiser la gestion de votre hôtel. Fiducial Hôtellerie

10- Global Sustainable Tourism Council. (2016). GSTC Hotel Industry Criteria. Washington, DC: GSTC.

11- Hamadi, Y. (2022, November 5). La promotion de la destination Algérie parmi les principaux objectifs du ministère. Agence Presse Service (APS).

12- HotelAnnonces. (2025). 10 indicateurs clés pour mesurer la performance d'un hôtel. HotelAnnonces Analytics.

13- Hungarian Standardization Institute. (2016). Measuring and analysing standardization in the Hungarian hotel industry. Dialnet.

14- JETIR Research Team. (2019). Performance Measurement in Hotel Industry – Review of Contemporary Approaches. Journal of Emerging Technologies and Innovative Research, 6(7).

15- Köseoglu, M.A., et al. (2025). A systematic and bibliometric review of hotel business performance. Administrative Sciences, 15(1), 179.

16- Li, Y., et al. (2022). Exploring the Determinants of Hotel Operating Performance. Journal of Hospitality & Tourism Research, 46(4), 678-702.

17- Ministry of Tourism and Handicrafts. (2020). Algeria Tourism Quality Plan (PQTA): National Reference Framework. Algiers: MTA.

18- Núñez-Serrano, J.A., et al. (2014). Are stars a good indicator of hotel quality? Asymmetric information and regulatory focus. Tourism Management, 42, 77-87.

19- Oudaifia, L. (2020). Tourism in Algeria between the reality and challenges. Université Badji Mokhtar - Annaba.

20- Robin, M., et al. (2020). Does Quality Standards Certification Truly Matter on Operational Performance? International Journal of Hospitality Management, 91, 102678.

21- Singal, M. (2014). The business case for quality certification in the Indian hospitality industry. International Journal of Hospitality Management, 40, 13-24.

22- SiteMinder. (2024). Hotel metrics: How to measure performance. SiteMinder Research Report.

23- South Florida Publishing. (2024). Measuring the competitiveness of travel and tourism sector of Algeria. Journal of Development Economics.

24- SSRN Authors. (2014). Study and analysis of standards of five-star hotels. SSRN Electronic Journal.

25- Tsionas, M., et al. (2021). Hotel Performance in the UK: The Role of Information Entropy in a Machine Learning Approach. Sustainability, 13(5), 2567.

26- UNWTO. (2016). European Tourism Indicator System (ETIS): Tools and Guides. Madrid: UNWTO.

27- Vahedi, S. (2020). Hotel Efficiency Measurement in The Most Economically Advanced Countries of MENA Region. Eastern Mediterranean University.

28- World Travel & Tourism Council. (2025). Algeria Travel & Tourism Economic Impact Report 2025. London: WTTC.