

Variations in Perceived Competitive Performance Among Petroleum Companies Allied with Sonatrach: A Comparative Study

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Abstract

This study aimed to examine the differences in the level of perceived competitive performance of strategic alliances among oil companies partnered with Sonatrach. Employing a descriptive-analytical methodology with a comparative approach, the study utilized survey data gathered from a purposive sample of 33 managers and executives across five oil companies: Sonatrach, ENI, Equinor ASA, Sinopec, and ENGIE. Perceived competitive performance was measured using indicators encompassing market share, cost reduction, and new product/service development. To analyze inter-company differences, descriptive statistics and One-Way Analysis of Variance (ANOVA) were performed, alongside the Games-Howell post-hoc test and the Kruskal-Wallis test as a robust supplementary check.

The findings revealed an overall mean score of 2.5455 for perceived competitive performance on a 3-point Likert scale, reflecting a high level according to the study's classification. Furthermore, ANOVA demonstrated statistically significant differences among the companies ($F = 4.458$, $p = 0.007$), with a substantial effect size ($\eta^2 = 0.389$). The Kruskal-Wallis test similarly yielded a statistically significant result ($p = 0.015$). Conservative post-hoc comparisons indicated that significant differences were primarily concentrated between Sonatrach and each of Equinor ASA, Sinopec, and ENI—favoring the latter group—whereas no statistically significant differences emerged in the remaining estimable comparisons.

These results suggest that respondents' perceptions of competitive performance are not uniformly distributed across the five companies; however, this does not imply absolute superiority for any single enterprise nor attribute differences solely to corporate identity. Plausibly, such variations can be explained by differences in project nature, technological capabilities, governance structures, and the degree of inter-partner integration. The study recommends establishing standardized metrics to evaluate alliance performance, supporting perceptual measures with objective financial and operational indicators, and interpreting findings cautiously due to the small sample size and variance heterogeneity.

Keywords: Perceived Competitive Performance; Strategic Alliances; Hydrocarbon Sector; Performance Evaluation; Benchmarking; Conservative Analysis of Variance (ANOVA).

1. Introduction

Contemporary oil companies operate in an environment characterized by volatile energy prices, increasing technological requirements, stringent environmental standards, and escalating geopolitical risks. In this dynamic setting, competitiveness is no longer solely tied to the volume of natural resources; rather, it primarily depends on firms' ability to build strategic alliances, transfer technology, share operational risks, and enhance responsiveness to market shifts.

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Strategic alliances in the hydrocarbon sector assume paramount importance due to capital-intensive investments, extended project lifecycles, and the complex technical and operational expertise required for exploration and production. While these alliances facilitate the pooling of resources and expertise, they may also yield varying levels of perceived performance resulting from inter-partner differences in technological expertise, project maturity, and decision-making systems. As Sonatrach serves as the central anchor for petroleum partnerships in Algeria, comparing perceived competitive performance across its partner companies provides a scientific framework for understanding organizational variation within this alliance network.

2. Problem Statement and Research Questions

The research problem lies in investigating potential variations in perceived competitive performance among oil companies partnered with Sonatrach, despite operating within the same economic sector and institutional framework. The primary research question is formulated as follows:

"Are there statistically significant differences in the mean responses of sample members regarding the competitive performance of strategic alliances attributable to the oil company under study?"

This primary question yields the following sub-questions:

1. What is the level of perceived competitive performance among oil companies partnered with Sonatrach?
2. Do mean competitive performance scores differ significantly among Sonatrach, ENI, Equinor ASA, Sinopec, and ENGIE?
3. What are the potential managerial and organizational implications of these differences, given that measurement relies on the perceptions of managers and executives?

3. Research Hypotheses

For statistical testing purposes, the following two hypotheses were formulated at a significance level of ($\alpha \leq 0.005$):

- Null Hypothesis (H_0): There are no statistically significant differences ($\alpha \leq 0.005$) in the mean evaluations of strategic alliance competitive performance attributable to the oil company.
- Alternative Hypothesis (H_1): There are statistically significant differences ($\alpha \leq 0.005$) in the mean evaluations of strategic alliance competitive performance attributable to the oil company.

4. Objectives of the Study

This study primarily aims to determine whether there are statistically significant differences in the level of perceived competitive performance of strategic alliances attributable to the oil company partnered with Sonatrach. This main objective branches into the following specific goals:

- Determining the Overall Performance Level: Evaluating the total level of perceived competitive performance among sample members and computing descriptive statistical metrics (means, standard deviations, medians, and ranges) for the target companies.
- Mapping Inter-Alliance Disparities: Identifying the nature and direction of performance differences among the five companies (Sonatrach, ENI, Equinor ASA, Sinopec, and ENGIE) and delineating the resulting organizational clusters.

5. Significance of the Study

The practical significance of the study lies in providing decision-makers and planners at Sonatrach with accurate empirical indicators derived from realistic evaluations by managers and executives. This allows for a deeper understanding of how performance evaluations vary across direct foreign partners. Furthermore, the findings contribute to developing benchmarking mechanisms for exploration and production contract managers by enabling systematic comparisons among different strategic partnership models (European vs. Asian), thereby building more effective negotiating options and capabilities for future contracts. Additionally, the study offers diagnostic insights that help enhance organizational governance, streamline decision-making

processes, address integration and organizational alignment barriers, and activate practical channels for knowledge localization and modern field technology acquisition within the national hydrocarbon sector.

Theoretical Framework

Concept of Strategic Alliances

A strategic alliance is a collaborative arrangement between two or more organizations aimed at achieving mutually agreed-upon objectives while preserving each party's organizational and legal autonomy. Partners share both expected benefits and operational control over executed activities, with each making ongoing contributions in critical strategic domains such as technology, financing, specialized knowledge, or market access (YOSHINO, 1995).

Within the hydrocarbon sector, strategic alliances encompass collaborative endeavors among national oil companies (NOCs), international oil companies (IOCs), oilfield service providers, and technology vendors across the entire energy value chain—including exploration, drilling, field development, production, transportation, refining, and marketing. These alliances may assume various structural forms, such as joint ventures, production-sharing agreements (PSAs), technical alliances, contractual partnerships, or project-specific collaborative arrangements. Industry literature emphasizes that such alliances align the objectives of operators and contractors around a joint enterprise, where capital investments, resources, capabilities, operational risks, and financial returns are shared while the partners remain distinct (Groves & Leslie Melville, 2015).

Thus, strategic alliances in the hydrocarbon sector can be defined as structured, collaborative relationships between two or more legally independent firms, wherein financial, technical, human, and knowledge resources are integrated to execute joint activities along the oil and gas value chain, share risks and rewards, and achieve objectives pertaining to operational efficiency, technology transfer, capability development, and competitive performance enhancement.

Characteristics of Hydrocarbon Alliances

Strategic alliances in the hydrocarbon sector are distinguished by several salient characteristics that differentiate them from conventional contractual relationships:

- **Legal Independence of Partners:** An alliance does not necessarily lead to a merger or acquisition; rather, each participating entity retains its distinct legal and organizational identity (Kang & Sakai, 2000).
- **Continuity and Active Contribution:** Each partner commits ongoing resources or capabilities in a critical domain, such as capital deployment, technical expertise, proprietary technology, or access to reserves and markets (Kang & Sakai, 2000).
- **Risk and Reward Sharing:** The burden of investment, alongside geological, technical, financial, and operational risks, is distributed among partners, as are the expected project returns and economic benefits (Groves & Leslie Melville, 2015).
- **Complementarity of Resources and Capabilities:** Alliances pool local concessions, hydrocarbon reserves, and domestic infrastructure provided by the national oil company with capital investment, technical expertise, and advanced field technologies brought by international partners or service providers (Garcia Palma, Lessard, & Singh, 2014).
- **Long-Term Orientation:** These partnerships are typically tied to exploration, development, and production contracts, complex offshore developments, or liquefied natural gas (LNG) projects—all of which entail extended time horizons and heavy capital intensity.
- **Governance and Trust:** Successfully managing these partnerships requires clear structural frameworks governing rights, obligations, decision-making, and information flow, alongside formal mechanisms for dispute resolution, interest alignment, and project execution monitoring.

Concept of Competitive Performance

Definitions of competitive performance vary depending on the theoretical perspectives through which it is examined. It can be viewed as an enterprise's ability to achieve superior results relative to its rivals across key indicators such as profitability, market share, and sales growth. Furthermore, it reflects the degree to which an organization successfully attains its strategic objectives with efficiency and effectiveness through the optimal deployment of its resources and capabilities (Taouab & Issor, 2019). From a competitive advantage perspective, competitive performance manifests in an organization's capacity to deliver superior value to customers—either through differentiation in quality, features, or service, or through cost reduction relative to competitors (Porter, 1985). Consequently, competitive performance is not confined to a single financial dimension; rather, it encompasses an interconnected array of financial, market, operational, and innovative outcomes.

Indicators of Competitive Performance

Competitive performance indicators serve as quantitative and qualitative tools utilized by organizations to evaluate their efficiency, effectiveness, and capacity to outperform competitors. Accurate measurement necessitates benchmarking an organization's results against industry averages or key competitors within the same time horizon. The literature commonly integrates indicators of profitability, cost, productivity, market share, quality, and customer satisfaction, with profitability, cost control, productivity, and market share recognized as primary determinants of organizational competitiveness (McFetridge, 1995).

1. **Profitability:** Refers to an enterprise's capability to generate profits from its resources, capital investments, and sales over a specified period. It constitutes a vital financial metric, demonstrating how effectively operational activities and investments are converted into economic returns.
2. **Productivity:** Reflects an organization's efficiency in transforming inputs—such as labor, capital, energy, and raw materials—into outputs of goods or services. Essentially, it measures the volume of output generated per unit of resource deployed.
3. **Market Share:** Represents an enterprise's sales as a proportion of total market or industry sales over a given period. It serves as a crucial indicator of market power and the firm's ability to attract and retain customers relative to competitors.
4. **Quality:** Denotes the extent to which a product or service conforms to customer requirements and meets or exceeds expectations. Quality represents a crucial competitive dimension, directly influencing customer satisfaction, corporate reputation, customer retention, and the reduction of defect and rework costs.
5. **Cost Control:** Entails the systematic planning, monitoring, and benchmarking of actual costs against target or standard costs, followed by corrective actions to minimize variances and waste without compromising product or service quality. This enhances the firm's capacity to pursue a cost leadership strategy and offer competitive pricing.

Based on the foregoing, competitive performance cannot be reduced solely to profitability or market share; rather, it should be evaluated through a holistic system that synthesizes financial metrics (such as profitability, turnover, and cost), market metrics (such as market share and customer satisfaction), and operational metrics (such as productivity, quality, and responsiveness). This multidimensional approach aligns with the logic of the Balanced Scorecard, which integrates financial, customer, internal business process, and learning and growth perspectives when evaluating strategic performance.

Empirical Literature Review

A study by (2014) (Garcia Palma, Lessard, & Singh, 2014) examined the measurement of strategic alliance performance through a literature review and classification of performance metrics. The study concluded that alliance performance measurement assumes multiple forms, including abnormal stock returns, alliance longevity, subjective or perceived measures, and objective-fulfillment metrics. The significance of this study lies in its confirmation that alliance performance is a multidimensional construct that should not be reduced to a single financial indicator.

In the oil and gas sector, (Beshears, 2013) aimed to compare the performance of corporate alliances against that of standalone firms in drilling operations in the Gulf of Mexico. The findings demonstrated that fields

developed through alliances achieved higher profitability than those developed by single companies, a result attributed to alliances' ability to pool information and specialized partner expertise.

Similarly, (Kang & Sakai, 2000) investigated the role of international strategic alliances in knowledge and technology transfer within the upstream petroleum sector. Their findings revealed that such alliances foster knowledge management, human capital development, and innovation, while facilitating access to advanced exploration and production technologies.

Focusing on alliance capability, Robson, (Robson, Katsikeas, Schlegelmilch, & Pramböck, 2019) examined the impact of alliance capabilities and shared partner characteristics on international alliance performance outcomes. They concluded that alliance-specific management capabilities enhance resource complementarity and trust among partners, with resource complementarity directly contributing to performance improvement.

In the Arab context, (Al Kindi, 2021) examined the impact of strategic alliances on organizational performance within the UAE oil and gas sector. The study revealed a positive relationship between alliance success and enhanced organizational performance, highlighting the critical role of governance frameworks, management mechanisms, and day-to-day operational monitoring.

Research Gap

A review of prior literature reveals that the majority of studies have addressed strategic alliance performance by focusing on unidimensional determinants—such as trust or governance—or by relying on broad, aggregated descriptive indicators without executing comparative statistical measurements across partners. Within the hydrocarbon sector, empirical studies have primarily focused on evaluating organizational performance or technical efficiency in international contexts (e.g., the Gulf of Mexico, the UAE, and Iran), while visibly neglecting the examination of variations in perceived competitive performance among oil companies partnered within the same joint venture.

This research gap is particularly pronounced given the scarcity of comparative empirical studies within the Algerian petroleum environment, specifically regarding the strategic alliances of Sonatrach. Accordingly, the present study seeks to bridge this gap by offering a rigorous comparative statistical approach to examine statistically significant differences in perceived competitive performance across five major oil companies partnered with Sonatrach. This evaluation spans three key dimensions: market share, cost reduction, and new product and service development, while estimating the effect size of these differences and providing a contextual and organizational interpretation.

Research Model

The research model is based on a single-factor comparative design aimed at examining differences in perceived competitive performance evaluations of strategic alliances across the target petroleum company or alliance. The independent variable is categorical, comprising five groups (Sonatrach, ENI, Equinor ASA, Sinopec, and ENGIE). The dependent variable (perceived competitive performance) is operationalized through three primary dimensions: market share, cost reduction, and new product and service development.

Research Methodology

The study adopted a comparative descriptive-analytical methodology. This approach allows for describing perceived competitive performance in strategic alliances, analyzing the field survey responses of sample members, and conducting a precise statistical comparison among the five target companies to identify differences and interpret their significance.

Study Population and Sample

The target population consisted of managers and executives across the oil companies partnered with Sonatrach, namely: Sonatrach, ENI, Equinor ASA, Sinopec, and ENGIE. A purposive sample of 33 respondents was selected. The deployment of a purposive sampling strategy is justified by the extreme difficulty in gaining access to high-level executives and managers within a sector characterized by high information sensitivity and complex organizational structures. Nevertheless, this sampling choice necessitates treating the empirical findings as exploratory insights specific to the sample rather than generalizable estimates for all personnel within the specified firms.

Research Instrument and Psychometric Properties

Field data were gathered via a structured questionnaire custom-developed to measure the study variables using a 3-point Likert scale to determine response levels. The instrument contained dedicated subscales covering the three adopted dimensions of competitive performance.

To evaluate the psychometric properties of the instrument, face validity was established by submitting the questionnaire to a panel of academic experts and industry professionals to refine item wording and structural alignment. Furthermore, construct validity was established through internal consistency analysis by computing Pearson correlation coefficients between each dimension's score and the total scale score. Instrument reliability was assessed using Cronbach's alpha, which yielded high coefficient values exceeding the standard methodological threshold (0.70), thereby confirming the statistical robustness of the instrument, its suitability for hypothesis testing, and the dependability of its empirical results.

Results Presentation and Analysis

Sample Distribution by Company

Table 01: Frequencies and Percentages of Sample Members by Company

Company	Frequency (f)	Percentage (%)
Sonatrach	15	45.45%
ENI	5	15.15%
Equinor ASA	5	15.15%
Sinopec	4	12.12%
ENGIE	4	12.12%
Total	33	100.00%

Source: Prepared by the author based on SPSS software output.

The results indicate that sample members are not evenly distributed across companies; Sonatrach represents the largest group with 16 respondents, accounting for 48.48% of the total sample. Meanwhile, the four foreign partner companies collectively comprise 17 respondents, representing 51.52%. This disparity in group sizes necessitates interpreting the results with caution, particularly given that the ENI and Sinopec subsamples are relatively small, which may affect the precision of estimated means and variances.

Levels of Perceived Competitive Performance Dimensions

Table 02: Levels of Perceived Competitive Performance Dimensions

Dimension	Mean (M)	Standard Deviation (SD)	Perceived Level
Market Share	2.60	0.6410	High
Cost Reduction	2.59	0.6680	High
New Product and Service Development	2.34	0.8226	High
Overall Competitive Performance	2.5084	0.55766	High (At lower threshold)

Source: Prepared by the author based on SPSS software output.

The findings indicate that the "Market Share" dimension achieved the highest mean score, followed by "Cost Reduction", both falling within the "High" level. The "New Product and Service Development" dimension recorded a mean of 2.34, placing it at the lower threshold of the "High" level while displaying the highest standard deviation among the three dimensions. This indicates greater variability in respondents' evaluations

regarding this aspect, suggesting that product and service development represents a less homogenous domain of perception compared to market share and cost reduction.

Descriptive Statistics for Competitive Performance by Company

Table 03: Descriptive Statistics for Competitive Performance by Company

Company Name	N	Mean (M)	Standard Deviation (SD)	Median	Range
Sonatrach	16	2.3125	0.46771	2.4375	1.88
Equinor ASA	5	3.0000	0.00000	3.0000	0.00
Sinopec	4	2.9375	0.12500	3.0000	0.25
ENI	3	3.0000	0.00000	3.0000	0.00
ENGIE	5	2.2500	0.75519	2.3750	2.00
Total	33	2.5455	0.53566	2.6250	2.00

Source: Prepared by the author based on SPSS software output.

The overall mean for perceived competitive performance reached 2.5455, with a standard deviation of 0.53566 and a median of 2.6250, placing the overall level in the "High" category according to the 3-point Likert scale limits adopted in this study.

At the firm level, Equinor ASA and ENI recorded the highest mean score (\$3.0000\$ each), representing the upper bound of the scale. However, the zero standard deviation in both groups indicates that all recorded responses were identical at the highest score; this does not necessarily imply greater estimation reliability, as both subsamples are small and do not allow for stable estimation of intra-group variance. Sinopec recorded a high mean of 2.9375 with a low standard deviation of 0.12500.

Conversely, Sonatrach registered a mean of 2.3125, while ENGIE recorded a mean of 2.2500. According to the adopted classification, both means fall within the "Moderate" level rather than "High". Notably, ENGIE exhibited the highest dispersion in responses, with a standard deviation of 0.75519 and a response range of 2.00. Consequently, respondents' evaluations of alliance performance associated with ENGIE were more heterogeneous than those for the remaining companies.

Test of Homogeneity of Variances

Table 04: Test of Homogeneity of Variances (Levene's Test)

Levene Test Calculation Method	Levene Statistic	df1	df2	Sig. (p-value)
Based on Mean	3.625	4	28	0.017
Based on Median	2.768	4	28	0.047
Based on Median with adjusted \$df\$	2.768	4	14.392	0.068
Based on Trimmed Mean	3.425	4	28	0.021

Source: Prepared by the author based on SPSS software output.

Levene's test based on the mean yielded a significance value of 0.017 ($p < 0.05$), indicating a violation of the assumption of variance homogeneity across companies. Similarly, the median-based formula was significant at 0.047, as was the trimmed-mean formula at 0.021, whereas the median-based formula with adjusted degrees of freedom was non-significant at 0.068. Given the statistical significance of the primary test and the trimmed-mean formulation, variances were treated as non-homogeneous. Consequently, post-hoc comparisons using the Games-Howell procedure were interpreted cautiously.

Furthermore, the presence of zero variance in the Equinor ASA and ENI groups limits the stability of certain estimates; thus, not all possible pairwise comparisons should be interpreted identically. The Kruskal-Wallis test is presented subsequently as a robust supplementary evaluation.

One-Way Analysis of Variance (ANOVA) and Effect Size

Table 05: One-Way Analysis of Variance (ANOVA) and Effect Size

Source of Variation	Sum of Squares (SS)	df	Mean Square (MS)	F-statistic	Sig. (p-value)	Effect Size (η^2)
Between Groups	3.572	4	0.893	4.458	0.007	0.389 (<i>Very Large</i>)
Within Groups	5.609	28	0.200	—	—	—
Total	9.182	32	—	—	—	—

Source: Prepared by the author based on SPSS software output.

The One-Way ANOVA test yielded an F-statistic of 4.458 at a significance level of $p = 0.007$, which is below the 0.05 threshold. Consequently, the null hypothesis (H_0) is rejected, confirming statistically significant differences in perceived competitive performance means among the target companies.

The calculated effect size η^2 reached 0.389. According to standard benchmark guidelines, this value indicates a very large effect size, meaning that the company variable accounts for a substantial proportion of the observed variance in competitive performance scores within this sample. This relationship should not be interpreted as causal due to the cross-sectional design and purposive sampling, as well as the potential influence of variance heterogeneity and small group sizes on effect size estimation.

Post-Hoc Comparisons Using Games-Howell

Table 06: Pairwise Post-Hoc Comparisons Using Games-Howell Test

Comparison Pair (I–J)	Mean Diff. (I–J)	Std. Error	Sig. (p-value)	95% Confidence Interval	Decision
Sonatrach – Equinor ASA	-0.68750*	0.11693	<0.001	[-1.0486, -0.3264]	Significant; favoring Equinor ASA
Sonatrach – Sinopec	-0.62500*	0.13258	0.002	[-1.0268, -0.2232]	Significant; favoring Sinopec
Sonatrach – ENI	-0.68750*	0.11693	<0.001	[-1.0486, -0.3264]	Significant; favoring ENI
Sonatrach – ENGIE	0.06250	0.35740	1.000	[-1.3715, 1.4965]	Non-significant
Equinor ASA – Sinopec	0.06250	0.06250	0.843	[-0.2690, 0.3940]	Non-significant
Equinor ASA – ENI	0.00000	0.00000	Not Estimable	[0.0000, 0.0000]	Equal means & zero variances
Equinor ASA – ENGIE	0.75000	0.33773	0.328	[-0.7514, 2.2514]	Non-significant
Sinopec – ENI	-0.06250	0.06250	0.843	[-0.3940, 0.2690]	Non-significant
Sinopec – ENGIE	0.68750	0.34347	0.393	[-0.7899, 2.1649]	Non-significant
ENI – ENGIE	0.75000	0.33773	0.328	[-0.7514, 2.2514]	Non-significant

Source: Prepared by the author based on SPSS software output.

The post-hoc comparisons reveal that statistically significant differences were concentrated in three specific pairwise comparisons: Sonatrach versus Equinor ASA, Sonatrach versus Sinopec, and Sonatrach versus ENI. In all three comparisons, Sonatrach's mean score was significantly lower than that of the comparison firm. No

statistically significant differences emerged between Sonatrach and ENGIE, nor among the remaining estimable pairwise comparisons.

Regarding the comparison between Equinor ASA and ENI, both groups exhibited identical means and zero standard deviations; consequently, the software output did not yield an estimable significance value. Methodologically, this pair should be described as descriptive equality rather than deriving inferential conclusions.

Kruskal-Wallis Test

The Kruskal-Wallis test for independent samples yielded a significance value of $p = 0.015$ ($p < 0.05$), thereby rejecting the hypothesis of equal competitive performance distributions across company categories. This result provides robust supplementary support for the existence of inter-company performance differences; however, it tests variations in distributions or mean ranks rather than independently demonstrating differences in parametric means.

Because the available Kruskal-Wallis output does not report the specific test statistic (H) or non-parametric pairwise comparisons, specific differing pairs should not be designated solely based on this output. To fully pursue a non-parametric post-hoc analysis, Dunn's pairwise test with Holm's step-down adjustment should be conducted.

Analytical Discussion of Results

The empirical findings demonstrate statistically significant differences in the perceived competitive performance of strategic alliances, dividing the target companies into two distinct clusters: a high-performing foreign cluster (Equinor ASA, ENI, and Sinopec) and a cluster exhibiting relatively lower average performance (Sonatrach and ENGIE). These observed disparities can be interpreted through the following strategic and organizational mechanisms:

- **Differences in Technological Capabilities and Field Expertise:** International oil companies possess distinct advantages in advanced exploration technologies and complex production management, which directly contribute to lowering operational costs and elevating perceived performance scores within the first cluster.
- **Variations in Governance Models and Decision-Making Agility:** Alliances differ in decision-making velocity and delegation of authority. Organizational flexibility provides a distinct operational advantage to certain partners compared to alliances constrained by protracted bureaucratic procedures.
- **Level of Inter-Team Integration and Alignment:** Clear communication channels and well-defined operational roles enhance alliance efficiency, whereas insufficient organizational integration leads to duplicated efforts and operational friction.
- **Project Nature and Maturity Phase:** Operational scope varies significantly between high-risk exploration ventures and mature, stable production assets. Consequently, project maturity and field characteristics serve as critical explanatory factors alongside firm identity.
- **Risk-and-Reward Sharing Arrangements:** Strategic priorities differ across alliances—ranging from market expansion and technology acquisition to long-term supply security—thereby shifting the criteria used to evaluate success and competitiveness across partners.

Conclusions

1. The overall level of perceived competitive performance for strategic alliances was high, recording an aggregate mean score of 2.5455.
2. Statistically significant differences ($p = 0.007$) were confirmed in competitive performance across the evaluated companies, characterized by a very large effect size ($\eta^2 = 0.389$).
3. Conservative post-hoc pairwise comparisons (Games-Howell) revealed the statistical superiority of the technology-driven cluster (Equinor ASA, ENI, and Sinopec) over both Sonatrach and ENGIE, with no significant intra-cluster differences.

4. No statistically significant differences were attributable to demographic variables (age, educational background, or work experience), confirming that the alliance's organizational context serves as the primary driver of performance rather than individual respondent characteristics.
5. The findings reflect the perceived evaluations of managers and executives, and do not necessarily mirror objective financial figures or hard production data.

Recommendations

1. **Formulate a Unified Performance Measurement Framework:** Develop a standardized framework tailored to the specific nature of hydrocarbon projects, integrating financial, operational, and technological metrics.
2. **Enhance Joint Governance Mechanisms:** Streamline decision-making pathways, clarify structural responsibilities, and establish explicit protocols for intellectual property rights.
3. **Establish a Periodic Benchmarking System:** Implement systematic benchmarking mechanisms to diagnose operational gaps across alliances and evaluate their root causes periodically.
4. **Activate Knowledge and Technology Transfer Channels:** Operationalize structured mechanisms for technology absorption to ensure foreign partners' expertise is internalized into Sonatrach's core capabilities.
5. **Adopt the Alliance as an Independent Unit of Analysis:** Maintain a clear distinction in administrative and financial evaluations between parent company performance and joint alliance operations.

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Appendices:

Report					
الاداء التنافسي					
Nom de l'entreprise	N	Std. Deviation	Mean	Median	Range
Sonatrach	16	,46771	2,3125	2,4375	1,88
EquinorAS	5	,00000	3,0000	3,0000	,00
Sinopec	4	,12500	2,9375	3,0000	,25
ENI	3	,00000	3,0000	3,0000	,00
ENGIE	5	,75519	2,2500	2,3750	2,00
Total	33	,53566	2,5455	2,6250	2,00

Test of Homogeneity of Variances					
الاداء التنافسي					
	Levene Statistic	df1	df2	Sig.	
Based on Mean	3,625	4	28	,017	
Based on Median	2,768	4	28	,047	
Based on Median and with adjusted df	2,768	4	14,392	,068	
Based on trimmed mean	3,425	4	28	,021	

ANOVA					
الاداء التنافسي					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3,572	4	,893	4,458	,007
Within Groups	5,609	28	,200		
Total	9,182	32			

Multiple Comparisons						
Dependent Variable: الاداء التنافسي						
Games-Howell						
(I) Nom de l'entreprise	(J)) Nom de l'entreprise	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Sonatrach	EquinorAS	-,68750 [*]	,11693	,000	-1,0486	-,3264
	Sinopec	-,62500 [*]	,13258	,002	-1,0268	-,2232
	ENI	-,68750 [*]	,11693	,000	-1,0486	-,3264
	ENGIE	,06250	,35740	1,000	-1,3715	1,4965
EquinorAS	Sonatrach	,68750 [*]	,11693	,000	,3264	1,0486
	Sinopec	,06250	,06250	,843	-,2690	,3940
	ENI	,00000	,00000	.	,0000	,0000
	ENGIE	,75000	,33773	,328	-,7514	2,2514
Sinopec	Sonatrach	,62500 [*]	,13258	,002	,2232	1,0268
	EquinorAS	-,06250	,06250	,843	-,3940	,2690
	ENI	-,06250	,06250	,843	-,3940	,2690
	ENGIE	,68750	,34347	,393	-,7899	2,1649
ENI	Sonatrach	,68750 [*]	,11693	,000	,3264	1,0486
	EquinorAS	,00000	,00000	.	,0000	,0000
	Sinopec	,06250	,06250	,843	-,2690	,3940
	ENGIE	,75000	,33773	,328	-,7514	2,2514
ENGIE	Sonatrach	-,06250	,35740	1,000	-1,4965	1,3715
	EquinorAS	-,75000	,33773	,328	-2,2514	,7514
	Sinopec	-,68750	,34347	,393	-2,1649	,7899
	ENI	-,75000	,33773	,328	-2,2514	,7514
*. The mean difference is significant at the 0.05 level.						

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of الإناء الشفسي is the same across categories of Nom de l'entreprise.	Independent-Samples Kruskal-Wallis Test	,001	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is ,05.