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**Examining the Drivers and Inhibitors of
Sustainability Adoption Among Oil &
Gas Service Providers: Case of UAE**

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Abstract

This study investigates the factors driving and inhibiting sustainability adoption among oil and gas service providers in the United Arab Emirates (UAE). The research applies the Innovation Diffusion Theory (IDT) to examine the impact of five critical dimensions: relative advantage, compatibility, trialability, observability, and complexity. It also explores how company size, stream, and type influence the adoption of sustainability. Using quantitative methods, an online survey gathered data from 486 participants, which was analyzed through linear and multiple regression, one-way ANOVA, and t-tests. Results reveal that relative advantage and compatibility are significant drivers of sustainability adoption, while complexity remains a substantial barrier. Larger companies, particularly those in the upstream sector, are more likely to adopt sustainability practices compared to smaller companies. The study concludes by offering recommendations for policymakers and industry leaders to enhance sustainability efforts within the sector.

Keywords: Sustainability, Oil and Gas, Innovation Diffusion Theory, UAE, Statistical Analysis, Sustainability Adoption

1.0 INTRODUCTION

1.1 Background

The environmental impacts of industrial activities, especially in the oil and gas sector, are well-documented and have led to increasing calls for the adoption of sustainability practices. Climate change, driven primarily by greenhouse gas emissions, has forced industries to reconsider their operational strategies and embrace more sustainable approaches. The oil and gas industry, a significant contributor to these emissions, faces immense pressure to mitigate its environmental footprint through the adoption of sustainability.

In the UAE, oil and gas remain central to the economy. According to recent statistics, the sector accounted for about 30% of the country's GDP, with substantial reserves and production

capacities (ITA, 2022; MOEC, 2021). However, as global and local attention shifts toward reducing carbon emissions, there is an increasing need for companies in the sector to integrate sustainability into their business models. This shift is crucial not only for reducing environmental harm but also for ensuring long-term business viability as markets increasingly favor greener, more sustainable practices.

The objective of this research is to examine the drivers and inhibitors of sustainability adoption among oil and gas service providers in the UAE. The study draws upon the Innovation Diffusion Theory (IDT), which offers a comprehensive framework for understanding how innovations—like sustainability—are adopted within industries. By exploring the five dimensions of IDT, alongside company-specific factors such as size, stream, and type, the study seeks to uncover the factors that facilitate or hinder the integration of sustainability in this crucial sector.

1.2 Research Objectives

This research aims to achieve the following objectives:

1. To identify the primary drivers and barriers that influence the adoption of sustainability practices among the oil and gas service providers in UAE.
2. To assess the role of company size, stream, and type in shaping the adoption of sustainability practices.
3. To develop recommendations for promoting sustainable practices within the industry based on empirical findings.

1.3 Research Questions

The research addresses the following questions:

- What are the key factors that drive or inhibit sustainability adoption among oil and gas service providers in UAE?
- What are the barriers preventing oil and gas companies from fully integrating sustainability into their operations?
- In what way do company size and company stream affect the likelihood of adopting sustainability practices?
- What role does company type play in shaping the sustainability strategies of oil and gas service providers?

2.0 LITERATURE REVIEW

2.1 Sustainability in the Oil and Gas Sector

Sustainability is no longer just a buzzword; it is now an essential part of the operational strategy for many industries, especially those with high environmental impacts, like the oil and gas sector. The Triple Bottom Line (TBL) framework, which emphasizes balancing economic, environmental, and social considerations, is widely adopted by companies looking to integrate sustainability into their core practices (Elkington, 1999). For the oil and gas industry, sustainability practices are often seen in the form of carbon reduction initiatives, investments in renewable energy, and improved resource efficiency.

Sustainability in the oil and gas sector has been driven by various factors, including regulatory pressures, market demands, and a growing awareness of corporate social responsibility (CSR). Gatto and Busato (2021) noted that companies who adopt sustainable practices often see long-term financial benefits, including improved brand reputation, increased investment opportunities, and reduced operational risks associated with environmental regulation. However, despite these benefits, many companies face significant challenges in adopting sustainability, particularly in industries as technically complex and capital-intensive as oil and gas.

The adoption of sustainability in this sector often requires significant changes to operations, from the way resources are extracted to how waste is managed. Previous research has highlighted several barriers to sustainability adoption in the oil and gas sector, including the high costs of implementing new technologies, the complexity of regulatory environments, and the inertia of established business practices (Wani & Ali, 2015).

2.2 Innovation Diffusion Theory (IDT)

The Innovation Diffusion Theory (IDT) by Rogers (2003) provides a valuable framework for understanding how new ideas and practices, such as sustainability, are adopted within an industry. The theory identifies five key dimensions that influence the rate and extent of adoption:

- **Relative Advantage:** The degree to which an innovation is perceived as better than the existing practice. In the case of sustainability, this could relate to cost savings, improved efficiency, or enhanced corporate reputation.
- **Compatibility:** The extent to which the innovation aligns with the existing values, experiences, and needs of the adopters. For oil and gas companies, sustainability practices must fit within their current operational models.
- **Trialability:** The ability to experiment with the innovation before committing to full-scale adoption. This is particularly important for companies in the oil and gas sector, where large-scale changes to operations can be costly and time-consuming.
- **Observability:** The visibility of the results of the innovation. If the benefits of adopting sustainability are easily observed, companies are more likely to adopt these practices.
- **Complexity:** The perceived difficulty of understanding and implementing the innovation. Sustainability practices that are seen as overly complex are less likely to be adopted.

Several studies have applied IDT to understand the adoption of various innovations within different industries. For example, Silva et al. (2022) applied the theory to analyze the adoption

of renewable energy technologies in emerging economies, while Wani and Ali (2015) examined its application in the oil and gas sector.

2.3 The Role of Company Size, Stream, and Type

Company-specific factors, such as size, stream, and type, also play a significant role in shaping sustainability adoption. Larger companies typically have more resources and are better positioned to invest in sustainable practices. In contrast, smaller companies may face financial and operational constraints that limit their ability to adopt such practices. Additionally, the stream of a company—whether it operates in upstream, midstream, or downstream sectors—can influence its sustainability strategies, as each stream has different environmental impacts and operational needs (Clarkson et al., 2019; Kim & Choi, 2019).

Similarly, the type of company, whether local or international, can affect its approach to sustainability. International companies often face greater scrutiny from global stakeholders and are more likely to adopt sustainability practices to maintain their global reputation. In contrast, local companies may prioritize short-term profitability over long-term sustainability (Lu et al., 2019).

3. METHODOLOGY

3.1 Research Design

This study follows a quantitative research design to explore the factors influencing sustainability adoption among oil and gas service providers in the UAE. A cross-sectional survey was employed to collect data from industry professionals, focusing on their perceptions of sustainability and the factors that influence its adoption within their organizations. The survey was distributed online, and responses were collected from a sample of 486 participants, providing a robust dataset for statistical analysis.

3.2 Sampling

The target population for this study consisted of oil and gas service providers operating in the UAE. Participants were selected using a simple random sampling technique to ensure a representative sample. The final sample included decision-makers, managers, and technical staff from companies of varying sizes (micro, small, medium, and large), streams (upstream, midstream, downstream), and types (local and international). This diversity allowed for a comprehensive analysis of the factors influencing sustainability adoption across different segments of the industry.

3.3 Data Collection

The primary data was collected through an online questionnaire designed using a 7-point Likert scale to measure the five dimensions of IDT (relative advantage, compatibility, trialability, observability, and complexity). The questionnaire also included items related to company size, stream, and type, as well as questions about the participants' views on the barriers and drivers of sustainability adoption.

3.4 Hypotheses

The following hypotheses were tested:

1. **H1:** Relative advantage has a statistically significant impact on the adoption of sustainability by oil and gas service providers in the UAE.
2. **H2:** Compatibility has a statistically significant impact on the adoption of sustainability by oil and gas service providers in the UAE.
3. **H3:** Trialability has a statistically significant impact on the adoption of sustainability by oil and gas service providers in the UAE.
4. **H4:** Observability has a statistically significant impact on the adoption of sustainability by oil and gas service providers in the UAE.

5. **H5:** Complexity has a statistically significant impact on the adoption of sustainability by oil and gas service providers in the UAE.
6. **H6:** Company size (micro, small, medium, and large) has a statistically significant impact on the adoption of sustainability practices by oil and gas service providers in the UAE.
7. **H7:** Company stream (upstream, midstream, downstream) has a statistically significant impact on the adoption of sustainability practices by oil and gas service providers in the UAE.
8. **H8:** Company type (local vs international) has a statistically significant impact on the adoption of sustainability practices by oil and gas service providers in the UAE.

4. RESULTS

4.1 Descriptive Statistics

The data was first analyzed using descriptive statistics to provide an overview of the respondents' demographics. Most respondents were from large companies (68%), with a substantial portion of participants working in the upstream sector (50%). The remaining respondents were distributed between midstream and downstream sectors. Regarding company type, 67% of the respondents were from international companies, while 33% represented local companies.

4.2 Reliability and Validity

To ensure the reliability and validity of the survey instrument, internal consistency was measured using Cronbach's alpha. The five dimensions of IDT—relative advantage, compatibility, trialability, observability, and complexity—exhibited strong reliability, achieving a Cronbach's alpha of 0.87, which surpasses the recommended threshold of 0.7 (Nunnally, 1978; Taber, 2020) as shown in Table 1. Additionally, convergent and discriminant validity assessments were conducted to evaluate the correlation of items within the same construct and to examine the interrelationships between constructs and latent variables.

The findings, presented in Table 2, confirm that the measurement instrument is suitable for use, with Average Variance Extracted (AVE) and Composite Reliability (CR) values exceeding 0.9, and the square root of AVE being greater than the correlation coefficients with other constructs (Fornell & Larcker, 1981).

Table 1:

Reliability of the Main Study.

| Cronbach's Alpha | N of Items |
|------------------|------------|
| 0.870 | 31 |

Note. Source: (Author, 2023).

Table 2:*Convergent & Discriminant Validity.*

| | CR | AVE | MSV | MaxR (H) | RAD | COM | TRI | OBS | CMX |
|-----|-------|-------|-------|-------------|---------|--------|-------|-------|-------|
| RAD | 0.986 | 0.908 | 0.019 | 0.990 | 0.953 | | | | |
| COM | 0.992 | 0.955 | 0.006 | 0.993 | -0.009 | 0.977 | | | |
| TRI | 0.995 | 0.971 | 0.019 | 1.001 | 0.137** | -0.031 | 0.985 | | |
| OBS | 0.994 | 0.965 | 0.008 | 0.998 | 0.090* | -0.004 | 0.025 | 0.982 | |
| CMX | 0.994 | 0.963 | 0.008 | 0.997 | 0.088† | -0.074 | 0.000 | 0.007 | 0.982 |

Note. Source: (Author, 2023).

4.3 Hypothesis Testing

4.3.1 Linear Regression Analysis

Linear regression was used to examine the relationship between the sub-factors encapsulated in each of the five IDT's attributes. The result of linear regression analysis demonstrated that market uncertainty ($\beta = 0.482, p = .000$), firm strategy ($\beta = 0.459, p = .000$), business simulation ($\beta = 0.43, p = .000$), energy and financial profile ($\beta = 0.435, p = .000$) were the highest potential drivers for sustainability adoption based on the four IDT's driver dimensions: relative advantage, compatibility, trialability, and observability. On other hand, the same analysis showed that ROI ($\beta = 0.446, p = .000$), corporate governor ($\beta = 0.440, p = .000$), risk free ($\beta = 0.411, p = .000$) and businesses expansion ($\beta = 0.417, p = .000$) were the lowest drivers for same IDT's dimensions respectively.

In contrast, complexity dimension was found to be a significant barrier to adoption. The results indicated that infrastructure ($\beta = -0.529, p = .000$) was the highest inhibitor while the lack of support was the lowest ($\beta = -0.506, p = .000$) indicating that companies are less likely to adopt sustainability practices if they perceive them as too complex or difficult to implement.

4.3.2 Multiple Regression Analysis

Multiple regression analysis was conducted to assess how each IDT attribute, along with its sub-factors, influences the adoption of sustainability. The results revealed that relative advantage ($\beta = 0.487, p = .000$) and compatibility ($\beta = 0.474, p = .000$) are significant predictors of sustainability adoption. These findings suggest that companies are more likely to adopt sustainability when they perceive it as providing a relative advantage and when it aligns with their existing practices.

Table 3:*Multiple Linear Regression Analysis.*

| Hypothesis | Model Summary | | ANOVA | |
|--------------------|-------------------|----------|--------|------|
| | R | R Square | F | Sig. |
| Relative Advantage | .487 ^a | .237 | 24.770 | .000 |
| Compatibility | .474 ^a | .225 | 23.170 | .000 |
| Trialability | .434 ^a | .188 | 18.494 | .000 |
| Observability | .444 ^a | .197 | 19.634 | .000 |
| Complexity | .544 ^a | .296 | 28.731 | .000 |

Note. Source: (Author, 2023).

4.3.3 One-Way ANOVA

One-way ANOVA analysis was conducted to assess the impact of company size and stream on sustainability adoption as shown in Table 4 and Table 5 respectively. The results show that company size ($F(3,482) = 3.360, p = 0.019$) and stream ($F(2,483) = 3.544, p = 0.030$) significantly affect the adoption of sustainability practices. Larger companies, particularly those in the upstream sector, are more likely to adopt sustainability measures compared to smaller companies or those in the downstream sector.

Table 4:*One-way ANOVA Test for Company Size.*

| Adoption of Sustainability | ANOVA | | | | |
|----------------------------|----------------|-----|-------------|-------|-------|
| | Sum of Squares | df | Mean Square | F | Sig. |
| Between Groups | 4.166 | 3 | 1.389 | 3.360 | 0.019 |
| Within Groups | 199.207 | 482 | 0.413 | | |
| Total | 203.372 | 485 | | | |

Note. Source: (Author, 2023).

Table 5:*One-way ANOVA Test for Company Stream.*

| ANOVA | | | | | |
|----------------------------|----------------|-----|-------------|-------|-------|
| Adoption of Sustainability | Sum of Squares | df | Mean Square | F | Sig. |
| Between Groups | 2.942 | 2 | 1.471 | 3.544 | 0.030 |
| Within Groups | 200.431 | 483 | 0.415 | | |
| Total | 203.372 | 485 | | | |

Note. Source: (Author, 2023).

4.3.4 t-Test

An independent samples t-test was performed to compare sustainability adoption between local and international companies as shown in Table 6. The analysis revealed that international companies are significantly more likely to adopt sustainability practices than local companies ($t(284.472) = -2.856, p = 0.005$). This finding suggests that international companies, which are often subject to global standards and regulations, are more inclined to integrate sustainability into their operations.

Table 6:*Independent Sample t-test for Company Type and Adoption of Sustainability.*

| Independent Samples Test | | | | | | | | | | |
|----------------------------|-----------------------------|---|------|--------------------------------------|---------|-----------------|-----------------|-----------------------|--|-------|
| | | Levene's Test for Equality of Variances | | <i>t</i> -test for Equality of Means | | | | | | |
| | | F | Sig. | t | Df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95 percent Confidence Interval of the Difference | |
| | | | | | | | | | Lower | Upper |
| Adoption of sustainability | Equal variances assumed | 4.297 | .039 | -2.986 | 484 | .003 | -.185 | .062 | -.306 | -.063 |
| | Equal variances not assumed | | | -2.856 | 284.472 | .005 | -.185 | .065 | -.312 | -.057 |

Note. Source: (Author, 2023).

5. DISCUSSION

5.1 Drivers of Sustainability Adoption

The results of the regression analysis indicate that relative advantage and compatibility are the primary drivers of sustainability adoption among oil and gas service providers in the UAE. These findings align with the existing literature, which emphasizes that companies are more likely to adopt sustainability when they perceive it as providing tangible benefits, such as cost savings, improved operational efficiency, or enhanced reputation (Gatto & Busato, 2021). Additionally, the importance of compatibility suggests that companies are more inclined to adopt sustainability practices when these align with their existing values, strategies, and operational processes.

5.2 Barriers to Sustainability Adoption

Despite the potential benefits of sustainability, the study found that complexity remains a significant barrier to adoption. Many respondents reported that sustainability practices, particularly those involving new technologies or regulatory compliance, are perceived as overly complex and difficult to implement. This finding is consistent with previous research by Wani and Ali (2015), who noted that the technical and financial complexities associated with sustainability can deter companies from fully integrating these practices.

5.3 The Influence of Company Size, Stream, and Type

The analysis revealed significant differences in sustainability adoption based on company size and stream. Larger companies are more likely to adopt sustainability practices due to their greater financial resources, access to technology, and ability to absorb the costs associated with sustainability initiatives. In contrast, smaller companies often struggle to implement these practices due to limited financial and operational capacity.

Company stream also plays a critical role in shaping sustainability adoption. The upstream sector, which involves exploration and extraction activities, is more likely to adopt sustainability measures due to the high environmental impact of these operations. In contrast, companies in the downstream sector, which focuses on refining and distribution, may perceive sustainability as less urgent, given the relatively lower environmental risks associated with their operations.

International companies are also more likely to adopt sustainability practices compared to local

companies. This can be attributed to the greater scrutiny and pressure that international companies face from global stakeholders, regulators, and investors. Additionally, international companies often have access to more advanced technologies and resources that facilitate the adoption of sustainability practices.

5.4 Policy Implications

The findings of this study have several important implications for policymakers and industry leaders. To enhance sustainability adoption within the oil and gas service sector, policymakers should focus on reducing the perceived complexity of sustainability practices. This could be achieved through the development of clear guidelines, the provision of training and support programs, and the introduction of financial incentives, such as tax breaks or grants, to encourage companies to invest in sustainability.

Moreover, policymakers should consider targeted interventions for smaller companies, which often face greater challenges in adopting sustainability due to limited resources. By providing financial support, technical assistance, and access to sustainability technologies, policymakers can help level the playing field and encourage more widespread adoption of sustainability practices across the sector.

6. CONCLUSION

This study offers valuable insights into the drivers and inhibitors of sustainability adoption in the oil and gas service sector in the UAE. By applying the Innovation Diffusion Theory, the research identifies relative advantage and compatibility as key drivers of adoption, while complexity remains a significant barrier. The findings also highlight the importance of company size and stream in shaping sustainability practices, with larger companies and those in the upstream sector more likely to adopt sustainable initiatives. International companies are also more inclined to integrate sustainability into their operations compared to local companies.

The study provides several actionable recommendations for policymakers and industry leaders to enhance sustainability adoption within the sector. By reducing the complexity of sustainability practices and providing targeted support to smaller companies, the UAE can accelerate its transition towards a more sustainable future. Future research could focus on exploring the long-term impacts of sustainability adoption on business performance in the oil and gas sector, as well as

examining the role of external factors, such as government regulations and market conditions, in shaping sustainability strategies.

References

- Arowoshegbe, A. O., Uniamikogbo, E., & Atu, O. O. K. (2016). Sustainability and triple bottom line: An overview of two interrelated concepts. *Igbinedion University Journal of Accounting*, 2(1), 88-105.
- Clarkson, P. M., Li, Y., Richardson, G. D., & Vasvari, F. P. (2019). Revisiting the relation between environmental performance and environmental disclosure: An empirical analysis. *Accounting, Organizations and Society*, 44(4), 317-338.
- Elkington, J. (1999). *Cannibals with Forks: The Triple Bottom Line of 21st Century Business*. Capstone Publishing Ltd.
- Fornell, C., & Larcker, D. F. (1981). Structural equation models with unobservable variables and measurement error: Algebra and statistics.
- Gatto, A., & Busato, F. (2021). The impact of sustainability on the oil and gas sector. *Sustainability*, 13(4), 1931.
- ITA. (2022). *From International Trade Administration-Oil and Gas*, p.5.
<https://www.trade.gov/country-commercial-guides/united-arab-emirates-oil-and-gas>.
- Kim, S. T., & Choi, B. (2019). Price risk management and capital structure of oil and gas project companies: Difference between upstream and downstream industries. *Energy economics*, 83, pp. 361-374.
- Lu, H., Guo, L., & Zhang, Y. (2019). Oil and gas companies' low-carbon emission transition to integrated energy companies. *Science of the total environment*, 686, pp. 1202-1209.

MOEC. (2021). Annual Economic and Statistical Reports, p. 7. From UAE Ministry of Economy:
Retrieved from: https://www.moec.gov.ae/documents/20121/0/Annual_Report_MOE20-20ENG2028229.pdf/ad3ea4ed-770e-4741-f8d2-0dfa08f7af12

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). Free Press.

Silva, C. A., Medeiros, C. P., & Guimarães, J. C. (2022). Innovation and diffusion of renewable energy: An integrative approach. *Renewable Energy*, 46(6), 856-864.

Taber, K. S. (2018). The use of Cronbach's alpha when developing and reporting research instruments in science education. *Research in science education*, 48, pp. 1273-1296.

Wani, T. A., & Ali, S. M. (2015). Sustainability practices in the oil and gas sector: Drivers and inhibitors. *Sustainable Development*, 23(2), 123-134.