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# Examining the Economic Impact of E-business Technologies in the Oil and Gas Industry on Local Communities in Emerging Economies: Implications for Policy and Practice in Guyana's Oil and Gas Sector

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***Abstract***

*This paper discusses the economic impact of e-business practices, specifically related to employment of technologies in the oil and gas industry on local communities in emerging economies and discussed implications for Policy and Practice in Guyana's Oil and Gas Sector. By adopting digital technologies such as AI, IoT and blockchain as part of the E-business infrastructure, business in the oil and gas industry benefits from improvements in operational efficiency, accountability and transparency in the supply chain, and sustainable economic growth in communities because of increase employment and other socio-economic benefits. The study employed a secondary research approach to collect and analyze data form various academic and industry sources. The findings from this study reveal that robust E-business infrastructures are augmented with advanced digital technologies, and economies that adopts this strategy benefits for improved operational efficiency in the oil and gas sector, enhanced community development through employment and economic diversification. Bases on this study, the key implications and recommendations for Guyana include policy and e-business infrastructure development, and capacity building.*

***Keywords:*** *E-business Infrastructure, E-business Practices, Oil and Gas Sector, Policies and Practices, Technology Integration.*

## Introduction

The evolution of digital technology as led to transformation is the way business is conducted across industries worldwide [23, 6, 12, 20, 13]. The use of digital technology in e-business in the oil and gas industry stands as a formidable example in this regard.

Guyana's a new emerging oil and gas economy [18] has the potential to play a significant role in the global oil and gas market. And the integration of robust, sustainable e-business infrastructure and practices within as an integral part of sector brings substantial opportunities to boost productivity, enhance operational efficiencies, promote sustainable development, and economic growth [4, 10].

Further, as the global oil and gas sector continues to be impacted by stakeholders concerns for the environment, in addition to advances in technology, Guyana approach to embracing e-business practices by way of robust policies, incentives and critical digital infrastructure, can serve as a model from which other oil and gas producing countries can learn.

The move towards a robust e-business infrastructure that incorporates the most recent advanced technologies could include several initiatives. For example, the adoption of advanced analytics, IoT solutions, blockchain to promote supply chain accountability, transparency, and security, and Artificial Intelligence [23, 6, 12, 20, 13].

Adopting these types of innovative technologies to drive e-business in the oil and gas sector, provides the framework for long-term economic benefits for communities across

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Guyana, while at the sometime balancing the need to be good stewards of the environment.

## Literature Review

### Theoretical Framework

The Endogenous Growth Theory developed and populated by Romer (1990) emphasizes the role of innovation and technology in promoting and fostering growth and development. This theory proposes that integrating advanced technologies in E-business functions is critical for economic growth. Based on this notion, [20] theoretical perspective can be applied to understand how digital transformation in the oil and gas sector creates sustainable economic development and business opportunities. Equally, [13] Multiplier Effect theory can also be applied to understand how investing in technology results in beneficial economic outcomes across various sectors of local communities. Integrating these theoretical constructs provides the groundwork for understanding the current trends and potential of optimizing strategies for enhancing E-business practices in emerging economies' oil and gas sectors, specifically in countries such as Guyana.

### The Economic Impact of Technology Integration in E-business

Adapting technology to facilitate E-business in the oil and gas industry transforms business operations. This transformation is due to advanced technologies such as blockchain, IoT, and AI [16, 23, 6, 11].

In the oil and gas sector, blockchain technology is significant in ensuring accountability and transparency of E-business transactions related to supply chain activities. According to [9], integrating blockchain technology provides efficient and effective transactions across supply chain activities, including data sharing. Further, using blockchain technology in the E-business process enhances compliance while reducing the likelihood of transaction errors and mistakes. This efficiency level promotes trust and reciprocal accountability amongst stakeholders and, by extension, economic growth across communities [23].

Equally, incorporating IoT technology in E-business in the oil and gas sector enhances monitoring and evaluation capabilities, primarily related to oil and gas infrastructure [12, 18]. The research suggests that the outcomes are positive, including predictive maintenance, reduced delays and downtimes, improved efficiency, and overall cost of operations. As a result, they are optimizing the management of resources and ensuring sustainable employment opportunities within communities.

Another advanced technology enhancing the capacity of E-business in the oil and gas sector is Artificial Intelligence (AI). Artificial Intelligence provides the impetus for activities such as data-driven decision-making, automated drilling, and other processes that significantly mitigate human errors while increasing the efficiency, effectiveness, and economic viability of operations in the sector [20, 13]. This efficiency contributed to lowering the cost of production, leading to lower prices for oil and gas products for businesses, thereby supporting their growth in the communities in which they are located.

### Global Perspective

From a global perspective, integrating E-business into the oil and gas sector of emerging oil and gas economies is critical in transforming operations and, by extension, ensuring sustainable economic growth and development in communities. Many researchers [16, 23, 6], examine the extent to which the use of advanced technologies employed for conducting E-business such as the Internet of Things (IoT), blockchains, and Artificial I intelligence (AI) are impacting supply chain and operational efficiencies in the oil and gas industries of both developing and developed countries. These technologies significantly

affect firms' operating costs due to enhanced efficiency, transparency, and compliance. As a result, the local communities' economies benefit from investments and employment [5].

### E-business, Economic Growth, and Community Development

The literature substantiates the positive impact of e-business practices in the oil and gas industry on local communities in emerging economies [16, 23, 6, 11, 9], more particularly, the integration of advance technology to enhance the e-business process. The combined effects of these e-business practices include reducing operational costs and extending to improved transparency and efficiency, resulting in a more attractive oil and gas sector for investors [4]. As a result of increased investment, more jobs are created within communities; people are paid higher wages, improving economic development in communities and the country. Equally, the spin-off benefits into other industries such as construction, logistics, education, and training have provided the vehicles for economic diversification, thereby reducing dependence on a single sector – oil and gas [10].

E-business's core incorporates robust technology that drives transparency, efficiency, and lower operational costs. These findings highlight the profound impact E-businesses employing the correct type of technology can have on oils and gas industries in both developed and emerging economies.

## Methodology

This section provides an overview of the method employed in conducting secondary research to gather and analyze the data for this study.

### Search Strategy

The search for relevant studies includes search engines and databases such as Google Scholar, Emerald Insight, Science Direct, and other scholarly and practitioner sources. A full search of the databases and journals was conducted using specific keywords and phrases related to the topic explored in this study. A combination of Keywords and phrases such as e-business impact on oil and gas economies, oil and gas industry, digital transformation, economic development, emerging oil and gas economies, developed oil and gas economies and e-commerce' were explored in the databases to find articles with content relevant for this study. Boolean operators were employed to refine results from the databases. Overall, the search strategy employed an iterative process, refining search terms based on initial findings. As a result, a wide range of relevant studies will be ensured.

### Inclusion and Exclusion Criteria

The criteria which were used to determine whether a study would have been considered for this research included:

1. Language: Only studies published in English were considered suitable for this research.
2. Relevance: Studies that focused on the impact of technologies used in e-business and their impact on communities in developed and emerging oil and gas economies were considered the primary data source.
3. Type of sources: Peer-reviewed, industry reports and government publications were considered.
4. Publication period: Studies published over the last ten years were considered most relevant and included.
5. Geographic location: Only studies on emerging oil and gas economies such as Guyana were considered.

### Data Extraction and Analysis

Relevant data from the studies were extracted and discussed [9] including types of e-business technology, reported impact, and geographical focus of the studies. This approach provided a systematic structure for effective country comparison of findings across

multiple studies. Thematic analyses were used to analyze and discuss the data.

## Results

The outcomes from examining published studies that provide empirical data on implementing technologies to enable E-business practices in the oil and gas sectors of emerging oil and gas economies showed noticeable differences. The Southeast Asia region, in addition to Nigeria, Brazil, and India, was examined. Each of these countries exhibits unique outcomes from how businesses in their respective oil and gas sector integrate technologies in their E-business activities and their impact on community development.

### Southeast Asia

For oil-producing nations in Southeast Asia, e-business activities in the oil and gas sector focus on expanding market reach and employing enhanced technologies such as artificial Intelligence (AI). Indonesia, Malaysia, and Vietnam produce 2 million barrels of oil daily [22]. While this combined level of production is small when compared to other oil-producing nations, research [17, 14] has shown that the use of digital platforms has enhanced the capabilities of businesses, particularly Small and Medium Sized Enterprises to benefit from connecting with larger enterprises both domestically and internationally. Some vital economic benefits countries such as Indonesia, Malaysia, and Vietnam include technology transfer and skills development for the local workforce. These benefits extend beyond the oil and gas sector to other economic sectors such as tourism, healthcare, and education, as evident from documented evidence of developments in Southeast Asia, enabling similar technological adoptions in local businesses operating in these sectors [22].

### Nigeria

Compared to Southeast Asian countries, the driving force for e-business practices in the oil and gas sector stems from the country's need to improve operational inefficiencies and meet the regulatory compliance demands of the industry. Researchers [21] argue that the prevalence of e-business in the oil and gas sector has resulted in improvements in the socio-economic development of communities in Nigeria, such as the creation of jobs and salaries and wages. As a result, standards of living in many local communities are improved. These are the direct benefits of oil and gas operations. However, these benefits were moderate compared to other countries, such as Ghana.

### Ghana

Over the years, Ghana's Oil and Gas sector has transformed due to the increasing emergence and use of e-business practices within the industry. This aligns with the country's national priority, improving operational efficiency, accountability, and transparency across the sector [5]. Equally, scholars [16] found that employing e-business practices and tools such as automated inventory management systems improved supply chain and logistics operations. However, e-business practices in Ghana go beyond operational efficiency to include robust compliance and sustainable environmental practices in the industry. The results of these initiatives benefit the economy and, by extension, communities through increasing demand for the products and services of local suppliers, thereby stimulating local economies.

### Brazil

Comparatively, according to [7], Brazil adopts a holistic approach to e-business in its oil and gas industry. This is a twin focus on improving the industry's operational efficiency while providing avenues for Small and Medium-sized businesses to take advantage of direct benefits, including being in the supply chain infrastructure of the industry and other large-scale projects in the industry. This is guaranteed in the country's local content policy

[7]. According [7], making legal provisions for the involvement of SMEs in the supply chain infrastructure of the oil and gas industry resulted in a more equitable distribution of economic benefits for communities and the facilitation of a more robust local business ecosystem.

### India

India's oil and gas industry has focused on e-business to drive efficiency and sustainable practices. Akhtar & Sushil [1] found that artificial Intelligence and IoT are critical technological drivers that enhance energy efficiency and reduce production delays and downtimes. Akhtar & Sushil [1] also found that employing these technologies in e-business is integral to reducing cost and environmental impact. Hence, it aligns with the country's self-sufficiency and economic sustainability agenda. Communities across India have benefitted significantly from these practices and policies.

## Discussion

These regional comparisons demonstrate the distinct approaches emerging oil and gas economies employ to leverage the benefits of advanced technologies to enhance e-business processes in the oil and gas sector. Considering communities and economic development, Ghana, like Nigeria, benefits from increasing economic opportunities, job creation for citizens and enhanced capabilities of small businesses to take advantage of the benefits accruing from robust e-business infrastructure and practices [16, 5, 21]. However, environmental sustainability is an integral aspect of Ghana's e-business strategy.

Specific to supply integrating practices, both Ghana and Brazil use e-business to promote the participation of local small and medium-sized businesses in the industry with a strong emphasis on compliance and sustainable practices [7, 5]. On the other hand, given the low levels of oil and gas production in India and Southeast Asia, e-business strategies are focused on expanding other sectors' attractiveness and market reach. Overall, the studies reveal that each country's unique approach to e-business practices in their respective oil and gas sectors provides a nuanced understanding of the impact this can have on economic development and long-term sustainable environmental practices of communities.

The implications of the findings suggest that employing e-business practices using technologically advanced tools in the oil and gas industry can serve as an important impetus for fostering economic growth and sustainable development across diverse communities in emerging oil and gas economies. The nuanced insights garnered from these country comparisons emphasize the importance of designing e-business strategies in local contexts to maximize the benefits for communities.

## Implications

In this regard, given Guyana's relatively new position in the global oil and gas sector and considering the findings presented in this study, the implications in relation to policies and practices are as follows:

1. **Policy Development:** Specific e-business policies and incentives for promoting and supporting sustainable e-business practices that are both economically beneficial and environmentally sustainable. Policies in this regard could include providing incentives for businesses that adopt and integrate green technologies and practices in their e-business practices.
2. **Capacity Building:** This is essential for Guyana, as a new oil and gas economy. Capacity building will involve significant investments in training and development for local businesses, and the workforce in areas such as entrepreneurship, digital skills, environmental management, and leadership. This also includes providing critical financial and ither forms of support

for SMEs. This type if intervention will ensure that businesses are fully equipped to leverage the benefits and opportunities provided by e-business activities. This strengthening of local capacity and participation will serve to enhance the digital skill sets of human resources capacity in the industry.

3. **Infrastructure Development:** If businesses are to reap the full benefits from e-business activities, then it's imperative that the government continues to make provide critical support in the development of digital infrastructure such as broadband internet access for businesses, particularly in the hinterland regions. Digital infrastructure development must also include data sharing platform that will allow for better collaboration in data sharing between businesses. This is key to enabling online communications and business transactions.

Recognizing and acting on these implications will allow Guyana to harness the benefits from E-business to enhance business operations in the oil and gas sector. They will also provide the impetus for inclusive, sustainable economic growth in communities, and by extension Guyana's economic and social development.

## Conclusion

This research reveals that e-business plays a significant role in the oil and gas sectors of emerging economies, and by extension community development in those countries. Various theories such as the multiplier effect, and endogenous growth perspectives provides the academic impetus for substantiating the roles and values of technology integration in e-business infrastructures, and the resultant beneficial impact on industries, and communities. Deeper insights into the research reveals that emerging oil and gas economic have different approaches to e-business practices in their respective oil and gas industries. However, the overarching theme of economic development and sustainability was constant on all the findings. As a result, by leveraging the insights garnered from these comparisons, governments and businesses in the oil and gas, and other sectors in the economy can better circumnavigate the challenges of implementing e-business practices that are effective, and sustainable. And as a result, making it possible for economic developments in communities.

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## Conflict of Interest

The author has no conflict of interest with regard to the research, and publishing of this article.

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