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## An Empirical Investigation into Managerial Attitude as a Barrier to Adoption of State-of-the-art Upstream Information Systems by Nigerian Indigenous Oil Companies

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### Abstract

*This study critically evaluates managerial attitude as a significant barrier to state-of-the-art upstream information systems adoption by Nigerian indigenous oil companies. Prior literature indicates lack of research on Information and Telecommunication Technology (ICT) infrastructure with respect to Nigerian indigenous oil and gas industry. However, the industry has been considered as the country's mainstay, because it accounts for almost 95 per cent of export revenues. The indigenous oil companies produce only 1 per cent of the total quantity of oil being produced in the country; this may be as a result of many factors, including the type of information systems used by indigenous oil companies. The main objective of the research is to identify the impact of managerial attitude as a significant barrier to upstream information systems adoption by Nigerian indigenous oil companies in their oil and gas exploration and production activities. Furthermore, survey reveals that the multinational oil companies have increased their expertise in using latest technological gadgets for their exploration and production, contrary to their indigenous counterparts. Suitable research tools were used to test the hypothesis. Data were collected and analysed through retrieving 140 valid questionnaires from various stakeholders in indigenous oil companies and ICT experts. A qualitative approach was used in data analysis; the analysis adopts objective statistical tools based on SPSS to identify the impact of managerial attitude towards state-of-the-art information systems adoption. The general opinion of respondents indicated that, they all agreed that managerial interest, knowledge, dynamism, age-bracket, ability, willingness, ICT-oriented culture and lack of proper governance structure were significant barriers to adoption of state-of-the-art information systems by Nigerian indigenous oil companies. The study suggests establishing international partnerships, efficiency, competency and motivation in Nigerian indigenous oil companies.*

Keywords: *managerial attitude, information systems, upstream, indigenous oil companies and ICT*

### 1. Introduction

The number of upstream indigenous oil companies in Nigeria is higher than multinational ones (Olujimi, 2011; Ozigbo, 2008). As of now, there are 26 indigenous and 24 Multinational oil and gas companies operating in the country (Blackherald, 2011; Ihua, 2009). With all these, very few resources are currently being found addressing Information Technology related issues in indigenous oil companies (Blackherald, 2011; Ihua, 2009; Bamiro, 2007; Banker, 2006). This

may be largely due to the insignificant role they play in oil production in the country. Still, oil and Gas sector in the country has been classified as Nigeria's mainstay, because of its significance and the role it plays in uplifting the economy of the country (Olujimi, 2011; Odulari, 2008; Atakpu, 2007).

In the oil and gas sector, drilling expenses account for a significant amount of exploration and production budgets through procuring state-of-the-art information systems (Okoye, 2004; Fisher and Kenny: 2000). The use of complex mathematical modelling for calculation in exploration started since around 1950, and it was the same decade that witnessed the emergence of digital computer system for commercial purposes (Ozigbo, 2008; Okoye, 2004; Shapiro and Randall, 1985; Galle and Woods, 1960). They emphasised that, the adoption of state-of-the-art information systems by international oil companies has been up-to-date and excellent. According to Neal *et al.*, (2007) the pioneer outstanding performance of technological innovation in the oil exploration and production was the separation of oil and gas. This study argues, in spite of technological advancement by international oil companies, the Nigerian indigenous oil counterparts are in poor state.

The state-of-the-art hardware, online monitoring systems and software applications as components of information systems allow programmes and engineering tools primarily designed for drilling in exploration to be placed in the hands of engineers and geologists anywhere in the world (Hill *et al.*, 2008; Shapiro and Randall, 1985). Consequently, international oil companies invested heavily in hardware, software and telecommunication gadgets, when the experts were convinced beyond reasonable doubt that the gigantic work of the companies could not be performed without the intervention of state-of-the-art information systems (Lenhard, 2004; Talib and Malkawi, 2011).

The paper is part of PhD study attempting to identify the significant barriers to adoption of state-of-the-art information system by Nigerian indigenous oil companies. The sequel of this paper is as follows- Section 2 presents the literature review; section 3 describes the methodology of the research; section 4 presents the survey result; and finally Section 5 discusses recommendations, limitations and conclusion.

## **2. Literature Review**

### *2.1 Barriers to adoption of state-of-the-art information systems*

There are many barriers to state-of-the-art Information and Communication Technology (ICT) adoption in developing countries. For example, Okot-uma (1992) and Kunda & Brooks (2000) opined that the constraints of deploying ICT resources in developing countries can be technically classified into three generic classes, namely, contextual, operational and strategic problems.

Contextual constraints are due to incompatibility of models designed for developed countries to the developing countries, in terms of differences and discrepancies in context, semantic discrepancies in the wording and understanding of phenomena as well as references to different concepts of rationality and different values (Kunda & Brooks, 2000). They stated that, operational constraints accommodate technical and economic constraints and poor and unskilled

personnel, whilst strategic constraints encompass organisation and government policies that impede the adoption of world-class information systems.

Mehrtens, Cragg and Mills (2011) argue that not all organisations are naturally inclined towards ICT adoption. In support of this argument, Shim and Jones (2001) enunciated that sometimes, the extent of ICT adoption depends on managerial attitude towards ICT resources. Hence, Tarafdar and Vaidya (2006) recommend that it is important for the management of all organisations to be educated about the fundamental factors behind adopting technology and its value to the organisational advancement. To date, no study has been conducted in Nigerian indigenous oil companies on managerial attitude with respect to adoption of state-of-the-art information systems and this makes this study an imperative one.

Furthermore, Ginsberg and Venkatramen (1992) emphasised that different organisations or managers show different attitudes towards ICT adoption, depending on its perceived usefulness in their operation and general activities. Apulu and Latham (2009) agreed with this observation and outlined among others, general aspects that influence organisations toward ICT adoption: they include the role of top management in organisational leadership and effects of organisational culture.

## *2.2 Top Management Role in Organisational Leadership*

The attitude of top management plays a vital and significant role towards ICT adoption in an organisation. An enthusiastic approach on the part of top managers can lead to ICT adoption (Grover, 1993; Premkumar and Ramamurthy, 1995; Crook and Kumar, 1998). Similarly, Yap, Soh and Raman (1992) confirmed that involvement of management is significant towards success of ICT deployment and adoption. As this study observed, managerial attitude could be very much relevant to Nigerian indigenous oil companies with respect to adoption of state-of-the-art information systems.

## *2.3 The Effect of Organisational Culture*

Studies reveal that managerial interest, technical expertise and attitude towards ICT influence the company's willingness and ability to engage in ICT matters (Tarafdar and Vaidya, 2006; Harindranath, Dyerson and Barnes, 2008). There are two aspects of organisational culture, which can influence ICT adoption: firstly, managers and/or owners' experience with ICT and secondly, cultures that motivate state-of-the-art ICT resources deployment (Andrade and Urqahart, 2009).

Furthermore, Akpan-Obong (2007) has identified three potholes to Nigeria's information superhighway: these are the telecommunication landscape, technology dependency and electricity constraints. However, according to his research, these potholes are not restricted to one sector; they affect the whole country. This study may argue that, indigenous oil companies were not given any preference in all the research conducted so far, this limitation emphasises the need for this study.

### 3. Methodology

Walonick (2004) has stated that questionnaire survey response significantly differs from one questionnaire to another and mostly within the range of 10% - 90%. Similarly, he strongly emphasised that, world-class questionnaires have high rate of response. This study has spent almost a year developing a questionnaire tool. After that, a pilot study was conducted, in which the questionnaire was edited, modified and integrated. Subsequently, a total of 200 questionnaires were administered to 6 groups of relevant governmental and non-governmental institutions and 142 questionnaires were successfully returned. 2 questionnaires were excluded from the research as they are invalid, because they were not completed according to the guidelines presented to the respondents. As a result of that, the 140 valid questionnaires constitute 70% of the total questionnaires administered. Considering the evidence stated above, this is an excellent response rate.

Descriptive statistics of Software Package for Social Sciences (SPSS) were used to determine mean, median and percentage of the response. A non-parametric test was conducted among the various stakeholders using Mann-Whitney test to check the existence of significant differences. After the test, no any negative significant difference was found to have existed between them.

### 4. Survey results

#### Descriptive frequencies relating to managerial attitude as a significant barrier to adoption of state-of-the-art information systems

Statement	Median	Mean	SD	D	N	A	SA
Managerial interest is significant to ICT adoption.	4.00	4.28	1 (0.7%)	4 (2.9%)	4 (2.9%)	76 (54.3%)	55 (39.3%)
Managerial knowledge is significant to ICT adoption.	4.00	4.09	0 (0%)	9 (6.4%)	6 (4.3%)	88 (62.9%)	37 (26.4)
Managerial dynamism is significant to ICT adoption.	4.00	4.14	0 (0%)	7 (5.0%)	3 (2.1%)	94 (67.1%)	36 (25.7%)
Managerial age bracket is significant to ICT adoption.	4.00	3.91	0 (0%)	13 (9.3%)	15 (10.7%)	84 (60%)	28 (20%)
Managerial ability towards establishing international partnerships.	4.00	3.59	0 (0%)	25 (17.9%)	27 (19.3%)	68 (48.6%)	20 (14.3%)
Managerial willingness towards establishing international partnerships.	4.00	3.64	0 (0%)	25 (17.9%)	19 (13.6%)	78 (55.7%)	18 (12.9%)
Managerial ICT-oriented culture is significant to ICT adoption.	4.00	4.11	0 (0%)	5 (3.6%)	5 (3.6%)	99 (70.7%)	31 (22.1%)
Lack of proper governance structure is significant to ICT adoption.	4.00	3.89	1 (0.7%)	10 (7.1%)	14 (10.0%)	94 (67.1%)	21 (15.0%)

**Note:** i) SD= Strongly Agree, D=Disagree, N= Neutral, A= Agree, SA= Strongly Agree ii) All figures in brackets are percentages of relevant responses.

From the analysis above, the general opinion of respondents indicated that, they all agreed that managerial interest, knowledge, dynamism, age-bracket, ability, willingness, ICT-oriented culture and lack of proper governance structure were significant barriers to adoption of state-of-the-art information systems by Nigerian indigenous oil companies. Out of the 140 valid

questionnaires analysed, the following agreed that these components of managerial attitude were significant barriers to state-of-the-art ICT resources. A median score of 4.00 from each statement has confirmed their agreement. And by rounding the mean score to the nearest whole number statistically will also vindicate their agreement collectively. The general percentage of agreement and strong agreement has confirmed their agreement as well. These include managerial interest 131 (93.6%), managerial knowledge 125 (89.3%), managerial dynamism 130 (92.8%), managerial age-bracket 110 (80%), managerial ability 88 (62.9%), managerial willingness 96 (68.6%), managerial ICT-oriented culture 130 (92.8%), and lack of proper governance structure 115 (82.1%). These percentages vindicated the strength of their agreement, in spite of the fact that, a substantial number of them were neutral, as a result of either lack of knowledge on the questions or inability to decide their opinion. Non-parametric test was conducted using Mann-Whitney U among all the stakeholders, which expounded lack of significant difference among them in their responses.

## 5. Recommendations, Limitations and Conclusion

Given the response from the respondents, this study recommends international partnerships, efficiency, competency and competition which must be considered as controlling factors for Nigerian indigenous oil companies in their management and appointment. In addition to that, stakeholders should be motivated about the importance of establishing international partnerships. In order to achieve the recommendations, there is the need for frequent educative seminars targeting managers, decision makers and other stakeholders of indigenous oil companies on managerial attitude towards adopting state-of-the-art information systems. In addition, this paper addresses managerial attitude among other significant barriers that may impede the adoption of state-of-the-art information systems, such as cost, skill development and environmental factors. This has been the main limitation of the research. As a result of that, there is a wide area for further research on other significant barriers to adoption of state-of-the-art information systems.

This paper concludes that there is urgent need for more academic investigations for motivating Nigerian indigenous oil companies with state-of-the-art information systems for upstream and downstream operations. Undoubtedly, this will increase performance, efficiency, safety and reduce cost of production and time.

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