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Creating An Environment Conducive To Effective Financial Risk Management In Nigeria's Petroleum Industry

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ABSTRACT

The primary research objective of this study was to make a contribution to the financial risk management (FRM) in the petroleum industry of Nigeria by exploring the critical factors required to create an environment conducive to FRM success in that industry. A sample of 70 lower, middle and top managers from the Association of Senior Staff of the Petroleum Industry of Nigeria participated in the study. The FRM framework produced in this study improves on the current unintegrated FRM situation, which is characterised by reactionary responses to mathematical calculations of financial ratios. The improved framework provides a more comprehensive and holistic method of managing financial risks in the Nigerian petroleum industry. The study identified critical FRM areas to address in a firm and the implementation of plans to improve in these areas.

INTRODUCTION

Petroleum companies are critical to the Nigerian economy, as the petroleum sector is the biggest foreign exchange earner and employer of labour in that country. The industry is however faced with challenges of unprecedented fluctuation of commodity prices, exchange rates, a series of divestments, host communities' demands, oil theft, project shelving, and destruction of infrastructure. Workforce reductions and consolidations are also the order of the day and current risk management systems in companies appear not to be working as they should.

Financial risk management (FRM) systems in Nigerian petroleum (oil and gas companies have failed because risk managers did not have one generally accepted framework to create an environment that is conducive to managing these risks. The focus thus far has been on the use of mathematical and statistical analyses of actuarial and financial reports to manage financial risks in that industry. Actuarial (mathematical) models have been successful in identifying factors that expose petroleum firms to financial risk, but effective FRM is still lacking in many of those firms. A framework is therefore required to focus on what constitutes a supporting environment for effective FRM in the Nigerian petroleum industry.

The present study investigates what the critical factors are that support an environment that fosters effective FRM in Nigerian petroleum firms.

PROBLEM STATEMENT

The petroleum industry plays a pivotal role in the economy of Nigeria for customers, contractors, employees and shareholders. Petroleum production and exportation has become the backbone of the Nigerian economy (Oladepo, 2014: 80). The revenue derived by the Nigerian government from the exportation of petroleum products accounted for 96% of total exports according to the International Monetary Fund (IMF) in 2012. This indicates that Nigeria operates an economy that is not diversified and depends solely on the petroleum sector for existence. Therefore, any issue that destabilises this sector will generate a huge impact on the macro-economic stability of the whole country, illustrating the importance of effective FRM in that industry.

In addition to export revenue, Nigerians depend heavily on the petroleum industry for their energy needs, for transportation, cooking, power and for micro-industries that are helping in unemployment reduction (Odularu, 2007: 14). The sector generates foreign direct investment inflows into Nigeria, boosts labour productivity, income and taxes (Akinlo, 2012: 166). The output from the petroleum sector is utilised as input for other industries such as the plastic, packaging and cosmetics industries which rely heavily on the output of the oil sector. The exchange rate of the Naira compared to other major currencies hinges on the price of oil and gas and all infrastructural development (Central Bank of Nigeria [CBN], 2013). Jibrim, Blessing and Ifurueze's (2012: 60) analysis of the impact of petroleum profit tax on the growth of the Nigerian economy found a significant positive relationship between oil-related taxes and the gross domestic product.

The petroleum sector boosts local demand for oil- and gas-related inputs of goods and services (Akinlo, 2012: 166). It also enhances petroleum-related skills development and employability of youth. As a result of revenue from the petroleum sectors, by 2012, Nigeria was able to reduce its external debts to $6.92 billion (CBN, 2013: 81).

Notwithstanding the fact that Nigeria is one of leading oil-producing countries of the world (United States Energy Information Agency [EIA] (2013), it is categorised as one of the poorest countries in the world according to Arong and Ikechukwu (2013: 123). One of the major issues is that Nigeria exports raw products, oil and gas, and imports several petroleum products such as fuel, diesel and kerosene at a higher cost than the exported product. Therefore, any gain derived from the export becomes a loss in the process of importation, which is destroying the Nigerian economy (Arong & Ikechukwu, 2013: 123).

An important issue is that of environment degradation by oil companies as a result of non-enforcement of existing laws. This, in addition to government corruption in the system, has destroyed the livelihood of millions of people in the Niger Delta region where most of the oil fields are concentrated (Odularu, 2007: 1,16). Poorly maintained ageing pipelines in addition to pipeline sabotage from oil theft, have been causing major oil spills. The oil spills have resulted in the pollution of land, air, and water, severely affecting surrounding villages by decreasing the fish stocks and fouling water supplies and arable land (EIA, 2013). Companies' utilisation of derelict infrastructure, gas flaring and use of unconventional management strategies are said to be responsible for environmental degradation (Ugbomeh & Atubi, 2010:106). Oil theft and the communities themselves are somehow associated with the rate of pollution witnessed in the Niger Delta, caused by vandalising infrastructure and oil installation (Shell, 2011: 1). Of the 14 incidents reported by Shell in the month of January 2011, eleven were credited to sabotage. All the above-mentioned statements further serve to emphasise the need for an environment conducive to managing risks, especially financial risks, in the Nigerian

petroleum industry. Arong and Ikechukwu (2013: 123) recommend that an effective overall risk management framework for the industry needs to be established. This need for such a framework was amplified by the discovery of shale oil in the United States in 2013, which has resulted in a decrease of foreign exchange inflow in Nigeria. It was furthermore reported that the Naira significantly deteriorated in the early part of 2015 as the result of the drop of the price of petroleum products (CBN, 2015: 24).

LITERATURE REVIEW

This section presents a review of the literature on factors that might influence FRM success in the Nigerian petroleum industry. In order to achieve FRM success in this industry, the review identifies what the most important financial risks are, how these risks affect the industry, what the challenges are that might retard successful pursuit of FRM in the industry, and critical factors that might ensure the success of FRM in the industry.

Seven such factors are identified, namely top management support, FRM culture, communication flow, information technology, organisational structure, training and development, and FRM oversight and control.

The main financial risks and how they influence the industry

It is important to be able to assess whether the Nigerian petroleum firms have a proper understanding of the financial risks that they face and how these risks impact on their firms.

The price of the petroleum industry's main product, which is crude oil, has fallen by nearly 55% since June 2014 owing to over-supply, slow demand triggered by the economic slowdown, and the decision taken by OPEC in 2014 not to cut output (Baffes, Kose, Ohnsorge & Stocker, 2015: 4). Low oil prices negatively affect the petroleum industry's financial assets, liabilities and expected future cash flow. Prolonged low oil prices have required companies to recalculate their oil reserves (Forbes, 2015). Sometimes, this has resulted in the abandonment of certain projects whose expected return rates are higher than the current oil price (Consumer News and Business Channel [CNBC], 2014: 1).

The prolonged low oil price from 2014 to 2016 has resulted in low returns, reduced profitability, reduction in skilled workers, and increase in the cost of doing business in the Nigerian petroleum industry. Exchange rate fluctuation has unfavourably affected cash flow, liquidity, rates of borrowing, skills procurement, and cost of oil prospecting and drilling projects (Binder Dijker Otte & Co [BDO], 2016: 1; Ogulu, 2017: 229).

An effective FRM in the petroleum industry of Nigeria requires that managers are aware of and understand the implications of the abovementioned risk factors which may affect these companies' strategic financial objectives. To assess this understanding, the present study investigated whether there was consensus on the type of financial risks experienced in the industry, whether a ranking order existed to assess which financial risks were most influential in the industry, and whether there was an understanding of how these risks influence the industry.

Financial risk management challenges in the industry

Literature points to certain challenges that hinder the achievement of FRM success in the Nigerian petroleum industry. First, there is a lack of capacity and competency owing to the scarcity of risk management professionals (Komolafe, 2012). This leads to a poor understanding of risk management by directors of company boards. Second, there are differences in how FRM is understood and therefore managed (KPMG, 2011: 5). Chief

operating officers, their functional heads and their boards differ in opinions of what constitutes FRM (KPMG, 2011: 5). Landsberg (2011: 7) also found that these managers placed a stronger emphasis on calculating risk than on the entire process of risk management. Such gaps in the understanding of FRM are often perceived as a lack of top management support for FRM activities.

It has also been reported that a very segmented approach to risk measurement and control was still being practised in many Nigerian firms (Fadun, 2012: 226). This approach excludes many employees from risk management in these firms, resulting in a deficit of risk awareness among staff members of companies. The current study investigated whether the abovementioned challenges still exist in the Nigerian petroleum industry by assessing the lack of capacity development, incompetent FRM staff, variances in the understanding of FRM, lack of FRM awareness and lack of top management support as challenges in the Nigerian petroleum industry.

Top management support

While most of the petroleum sector companies in Nigeria are managing financial risks, they do so in an unintegrated fashion, which leads to fragmented efforts to manage the said risks (KPMG, 2011: 5). Oracle (2009) adds that companies rarely approach risk management proactively but are reactive, without having alternative plans to mitigate the various risks when they actually become issues. FRM should be an all-inclusive organisation-wide approach instead of the isolated method in use by some in the industry (Fadun, 2013: 69). Those who manage financial risks are often isolated and have no power to influence the strategic direction of the oil company owing to lack of understanding, or to lack of inclusion in strategy decision-making committees (KPMG, 2011: 6).

In 2012, the deputy governor of the Central Bank of Nigeria, Dr Maghalu, expressed the opinion that risk management is still at a rudimentary level in Nigeria and beset with a number of challenges (Komolafe, 2012). Foremost among these is the severe scarcity of knowledgeable and skilled risk professionals. In addition, there is a poor understanding of risk management by the companies' boards, these being the authority which should direct the risk management processes. When risk management is organised in a strategic direction, and with strategic plans, it enhances the achievement of more value creation in the organisation, according to Oracle (2009: 4). However, this was not the case in Nigeria's oil and petroleum sector in 2010, as indicated by the KPMG (2011: 6) survey on emerging economies, including the petroleum industry.

There is also a difference in the understanding of what FRM is in the Nigerian petroleum industry. This variance in understanding hampers the co-ordinated management of risk factors. The KPMG survey (2011: 5), for example, revealed that opinions of the boards of directors of financial risk differed from those of the chief operating officers, and from those of the functional heads. In the Nigerian petroleum industry, "financial risk" draws attention to the use of derivatives for hedging, even though KPMG (2008: 6) and Landsberg (2011: 7) warn that this is just a small portion of the FRM system, and that risk calculation is not risk management. According to Soyemi, Ogunleye and Ashogbon (2014: 347), FRM should focus on the use of derivatives and non-derivative instruments to control the effect of these risks. Furthermore, Smith and Fischbacher (2009: 4) contend that managers often do not appreciate the connection between financial risks (exchange rates, interest rates and commodity prices risks) and operational risks, compliance risks, strategic risks, geological risks, hazards and legal risks. These differing perceptions of FRM can create a culture that is not conducive to FRM in

Nigerian petroleum firms, because gaps in the FRM systems could be erroneously seen as top management not supporting FRM as they should.

Against this literature review, it was hypothesised that:
H1: Top management support is positively related to FRM success in the Nigerian petroleum industry.

Financial risk management culture
FRM is generally understood to be the use of complicated mathematical–statistical models or quantitative finance to manage a firm's exposure to financial risk instead of proper strategic risk management (Landsberg, 2011: 5; Mikes. 2009: 18). In other words, those who manage financial risks in the industry mostly utilise and rely on mathematical calculations from financial statements, which are often understood to a limited degree by those who are not mathematically inclined. As a result, there is no meeting of minds between enterprise level and the risk management section (Buehler, Freeman & Hulme, 2008: 8). This leads to a barrier of communication between the two opposing cultures in FRM, namely calculative culture and qualitative culture (Mikes, 2009: 18). If individuals in the various departments of the organisation cannot communicate with one another, then FRM cannot be efficient, especially when it relates to culture (Crouhy, Galai & Mark, 2006: 16; Servaes, Tamayo & Tufano. 2009: 76). An environment which accommodates both the calculative and qualitative cultures needs to be encouraged, hence the focus of the present study. A culture conducive to FRM should entail the paramount attitudes, knowledge, beliefs, accepted values and shared leadership concerning risk in an organisation (Protiviti, 2012: 10). It was therefore hypothesised that:
H2: An enabling FRM culture is positively related to FRM success in the Nigerian petroleum industry.

Communication flow
An effective communication flow is important for FRM success (Landsberg, 2011: 7–8). Breakdowns or blockages in communication between departments within organisations are hindrances to effective risk management in such organisations (Crouhy et al., 2006: 15). A free communication flow (vertical, horizontal and diagonal) is required to facilitate timely risk identification, risk policy formulation and dissemination, risk decision-making, and implementing risk control measures (Zhao, Hwang & Low, 2013: 1199). It was therefore hypothesised that:
H3: An FRM-supporting communication flow is positively related to FRM success in Nigerian petroleum firms.

Information technology
Organisations are increasingly relying on information technology to execute day-to-day activities. The poor use of information technology in risk management has been identified as a weakness in the petroleum industry of Nigeria (Zuofa & Ochieng, 2014). Technological infrastructure is a necessity for the identification, analysis, planning, information dissemination and monitoring of an effective FRM system (Institute of Management Accountants [IMA], 2007: 25–26). The use of information technology supports FRM activities such as corporate governance, environmental scanning, risk-ranking and analysis, and risk mitigation and control (Landsberg, 2011: 7–8). Against this background, the following hypothesis was formulated:
H4: Informational technology support is positively related to FRM success in Nigerian petroleum firms.

Organisational structure

The functional structure of an organisation should support FRM to enable delegation within the enterprise (Kallman & Maric, 2004: 60). FRM is often incorrectly viewed as the sole responsibility of the finance department of a company (Lessard & Lucea, 2009: 296). In other words, FRM is, in that context, seen as a centralised function of a finance department, which manages financial risks in a top-down fashion. Research has shown, however, that hierarchical centralised organisational structures tend to be inflexible and cannot support a speedy response to risks, including financial risks (Andersen & Schroder, 2010: 214). In addition, Nandi and Kumar (2016: 728) reported that centralised organisational structures inhibited the effectiveness and success of enterprise resource planning, which could cause serious financial risks if not conducted correctly. A less centralised risk management organisation system is therefore preferred as this most often leads to capacity-building, and success of the risk management system (Nandi & Kumar, 2016: 744).

Against the background of the preceding literature review, the following hypothesis was formulated:
H5: A highly centralised organisational structure is negatively related to FRM success.

Training and development

Komolafe (2012: 2) has identified training in strategic FRM as a necessity for the sustainability of the petroleum industry of Nigeria. A lack of training institutes for risk professionals in Nigeria has created acute shortages of professional risk experts and inadequate risk management knowledge among board members of Nigerian companies (Komolafe, 2012: 2). In order to improve risk management in these companies, training would be required in areas such as the nature of financial risks, techniques to identify risks, the reporting systems and computer software to manage risks, and how to leverage knowledge about risks (IMA, 2007: 25).

The present study assumes that FRM training and development are taking place in Nigeria, as its petroleum industry would not have survived until now without such training. This study therefore pursues the question of how frequently FRM training and development takes place in that industry. The following hypothesis was therefore formulated:
H6: Regular FRM training is positively related to FRM success in Nigerian petroleum firms.

Financial risk management oversight and control

Monitoring (oversight) and control are important activities in all risk management frameworks (Committee of Sponsoring Organizations of the Treadway Commission [COSO], 2004: 5; Charted Institute of Management Accounting [CIMA], 2008: 7; Frigo & Anderson, 2011: 2). Oversight and control activities ensure that there is a system of early warning in place to detect any weak link in an FRM processes. Early warning systems make sure that mistakes are detected early, that mistakes are not repeated and that errors do not accumulate (Crouhy et al., 2006: 54).

The present study investigates to what extent oversight and control activities have been successful in protecting Nigerian petroleum companies from risk. By conducting this investigation, the present study will answer the question of whether successful FRM control and oversight is achieved in Nigerian petroleum firms. Against the preceding background, the following proposition was formulated:
P1: Proper FRM oversight and control measures in Nigerian petroleum firms save them from selected risk consequences.

RESEARCH OBJECTIVE

The primary research objective of this study is to make a contribution to the financial risk management (FRM) in the petroleum industry of Nigeria by exploring the critical factors required to create an environment conducive to FRM success in that industry.

METHODOLOGY OF THE STUDY

Research paradigm

The present study is located in the positivistic research tradition and therefore in the quantitative methodological research paradigm. This paradigm purports that knowledge is derived from objective evidence about phenomena that can be observed and quantitatively measured (Collis & Hussey, 2014). In quantitative studies, data is expressed in numerical form and statistical analyses are conducted on such data sets. These statistical analyses include the calculation of descriptive statistics (mean scores, percentages, standard deviations), the estimation of sample means and the investigation of hypothesised cause-and-effect relationships between latent and nominal variables (Maree, 2016).

Sample

The study relied on the membership list of the Association of Senior Staff of the Petroleum Industry of Nigeria, to identify participants for the study. In this way, 130 potential individuals were identified as constituting the sampling frame for the study. A convenience sample of 100 individuals was targeted in the sampling frame and questionnaires were distributed to 100 potential participants. Only 70 respondents eventually participated, which translated to a 70% response rate.

Table 1: Demographic composition of the sample

DEMOGRAPHIC VARIABLE	N	Percentage %
GENDER		
Male	50	71.4
Female	20	28.6
Total	**70**	**100.0**
AGE		
20 –29	3	4.00
30–39	23	33.00
40–49	31	44.00
50–59	13	19.00
Total	**70**	**100.00**
OCCUPATIONAL		
Accountant	39	56.00
Engineer	10	14.00
Manager	9	13.00
Analyst	9	13.00
Economist	3	4.00
Total	**70**	**100.00**
MANAGEMENT LEVEL		
Top management	2	3.00
Middle management	49	70.00
Lower management	19	27.00
Total	**70**	**100.00**
SECTOR DISTRIBUTION		
Upstream companies	45	64.00
Downstream companies	17	24.00
Both up- and downstream companies	8	12.00
Total	**70**	**100.00**

Table 1 shows that of the 70 respondents taking part in the study, 50 (71.4%) were males and 20 (28.6%) were females. This is a true reflection of the gender distribution in the Nigerian petroleum industry. More of the risk management practitioners are male than female in this industry.

Most of the respondents (n=31 or 44%) fell into the 40–49 age bracket. Those between the ages of 30 and 39 accounted for 33% (n=23) of the sample, while those within the 50–59 bracket accounted for 19% (n=13) of the sample, and those between 20 and 29 years accounted for 4% (n=3) of the sample. This suggests that those who manage financial risks in the Nigerian petroleum industry are more likely to be between 30 and 49 years old.

Table 1 shows the occupational distribution of the respondents as follows: 56% were accountants (n=39), 14% were engineers (n=10), 13% were managers (n=9), 13% were analysts (n=9) and 4% were economists (n=3). It appears that those who manage financial risks in the Nigerian petroleum industry are more likely to come from the accounting profession.

Middle managers accounted for 70% (n=49) of the sample and lower-level managers were 27% (n=19) of the sample. Top managers accounted for only 3% (n=2) of the sample. It appears that top managers are delegating the function of FRM largely to middle management in the Nigerian petroleum industry. This result indicates that middle management is more likely to manage financial risks in the Nigerian petroleum industry than top management or lower level management.

Table 1 further reveals that the majority, 64% (n=45), of the respondents were from the upstream sector and 24% (n=17) were from the downstream sector of the Nigerian petroleum industry. Those whose companies are involved in both upstream and downstream accounted for 12% (n=8). This analysis therefore suggests that those who manage financial risk or maintain a financial risk function are more likely to come from the upstream sector of the Nigerian petroleum industry.

The measuring instruments

Various instruments were constructed to capture the respondents' responses to the research questions.

On the question of which financial risk factors were the most important in the petroleum industry of Nigeria, the respondents were requested to indicate their response and ranking on an agreement/disagreement anchoring scale. The financial risks included commodity (oil and gas) price risk, the Naira/dollar exchange rate risk, demand and supply risk, interest rate risk, cost of doing business risk, liquidity risk and equity risk.

In response to the question of the impact of financial risks on petroleum firms in Nigeria, the respondents were required to indicate their response and ranking ranging from (1) very low to (5) very high. The financial risks included commodity (oil and gas) price risk, the Naira/dollar exchange rate risk, demand and supply risk, interest rate risk, liquidity risk. Respondents were also requested to indicate and rank what the impact of these financial risks would be on the profitability, cash flow, cost of doing business, project completion and the workforce of petroleum firms.

When answering the question of what the challenges were in implementing FRM in the Nigerian petroleum firms, respondents were required to indicate their perceptions and ranking of the following challenges: capacity development, incorrect perceptions, insufficient awareness, inadequate management support, and incompetent staff. Perceptions were to be indicated on a 5-point Likert scale ranging from (1) strongly disagree to (5) strongly agree.

Critical factors that were needed for the successful implementation of FRM (in short, FRM success) in the petroleum industry in Nigeria were sourced from the literature. These factors included four latent variables, top management support, FRM culture, communication flow and information technology (see the operationalisation of these variables after the discussion of Table 5). Self-constructed instruments were developed to measure the latent variables, including the dependent variable FRM success. The anchoring scale for these latent variables was a 5-point Likert scale ranging from (1) strongly disagree to (5) strongly agree.

Additional critical success factors included organisational structure, frequency of training and development, and FRM oversight and control. These variables were measured on nominal anchoring scales as follows:

- Organisational structure: whether the firm had a flat, hierarchical structure, matrix structure, or centralised structure;
- Frequency of training and development: whether the firm provided this once a year, twice a year, more than twice a year, or never;
- FRM oversight and control: whether this assisted the firm in avoiding unauthorised risk taking, risks related to unexpected changes in regulations, reputational risk, and reserve recalculation risks.

The STATISTICA Version 13.3 (2017) was used to analyse the data emanating from the data collection process using the above-mentioned instruments. Descriptive statistics (mean scores, standard deviations and percentages) were calculated on all questionnaire statements. A multiple regression analysis was conducted on the relationships between the critical success factors (the independent variables) and FRM success (the dependent variable). The validity and reliability of the data were also evaluated by conducting an exploratory factor analysis and calculating Cronbach's alpha respectively. Moreover, Pearson correlations were calculated to assess the relationships between nominal variables (organisational structure, training and development and FRM oversight and control) on one hand, and FRM success on the other hand.

EMPIRICAL RESULTS

The research questions investigated in this study were as follows:

1) What are the most important financial risk factors in the petroleum industry of Nigeria?
2) What is the impact of financial risks on petroleum firms in Nigeria?
3) What are the challenges in FRM that petroleum firms encounter in Nigeria?
4) What are the critical factors needed for the success of FRM in the petroleum industry in Nigeria?
5) What would be an effective strategic FRM framework for petroleum firms in Nigeria?

The empirical results are now discussed in response to each of these questions.

What are the most important financial risk factors in the petroleum industry of Nigeria?

The empirical results of responses to this research question are summarised in Table 2.

Table 2: Most Important Risk In Nigerian Petroleum Industry

Rank	Most important risk	Agree	%	Disagree	%
1	Commodity (oil and gas) price risk	67	95.7	3	4.3
2	Naira/dollar exchange rate risk	58	82.9	12	17.1
3	Demand and supply risk	52	74.3	18	25.7
4	Interest rate risk	37	52.9	33	47.1
5	Cost of doing business risk	29	41.4	41	58.6
6	Liquidity risk	28	40.0	42	60.0
7	Equity risk	9	12.9	61	77.1

Table 2 shows that the most important financial risk in the Nigerian petroleum industry, according to the respondents, is commodity (oil and gas) prices, followed by the fluctuations in the Naira/dollar exchange rate, fluctuations in demand and supply for petroleum, interest rates, cost of doing business, and liquidity and equity in firms. It is important that managers of petroleum firms prioritise their FRM activities accordingly.

What is the impact of financial risks on petroleum firms in Nigeria?

Table 3 provides the empirical results of responses to the above-mentioned research question.

Table 3: How Risks Influence The Industry

Variable impacted upon	Perceived influence on the industry							
	Very low	Low	Average	High	Very high	Mean	Std. dev.	Rank
Profitability	0	0	16	23	31	4.23	0.82	1
Cash flow	0	2	16	36	16	3.94	0.76	3
Cost of doing business	0	5	11	30	24	4.04	0.89	2
Capital project completions	4	5	18	35	8	3.54	0.99	5
Workforce retrenchments	3	9	18	23	17	3.60	1.12	4
Average	**1.4**	**4.2**	**15.8**	**29.4**	**19.2**	**3.87**	**0.92**	

The results according the respondents showed that financial risks most affected the profitability of the firms (mean score = 4.23), followed by cost of doing business (4.04), cash flow (3.94), workforce retrenchments (3.60) and capital project completions (3.54). It is important that management of petroleum companies communicate these results among themselves and to lower-level employees in order to increase the awareness and buy-in of effective FRM at all organisational levels.

What are the challenges in financial risk management that oil and gas firms encounter in Nigeria?

The above-mentioned research question was answered by the empirical results in Table 4.

Table 4: FRM Challenges In The Nigerian Petroleum Industry

Challenge	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std. dev.	Rank
Capacity development	9	22	16	17	6	3.01	1.19	1
Incorrect/ different FRM perceptions	4	25	15	23	3	2.94	1.06	2
Insufficient awareness	7	26	12	19	6	2.87	1.18	3
Inadequate management support	8	27	16	12	7	2.76	1.17	4
Incompetent staff	21	20	12	14	3	2.40	1.23	5
Average	**9.8**	**24**	**14.2**	**17**	**5**	**2.79**	**1.17**	

The empirical results revealed that the respondents mostly disagreed with the statements that the listed challenges were prevalent in the Nigerian petroleum industry. The average mean score on these responses was 2.79, which is on the disagree side of the 5-point anchoring scale. The results nonetheless showed a hierarchy of the prevalence in that industry. The main FRM challenge according the results was capacity development, followed by incorrect or differing perceptions about FRM, insufficient FRM awareness, inadequate management support, and incompetent staff. These results support the challenges that were highlighted in the literature review. It is therefore imperative that management of Nigerian petroleum firms attend to these challenges in their firms before they become major issues.

What are the critical success factors for effective financial risk management in the petroleum industry in Nigeria?

The literature indicated that there were seven variables that were of critical importance in firms in order to manage financial risks in any organisation. These critical success factors included four latent variables (top management support, FRM culture, communication flow and information technology) and three nominal variables (organisational structure, training and development, and FRM oversight and control). This section explores to what extent this assertion held true for the respondents in this study.

Latent variables

First, two sets of exploratory factor analyses were conducted to ascertain the discriminant validity of the latent independent and dependent variables. Table 5 shows the results of these analyses. It was postulated that the four independent variables (top management support, FRM culture, and communication flow and information technology) constituted four distinctly different constructs and that the dependent variable (FRM success) was a unidimensional construct. Principal components were specified as the method of factor extraction and varimax raw rotation of the original factor matrix was used. The empirical factor structure (Table 5) supported the contention that there were four distinctly separate independent variables and one unidimensional dependent variable.

Second, the reliability of the measuring instruments of the latent variables (see Table 5) was assessed by the calculation of the Cronbach alphas from the data that emerged from these instruments. Table 5 shows that all the Cronbach alpha values exceeded 0.68, which was higher than the minimum cut-off point for fair reliability of 0.60 (as defined by Zikmund, Babin, Carr & Griffin, 2013). This meant that the instruments used for measuring the independent and

dependent variables had operationalised above exhibited sufficient reliability, to proceed with further data analyses.

Table 5: Empirical Factor Structure Of The Latent Variables

Variable	Measurement items	Factor loadings	Variance explained	Cronbach alpha
Communication flow	COMMU 1-4	0.749 – 0.854	3.356282	0.91
Top management support	TOPMGT 1-4	0.566 – 0.787	2.207326	0.77
Information technology	ITIMPAC 1-4	0.607 – 0.837	3.022872	0.87
FRM culture	FRMCULT 1-4	0.673 – 0.851	3.081458	0.88
FRM success	FRMSUCC 1 - 5	-0.546 – -0.802	2.217723	0.68

The above-mentioned independent and dependent variables were operationalised as follows:

Communication flow refers to the extent to which a firm's communication flow supported (assisted with) the following, in the context of FRM: timely identification of risks, dissemination of policies, decision-making, and control measures.

Top management support refers to the extent to which the top management of a firm was effective in achieving the following in the context of FRM: formulation of FRM policy, dedication to achieving FRM success, provision of sufficient funding to achieve FRM success; and taking responsibility for the evaluation and control of FRM.

Information technology refers to the extent to which a firm used information technology to support (assist with) the following FRM-related areas: corporate governance, environmental scanning, risk ranking and analysis, and risk mitigation and control.

FRM culture refers to the extent to which a firm enabled the achievement of FRM strategic objectives, improved FRM decision-making, increased participation and collaboration in FRM, and greater awareness of FRM.

FRM success refers to extent to which companies were successful in the development of policy frameworks to manage financial risks, the identification of financial risks, the analysing of financial risks, the mitigation of financial risks, and the communication and controlling of financial risks.

Third, a multiple regression analysis was conducted to investigate the relationships between the critical success factors and FRM success. The empirical results are reported in Table 6.

Table 6: Relationships Between The Critical Success Factors And FRM Success – The Empirical Results

Dependent variable: FRM SUCCESS R^2 = 0.444 F(4,65) = 12.978, p < 0.001						
	b*	**Std. error - of b***	**B**	**Std. error - of B**	**t(65)**	**p-value**
Intercept			1.348873	0.366759	3.677816	0.000479
TOPMGT	0.353468	0.112725	0.283067	0.090273	3.135676	0.002575**
CULTU	0.021570	0.121780	0.019148	0.108107	0.177118	0.859966
COMM	0.256934	0.128437	0.178770	0.089364	2.000475	0.049630*
ITIMPAC	0.190740	0.127726	0.148684	0.099564	1.493356	0.140183

Note: *Relationship significant at p < 0.05
**Relationship significant at p < 0.01

Table 6 shows that top management support (r=0.35, p < 0.01) and communication flow (r=0.26, p < 0.05) were significantly positively related to FRM success, while FRM culture and information technology were not significantly related to FRM success. This means that top management support and communication flow were the most critical success factors for achieving FRM success.

The empirical results (Table 6) also reveal that the four independent variables – top management support, FRM culture, communication flow, and information technology – collectively explained 44% (r^2=0.444) of the variance in FRM success (the dependent variable). Other variables not measured in this study therefore explained 56% of the variance in the dependent variable. The four independent variables were therefore important determinants of FRM success and were deserving of attention by the responsible managers in these firms. However, in this study, only top management support and communication flow were critical success factors in achieving FRM success.

Nominal variables

First, Pearson correlations (see Table 7) were calculated to ascertain whether certain types of organisational structure are related to FRM success. The empirical results in Table 7 reveal that only the matrix structure is significantly related to FRM success. This means that the more the matrix organisational structure is in use, the more FRM success will be achieved. The matrix structure is therefore preferred to achieve success in FRM.

Table 7: The Relationship Between Organisational Structure And FRM Success

Type of structure	FRM success
Hierarchical structure	0.13
Centralised structure	-0.13
Matrix structure	0.28*
Flat structure	0.01

Note: Indicates a significant relationship at p < 0.05

Pearson correlations were also calculated to investigate whether the frequency of training was related to FRM success. The empirical results in Table 8 show that the provision of training and development more frequently than twice per annum is significantly positively (r=0.32, p < 0.05) related to FRM success. This means that if FRM training and development occurs more than twice a year in a firm, more FRM success will be achieved. Table 8 also reveals that no training and development is significantly negatively (r=-0.36, p < 0.05) related to FRM success. This means (unsurprisingly) that if FRM training and development never occurs in firms, FRM

success will not be achieved. FRM training and development must therefore take place in Nigerian petroleum companies, preferably more often than twice per annum.

Table 8: The Relationship Between Training And Development Frequency And FRM Success

Training and development frequency	FRM success
Once per annum	-0.01
Twice per annum	-0.85
More than twice per annum	0.32*
Nil times per annum	-0.36*

Note: Indicates a significant relationship at $p < 0.05$

Finally, further Pearson correlations were calculated to investigate how FRM oversight and control was related FRM success. Table 9 shows that all the elements of FRM oversight and control actions implemented to avoid financial risks were significantly positively related FRM success. This means that the more FRM oversight and control success is achieved, the more successful FRM will be. Managers of Nigerian petroleum companies must therefore continuously increase their efforts to pursue FRM oversight and control in order to achieve FRM success.

Table 9: The Relationship Between Oversight And Control Success And FRM Success

FRM oversight and control actions to avoid …	FRM success
Unauthorised risk taking actions	0.37*
Risks related to unexpected changes in regulations	0.37*
Reputational risk	0.30*
Reserve recalculation risk	0.26*

Note: Indicates a significant relationship at $p < 0.05$

DISCUSSION OF THE RESULTS

The empirical results of the present study provide a framework to develop an environment conducive to FRM in the petroleum industry of Nigeria. This framework constitutes the following steps:

(1) Identify the main financial risks that have an impact on petroleum firms;
(2) Identify how financial risks affect petroleum firms and formulate techniques to manage these impacts;
(3) Identify the main FRM challenges that petroleum firms face and implement plans to address these challenges;
(4) Identify the critical factors for achieving FRM success in petroleum firms and implement plans to improve in these areas.

These framework steps are now individually discussed.

MAIN FINANCIAL RISKS

The empirical results identified the following as the main financial risks that impact on Nigerian petroleum firms:

- Fluctuations in the petroleum price
- Fluctuations in exchange rates
- Fluctuations in demand and supply of petroleum products

It is recommended that managers of these firms regularly and continuously scan the environment (for instance checking indices, governmental reports, industry reports) for

changes or developments as far as these risks are concerned. Managers should also develop a strategy to continuously monitor, flag, quantify, analyse, communicate, mitigate and control these risks in their firms.

HOW FINANCIAL RISKS AFFECT FIRMS

The empirical results revealed that the identified financial risks have an impact on firms' profits, cash flow and cost of doing business. It is therefore recommended that managers of petroleum firms develop simple graphs and indices on oil and gas prices, exchange rates, and demand and supply numbers, and juxtapose these against their concomitant profit and cash flow movements. It is also recommended that managers develop graphs and indices for interest rate, liquidity and equity prices and to juxtapose these against their cash flow movements and their costs of doing business. Moreover, managers must develop early warning techniques that would indicate that these impacts are occurring and the extent of these impacts.

MOST IMPORTANT FINANCIAL RISK MANAGEMENT CHALLENGES

The empirical results indicated that the most important FRM challenges that Nigerian petroleum firms face included the lack of capacity-building, incorrect perceptions about FRM and insufficient awareness of FRM operations. Without a proper understanding of and capacity to implement FRM in their firms, managers would not be able to successfully implement FRM in their firms. The empirical results revealed that some managers might not even be aware of FRM operations in their firms. It is therefore important that managers institute extensive awareness and capacity-building programmes for FRM operations in their firms.

CRITICAL FACTORS TO ACHIEVE SUCCESS IN FINANCIAL RISK MANAGEMENT

The empirical results identified the following critical areas in the achievement of FRM success in Nigerian petroleum firms:

- top management support;
- communication flow;
- matrix organisational structure;
- frequency of FRM training and development;
- oversight and control.

The empirical results showed that it is particularly important that the top management of Nigerian petroleum firms monitor and continuously improve their support for and dedication to FRM activities by a continuous involvement in the formulation of FRM policies and funding of FRM operations. It is recommended that top management not only supports but also takes full responsibility for FRM evaluation and control.

As far as organisational communication is concerned, the empirical results suggest that managers should also monitor and continuously improve organisational communication flow in order to facilitate timely risk identification and FRM policy dissemination. Managers should also continuously ensure that their organisation's communication flow facilitates FRM decision-making and strengthens FRM control measures.

The empirical results further suggest that a matrix organisational structure should be implemented to manage FRM operations. Matrix organisational structures usually strengthen the effective use of resources, employee involvement and commitment, and information flow for effectiveness and sustainability of organisational processes. This type of organisational structure should therefore also increase FRM awareness and capacity.

Finally, based on the empirical results, it is recommended that FRM staff members go for training more than twice a year, especially in FRM oversight and control. These employees must be trained in how FRM oversight and control actions should be utilised to prevent risks such as unauthorised actions, unpreparedness for unexpected changes in regulations, actions that will cause reputational damage, and the lack of reserve recalculation. Unauthorised actions could create risks such as those which brought down Barings Bank in London. Inability to operate according to the country of export or host country's regulatory changes can result in fines and reputational damage that could strain the already stressful financial situation of these oil firms. It also very important that oil firms recalculate their proven oil reserves whenever there is a significant change in the oil price, to avoid situations such as the case of Shell in 2014 when its chief executive official had to resign.

CONCLUSION

By implementing the above-mentioned steps and activities, managers of Nigerian petroleum firms can put into place an effective framework to manage FRM in their firms. The framework produced in this study improves on the current unintegrated FRM situation, which is characterised by reactionary responses to mathematical calculations of financial ratios. The improved framework provides a more comprehensive and holistic method of managing financial risks in the Nigerian petroleum industry.

Another important contribution of this study is that the framework could be used as a basis or model to implement FRM in other contexts. Such a model would include the following steps: (1) the identification and creation of an environment to manage the main financial risks that impact on a firm, (2) the identification of how financial risks affect a firm and the formulation of techniques to manage those impacts, (3) the identification of the main FRM challenges that present a hindrance to firms addressing these risks and the implementation of plans to address these challenges, and (4) the identification of the critical areas to address in a firm and the implementation of plans to improve in these areas.

No study is perfect and the present study has its limitations. The critical success factors investigated in this study were not exhaustive and there is a need to explore other such factors for the petroleum industry. In the present study, FRM culture and information technology were also investigated as critical success factors, but were found not to be statistically significantly related to FRM success. A petroleum firm's financial risk culture was measured in this study as the extent to which it enabled the firm to achieve its strategic objectives, improved decision-making, increased participation and collaboration, and greater awareness of FRM matters. However this might have not have been the best measure of financial risk culture. An improved measure could render different results in future studies.

Similarly, information technology as an enabler of FRM success was measured in the present study as the extent to which information technology was used to support corporate governance, environmental scanning, risk-ranking and analysis, and risk mitigation and control in the FRM context. A future study could explore the use of a better measure for information technology as an enabler of FRM success.

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