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Title: Earnings Quality of the Successful Efforts and Full Costing Accounting Methods used by Upstream Oil and Gas Companies in the U.S.

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Aim: To ascertain which if any, of the two accounting methods SE and FC provides superior earnings quality.

Objectives:

1. To identify the characteristics of FC and SE accounting methods.

2. To examine the possible approaches of measuring the quality of earnings and identify the most appropriate.

3. To compare the quality of earnings of FC and SE upstream oil and gas companies.

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Earnings Quality of the Successful Efforts and Full Costing Accounting Methods used by Upstream Oil and Gas Companies in the U.S.

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Submission Date: 22nd August 2014

ABSTRACT

Exploration and Production (E&P) or upstream oil and gas companies in the U.S. prepare their financial statements using either Full Cost (FC) or Successful Efforts (SE) historical accounting methods. Although there have been numerous attempts by FASB and SEC to narrow the choice of accounting methods so that the financial statements of petroleum companies are more comparable, the question as to which historical accounting method provides investors with more informative numbers, and thus should be mandated for all oil and gas companies is still unresolved. This research compares the quality of earnings of SE and FC upstream oil and gas firms, with an aim of ascertaining which if any, of the two methods provides superior earnings quality, and thus more relevant information to investors.

While the earnings quality literature defines earnings quality several different ways, the researcher utilised the definition that focuses on the association between earnings and cash flows. The research relied primarily on secondary data from annual reports, journals and textbooks for the purpose of analysis and interpretation with the help of Microsoft excel and Statistical Package for Social Sciences (SPSS). Both qualitative and quantitative methodologies were used in this research. In all, the study covered 76 public listed oil and gas companies in the U.S. (39 FC firms and 37 SE firms), engaged primarily in the exploration and production of crude oil and natural gas, with data for the years 2009 to 2013. The findings of this research indicate that the correlation coefficient for SE firms is extremely significantly higher than that of full cost firms, implying that the successful efforts earnings is more highly correlated with cash flows than is full costing earnings. Therefore, this research concludes that the SE method of accounting provides earnings quality superior to the FC method.

Keywords: *Full cost, successful efforts, earnings quality, earnings, cash flow, exploration and production.*

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Acronyms and Abbreviations

AICPA	American Institute of Certified Public Accountants
APB	Accounting Principles Board
ASR	Accounting Series Release
CFO	Cash Flow from Operations
DD&A	Depletion, Depreciation and Amortisation
E&E	Exploration and Evaluation
E&P	Exploration and Production
EDGAR	Electronic Data Gathering, Analysis and Retrieval
ERCs	Earnings Response Coefficients
FASB	Financial Accounting Standards Board
FC	Full Cost
GAAP	Generally Accepted Accounting Principles
IAS	International Accounting Standard
IASB	International Accounting Standards Board
IFRS	International Financial Reporting Standard
IFRS	International Financial Reporting Standards
OIAC	Oil Industry Accounting Committee
OIBD	Operating Income before Depreciation
PMCC	Pearson's Product Moment Correlation Coefficient
RRA	Reserve Recognition Accounting
SE	Successful Efforts
SEC	Securities and Exchange Commission
SFAS	Statement of Financial Accounting Standards
SIC	Standard Industry Classification
SPSS	Statistical Package for Social Sciences
U.S.	United States

CHAPTER 1: INTRODUCTION

1.1 Background of the Study

The two alternative historical accounting methods acceptable for use in the Exploration and Production (E&P) or upstream oil and gas industry are Successful Efforts (SE) and Full Cost (FC) accounting methods. Under Full Cost accounting, all costs associated with exploring for oil and gas reserves are capitalised as an intangible asset, irrespective of the success or failure of the exploration activity, while Successful Efforts method only capitalizes exploration costs if they directly result in the discovery of oil and gas reserves (Wright and Gallun 2008).

Attempts to have a uniform accounting method to enhance comparability of oil and gas company financial statements over the years have been unsuccessful. Such attempts date as far back as 1969, when the American Institute of Certified Public Accountants (AICPA) Research study No. 11, "Financial Reporting in the Extractive Industry", recommended the use of only successful efforts. However, the recommendation could not stand the test of time due to the political sensitivity surrounding the issue (Wright and Gallun 2008). The Financial Accounting Standards Board (FASB) that assumed the role of setting standards in U.S. in 1973, upon the request of the Securities and Exchange Commission (SEC) proposed to narrow accounting alternatives by issuing an exposure draft (SFAS No. 19) in 1977, mandating oil and gas companies to use successful efforts method of accounting (Nichols 2012; Cortese et al. 2009; Flory and Grossman 1978). The argument for this was that unsuccessful wells have little or no commercial value and should not be included as assets in the balance sheet. However, advocates of the full cost accounting method especially small or new firms strongly opposed the decision, arguing that the proposed elimination of full cost would affect their ability to obtain capital from debt and equity markets due to volatility in their company earnings and lower asset base (Cortese et al. 2009; Deakin 1979). This argument supports the inefficient market hypothesis, which asserts that market prices of common

stocks and similar securities are not always accurately priced and tend to deviate from the true discounted value of their future cash flows.

Lobbying against the standard continued and in what has been described as one of the "most intensely politicised accounting arguments ever" (Van Riper 1994, 64), the SEC overruled the FASB by permitting companies to choose between the successful efforts or the full cost method (Cortese et al. 2009; Van Riper 1994; Smith 1981; F`lory and Grossman 1978). In 1978, SEC proposed a new method of accounting known as Reserve Recognition Accounting (RRA), to replace successful efforts and full cost methods since neither of the methods disclosed in the financial statements the proved oil and gas reserves, which are the most valuable asset of an oil and gas company (Jenning, Feiten and Brock 2000). However, development of RRA was later abandoned due to the high level of subjectivity of proved reserves volumes and values (Nichols 2012). As a result, FASB issued SFAS No.69 which required publicly traded companies to disclose supplementary information in their annual financial statements.

In 2004, the International Accounting Standards Board (IASB) in its pursuit of a comprehensive reporting standard for extractive industries, issued the International Financial Reporting Standard (IFRS) number 6, *Exploration for and Evaluation of Mineral Resources* as an interim solution and did not take any position on the successful efforts versus full cost. It instead permitted a continuation of a choice between the methods (IASB 2004). IFRS 6 requires an entity to determine an accounting policy that takes into account the degree to which the expenditure can be associated with finding specific mineral resources, and that upon initial recognition, exploration and evaluation assets should be measured at initial cost (Ernst and Young 2009). Currently, the board is developing accounting standards for the oil and gas companies; however, it is still failing to narrow accounting alternatives for the extractive industries.

To date, upstream oil and gas companies in the U.S. are allowed to use successful efforts, as prescribed in SFAS No.19, or full cost, as prescribed in Reg. S-X, Rule 4-10. In addition, irrespective of the method used,

disclosures on reserve quantities and values as required by SFAS No.69 must be presented as supplemental information in the financial statements (Wright and Gallun 2005). However, some of the disclosures like reserve values involve making a lot of assumptions and estimates, which makes it hard to rely on them for example by analysts, when making their own adjustments to the financial statements.
Therefore, despite debates between the Accounting Principles Board (APB), FASB, and SEC, there has been no agreement on which method provides investors with more informative numbers (superior quality earnings) and thus should be mandated for all oil and gas companies (Nichols 2012).

According to IASB and FASB, the objective of general purpose financial reporting is to; "provide financial information about the reporting entity that is useful to existing and potential investors, lenders, and other creditors in making decisions about providing resources to the entity". These primary users of financial statements need information to help them assess the prospects for future net cash inflows to an entity so that they can make decisions about buying, selling, or holding debt instruments for the case of investors, and providing or settling loans for the case of lenders and other creditors. Therefore, to achieve this, financial information provided in the financial statements must be relevant and faithfully represent what it purports to represent, i.e. complete, neutral and free from bias. This in turn also allows markets to operate efficiently. However, the possibility of switching accounting methods, SE and FC, provides for earnings management which impairs the quality of the reported earnings. It also inhibits comparability of financial statements which could result into users making wrong decisions since the two methods give different results.

This research seeks to compare the quality of earnings of upstream oil and gas firms who use either SE or FC accounting methods, with an aim of ascertaining which if any, of the two methods provides superior earnings quality and thus more relevant information to investors. However, one difficulty in comparing the earnings quality of these two methods is in the phrase "earnings quality", which is widely used, but with neither an agreed-upon meaning nor a generally accepted approach to its measurement

(Schipper and Vincent 2003). For example; Wolk and Tearney (1997) define better earnings quality as "the higher the correlation between accounting income and cash flows, while Barragato and Markelevich (2008) describe high quality earnings as a stream of earnings more closely associated with future operating cash flows. To address this difficulty, a review of literature on possible earnings quality measures and evaluation of their benefits was conducted, to conclude on the most appropriate measure(s) and thus operationalise the concept of earnings quality in this research.

1.2 Justification of the Study

There has been an increasing amount of research aimed at exploring the use of FC and SE accounting methods in the upstream oil and gas industry (Bryant 2003; Johnson and Ramanan 1988; Dhaliwal 1980; Collins and Dent 1979), and the focus being on why the attempts to eliminate the full cost accounting method have been unsuccessful. Little research has been done when it comes to comparing the earnings quality of SE and FC accounting methods. For example; Collins and Dent (1979) conducted an empirical assessment of whether the proposed elimination of full cost accounting had an adverse effect on the security returns of full cost versus successful efforts firms. They concluded that the proposal was associated with a significant negative difference in risk-adjusted rates between the two methods whose financial reports remained unaffected by the proposed change. Deakin (1979) conducted empirical research on the need for external capital by SE and FC firms, and concluded that FC firms were more highly leveraged than SE firms. However, the cause of this greater use of debt could not be determined. Also, Bryant (2003) empirically studied the relative value of the successful efforts and full cost methods, and concluded that FC accounting data is more relevant to investors since it provides smooth earnings compared to SE.

The little research conducted in the area of accounting methods and earnings quality has presented conflicting results. For example; Bandyopadhyay (1994) studied the association between earnings and

security prices of a sample of 39 integrated and independent oil and gas firms, over the period 1982 – 1990, and concluded that SE accounting method produces superior quality earnings to FC, whilst Bryant (2003) established that capitalizing costs with uncertain future benefits (FC) was more relevant to security returns and market value than partial capitalization (SE). Bryant's sample consisted of 112 independent oil and gas firms with data for the years 1994 to 1996. This therefore creates contrasting conclusions regarding the superiority of SE and FC methods to earnings quality and thus necessity for further research.

Furthermore, in terms of time dimension, most of the studies conducted on these two methods were in the 1970s, 1980s, and 1990s (20th Century). This was because it was majorly the period when different standard setting bodies in the U.S. debated on having one accounting method for the petroleum industry to ensure comparability of financial statements. Conducting a further research in the current century can help reveal whether the findings in earlier research are still applicable in this modern time. The research would help reveal interesting characteristics relating to the earnings and cash flows of upstream oil and gas companies, which can be valuable to various stakeholders like banks, analysts, and shareholders. Lastly, this research would also be valuable to IASB in setting a comprehensive accounting standard for the petroleum industry.

1.3 Aim and Objectives of the Study

The main aim of the study is to ascertain which if any, of the two accounting methods SE and FC provides superior earnings quality.

In order to achieve the aim above, the objectives of the study will be;

1. To identify the characteristics of FC and SE accounting methods.
2. To examine the possible approaches of measuring the quality of earnings and identify the most appropriate.
3. To compare the quality of earnings of FC and SE upstream oil and gas companies.

1.4 Structure of the Research

This research report is organized into five chapters which are logically and systematically presented to ensure a clear and well-presented dissertation. Chapter one gives an introduction to the study; highlighting the background of the study, aims and objectives, and justification of undertaking the research. Chapter two presents an analysis of the relevant theoretical and empirical evidence of earlier research regarding the research topic as far as the aim and objectives of the study are concerned. The methodology of the research is contained in Chapter three starting with the discussion of the two main research paradigms, data sources, research variables and hypothesis, sample selection, data analysis and interpretation, limitations of the research design, and ending with the ethical considerations. The findings from data analysis are presented, analysed and synthesised under Chapter four. The last chapter of the study is Chapter five which covers a summary of the dissertation, research limitations, recommendations for further research, and implications of the research.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

According to Saunders et al. (2012), literature review provides the foundation on which research is built, and thus helps the researcher to develop a good understanding and insight into relevant previous research, and the trends that have emerged. Literature review involves a constructively critical analysis that develops a clear argument about what the published literature indicates is known and not known about the research question (Wallace and Wray 2011). This chapter therefore presents the theoretical framework of the research and review of relevant previous research. It begins with the broad literature on the two accounting methods, SE and FC, used in the upstream oil and gas industry providing the features of the two methods. It proceeds with examining earnings management, earnings quality, and the possible approaches of measuring the quality of earnings with an aim of identifying the most appropriate that can be used to operationalise the concept of earnings quality in the study. Finally, the chapter ends with a review of empirical studies conducted on earnings quality of SE and FC accounting methods. Generally, the literature review has been structured to ensure that all the various objectives are captured for critical analysis.

2.2 Characteristics of Full cost and Successful Efforts accounting methods

Accounting for oil and gas producing activities poses many technical and theoretical problems due to a number of unique features presented by the industry. The features create an unusual and complex set of rules and practices, and thus its accounting and financial presentation. These unique features include the following: high exploration risk and low probability of discovering commercial reserves, long time span from when costs are first incurred until benefits are received, lack of correlation between the size of

expenditure incurred and the value of the resulting oil and gas reserves, high cost of investment, and the underlying value of the reserves (which represent the major economic worth of a company) cannot be valued reliably enough to be recorded on the balance sheet (Wright and Gallum 2008). These and other factors resulted in the development of a wide range of practices as companies sought to provide a proper accounting presentation of the underlying activities. These practices have therefore been narrowed into two categories; 'full cost' and 'successful efforts' (OIAC 2001).

Standard setting in the Oil and Gas Industry has been a subject of controversy for nearly four decades, with most of the decisions rendered by the standard setting agencies being extremely dubious (Wolk, Tearney and Dodd 2000). The major controversy in accounting for oil and gas upstream activities concerns the accounting for pre discovery costs. Accountants are in agreement that development costs should be capitalised and amortised against the revenues that arise during the production phase (Wright and Gallum 2008). Upstream oil and gas firms have a choice to either use FC or SE accounting methods for the preparation of their annual financial statements. The basic difference between the two methods centres on the treatment of pre discovery costs incurred in finding new oil and gas reserves (Collins and Dent 1979).

2.2.1 Successful Efforts Accounting Method

Successful Effort accounting method is the practice of capitalizing only those pre-discovery costs which are directly identifiable with discovery of commercial reserves, and treating the other pre-discovery costs as operating expenses (Sunders 1976). Under this method, establishing a direct cause-and-effect relationship between costs incurred and reserves discovered is relevant to recording the costs as assets (Wolk, Tearney and Dodd 2000). The size of the cost centre over which the costs are accumulated and amortised is smaller compared to FC, and this can be a lease, field or reservoir. The success or failure of each exploration effort is judged on a well-by-well basis as each potentially hydrocarbon-bearing

structure is identified and tested (OIAC 2001). Under both SE and FC methods, acquisition and development costs are capitalised and production costs expensed (Wright and Gallum 2008).

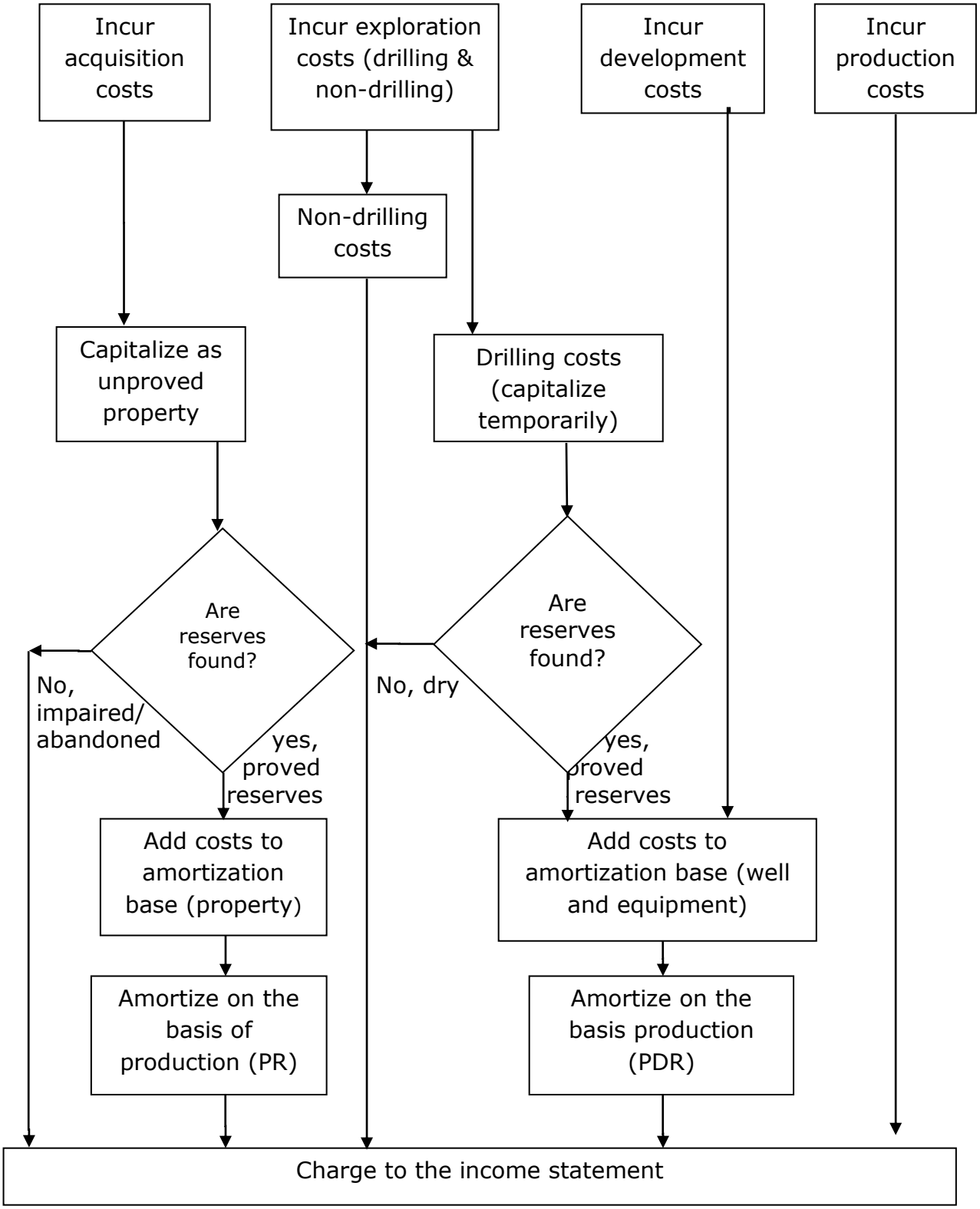
Acquisition costs of undeveloped oil and gas fields are accounted for on a property-by-property basis and classified as unproved property, implying that each oil and gas well or field is treated as a cost centre. If reserves are found, the unproved property is reclassified as proved property and amortized on the basis of production. However, if no reserves are discovered, the unproved property is impaired or abandoned thus an expense to the income statement (Wright and Gallun 2008).

Costs of exploration under successful efforts method are treated differently depending on whether the exploration is regarded as drilling or non- drilling. All non - drilling exploration costs including: geological and geophysical costs, costs of carrying and retaining undeveloped properties, dry hole and bottom hole contributions, are written off to the Income statement. On the other hand, exploratory drilling costs are initially temporarily capitalized pending the discovery or none discovery of reserves. In the event where proved reserves are found, exploratory drilling costs are transferred to wells and equipment for appropriate Depletion, Depreciation, and Amortization (DD&A) computation for the purpose of charging it as an expense in the Income statement. However, if proved reserves are not discovered (i.e. dry holes) drilling costs are directly written off to the income statement (Wright and Gallun 2008). In theory, costs that have already been expensed can be reinstated as an asset if they are considered to have resulted in the discovery, acquisition, or development of mineral reserves, but practically, this act of expensing and later reinstating is rare (Extractive Industries Issue Paper, Chapter 4 in IASC 2000).

Successful efforts accounting in various forms has been used for over 60 years (Jenning, Feiten and Brock 2000). Upstream oil and gas companies wholly used successful efforts accounting before 1959 (Nichols 2012). In 1969, The Accounting Research study No. 11 (Financial Reporting in the Extractive Industries) which was issued by the American Institute of Certified Public Accountants (AICPA) supported the use successful efforts

(Wright and Gallun 2008). Also, in 1977, FASB who took over the role of Accounting Principles Board prescribed the use of successful effort as issued in SFAS No. 19, "Financial Accounting and Reporting by Oil and Gas Producing Companies". Four years later, FASB issued SFAS No. 69, "Disclosures about oil and Gas Producing Activities" which required the disclosure of supplementary information on reserves by publicly traded companies in their annual financial statements. Petroleum Firms that use successful effort method are usually large size firms compared to firms using FC method (Collins and Dent 1979). Currently in the U.S., almost half of the upstream oil and gas companies use successful efforts, implying an equal preference for the two methods (Nichols 2012; Murdoch and Krause 2009).

Figure 1: Flow chart showing the treatment of various costs under Successful Efforts accounting method



Source: Wright and Gallun (2008) page 52

2.2.1.1 Theoretical arguments for Successful Efforts accounting method

SE method is conservative and also conforms to what constitutes an "asset", which is only those oil reservoir that provide sufficient quantities of hydrocarbons, and therefore provide the company with a future economic benefit, are shown in the balance sheet (IASC 2004). The IASC (2004) Framework paragraph 49, defines an asset as; "a resource controlled by the enterprise as a result of past events and from which future economic benefits are expected to flow to the enterprise". Unsuccessful wells have little or no commercial value and should not be included as assets in the balance sheet. It is also argued that in case of a conflict between the principles of conservatism/prudence and matching, then conservatism takes precedence (ACCA 2011). However, recent pronouncements by IASB have replaced the concept of prudence with neutrality because the requirement to be prudent would lead to bias in the preparation of financial statements.

It reflects management's success or failures in its efforts to find new reserves and the cost of finding those reserves. The quantity of reserves added can be assessed in light of the exploration costs which have been capitalised and those that have been charged to expense in the two accounting periods (IASC 2000).

2.2.1.2 Theoretical arguments against Successful Efforts accounting Method

The Profit and Loss account can sometimes give a misleading picture of the company performance in terms of success in finding reserves if there has been significant reduction in the overall exploration expenditure, since it might look like profits have significantly increased in the current accounting period. A reduction in exploration expense resulting from the curtailment of exploration activity would likely increase reported net profits in the years in which exploration is cut back since there would be a reduction in unsuccessful exploration costs written off (IASC 2000).

Successful Efforts method provides a means of "earnings management" because of its effect on net profit or loss of increasing or decreasing exploration expenditures. It is argued that management can smooth income to some extent by adjusting the timing of exploration expenditures for discretionary period costs.

The method does not achieve a proper matching of costs and revenues since the financial statements of SE companies often show a write off of unsuccessful exploration costs charged against (arguably 'miss-matched' with) revenues to which they are wholly unrelated (IASC 2000). On the other hand, it is also argued that the SE method is not poorer at matching costs with revenues since it takes the view that the costs which should 'properly' be matched with revenues are only those directly associated with finding the reserves that give rise to the revenues (IASC 2000).

2.2.2 Full Cost Accounting Method

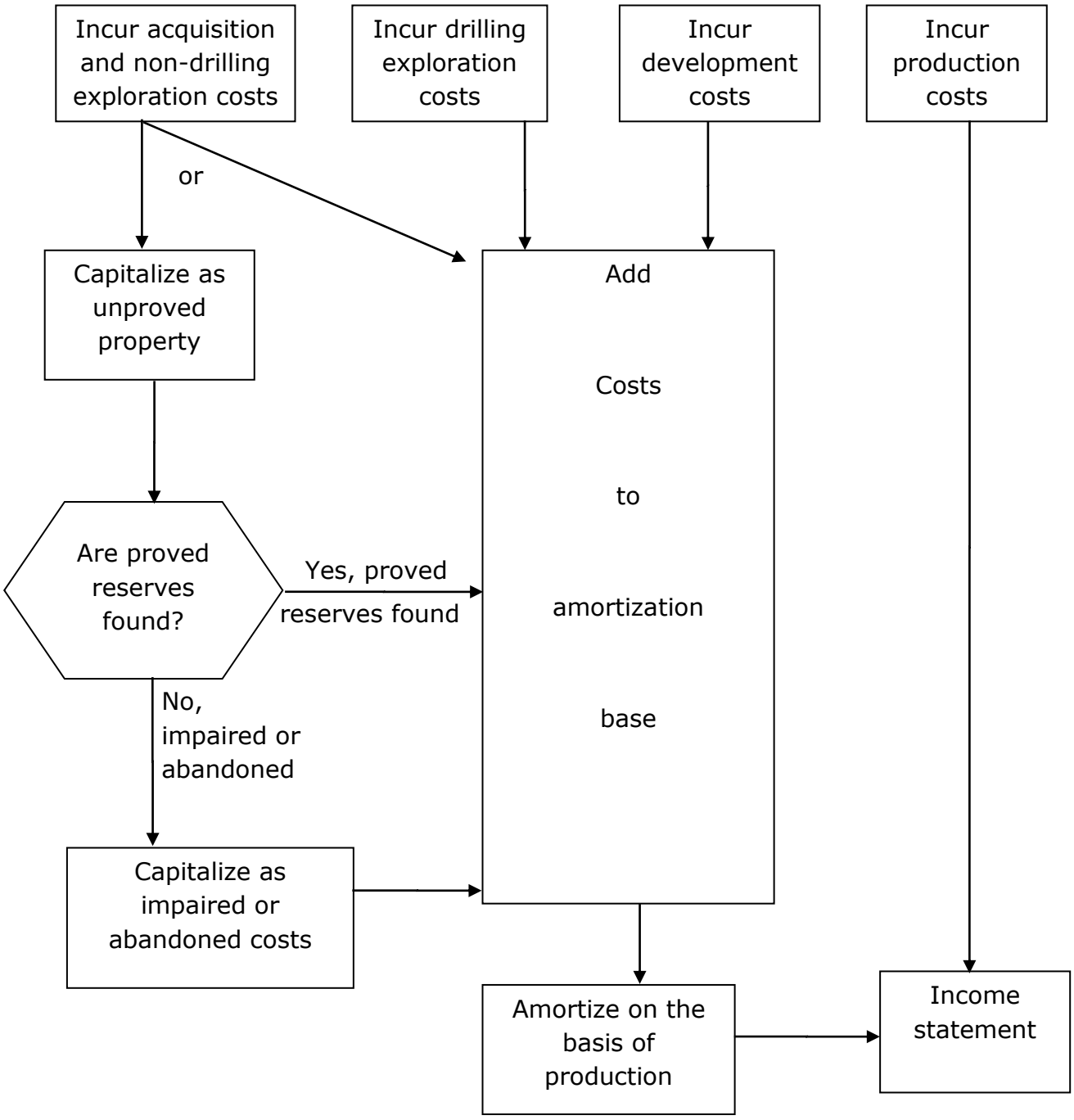
According to Sunders (1976), the practice of capitalizing all pre-discovery costs irrespective of their result, and amortizing the costs over the discovered reserves on a pro rata basis, is referred to as full cost accounting. Under this method, all property acquisition, exploration costs (including dry hole costs), and development costs are capitalised as oil and gas properties, and amortised on a country-by-country basis using a unit of production method based on volumes produced and remaining proved reserves (Jenning, Feiten and Brock 2000).

SE accounting was the only method used prior to the late 1950s and early 1960s. The idea of FC first emerged in the late 1950s with the first corporation to use the accounting method being Belco Petroleum in 1957, which at that time was just going public (Johnston and Johnston 2006). In 1977, the FASB statement No.19 struck down the full cost method of accounting, with seven of the then "Big Eight" accounting firms ruling against it (Johnston and Johnston 2006). FASB's argument against FC was that exploratory dry holes do not have future economic benefit and therefore do not qualify for capitalisation.

While the FASB did not consider full cost an acceptable accounting method under GAAP, the SEC in 1978 declared FC method acceptable and ruled that the two methods should coexist, and companies choosing whichever method were desired. The SEC went further to develop the FC guidelines after the refusal of FASB to develop the rules for full cost accounting.
The motivation for FC was the frustration with SE accounting which penalises enterprises for exploration efforts that result in no discoveries since their profits are adversely affected by such costs written off (Wolk, Tearney and Dodd 2000). Full cost accounting allowed smaller firms and especially infant companies to access the capital markets more easily since they believed the method was fairer and produced less volatile earnings (Johnston and Johnston 2006).

Full cost accounting method capitalizes all costs related to drilling both productive and non-productive wells, creating a high probability that the net book value of oil and gas assets could easily exceed its underlying value of oil and gas assets (Boone and Raman 2003). Because of this possibility, it caused the SEC in 1978 to require that all oil and gas firms using FC accounting method recognize an impairment loss if the book value of oil and gas assets is greater than the "cost ceiling," which is represented by or equivalent to the market value of the oil and gas assets of a company (SEC *Reg.* S-X 4-10). Under this Regulation, a key component of the cost ceiling is the "reserves value", which is measured or computed by finding the present value of the future net revenues from "proved" oil and gas reserves using prevailing oil and gas prices on the balance sheet date and discounted by applying a uniform interest rate of 10% (Wright and Gallun 2008).

Figure 2: Flow chart showing the treatment of various costs under Full Cost accounting method



Source: Wright and Gallun (2008) page 64

2.2.2.1 Theoretical arguments for Full Cost accounting method

This method acknowledges that the risk exposure at the exploration phase is a necessary part of the cost of finding commercial reserves, and that capitalising both successful and unsuccessful wells achieves a better matching of the true costs of oil and gas reserves with the revenues that ultimately arise from their production.

Exploration and appraisal phase of the project is concerned with gathering information to make a commercial decision. Therefore, wells that are unsuccessful may provide information that might ultimately lead to a successful commercial development, thus unsuccessful wells can add value and should be capitalised (IASC 2000).

FC avoids distortions of reported earnings since the total costs of finding reserves are spread over a given period of time. This allows firms to raise capital from the capital and money markets irrespective of the company's size (Cortese et al. 2009). FC method also prevents creative accounting as management do not have to use their own subjectivity in determining whether a particular cost should be expensed or capitalized since the method requires the capitalization of all exploration costs.

2.2.2.2 Theoretical arguments against Full Cost accounting method

FC method delays loss recognition since capitalising costs that do not result directly in future benefits leads to deferring the effects on expenses (Johnston and Johnston 2006). Therefore, the method leads to reporting of higher book values in the balance sheet and higher profits in the income statement.

The method does not allow for the effective measurement of an enterprise's exploration and development activities. This is because costs of successful and unsuccessful activities are treated in the same way, and are matched against future revenues from all an enterprise's successful exploration and

development activities (IASC 2000). For example, in a given year management may conduct exploration activities that are completely unsuccessful, yet the income statement may not reveal this fact.

There is also a danger of carrying large amounts of intangible assets without a corresponding future benefit. However, this danger could be addressed by a requirement to conduct a regular impairment test (OIAC 2001).

2.3 Effect of Full Cost and Successful Efforts accounting methods on the financial statements

The differences between the two methods outlined above reflect the differing perceptions which may be taken by companies of their exploration activities, since the methods give very different results on earnings, return on equity, and book values (Johnston and Johnston 2006). For example, a company with a large exploration drilling program and a normal unsuccessful drilling rate would, under SE have significant amount of dry hole expense which would adversely affect its net income. On the other hand, a FC company would capitalise exploratory dry hole costs, therefore the costs would typically have no immediate effect on its net income. However, they would reduce net income through future amortisation of the capitalised cost. The negative effect on net income of expensing exploratory dry hole costs under SE may impact more on financial statements of smaller companies compared to large ones. Because of this, smaller firms prefer to use FC method of accounting since it provides "smooth" earnings figures (Cortese et al. 2009). The overall consequence of these two methods is that there is a difference in the "timing" of profit or loss recognition (OIAC 2001). Under the successful efforts method, the costs of individually unsuccessful efforts are usually written off earlier in the financial statements but greater reported profits will be shown once production starts. Under the full cost method, the total costs of both successful and unsuccessful activities are spread over total production from each pool. Over the life of

the entity, aggregate reported profits under each method will be the same, but profits under full cost would tend to be recognised earlier (OIAC 2001).

2.4 Reserve Recognition Accounting

A number of methods have been considered in an effort to find a way to adequately represent the actual value of oil and gas assets. In August 1978, the SEC issued Accounting Series Release (ASR) 253 concluding that neither of the two methods, full cost and successful efforts provided meaningful financial statements because neither of the methods recognised the value of the oil and gas reserves discovered, nor reflected the discovery activity's true income, i.e. reserve value added less related discovery costs (Jenning, Feiten and Brock 2000). The SEC cited that, historical cost accounting information fails to provide sufficient information on the financial position and operating results for oil and gas producers, and therefore an accounting method based on oil and gas reserves valuation was needed to provide sufficiently useful information by including reserve values in the primary financial statements, i.e. the balance sheet and income statement (Wolk, Tearney and Dodd 2000). For this reason, the SEC proposed a new method of accounting called Reserve Recognition Accounting (RRA), under which revenue would be recognised when reserves were discovered versus when they were produced and sold, and assets would be a valuation of the estimated future production of proved oil and gas reserves in place discounted at 10% (Wright and Gallun 2008). However, some evidence indicates that the SEC proposed RRA because it was in a bind between SFAS 19, which was seen by some people as a possible deterrent to petroleum exploration due to the faster write off of costs, and on the other hand, the FASB and the major oil companies which preferred to use successful efforts method (Wolk, Tearney and Dodd 2000).

The SEC originally intended RRA to replace FC and SE accounting methods, but would only be required as supplemental information during the trial period and later the basis for preparing the primary financial statements. However, it was determined by SEC that RRA could not replace FC and SE

accounting due to the inaccuracies of reserves reporting, arising from the unreliable assumptions made when estimating reserves (Johnston and Johnston 2006).

2.5 Current disclosure requirements

Currently, oil and gas companies in the United States are allowed to use successful efforts, as prescribed in SFAS No. 19, or full cost, as prescribed in Reg. S-X, Rule 4-10. Irrespective of the accounting method used, publicly traded companies in the U.S. with significant oil and gas producing activities, are required to prepare disclosures according to SFAS No.69, "Disclosures about Oil and Gas Producing Activities", and presented as supplemental information outside of the basic financial statements and notes thereto (Wright and Gallun 2005). These disclosures are both historical and value based. The historical based disclosures include: proved reserve quantity information; capitalised costs relating to oil and gas producing activities; costs incurred for property acquisition, exploration, and development; and results of operations for oil and gas producing activities; while the value based disclosures include: a standardised measure of discounted future net cash flows relating to proved oil and gas reserve quantities; and changes in the standardised measure of the discounted cash flows relating to proved oil and gas reserve quantities (Wright and Gallun 2008). In addition, public and non-public companies are required to disclose two informational items including: accounting method used in accounting for oil and gas producing activities, and the manner of disposing of capitalised costs (Wright and Gallun 2008).

However, even with such disclosures, investors may not get full information about the activities and performance of an oil and gas producing company. This is mainly because SFAS No.69 limits the reserves that are to be disclosed to "proved reserves", thus eliminating the "probable reserves". Also, the value based disclosures involve making a lot of assumptions and various estimates for example determining the future net cash flows, and using a fixed discount rate of 10%, thus reducing their reliability (Wolk,

Tearney and Dodd 2000). Lastly, there is no requirement to subject these disclosures to external audit since they are not part of the primary financial statements.

2.6 Accounting standards regulating the Oil and Gas companies

Accounting for extractive industries has been a political hot topic for decades in the U.S. due to the political power held by members of this industry (Nichols 2012). The International Accounting Standards Board's (IASB's) efforts to formulate and release a comprehensive accounting standard for the extractive industries seems to have come to a standstill. It could be that the IASB is now also facing pressures similar to those experienced in the U.S. and as a result has decided not to move forward at this time than force the issues to resolution.

2.6.1 IFRS 6: Exploration for and Evaluation of Mineral Resources

Beginning with fiscal year 2005, the European Union required all listed companies issuing consolidated financial statements to conform with International Accounting Standards (IAS), forcing the oil and gas industry to desire guidance from the IASB regarding the application of IASs to the industry.

As a result in 2004, the IASB issued International Financial Reporting Standard (IFRS) Number 6, *Exploration for and Evaluation of Mineral Resources*, and at the same time it also announced that the research stage of a project with a goal of issuing a comprehensive standard for extractive industries would commence. IFRS 6 was to make limited improvements to the already existing accounting practices, since the issuance of a comprehensive standard was anticipated in the future. The standard allowed the continued use of either full cost or successful efforts methods of accounting, and required exploration and evaluation assets to be initially measured and recorded at cost, also allowing either the cost or revaluation

model to be used for exploration and evaluation of assets subsequent to initial recognition. Most importantly, the standard required assets to be assessed for impairment in case circumstances suggested so, and also included a non-exhaustive list of circumstances that could indicate the need for performing impairment tests.

IASs do not specifically prohibit the use of full cost accounting, but may require substantial modification if used (Nichols 2012). IFRS 6 allows for the current policies used by full cost companies in the U.S. to some extent in the Exploration and Evaluation (E&E) project phase. However, the extent of capitalisation depends on whether the E&E expenditure can be associated with the finding of oil and gas reserves and once capitalised, the costs need to be monitored at a lower level than at country level. On the other hand, companies using full cost accounting in the U.S. normally compute Depreciation, Depletion, and Amortisation (DD&A) based on units of production and charge the country as the cost centre. Therefore, the IAS adapt a "highly modified full cost" approach to accounting where most pre licensing costs are expensed and cost pools disaggregated into much smaller units than countries, resulting to an approach much closer to the successful efforts accounting method (Nichols 2012).

2.6.2 Status of the IASB Discussion Paper

The IASB Discussion paper on extractive industries inclusive of oil and gas industry was released on April 6, 2010 though a working draft had earlier been released in August 2009. By the end of the comment period on July 30, 2010, 141 comment letters had been filed with IASB with responses from differing geographical dispersions and mainly from large mining, oil and gas companies and other industry associates.

Overall, majority of the respondents supported the idea of developing a comprehensive accounting standard that will regulate financial reporting for the extractive industries, though some of the specific proposals were not agreed to. For example regarding asset recognition and measurement, the historical cost based approach was preferred by most respondents and

recommended its use. However, most concern was raised regarding the capitalisation of costs related to exploration and evaluation activities, with a feeling that the capitalisation of these activities was inconsistent with the IASB framework since they may not have probable future economic benefits (Nichols 2012).

In October 2010, a summary of the feedback from the comment papers was presented to the IASB, however since then, there has been no visible progress regarding developing a comprehensive standard for the extractive industry. The IASB announced that the project was paused as it concluded deliberations on its future work plan, and a decision as to whether the extractive industries project would be included to its active agenda would be made in 2011. However, IASB's work plan by December, 2011 had no information regarding the extractive industries project and IASB provided no reason for that but rather planned for a further agenda decision in later years.

2.6.3 The FASB and the Extractive Industries Project

The U.S. standard setting body, FASB, has made a choice not to involve itself with the IASB's extractive industries project. Despite the U.S. having a good representation on the IASB of 4 out of 15 board members, it was not represented on the extractive industries project team currently comprising of staff from national standard setters in Australia, Canada, Norway and South Africa. With the prominence of extractive industry companies in the U.S., FASB's not being represented on the team could be an indication that they had no desire to be part of the team. In addition, FASB once made a comment that they were monitoring developments of the extractive industries and would make a decision as to whether to join in the project later when the discussion paper had been issued. Lately, FASB has considered this project to be of limited interest and has "little or no significance from a convergence stand point" (FASB 2012). Nichols (2012) claims that FASB's reluctance to involve itself in the project could be attributed to the history of political pressure from U.S. industry members concerning financial accounting and reporting in the oil and gas industry.

2.7 Earnings Management and Earnings Quality

In order to accommodate different businesses and different situations, Generally Accepted Accounting Principles (GAAP) are developed with some flexibility in preparing financial statements and give financial managers some freedom to select among accounting policies and alternatives. In turn, this flexibility in financial reporting provides an opportunity for earnings management, thus affecting the quality of the accounting numbers (Ortega and Grant 2003).

2.7.1 Meaning of Earnings Management

Earnings Management also referred to as creative accounting, income smoothing, earnings smoothing or cosmetic accounting, is the presenting of financial statements which comply with the letter of the law and with accounting standards but not the spirit of the law and are thus misleading. It is any action performed by management that impacts on the reported income and provides no true economic advantage to the organisation and may in the long run be harmful (Merchant and Rockness 1994). According to Copeland (1968), earnings management involves the repetitive selection of accounting measurement or reporting rules in a particular pattern, with a purpose of reporting income with minimal variation from a desired trend than would otherwise have appeared. Earnings management involves Managers manipulating earnings to achieve pre-set targets in order to satisfy and manage market expectations of the company and avoid deterioration in the stock market price (Schipper 1989). According to Healy and Whalen (1999), creative accounting occurs when managers use judgement in financial reporting and in structuring transactions to alter financial statements with a motive of either misleading some stakeholders about the underlying performance of the company, or to influence contractual outcomes that depend on reported accounting numbers.

Earnings management behaviour affects the quality of accounting earnings since it distorts the stability and persistence of the reported earnings thus increasing earnings variability (Ranjbar, Mohebbi and Moosavi 2013). It is

therefore important for financial analysts to be able to detect any potential miss-reporting or creative accounting as this adversely affects the quality of the information in the financial statements which might be misleading to the investors.

2.7.2 Earnings management incentives

A number of research studies have examined the issue of management incentives or motivations towards earnings management (Hepworth 1953; Beidleman 1973; Fox 1997; Niskamen and Keloharju 2000; Magrath and Weld 2002). Hepworth (1953) identified several earnings management motivations including; the existence of tax levies based on income, confidence by shareholders and workers in management of their ability to report stable earnings, and psychological expectations relating to increases or decreases in anticipated income. These incentives are discussed below in detail.

2.7.2.1 Meeting analysts' expectations

Generally, company predictions and analysts' expectations tend to focus on two components of financial performance, which is revenue and earnings from operations. Companies do provide earnings estimates to analysts and investors which in turn puts them on pressure to meet these targeted forecasts since they become the market's earnings expectations. This pressure is the primary catalyst in leading managers to engage in earnings management practices that result in fraudulent revenue recognition practices thus negatively affecting the quality of the reported earnings (Abdelghany 2005). For example, inappropriate revenue recognition practices were the cause of one-third of all voluntary or forced restatements in income filed with SEC from 1977 to 2000 (Magrath and Weld 2002).

2.7.2.2 Meeting the bonus plan requirements

According to Healey (1985), earnings are managed in the direction that is consistent with maximising executives' earnings-based bonus. When

managers expect earnings to be below the minimum level required to earn a bonus, then earnings are managed upward so that a minimum is achieved and a bonus earned. Conversely, if earnings are expected to be above the maximum level at which no additional bonus is paid, then earnings are managed downward, and the extra earnings that will not generate extra bonus this current period are saved for future periods. In case earnings are between the minimum and maximum levels, earnings are managed upward so as to increase the bonus earned in the current period.

2.7.2.3 To smooth earnings towards a long-term sustainable trend

Firms have an incentive to manage earnings so as to help achieve a smooth and growing earnings stream that tie with forecasts, and also to maximise the share price (Ortega and Grant 2003). A highly volatile earnings stream is an indicator of risk, which can result in loss in value of a company's stock compared to those with more stable earnings patterns (Beidleman 1973). Income smoothing can be particularly more pronounced in countries with highly conservative accounting systems because of the high level of provisions that can accumulate. Fox (1997) reports on how accounting policies in some companies are designed within the normal accounting rules, to match reported earnings to profit forecasts. For example, a company may have an accounting policy whereby when it sells products, a large part of the profit is deferred to future years to cater for potential upgrade and maybe customer service costs, thus making future earnings easy to predict. Also a change in accounting method may boost a company's profit figures and therefore distract attention from unwelcome news to the investors (Collingwood 1991).

2.7.2.4 To avoid debt-covenant violations and minimise political costs

Some firms are motivated to engage in earnings management techniques to increase earnings in order to meet earnings based debt covenants because if these are violated, it may trigger the lender to raise the interest rate on

the debt thus increasing the cost of capital or may demand immediate repayment (Abdelghany 2005). Therefore firms usually create the impression of less debt by disgusting debt as something else or keeping it off the balance sheet thereby negatively impacting on the quality of the financial statements. On the other hand, other firms are motivated to lower their earnings in order to avoid or minimise the political costs like high tax levies associated with being seen as too profitable (Niskanen and Keloharju 2000). For example, if oil companies are achieving high profit level as a result of a significant increase in gasoline prices, then government may be motivated to intervene and enact an excess profit tax or could introduce price controls.

2.7.2.5 Changing Management

According to Abdelghany (2005), earnings management usually occurs around the time of changing management of a company. The Chief Executive Officer (CEO) of a company that has poor performance indicators will try to improve the performance of the company by increasing the reported earnings in order to prevent or delay being fired. On the other hand, the new CEO whose performance is yet to be evaluated or measured soon will try to shift part of the income to future years and blame the low earnings at the start of his contract on the performance of the previous CEO.

2.7.3 Earnings Management Techniques

The opportunity for earnings management can be found in majorly six areas including: overly flexible and incomplete regulation, a choice for managerial judgement or estimation in respect of assumptions about the future, the use of artificial transactions, timing of some transactions, and lastly the reclassification and presentation of accounting numbers (Amat and Gowthorpe 2004). Even with a highly regulated financial accounting and reporting environment in the U.S., a great deal of flexibility still exists in the regulation, providing an opportunity to creative accounting (Largay 2002).

Some of the common earnings management techniques are discussed below:

2.7.3.1 Use of artificial transactions

Artificial transactions can be achieved by entering into two or more related transactions with a third party in order to manipulate balance sheet amounts and to move profits between different accounting periods (Amat and Gowthorpe 2004). Such techniques could include: selling an unused asset to another company while at the same time agreeing to buy back the same asset at about the same price, or two companies selling to each other virtually identical assets to recognise revenue. These techniques tend to artificially inflate the revenue of both the buyer and the seller.

2.7.3.2 Big bath

"Big bath" charges are once off charges sometimes related to restructuring, that are over stated causing current earnings to decrease, and later when the excessive reserve is reversed, future earnings will increase. For example in 2001, Cisco Systems Incorporation announced charges against earnings of almost $4 billion, whereby $2.5 billion of the charges consisted of an inventory write down, causing a reduction in the future period inventory cost. This implies that ultra-conservative accounting in one period makes possible in future periods.

2.7.3.3 Conservative accounting

Conservative accounting means choosing an accounting method that keeps carrying values of the assets relatively low and as a result affects both the quality of numbers reported on the balance sheet and income statement (Abdelghany 2005). Some of the conservative accounting techniques include: adapting policies that consistently over estimate allowances for doubtful debts, sales returns or warranty liabilities; expensing research and development expenditures instead of capitalising and amortising them; and

accounting for inventories using LIFO method relative to FIFO, particularly if inventory prices are increasing.

2.7.3.4 Abuse of materiality

Application of the materiality concept in preparing financial statements is another key area that accountants can use to manipulate earnings, because the principle of materiality is very wide, flexible and also has no specific range to determine whether an item is material or not. According to the ruling of the U.S. Supreme court, which interpretation is adapted by SEC, a fact is material if there is a substantial likelihood that the fact would have been viewed by reasonable investor as having significantly altered the "total mix" of information made available (SEC, SAB No.99, 1999).

2.7.3.5 Voluntary accounting changes

Earnings can be managed through switching from one generally accepted accounting method to another, particularly by making several different types of accounting changes either together or individually over several periods. For example in respect of asset valuation, companies may quite validly change their accounting policy between carrying non-current assets at either revalued amounts or depreciated historical cost, since the IASs permit so. Such changes could be noticeable in the year of change, but are much less readily visible thereafter (Schipper 1989).

2.7.3.6 Timing of adoption of mandatory accounting standards

Generally, FASB standards are enacted with a two to three transition period prior to mandatory adoption but with early adoption encouraged. The long adoption window provides an opportunity for managers to select an adoption year most favourable to the firm's financial performance, thus some firms may adopt a standard early if only it provides an opportunity to boost their revenues and vice versa (Ayres 1994).

2.7.4 Meaning of Earnings Quality

Earnings quality is of interest to various users of financial statements because earnings, and the varied metrics derived there from, are utilized in making contracting and investment decisions. From a contracting perspective, low-quality earnings may result in unintended wealth transfers, while on the investor's side, they result in a defective resource allocation signal (Schipper and Vincent 2003). Although the phrase "earnings quality" is widely used, there is neither an agreed-upon meaning assigned to the phrase nor a generally accepted approach to measuring earnings quality (Schipper and Vincent 2003). Earnings quality is a broad concept that reports the stability, sustainability and lack of variability in reported earnings (Ranjbar, Mohebbi and Moosavi 2013; Bellovary, Giacomino and Akers 2005). Richard et al. (2001) defines earnings quality as the degree of stability of earnings performance in future periods. Benish and Wargass (2002) define quality of earnings as the probable consistency of current incomes in the future. Pennman and Zhang (2002) identify earnings quality as the ability of earnings to show future incomes. Michael et al. (2003) describe quality of earnings as the amount of relations between past incomes of a firm and its current and future cash flows. Schipper and Vincent (2003) view earnings quality as "the extent to which reported earnings faithfully represent Hicksian income," which includes "the change in net economic assets other than from transactions with owners."

One of the likely reasons to have different definitions for earnings quality is because researchers view "earnings quality" concept in different dimensions. Thus, earnings quality seems to be a complex concept and none of the researchers have ever succeeded to present a concise definition or complete criterion for it (Zeinali et al. 2012).

2.7.5 Earnings quality measures

Francis et al. (2004) identify seven measures of earnings quality which have been widely used in accounting research, classified as either accounting based or market based attributes. The accounting based attributes which

are estimated using accounting data are; accruals quality, persistence, predictability, and smoothness, while the market based attributes which rely on both accounting data and returns for their estimation are; value relevance, timeliness and conservatism. Specifically, accounting based earnings quality measures assume that the function of earnings is to allocate cash flows to reporting periods via accruals, while market based measures assume the function being to reflect economic income as represented by stock returns. In order to identify an appropriate earnings quality measure for this research, a detailed review of the several measures of earnings quality that have been used in accounting research was carried out as discussed below:

2.7.4.1 Accrual Quality

Accruals quality is a measure of earnings quality based on the view that earnings that map more closely into cash flows are of better quality (Francis, Olsson and Schipper 2006). Earnings quality assessment requires sometimes the separation of earnings into cash and accruals, whereby the more the earnings are close to cash from operations, the higher the quality of accruals and consequently superior earnings quality. Penman (2001) states that the focus of an accounting quality analysis is on distinguishing "hard" numbers which result from cash flows, from "soft" numbers in the accruals, which are subject to estimate. This approach to measuring of earnings quality is based on the ratio of cash from operations to operating income, where a smaller ratio implies higher quality earnings.

Dechow and Dichev (2002) proposed a measure of earnings quality that captures the mapping of working capital accruals into last, current, and next period cash flows from operations, as shown below:

$$\frac{TCA_{k,t}}{Assets_{k,t}} = \frac{CFO_{k,t-1}}{Assets_{k,t}} + \frac{CFO_{k,t}}{Assets_{k,t}} + \frac{CFO_{k,t+1}}{Assets_{k,t}}$$

where, $TCA_{j,t}$ = firm $k's$ total current accruals in year t; $Assets_{k,t}$ = firm $k's$ average total assets in year t; $CFO_{k,t}$ = cash flow from operations in the

current year t; $CFO_{k,t-1}$ = cash flow from operations in the last period; $CFO_{k,t+1}$ = cash flow from operations in the next period.
To obtain a firms-specific time series measure of accruals quality, the above equation is estimated over some interval, say 10 years, with each estimation yielding specific residual values for each year. Therefore, "Accrual Quality" based on this measure is equal to the standard deviation of firm $k's$ estimated residuals, where smaller values of the standard deviation imply good accruals quality, because there is more precision about the mapping of current accruals into current, last period and next period cash flows.

However, "accrual quality" attribute does not capture the effects of larger, more numerous and arguably more complicated accruals like pensions, deferred tax assets and liabilities, and asset retirement obligations, among others (Francis, Olsson and Schipper 2006). It specifically focuses on the mapping of current accruals into lagged, current and one year a head cash flow from operations.

2.7.4.2 Earnings Variability and Smoothness

Leuz et al. (2003) measured profit variability by calculating the ratio of standard deviations in performance profits with the standard deviation of cash flows. His view is based on the idea that managers smooth out the profits because they believe that investors prefer smoothly increased income, thus a low amount of this ratio is the reason for more smooth profits and lower earnings quality. However, results reported by Francis et al. (2004) suggest that earnings smoothness is desirable (in the eyes of the investors) because it reflects higher quality financial reporting decision and thus superior earnings quality. As a result, capital market participants reward smoother earnings streams with reduced costs of debt and equity capital. This conflicts with the approach of IASB, which states in its conceptual framework that for information to be useful, it must be considered to be both relevant and faithful in its presentation.

According to Francis et al. (2004), earnings smoothness can be measured by taking the ratio of a firm's standard deviation of net income before extraordinary items divided by beginning assets, to its standard deviation of cash flows from operations divided by opening total assets. Hunt et al. (2000) measures smoothness as the ratio of the standard deviation of non-discretionary net income to the standard deviation of cash flows from operations, while Leuz et al. (2003) considered ratio of standard deviation of operating income scaled by assets to the standard deviation of cash flows also scaled by assets. All these three approaches are almost similar and are likely to be highly correlated (Francis et al. 2006).

2.7.4.3 Earnings Surprise

Barton and Simko (2002) proposed measuring earnings quality by the "earning surprise indicator", which is the ratio of the beginning balance of net operating assets relative to sales, with higher quality earnings associated with a smaller ratio. Their study was based on the theory that the balance sheet accumulates the effects of previous accounting choices, and therefore the level of net assets partly reflects the extent of previous earnings management. They provided empirical evidence by examining the likelihood of reporting various earnings surprises for 3,649 firms over the period 1993 – 1999, which showed that the possibility of firms reporting larger positive or smaller earnings surprises decreases with the beginning balance of net operating assets relative to sales. They suggested that managers' ability to optimistically bias earnings decreases with the extent to which net asset values are already overstated on the balance sheet. However, their study focused only on one incentive to manage earnings – meeting or beating analysts' earnings forecasts, yet managers do have other incentives of managing earnings.

2.7.4.4 Earnings Persistence

Persistence as a measure of earnings quality is based on the view that more sustainable earnings are of higher quality and thus more useful in the process of decision making (Bellovary, Giacomino and Akers 2005).

According to Francis et al. (2006), earnings persistence is measured as the slope coefficient estimate, β, from an auto regression model of first order for annual split-adjusted earnings per share $X_{k,t}$, as represented below:

$$X_{k,t} = \alpha + \beta X_{k,t-1} + \mu$$

where, $X_{k,t}$ is measured as the firm $k's$ net income before extraordinary items in the current year t divided by the weighted average number of outstanding shares during year t; $X_{k,t-1}$ is firm $k's$ net income before extraordinary items in the previous year $t-1$ divided by the weighted average number of outstanding shares last year; α and μ are constants.
Therefore, the resultant estimate of β shows firm $k's$ persistence of earnings, where values close to 1 imply high persistent (high quality) earnings, while values close to zero signify high transitory (low quality) earnings.

2.7.4.5 Earnings Predictability

Predictability is the ability of earnings to predict itself (Lipe 1990), and is based on the view that an earnings number that tends to repeat itself is of a higher quality. This view concurs with Dechow and Schrand (2004), that a high quality number is representative – a good predictor of future earnings.
Francis et al. (2006) suggests that earnings predictability can be measured by using the same variables used to estimate earnings persistence, described above as, $X_{k,t}$ and $X_{k,t-1}$. This measure (predictability) is therefore the square root of the error variance of the variables, where large (small) values imply lower (higher) quality earnings.

Earnings predictability can also be measured based on analysts' forecast errors (forecast EPS less reported EPS, scaled by share price 10 days before the forecast date), by taking the average absolute forecast errors of analysts' annual earnings forecasts (Bellovary, Giacomino and Akers 2005). However, this approach reflects analysts biases (self-selection and cognitive) that affect their earnings forecasts but are not related to the quality of the earnings number itself (Francis et al. 2006).

2.7.4.6 Value Relevance and Timeliness

Value relevance as a measure of earnings quality is the ability of one or more accounting numbers to explain variation in stock returns. It is based on the view that accounting numbers should explain the information that is impounded in returns (Bellovary, Giacomino and Akers 2005). Therefore, earnings with greater explanatory power – earnings that explain greater variation in stock returns, are of higher quality and hence more desirable.
According to Francis and Schipper (1999), value relevance is based on the explanatory power (the adjusted R^2) of the following equation that regresses returns on the level and change in earnings, and where small (large) values of the adjusted R^2 imply less (more) value relevant earnings and thus lower (higher) earnings quality.

$$RET_{k,t} = \alpha + \beta\, EARN_{k,t} + \gamma\, \Delta EARN_{k,t} + \mu$$

where, $RET_{k,t}$ can be firm $k's$ 15-month return ending 3 months after the end of fiscal year t; $EARN_{k,t}$ is the firm's income before extraordinary items in year t ($NIBE$), scaled by market value at the end of year $t-1$; $\Delta EARN_{k,t}$ is the change in the firm's $NIBE$ in year t, scaled by market value at the end of year $t-1$; α, β, γ and μ are constants.

Timeliness is similar to value relevance since both measures make reference to stock returns and are both based on explanatory power. It further captures the ability of earnings to reflect good news and bad news that is impounded in returns. Ball et al. (2000) measures timelines based on the adjusted R^2 from the equation below, where smaller values imply less timely (i.e. lower quality) earnings and vice versa.

$$EARN_{k,t} = \alpha + \beta\, NEG_{k,t} + \gamma\, RET_{k,t} + \mu\, NEG_{k,t}\, .\, RET_{k,t} + \varepsilon$$

where, $NEG_{k,t} = 1$ if $RET_{k,t} < 0$, and 0 otherwise. All other variables are as previously defined in the equation for measuring relevance.

According to FASB, the objective of financial reporting is that "financial reporting should provide information to help investors, creditors and others assess the amounts, timing, and uncertainty of an entity's future cash flows". This objective supports the argument that earnings quality is closely aligned with cash flows. The idea that closeness to cash means higher quality earnings appears in financial analyst's reports and in financial statement analysis textbooks (Schipper and Vincent 2003). It is also consistent with prior research documenting the predictive abilities of earnings for future cash flows (Barth et al. 2001, Dechow et al. 1998, Finger 1994), and also related to a developing stream of research that describes accrual quality as the extent to which accruals map into cash flow realisations (Dechow and Dichev 2002; Sloan 1996).

Wolk and Tearney (1997) offer a definition that specifies better earnings quality to be a higher correlation between accounting income and cash flows. Murdoch and Krause (2009) focused on the association between earnings and cash flows to investigate the earnings quality of SE and FC methods and the results were extremely significant. Most research literature is in agreement that the idea of closeness to cash means higher quality earnings. Therefore, this research will use Wolk and Tearney's (1997) definition, to operationalise the concept of earnings quality in the study.

2.8 Quality of earnings of SE and FC upstream oil and gas companies

From time to time over the last 45 years, the Accounting Principles Board (APB), the Financial Accounting Standards Board (FASB) and the Securities Exchange Commission (SEC) have debated whether SE or FC accounting method provides investors with more informative numbers and thus should be mandated for use by all oil and gas firms (Nichols 2012; Murdoch and Krause 2009; Bandyopadhyay 1994; Deakin 1989). The debate is related to the idea of "quality of earnings" which has gained attention both in the popular press and in the academic accounting literature (Bandyopadhyay 1994).

One major influence on the quality of earnings is management's and accountant's discretion in choosing and using accounting policies or methods, which can either be liberal - that is, they can assume an optimistic view of the future, or could be conservative (Bernstein and Siegel 1979). Managers have different motivations for choosing particular accounting methods (Fields, Lys and Vincent 2001). For example, managers may behave opportunistically by choosing an accounting method that will most likely increase their compensation over the next few years, instead of selecting the method that will provide the most value-relevant information to investors (Bryant 2003). Alternatively, an accounting method may be selected by management basing on the ability of the method to convey the economics of the firm's activities to investors in a transparent manner, and different companies select different methods because of subtle differences in their operations, financing, and corporate governance, etc. Generally Accepted Accounting Principles (GAAP) offer some flexibility in preparing the financial statements and give financial managers some freedom to select among accounting policies and alternatives. Earnings management uses the flexibility in financial reporting to alter the financial results of the firm hence lower earnings quality (Ortega and Grant 2003).

Some studies have been carried out comparing the earnings quality of SE and FC accounting methods used by upstream oil and gas companies (Murdoch and Krause 2009; Yee 2006; Bryant 2003; Bandyopadhyay 1994; Harris and Ohlson 1987; and Sunder 1976). Sunder (1976) conducted an early research on the subject and established a mathematical model to analyse the impact of the SE and FC methods on income, cash flows, capitalised assets, and return on assets. Pertinent to this research, Sunder's analysis theorised that full cost income is more highly correlated with contemporaneous cash flow than SE income.

Harris and Ohlson (1987) studied the relevance of reserve based supplemental disclosures, and found the coefficient on SE book value to be greater than the coefficient on FC book value when regressed on the market value of oil and gas properties. They also find the SE regression to have higher explanatory power than the FC regression, attributed to SE method

being more conservative than the FC method. Overall, their results suggest that the SE method is more useful than FC and thus provides higher quality earnings to investors.

Later, Bandyopadhyay (1994) looked at the association between earnings and security prices, arguing that SE earnings are of higher quality than FC earnings because the full cost method imparts considerable price-irrelevant elements to earnings. He compares the Earnings Response Coefficients (ERCs) of SE and FC firms around their quarterly earnings announcements and finds successful efforts ERCs are larger than FC ERCs, implying that that SE method produces higher quality earnings. However, Bryant (2003) examined the relative value of the SE and FC methods in the Oil and gas industry. He concluded that FC accounting data is more value relevant (in terms of explaining market measures) than SE accounting data. He further revealed that the smooth earnings provided by the FC method contribute to the higher value relevance of the FC method and thus concludes that "a policy of full capitalization of expenditures with uncertain future economic benefits better summarizes information useful to investors relative to partial capitalization".

More recently, Murdoch and Krause (2009) investigated the earnings quality of SE and FC firms, and concluded that the SE method of accounting provides earnings quality superior to FC, with extremely significant results from the tests. Therefore, Harris and Ohlson (1987), Bandyopadhyay (1994) and Murdoch and Krause (2009) agree about the superiority of the SE method over the FC method in providing higher quality earnings to investors, while Bryant (2003) advocates for the FC method of accounting. These are contrasting conclusions regarding the supremacy of SE and FC methods to earnings quality and thus the basis for this research.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

This chapter discusses the research methodology adopted in the study. In order to have a better insight of the way the study was undertaken and why a given approach was chosen, the chapter starts with discussing the different philosophies and why the mixed stance and consequent choice of both quantitative and qualitative were adopted. The chapter proceeds by discussing the sources of data, research variables and hypothesis to be tested, sample selection, evaluation techniques used and the means of analysis of the data. Finally, the chapter concludes with the limitations of the research and ethical considerations.

3.2 Qualitative Verses Quantitative

Quantitative research involves collecting and analysing numerical data and applying statistical tests. It uses a structured scientific approach to quantify attitudes, opinions, behaviours, and other defined variables and generalise results from a larger sample population (Saunders et al. 2012). Quantitative research designs are either 'experimental' (where subjects are measured before and after an intervention) or 'descriptive' in nature (where subjects are usually measured once) (Hopkins, 2000). Quantitative research is more objective and it's easy to examine large amounts of data in a relatively short time compared to qualitative research.

Qualitative research on the other hand is more subjective in nature and involves examining and reflecting on perceptions in order to gain an understanding of social and human activities. It involves use of unstructured or semi structured techniques like interviews, observation, focus groups, and content analysis of relevant literature (Hussey and Hussey 1997). It attempts to uncover trends in thoughts, opinions and feelings and dive deeper into the problem. A common belief in qualitative

research is that human feelings, opinions and experiences are too complex to be presented and represented in numerical terms as portrayed in a quantitative research. However, qualitative research is criticised for being purely descriptive, lacking validity, and not being robust compared to statistical approaches (Goulding 2002). From the above, it can be concluded that interpretivists tend to use qualitative while positivism is normally associated with quantitative data.

Considering the objectives of this research; the first and second objectives were addressed by use of qualitative methods involving a review and content analysis of relevant literature on SE and FC methods, and a review of literature on earnings management and earnings quality with an emphasis on earnings quality measures. Therefore, the interpretivist approach was adopted to address objectives one and two due to the availability of sufficient literature on the topics. A cross-sectional methodology (quantitative approach) was used to compare the earnings quality for SE and FC firms (objective three). The reason for using cross-sectional rather than time series data is that the results are generalizable, and therefore more firms are represented in this sample. Also, the constraint of time and resources limits the research to this approach. However, cross-sectional studies do not explain why a correlation exists; only that it does or does not (Hussey and Hussey 1997).
Therefore, the overall aim of this study was achieved by combining both qualitative and quantitative research approaches and techniques. This is known as triangulation, and thus helps to overcome the potential bias and sterility of a single method approach (Saunders et al. 2012).

3.3 Sources of Data

The two major sources of data for research are primary and secondary data. Primary data is collected directly from first hand by the researcher using tools such as surveys, experiments, questionnaires, interviews and observation. Although more reliable and up-to-date compared to secondary data, primary data is time consuming (Saunders et al. 2012).

Secondary data on the other hand, is data that has not been originated by the researcher but already exists. Sources include; book reviews, newspaper articles, company annual reports, journal articles, and data bases etc.

This research used secondary data from annual reports, online data bases, peer reviewed journals and articles, and text books, to achieve the research objectives. Annual reports which are the major source of financial information for investors were downloaded from a public online database called EDGAR (Electronic Data Gathering, Analysis and Retrieval), maintained by the SEC. It is a requirement for all public companies in the U.S. to file their annual reports with the SEC (Securities Act 1933). Also, Osiris financial database for public listed companies worldwide, and which is one of the databases to which the University subscribes and is highly credible, was used as a source of company accounts over years.

The use of secondary data has merits and demerits.

The merits of secondary data include:

- It allows comparison of research findings with other similar research on the same data.
- Data can easily be accessed especially given the availability of online data bases and other internet search tools.
- Data can be manipulated and presented in formats that allow their easy understanding and interpretation.
- It is less expensive and time saving when collecting and analysing secondary data.

However, the demerits of secondary data can be identified as below:

- Data got from unreliable sources can affect the quality of the research results.
- Quantitative secondary data analysis requires knowledge of quantitative or financial analysis skills.
- Existence of inconsistencies in data can hinder comparative studies.
- Some historical data or untimely data may not be relevant to the research study.

In this study, the above demerits (weaknesses) were mitigated by applying quantitative techniques and financial analysis knowledge to aid in interpreting the quantitative aspect of the secondary data. Also, the researcher used Osiris financial data base, EDGAR and main websites of the selected oil and gas companies to ensure that the correct annual reports and other relevant financial data are used for analysis.

3.4 Research Variables and Hypothesis

As discussed in the literature review above, most studies agree that the higher the correlation between accounting income and cash flows, the better the earnings quality (Murdoch and Krause 2009; Schipper and Vincent 2003; Wolk and Tearney 1997). To address the issue of earnings quality of the SE and FC, this research ascertained the correlation between earnings and cash flows. Operating income before depreciation/amortisation (OIBD) served as the measure of earnings. Net cash flow from operations (CFO) was used as a measure of cash flows. Operating income corresponds to operating cash flows more precisely than does net income because both are associated with operations (Murdoch and Krause 2009). Depreciation and amortisation are excluded because they have no effect on operating cash flows. This research also deflated (divided) both variables, OIBD and CFO, by total assets to control for size. Therefore, operating income before depreciation (OIBD) and net cash flows from operations (CFO), deflated by total assets, as defined in Osiris data base, were used in correlation and hypothesis tests.

To compare the earnings quality of SE and FC firms based on Wolk and Tearney's (1997) definition, a cross-sectional correlation between contemporaneous measures OIBD and CFO in periods t (i.e. $OIBD_t$ and CFO_t) was carried out. The null and alternative versions of the hypothesis were therefore stated as below;

Null hypothesis $H_0 : \rho_{SE} = \rho_{FC}$

Alternative hypothesis $H_1 : \rho_{SE} \neq \rho_{FC}$

where ρ_{SE} is SE firms' correlation coefficient and ρ_{FC} is FC firms' correlation coefficient, for the correlation CFO_t and $OIBD_t$.

This research interpreted a higher correlation between CFO_t and $OIBD_t$ across all firms as evidence that earnings, as measured under that particular method (SE or FC), exhibits higher earnings quality.

3.4.1 The correlation coefficient

A correlation coefficient is a measure of the degree of association between two variables. It enables to quantify the strength of the linear relationship between two ranked or numerical variables and consequently overcomes one weakness of the covariance, because the size of the correlation coefficient is not influenced by the values of the observations (Watsham and Parramore 1997). The correlation coefficient can take on values between -1 for a perfectly negative correlation, through zero where the two variables are perfectly independent of each other, to +1 for a perfectly positive correlation between the variables. Within business research, it is however extremely unusual to obtain perfect correlations (Saunders et al. 2012).

The correlation coefficient can be calculated using three methods including; Pearson's product moment correlation coefficient (PMCC), Spearman's rank correlation coefficient, and Kendall's rank correlation coefficient. This research chose the PMCC method to assess the relationship between the two variables, CFO and OIBD, because both variables contained numerical data. Pearson's product moment correlation coefficient, ρ, is calculated by dividing the covariance between X and Y by the product of the standard deviation of X and the standard deviation of Y, i.e.

$$\rho_{xy} = \frac{\sigma_{xy}}{\sigma_x \sigma_y}$$

This research used Statistical Package for Social Sciences (SPSS) to obtain the correlation coefficients. However, it is important to note that irrespective of how positive or negative the correlation is, the correlation

coefficient only measures statistical association, with no inference of causality in the statistic (Watsham and Parramore 1997).

3.4.2 The p-value method of hypothesis testing

The *p*-value is the value which, if the null hypothesis is correct, represents the probability of getting a value for the standardized test statistic that is more extreme than the one observed (Watsham and Parramore 1997). For a one tailed test, the *p*-value is equal to the area in the tail to the right (right-tailed test) or to the left (left-tailed test) of the value of the test statistic. For a two-tailed test, it is equal to double the area in the tail to the right or left of the test statistic. The decision rule under the *p*-value method is the same whether performing right-tailed tests, left-tailed tests or two-tailed tests. Therefore, the decision rule would be as summarised below, when assuming the degree of significance of the test designated as α: Accept H_0 if *p*-value ≥ α, and Reject H_0 if otherwise.

In this research, the degree of significance of the test statistic was considered at 5% (0.05), and 10% (0.1) in some cases. The probability of the correlation coefficients (*p*-value for a two tailed test) were calculated automatically using SPSS and then compared with the significance level of 5%, whereby a very low *p*-value less than 0.05 implied that the correlation or relationship between CFO and OIBD was statistically significant, and vice versa. Also, p-values were used in the descriptive statistics analysis to investigate whether there were significant differences between samples of total assets, cash flow from operations and operating income before depreciation, for full cost and successful efforts firms. These p-values were calculated using excel and thus compared with the significance level of 0.05.

3.5 Sample selection

The sample consists of 76 public listed oil and gas companies in the U.S. (39 FC firms and 37 SE firms), engaged primarily in the exploration and

production of crude oil and natural gas, with data for the years 2009 to 2013. An initial set of 92 firms was identified as the population. This was determined by extracting from Osiris data base a list of all companies with primary Standard Industrial Classification (SIC) code 1311 (Crude Petroleum and Natural Gas). This list consists of firms that derive a significant portion of their income from exploration and production, and therefore, the choice of accounting method would significantly impact on their financial statements. Sixteen firms were excluded because they had either some missing data over the period, resulting from acquisitions, mergers, and new firms or they changed their accounting method during the period of study. Public listed firms, which also report under the U.S. SEC regulation, were chosen to avoid disparities in comparing companies who report under different regulations. The researcher chose to focus on U.S. firms because the history of FC and SE has its origin from there and it is therefore possible to find categories of E&P firms either using FC or SE accounting methods. Also over the years, U.S. companies have dominated the oil and gas industry with most multinational companies in the sector being U.S. firms. Because of the time constraint, the study only covered a 5 year period, from 2009 -2013.

Table 1: Selected Successful Efforts Companies

No.	Name of Company
1	Marathon Oil Corporation
2	Anadarko Petroleum Corp
3	EOG Resources INC
4	Noble Energy, Inc.
5	Pioneer Natural Resources CO
6	Continental Resources, Inc.
7	QEP Resources, Inc.
8	WPX Energy, Inc.
9	Whiting Petroleum Corporation
10	Linn Energy, LLC
11	Concho Resources Inc.

12	SM Energy Company
13	Range Resources Corp
14	Cabot Oil & GAS Corporation
15	Antero Resources Corporation
16	Oasis Petroleum Inc.
17	EPL Oil & Gas, Inc.
18	Breitburn Energy Partners L.P.
19	Bill Barrett Corporation
20	Legacy Reserves LP
21	Penn Virginia Corp
22	Clayton Williams Energy INC
23	Comstock Resources INC
24	PDC Energy, Inc.
25	EV Energy Partners, L.P.
26	REX Energy Corporation
27	Goodrich Petroleum Corporation
28	Approach Resources Inc.
29	Vaalco Energy, Inc.
30	Contango Oil & GAS CO
31	Primeenergy Corp
32	Panhandle Oil And GAS Inc.
33	Miller Energy Resources, Inc.
34	Camac Energy Inc.
35	Magellan Petroleum Corp
36	Blacksands Petroleum, Inc.
37	Jayhawk Energy, Inc.

Source: EDGAR

Table 2: Selected Full Cost Companies

No.	Name of Company
1	Chesapeake Energy Corp
2	Apache Corp
3	Devon Energy Corp
4	Denbury Resources Inc.
5	Cimarex Energy CO.
6	Newfield Exploration CO
7	Halcon Resources Corporation
8	W&T Offshore, Inc.
9	Stone Energy Corp
10	Rosetta Resources Inc.
11	Gran Tierra Energy Inc.
12	Laredo Petroleum, Inc.
13	Exco Resources, Inc.
14	Swift Energy CO
15	Quicksilver Resources INC
16	Carrizo Oil & GAS INC
17	Midstates Petroleum Company, Inc.
18	QR Energy LP
19	Vanguard Natural Resources, LLC
20	Forest Oil Corp
21	Resolute Energy Corporation
22	Endeavour International Corporation
23	Northern Oil & Gas, Inc.
24	Gulfport Energy Corp.
25	Matador Resources Company
26	Diamondback Energy, Inc.
27	Petroquest Energy, Inc.
28	Warren Resources, Inc.
29	Callon Petroleum CO
30	Abraxas Petroleum Corp
31	Postrock Energy Corporation

32	Synergy Resources Corporation
33	Barnwell Industries INC
34	Evolution Petroleum Corporation
35	Duma Energy Corporation
36	Cubic Energy, Inc.
37	Lexaria Corp.
38	Arkanova Energy Corporation
39	Brinx Resources Ltd

Source: EDGAR

3.6 Data Analysis and Interpretation

In this research, numerical data relating to; operating income, depreciation/amortisation, net cash flow from operating activities, and total assets, for the five year period and for each of the firms, was extracted from Osiris data base. Microsoft Excel was used to generate graphs and descriptive statistics, compute the research variables OIBD and CFO, and perform hypothesis tests for the sample means derived from the descriptive statistics. Statistical Package for Social Sciences (SPSS) was used to calculate the correlation coefficients between OIBD and CFO for SE and FC firms. It was also used in testing for the significance of the correlation coefficients. According to Hodson (1991), the use of SPSS in data analysis helps to reveal any consistencies, discrepancies, anomalies and negative cases. Soper (2014)'s online software was used to ascertain the significance of the difference between the two correlation coefficients for SE and FC firms.

3.7 Limitations and Mitigations

There may be differences in activities and operations among petroleum companies which could hinder effective comparison and reliable conclusions being made. To address this, the research study selected independent oil and gas companies involved primarily in only E&P (upstream) activities,

leaving out integrated oil and gas companies which are involved in E&P activities as well as at least one downstream activity like; refining, processing, marketing and distribution. Integrated oil and gas companies were excluded from the research study to avoid significant data distortion due to additional incomes they derive from downstream activities.

3.8 Ethical Considerations

The research considered issues related or conforming to acceptable standards of social and ethical behaviour. It observed the interests of the University and its reputation, as well as its partners. Ethical problems like anonymity, confidentiality, and informed consent, were less likely to occur since this research relied on information that is available and easily accessible to the public. For example, there was no need to obtain consent to access data since information required was accessible on the internet, journals, articles and textbooks.

Further, Saunders et al. (2012) noted that researchers should avoid misleading and false reporting of findings. This was addressed through keeping proper records of the research process, analysis and interpretation for regular review by the research supervisor and signing of ethical forms.

CHAPTER 4: DATA ANALYSIS, REPORTING AND DISCUSSION

4.1 Introduction

Because prior research suggests there are fundamental differences between FC and SE firms, the analysis in this chapter is partitioned based on accounting method choice. This chapter starts by giving a description on how the data generated from Osiris financial data base was prepared for analysis. It then proceeds with the comparison of the FC and SE methods based on the data for market capitalisation, total assets, depreciation, operating profit before depreciation, and cash flow from operations. It also gives a descriptive statistics analysis for FC and SE firms based on total assets, OIBD, and CFO, and goes ahead to determine the significance of the difference between the sample means of FC and SE firms. It concludes with the results and outcomes of the correlation and significance tests of the correlation coefficients for FC and SE firms, and hypothesis testing. Overall, the findings of the study are interlinked and contrasted with existing literature that either agrees or disagrees with study findings.

4.2 Data Preparation

Data was primarily collected from Osiris financial database. The data base provided key information from financial statements (statement of financial position, Income statement and Statement of cash flows) for the period 2009 - 2013 on the companies' total assets, cash flow from operations, operating profits, and depreciation/amortisation, needed for the research. Also, the current market capitalisation for each of the companies was extracted. Annual reports for each of the companies were collected from EDGAR to ascertain the accounting methods used. The accuracy of the data obtained from Osiris was confirmed by randomly picking companies within the sample and cross checking the data obtained with that in the published annual reports.

The data was then aggregated in Microsoft Excel and adequate checks made to ensure that there was neither missing data nor incomplete information with the hope that any inaccurate and inconsistent data would be removed from the sample. It was then migrated to SPSS in order to carry out correlation analysis between the two variables OIBD and CFO and also perform significance tests.

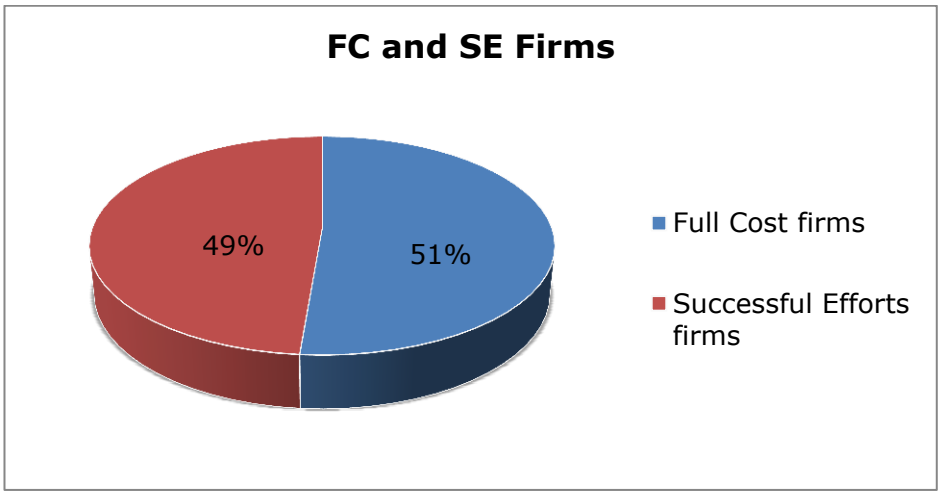
4.3 Comparison of Full Cost and Successful Efforts Firms

Since prior research suggests that there are fundamental differences between FC and SE firms, a comparison of the two methods was done using the data collected to confirm some of the suggested differences. The comparison was based on: Composition, current market capitalisation, total assets, depreciation/amortisation, operating profit before depreciation, and cash flow from operations.

4.3.1 Composition

Exploration and Production companies in the U.S. have a choice to prepare their financial statements using either full cost or successful efforts methods of accounting. The sample of this research consisted of 76 oil and gas firms engaged primarily in oil and gas exploration and production activities, and with data for the years 2009 to 2013. Of these, 39 (51%) were found to be full cost firms while 37(49%) were successful efforts firms as shown in figure 3 below:

Figure 3: Composition of FC and SE firms



Source: Author's computation

From the figure 3 above, it is evident that neither of the two methods dominates accounting for E&P activities in the U.S. That is, approximately half E&P firms use SE method and also about half use the FC method. The results correspond to the findings of Murdoch and Krause (2009) who observed in their study of earnings quality of SE and FC methods, that the proportion of companies using successful efforts method was approximately the same as that using full cost method (i.e. 50.4% use SE and 49.6% use FC method).

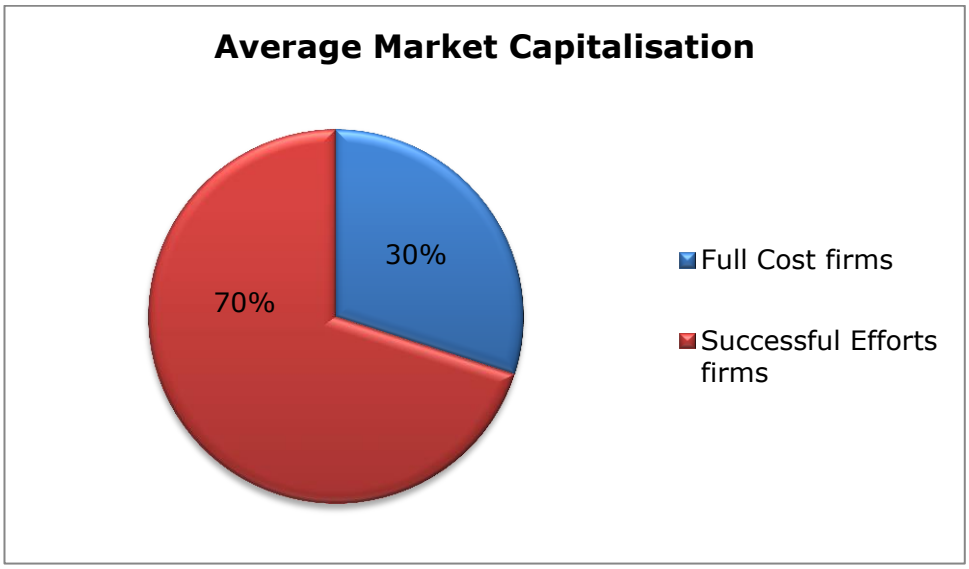
This implies that Exploration and production companies in the U.S. have equal preference for the two methods thus justifying why attempts to have a uniform accounting method for the oil and gas industry have been unsuccessful.

4.3.2 Current market capitalisation

According to Brealey et al. (2006), market capitalisation refers to the total dollar market value of all the company's outstanding shares. It is calculated by multiplying a company's shares outstanding by the current market price of one share. Investors normally use this figure to determine a company's size, as opposed to sales or total asset figures.

Using the data collected, the average market capitalisation of all the full cost firms at the end of 2013 was compared with that of the successful efforts firms as shown in figure 4 below:

Figure 4: Average market capitalisation as at end of 2013



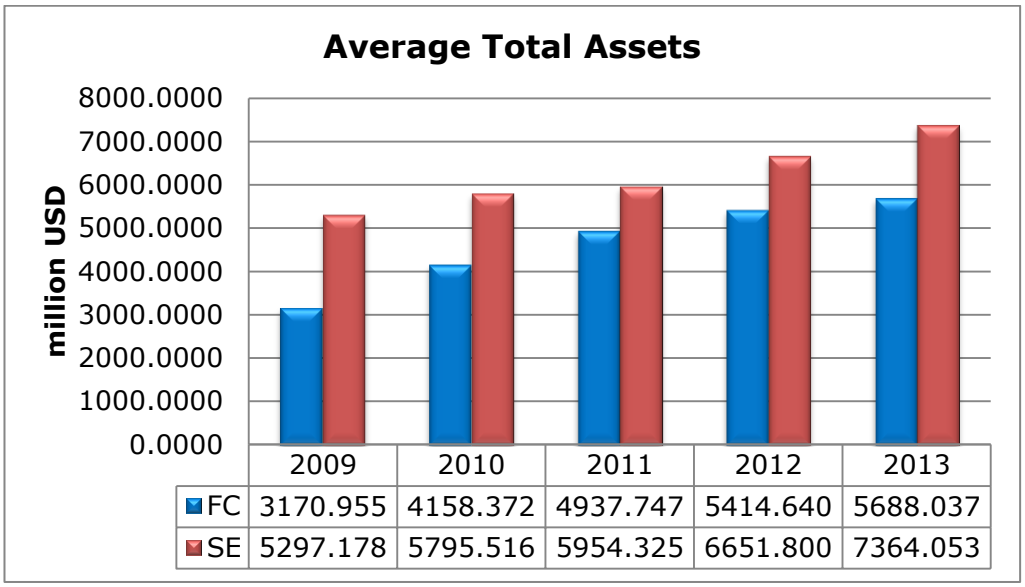
Source: Author's computation

The average market capitalisation of all the successful efforts firms was twice more (70%) than that of the full cost firms (30%) because most of the SE firms are large size firms with a large number of ordinary shares. These findings correspond with the observation of Collin and Dent (1979) that firms using successful effort method are usually large size firms compared to firms using FC method. The practice of expensing dry hole exploration costs in one accounting period increases the volatility (risk) in net income of SE firms and reduces total assets. The negative effect on net income may impact more on the financial statements of smaller companies compared to large ones. Therefore, most small and infant companies prefer to use the Full cost method of accounting because they believe it allows them to access the capital markets more easily due to less volatile earnings.

4.3.3 Total Assets

The graph below compares the average total assets of full cost companies with that of successful efforts companies within the sample for the five years period starting 2009 to 2013.

Figure 5: Average Total Assets



Source: Author's computation

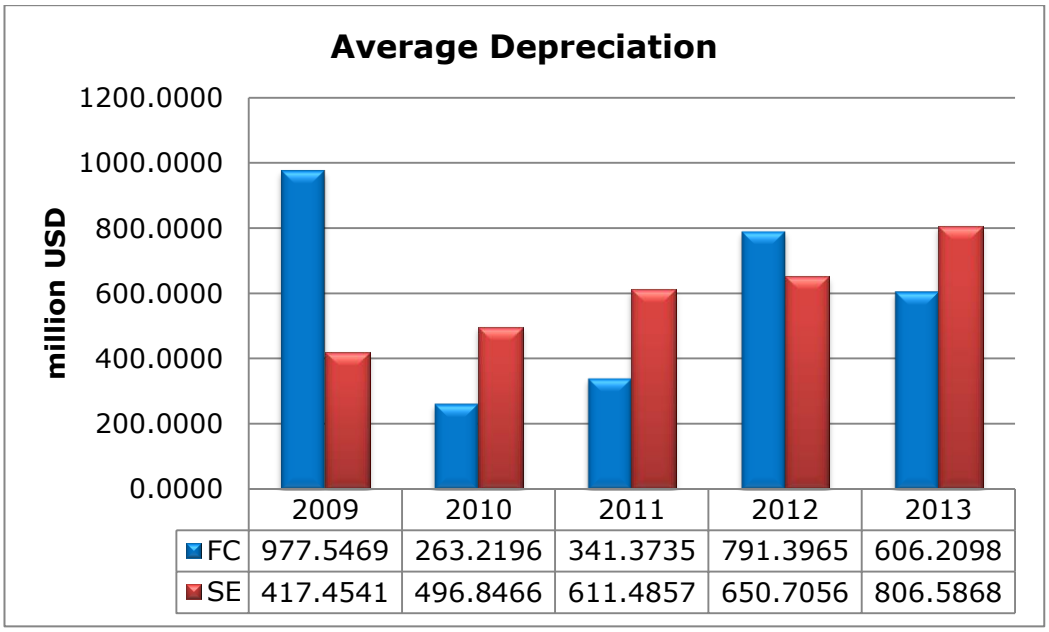
From the graph above, it is evident that SE firms experienced the highest average total assets in all the five years. The average total assets for both SE and FC firms were on an upward trend throughout the period, with that of SE firms increasing by 79%, and FC firms rising by 39%, between 2009 and 2013. Also, the average assets of SE firms exceeded that of the FC firms in 2009, 2010, 2011, 2012 and 2013 by 67%, 39%, 21%, 23%, and 29% respectively, with the greatest difference occurring in 2009. This comparison established that despite SE firms not capitalising unsuccessful exploration costs; their total asset book values on average outweighed that of FC firms thus contradicting the earlier findings of Deakin (1979). However, it can be argued that the reason for this is because most of the successful efforts companies are large size firms with high total assets book values whereby the none capitalisation of dry hole exploration costs has no material effect on their asset book values. Also, the average assets value for the full cost firms did not differ so much from that of the successful efforts firms in all the 5 years despite most of the full cost firms being small. This is majorly because of capitalising both successful and unsuccessful exploration expenditure under full cost accounting. Therefore, if comparing same size SE and FC firms, full cost companies would have higher asset book values.

4.3.4 Depreciation

Depreciation refers to the systematic allocation of the depreciable amount of an asset over its useful life. Once production of oil and gas commences, one of the major problems facing the accountant is the determination of the best method of matching the capitalised costs of exploration and development with revenues to be generated from production. This process of depreciation (of tangible equipment), depletion (of petroleum reserves) and amortisation (of intangible costs), is referred to collectively as DD&A (Wright and Gallum 2008). It is concerned with the matching of capitalised exploration, appraisal and development costs with the production which gives rise to revenue. Since FC firms capitalise both successful and unsuccessful exploration costs, it is expected that their depreciation and amortisation costs in the income statement would be greater than that of the SE firms (Collin and Dent 1979).

The graph below compares the average depreciation/amortisation as reported in the income statement of full cost companies with that of successful efforts companies for the five years period starting 2009 to 2013.

Figure 6: Average Depreciation



	2009	2010	2011	2012	2013
FC	977.5469	263.2196	341.3735	791.3965	606.2098
SE	417.4541	496.8466	611.4857	650.7056	806.5868

Source: Author's computation

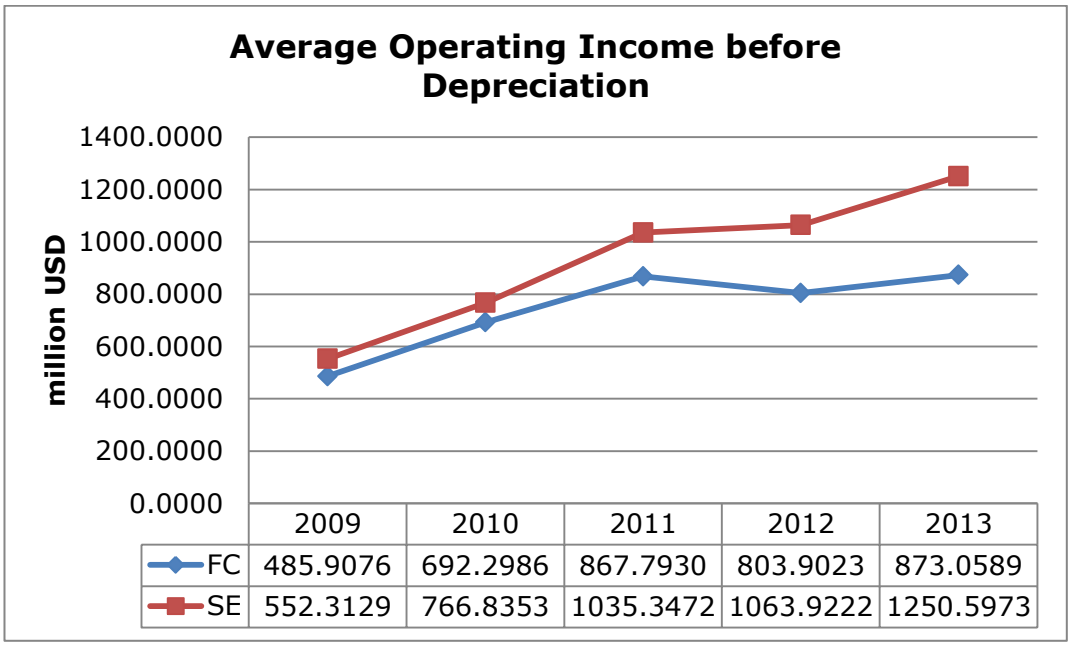
From the graph above, it is observed that the average depreciation of FC firms was higher than that of SE firms in 2009 and 2012 by 134% and 22% respectively. From 2009 to 2010, there was a sharp decline in the average depreciation for FC firms by 73%, a slight increase of 30% in 2011, a significant increase of 132% in 2012, and lastly a slight decline in 2013 of 23%. On the other hand, the average depreciation for SE firms was on an upward trend throughout the period rising by 93% between 2009 and 2013, and with the highest increase occurring between 2012 and 2013 at 24%. Also, the average depreciation for SE firms exceeded that of the FC firms in 2010, 2011 and 2013 by 89%, 79% and 33% respectively, with the greatest difference occurring in 2010. Overall from this analysis, the researcher cannot conclude on a method that allocates more depreciation costs due to lack of consistency in the findings possibly due to differences in the size of SE firms compared to FC firms. However, from a theoretical point of view, FC accounting method allocates higher depreciation costs because of capitalising both successful and unsuccessful exploration costs thus leading to higher book values (Cortese et al. 2009).

4.3.5 Operating Income before Depreciation (OIBD)

According to Brealey et al. (2006), OIBD is a measure of financial performance used by companies to show profitability in continuing business activities, excluding the effects of capitalization and tax structure. OIBD was considered in this research because it corresponds to operating cash flows more precisely than does net income, and that both CFO and OIBD are associated with operations. Also, OIBD is not affected by non-operating gains and losses, the related cash flows of which are not included in operating cash flows. Likewise, depreciation is a non-cash item and has no effect on operating cash flows thus excluded from the earnings to allow comparison of CFO and OIBD.

The graph below compares the average OIBD of full cost companies with that of successful efforts companies for the five years period starting 2009 to 2013.

Figure 7: Average Operating Income before Depreciation



	2009	2010	2011	2012	2013
FC	485.9076	692.2986	867.7930	803.9023	873.0589
SE	552.3129	766.8353	1035.3472	1063.9222	1250.5973

Source: Author's computation

From the graph above, it is observed that the OIBD for SE firms was on an upward trend and thus increased by 126% between 2009 and 2013, with the highest increase occurring between 2009 and 2010 at 39%. This could be attributed to the aggressiveness of SE firms in finding new oil and gas reserves hence the steady earnings growth. This observation is in agreement with the research conducted by Deakin (1979), who concluded that SE firms were more aggressive than FC firms. On the other hand, from 2009 to 2011, there was a rapid increase in the average OIBD for FC firms by 79%, a slight decline in 2012 of 7% and a slight rise of 9% in 2013. Comparatively, the average OIBD for SE firms exceeded that of FC firms in all the five years; i.e. 2009, 2010, 2011, 2012 and 2013 by 14%, 11%, 19%, 32%, and 43% respectively, with the greatest difference occurring in 2013. The reason for SE firms having higher earnings in all the five years compared to the FC firms could be attributed to size; i.e. SE firms are normally of large size compared to FC firms.

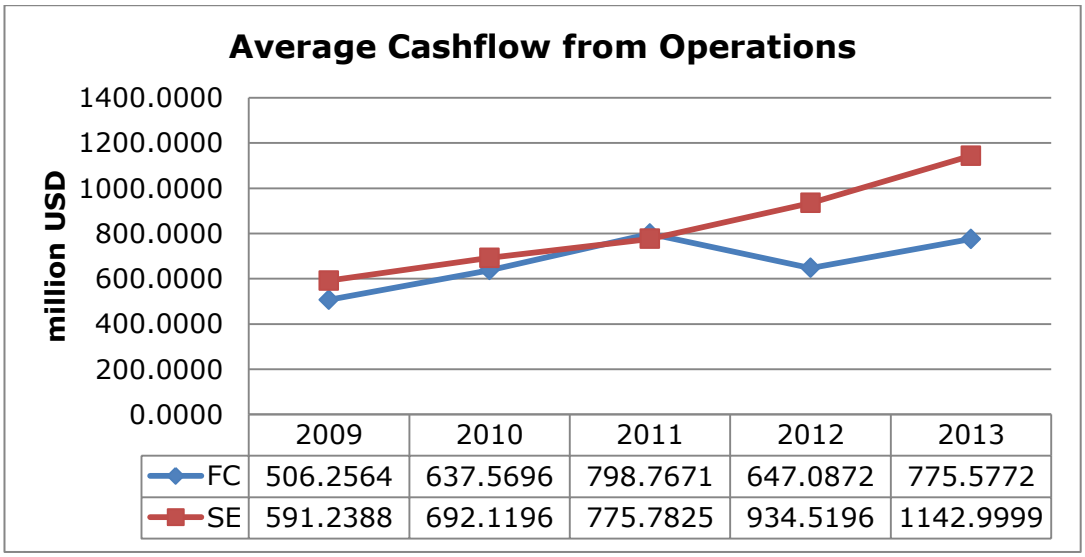
4.3.6 Cash flow from operations (CFO)

Cash flow from operations is a measure of the amount of cash generated from the company's normal business operations. Operating cash flow is

important because it indicates the ability of the company to generate sufficient positive cash flow to maintain and grow its operations, or whether it may require external financing (Brealey et al. 2006). Analysts sometimes prefer to look at cash flow metrics because it strips away certain accounting effects and is thought to provide a clearer picture of the current reality of the business operations.

The graph below compares the average operating cash flow of full cost companies with that of successful efforts companies within the sample for the five years period starting 2009 to 2013.

Figure 8: Average Cash flow from Operations



	2009	2010	2011	2012	2013
FC	506.2564	637.5696	798.7671	647.0872	775.5772
SE	591.2388	692.1196	775.7825	934.5196	1142.9999

Source: Author's computation

From figure 8 above, it is evident that the operating cash flow for SE firms was on an increasing trend and thus increased by 93% between 2009 and 2013, with the most significant increase occurring at 22% between 2012 and 2013. This trend was attributed to the upward trend in the average operating income before depreciation for successful effort firms. On the other hand, from 2009 to 2011, there was a noticeable increase in the average operating cash flow for FC firms by 58%, a slight decline in 2012 of 19% and a slight rise of 20% in 2013. This trend was comparable to the trend of average operating income before depreciation for full cost firms.

Furthermore, the average cash flow from operations for SE firms exceeded that of FC firms in the years 2009, 2010, 2012 and 2013 by 17%, 9%, 44% and 47% respectively, with the greatest difference occurring in 2013. However, from 2010 to 2011, it fell below the FC firms' average by 3%.

4.4 Descriptive Statistics Analysis

To provide summary measures of the variables, i.e. total assets, cash flow from operations and operating profit before depreciation; the mean, median, and standard deviation were computed, for both FC and SE firms pooled across the sample period of five years, 2009 – 2013.

Table 3 below shows the descriptive statistics for the cross-sectional sample of SE and FC firms. Because prior research suggests there are fundamental differences between FC and SE firms, the analyses are partitioned based on accounting method choice.

Table 3: Descriptive statistics for SE and FC firms (million USD)

Description	n	Mean	Standard deviation	Median
FC Firms				
Total Assets	195	4,673.95	11,311.30	947.56
Operating Income before depreciation (OIBD)	195	744.59	1,936.43	122.76
Cash flow from Operations (CFO)	195	673.05	1,652.45	119.18
SE Firms				
Total Assets	185	6,212.57	11,058.35	1,971.03
Operating Income before depreciation (OIBD)	185	933.80	1,774.67	224.60
Cash flow from Operations (CFO)	185	827.33	1,526.04	213.87

Source: Author's computation

From the table above, the means for total assets, OIBD and CFO are all larger for SE firms, possibly due to the size difference between the SE and FC firms (i.e. SE are large size firms). The SE firms' means are 1.33 times larger than the FC firms' means for total assets, 1.25 times larger than the FC firms' means for operating income before depreciation, and 1.23 times larger than FC firms' means for net operating cash flows. Similarly, the medians for total assets, OIBD and CFO are all larger for SE firms compared to full cost firms, i.e. 2.08 times larger for total assets, 1.83 times larger for OIBD, and 1.79 larger for CFO. These results are in agreement with the findings of Bryant (2003), that both the average and median book values under each method are larger for SE firms than for FC firms.

The standard deviations for total assets, OIBD and CFO are all slightly larger for FC firms compared to SE firms. Specifically, FC firms' standard deviations are 1.02 times larger than SE firms' standard deviation for total assets, 1.09 times larger than SE firms' standard deviation for OIBD, and 1.08 times larger than SE firms' standard deviation for cash flow from operations. This implies that the data for FC firms is greatly spread out compared to SE firms, and that there is greater total risk, uncertainty and higher volatility associated with the total assets, earnings and cash flows for full cost firms. These findings are contrary to an earlier research finding that SE firms' earnings are more volatile than FC firms earnings due to the writing off of dry hole exploration costs in one accounting period (Cortese et al. 2009; Deakin 1979). The cause of variance in the findings could be attributed to the difference in time dimensions when their study was conducted and the current period. Also, the sample size taken by the researcher was limited to companies engaged primarily in exploration and production of oil and gas.

4.4.1 Hypothesis tests of the sample means

To test if there is a statistically significant difference in the samples for total assets, OIBD, and CFO for the SE and FC firms; tests for the difference between the SE and FC sample means for total assets, OIBD, and CFO were

carried out using excel data analysis tool. The general null and alternative hypotheses were stated as below;

Null hypothesis: There is no difference between the sample means

$$H_0: \mu_1 = \mu_2$$

Alternative hypothesis: There is a difference between the sample means

$$H_0: \mu_1 \neq \mu_2$$

Table 4 below shows the z – test for two sample means of total assets for SE and FC firms.

Table 4: The z-test for FC and SE firms based on total assets

	Total Assets - FC	*Total Assets - SE*
Mean	4,673.95	6,212.57
Known Variance	127,945,498.70	122,287,001.70
Observations	195.00	185.00
Hypothesized Mean Difference	0	
z	- 1.34	
P(Z<=z) one-tail	0.09	
z Critical one-tail	1.64	
P(Z<=z) two-tail	0.18	
z Critical two-tail	1.96	

Source: Author's computation

From the table above, the null hypothesis is accepted since the two tailed test *p*-value, given by 0.18 (18%), is higher than the significance level of 5%. This implies that there is no significant difference between the means for total assets of FC and SE firms, and as such the two samples are not significantly different. In the same vein at a significance level of 10%, the null hypothesis can still be accepted since the *p*-value (18%) will still be greater than 10%. Therefore, at significance levels of 5% and 10%, there is enough statistical evidence to accept the null hypothesis and thus conclude that there is no statistically significant difference between FC and SE firms in terms of their total asset book values.

Table 5 below shows the z – test for two sample means of operating income before depreciation for SE and FC firms.

Table 5: The z-test for FC and SE firms based on OIBD

	OIBD - FC	*OIBD - SE*
Mean	744.59	933.80
Known Variance	3,749,744.45	3,149,464.92
Observations	195.00	185.00
Hypothesized Mean Difference	0	
z	- 0.99	
P(Z<=z) one-tail	0.16	
z Critical one-tail	1.64	
P(Z<=z) two-tail	0.32	
z Critical two-tail	1.96	

Source: Author's computation

From the table above, the null hypothesis is accepted at both 5% and 10% significance levels since the two tailed test *p*-value given by 0.32 (32%) is higher than both significance levels. This implies that there is no significant difference between the means for operating income before depreciation of FC and SE firms, and as such the two samples are not statistically significantly different. Therefore, at a significance level of 5% and 10%, there is enough statistical evidence to accept the null hypothesis and thus conclude that there is no significant difference between FC and SE firms in terms of their operating income before depreciation.

Table 6 below shows the z – test for two sample means of cash flow from operations for SE and FC firms.

Table 6: The z-test for FC and SE firms based on CFO

	CFO - FC	*CFO - SE*
Mean	673.05	827.33
Known Variance	2,730,582.27	2,328,810.51
Observations	195.00	185.00
Hypothesized Mean Difference	0	
z	- 0.95	
P(Z<=z) one-tail	0.17	
z Critical one-tail	1.64	
P(Z<=z) two-tail	0.34	
z Critical two-tail	1.96	

Source: Author's computation

The table above indicates that, since the two tailed test *p*-value given by 0.34 (34%) is higher than the significance levels of 5% and 10%, the null hypothesis is accepted. The implication of this is that there is no significant difference between the means for cash flow from operations of FC and SE firms, and as such the two samples are not significantly different. Therefore, at a significance level of 5% and 10%, there is enough statistical evidence to accept the null hypothesis and thus conclude that there is no statistically significant difference between FC and SE firms in terms of their operating cash flows.

Overall, tests for the significant difference between SE and FC sample means for total assets, operating income before depreciation, and net cash flows from operating activities, indicated no significant difference in the samples of the two methods based on the above variables. These results are contrary to the earlier research findings of Murdoch and Krause (2009) whose tests showed differences between the SE and FC sample means for the above variables with extremely significant z-values, i.e. 4.6, 90.8, and 83.1 for total assets, OIBD, and CFO respectively. The variance in the results could be attributed to the difference in time dimensions when their study was conducted and the current period (5 years). Also, their study covered a period of 20 years (1987 – 2006) and sample firms were drawn from various oil and gas industry classifications in the U.S. including: crude petroleum and natural gas, drilling oil and gas wells, oil and gas field exploration services, and oil and gas field services.

4.5 Quality of earnings of SE and FC upstream oil and gas companies

This research examined the issue of whether the SE or FC method results in a higher correlation between contemporaneous earnings and cash flows and thus determines which method has higher earnings quality as defined by Wolk and Tearney (1997). Operating income before depreciation (OIBD) was considered as the measure of earnings and net cash flow from operations (CFO) used as a measure of cash flows. Data for both SE and FC firms was pooled across the five years of study (2009 – 2013) for the variables OIBD, CFO and total assets, as defined in Osiris data base. Also, OIBD and CFO were deflated (divided) by total assets to control for size. The results were then run in SPSS to compute the correlation coefficients for OIBD and CFO, and significance tests.

The table below shows Pearson correlation coefficient from the association of $OIBD_t$ and CFO_t for FC firms.

Table 7: Correlation coefficient between OIBD and CFO for FC firms

		OIBD	CFO
OIBD	Pearson Correlation	1	.763**
	Sig. (2-tailed)		.000
	N	195	195
CFO	Pearson Correlation	.763**	1
	Sig. (2-tailed)	.000	
	N	195	195

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Author's computation

From the table above, the correlation coefficient between earnings and cash flows of full cost firms is given by 0.763, which is a strong positive relationship. Since the *p*-value of the correlation coefficient is given by 0.000, lower than the significance level of 1% and 5%, then the relationship between earnings and cash flows of full cost firms is statistically significant.

The table below shows Pearson correlation coefficient from the association of $OIBD_t$ and CFO_t for SE firms.

Table 8: Correlation coefficient between OIBD and CFO for SE firms

		OIBD	CFO
OIBD	Pearson Correlation	1	.912**
	Sig. (2-tailed)		.000
	N	185	185
CFO	Pearson Correlation	.912**	1
	Sig. (2-tailed)	.000	
	N	185	185

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Author's computation

From the above table, it is evident that the correlation coefficient between earnings and cash flows of successful efforts firms is given by 0.912, which is a very strong positive relationship. Also, since the *p*-value of the correlation coefficient is given by 0.000, lower than the significance level of 1% and 5%, then the relationship between earnings and cash flows of successful effort firms is statistically significant.

The correlation coefficient from the association of $OIBD_t$ and CFO_t for SE firms is 0.912, higher than that for FC firms of 0.763 based on the same measure, with a difference between the coefficients given by 0.149. A test for the significance of the difference in the two correlation coefficients was performed using Soper (2014)'s online software and yielded a *z*-score of 5.18 and *p*-value of 0.00. Since the *p*-value is less than the significance levels of 1% and 5%, the null hypothesis that there is no difference in the correlation coefficients (earnings quality) for SE and FC firms is rejected. This implies that the earnings qualities of FC and SE firms as defined by their correlation coefficients are statistically significantly different from each other. Therefore, since the correlation coefficient for SE firms is significantly higher than that of full cost firms, this research concludes that the SE method results in higher earnings quality than the FC method.

As previously discussed, Sunder (1976), postulated that FC earnings are more highly correlated with cash flows than SE earnings, a conclusion that this research does not support. However, the findings of this research agree with Bandyopadhyay (1994) and Murdoch and Krause (2009).

CHAPTER 5: CRITICAL DISCUSSION AND CONCLUSIONS

5.1 Summary of the dissertation

The issue of accounting for exploration and production (E&P) activities has been politically charged and hotly debated in the U.S. for decades, the focus of the debate being whether successful efforts or full cost accounting methods provides investors with more informative numbers, and thus should be mandated for all oil and gas companies. This debate is related to the notion of "quality of earnings" which has received some attention both in the popular press and in academic accounting literature (Bandyopadhyay 1994). The fundamental difference between FC and SE is that, the full cost method capitalizes all exploration costs while the successful efforts method capitalizes exploration costs only if they can be directly associated with the discovery of oil and gas reserves. Several attempts have been made to ensure a uniform accounting method for the oil and gas industry for comparability of financial statements, but have been unsuccessful. For example; the recommendation of the American Institute of Certified Public Accountants (AICPA) in 1969 to eliminate full cost method and use successful efforts method failed. Also, the issuance of SFAS No.19 in 1977 by FASB, mandating oil and gas companies to use successful efforts accounting method was unwelcome and rejected by SEC thus permitting companies to choose between successful efforts or the full cost method. Furthermore, the SEC proposed a new accounting method, Reserve Recognition Accounting (RRR) that would be developed by 1981 and replace the historical cost accounting methods (SE and FC). However, due to the high level of subjectivity of proved reserves volumes and values, RRA was abandoned. Subsequently, FASB issued SFAS No. 69, "Disclosures about Oil and Gas Producing activities" requiring disclosures on reserve quantities and values, presented as supplemental information in the annual reports. The SEC in 1996 issued *Reg. S-X 4-10*, prescribing the use of full cost accounting, and also allowing successful efforts companies apply the amended SFAS No. 19 and added that whether SE or FC method is selected

for preparation of financial statements, all oil and gas companies should also comply with the requirements of SFAS No. 69.

The International Accounting Standards Board's (IASB's) efforts to formulate and release a comprehensive standard for the oil and gas industry have been unsuccessful. As a short term solution, and in a bid to provide guidance to oil and gas companies on the application of IASs, IASB issued International Financial Reporting Standard (IFRS) Number 6, *Exploration for and Evaluation of Mineral Resources*, which was to make limited improvements to the already existing accounting practices. The standard allows the continued use of either full cost or successful efforts methods of accounting, and requires exploration and evaluation assets to be initially measured and recorded at cost, also allowing either the cost or revaluation model to be used for exploration and evaluation of assets subsequent to initial recognition. It is still awaited whether the IASB will come up with a comprehensive accounting standard for the oil and gas industry recommending a uniform accounting method in favour of either successful efforts or full cost method. However, Nichols (2012) argues that, the delay could be due to the political clout held by members of the industry and that IASB may be facing political pressures similar to those experienced in the U.S. Therefore, since the IASB, SEC, and FASB are still undecided on which accounting method is more superior to investors and as such should be recommended for use by oil and gas companies, there is need to do research studies on the relevance of the two accounting methods.

Since both full cost and successful effort accounting methods are still in use, the aim of this research study was to ascertain which if any, of the two accounting methods SE and FC used by upstream oil and gas companies in the U.S. provides superior earnings quality. Research gaps were identified that motivated this research. Firstly, the focus of previous studies was on how the attempts to eliminate full cost accounting method over the years have been unsuccessful (Collins and Dent 1979; Deakin 1979; Johnson and Ramanan 1988). This research was intended to fill the gap so far since little research has been done when it comes to comparing earnings quality of SE and FC accounting methods. Secondly, in terms of time dimension, most of

these researches were conducted in the 20th century, and as such conducting a research in the current century in relation to earnings quality was considered pertinent.

The research relied primarily on secondary data, using both quantitative and qualitative methodologies in analysing the available data, so as to achieve the objectives and subsequently the overall aim of the study. Most of the numeric data was analysed quantitatively using Microsoft Excel though SPSS was also used for some statistical findings; other non-numeric data was analysed qualitatively. The major source of numeric data was Osiris financial data base, which is a record of all financial statements of public listed companies. In all, the study covered 76 public listed oil and gas companies in the U.S. (39 FC firms and 37 SE firms), engaged primarily in the exploration and production of crude oil and natural gas, with data for the years 2009 to 2013.

The first objective of this study was to identify the characteristics of full cost and successful efforts accounting methods. This was achieved primarily by use of qualitative methods involving a review of relevant literature on the differences, similarities, theoretical arguments for and against SE and FC accounting methods. Also, Reserve Recognition Accounting, current disclosure requirements, and accounting standard regulating the oil and gas industry were reviewed. Furthermore, an analysis of the numeric data from the sample was carried out to confirm some of the features of these two methods. The following were the findings:

It is noted in this research that neither of the two methods dominates accounting for oil and gas exploration and production activities in the U.S. Out of the 76 companies sampled for the study, 51% were found to be full cost firms while 49% were successful efforts firms. The results correspond to the findings of Murdoch and Krause (2009) who observed in their study of earnings quality of SE and FC methods, that the proportion of companies using successful efforts method was approximately the same as that using full cost method (i.e. 50.4% use SE and 49.6% use FC method).

In terms of size, a review of the literature revealed that SE method is normally used by large size firms compared to FC method which is preferred by small and infant firms. Analysis of the sample data was in support of this premise, for example; market capitalisation data showed that SE firms' average market capitalisation was twice more (70%) than that of the full cost firms (30%). Also, the average total assets and OIBD of SE firms exceeded that of FC firms in all the five years. Theoretically, small and infant companies prefer to use the Full cost method of accounting because they believe it allows them to access the capital markets more easily due to less volatile earnings.

The mean and median book values of total assets, OIBD and CFO under each method were found to be larger for SE firms than for FC firms, thus agreeing with Bryant (2003). However, the standard deviations were larger for FC firms compared to SE firms, signifying more total risk and high volatility in FC earnings. This was contrary to the findings of Cortese et al. (2009) and Deakin (1979).

Tests for the significant differences between SE and FC sample means for total assets, operating income before depreciation, and net cash flows from operating activities, indicated no significant difference in the samples of the two methods based on the above variables. These results were contrary to the earlier research findings of Murdoch and Krause (2009) whose tests showed extremely significant differences between the SE and FC sample means based on the same variables.

The second objective was intended to examine the possible approaches of measuring the quality of earnings and identify the most appropriate. This was achieved entirely by reviewing the concepts of "earnings management" and "earnings quality", examining first the earnings management incentives, earning management techniques, and lastly the earnings quality measures. The earnings quality measures reviewed included; accrual quality, variability and smoothness, earnings surprise, persistence, predictability, value relevance and timeliness. Accrual quality, i.e. closeness of earnings to cash flows, was chosen as the appropriate measure for earnings quality for the purpose of this research because it is in line with FASB's objective of financial reporting. The idea that closeness to cash

means higher quality earnings appears in financial analyst's reports and in financial statement analysis textbooks (Schipper and Vincent 2003). Therefore, this research used Wolk and Tearney's (1997) definition of better earnings quality, i.e. higher correlation between earnings and cash flows, to operationalise the concept of earnings quality in the study.

The third objective was to compare the quality of earnings of FC and SE upstream oil and gas companies. The comparison was based on the correlation coefficients between earnings and cash flows of full cost and successful effort firms. The findings indicate that the correlation coefficient for SE firms is extremely significantly higher than that of full cost firms, implying that the successful efforts earnings is more highly correlated with cash flows than is full costing earnings. Therefore, this research concludes that the SE method of accounting provides earnings quality superior to the FC method.

5.2 Research limitations and recommendations for further research

This research has come up with interesting findings however, like any other research it is not without its own limitations.

With respect to the conclusion that the successful efforts earnings is more highly correlated with cash flows than full costing earnings, this research acknowledges that the analysis only investigated the relationship between current year earnings and operating cash flows. It may be that this stronger association does not extend to longer time horizons, for example association of earnings and future cash flows. This is a key limitation and the researcher suggests further inquiry is warranted.

As earlier noted in this research, there are several competing definitions and measures of earnings quality, and this study focused on only one, association of contemporaneous earnings and cash flows. It could be that considering other earnings quality metrics, the findings may differ. An area

of future research is to compare the quality of earnings of SE and FC accounting methods using other earnings quality metrics.

This study was limited to only U.S. companies engaged primarily in exploration and production of oil and natural gas (upstream activities), and with data for the period 2009 – 2013. Inference from the results obtained in this study can be made more accurate if the sample size can be considerably increased to include companies engaged in; drilling oil and gas wells, oil and gas field exploration services, oil and gas field services, and downstream activities. The study period could also be extended to at least 20 years in order to fully cater for changes in economic cycles such as booms and recessions.

The study focused on one category of users of financial statements – Investors. There are different users of financial statements including; managers, employees, creditors, financial institutions, government, and each user has different information needs from the financial statements.

5.3 Implications of the research

The results of this research work make an important contribution towards addressing the ongoing debate about whether successful efforts or full cost accounting methods provides investors with more informative numbers, and thus should be mandated for all oil and gas companies. It is this debate that has led to the failure of the FASB, SEC and IASB to agree on one accounting method to be used by all companies in the extractive industry. Specifically, the results would be valuable to IASB which is in the process of setting a comprehensive standard for the oil and gas industry.

This research observed that the IASB has failed to move ahead in a timely fashion towards issuance of a comprehensive standard for the extractive industry, possibly due to being subjected to intense political pressure thus hindering their efforts. The IASB being a prominent global standard-setter, the researcher recommends that it should come out and move forward with

the issuance of a comprehensive standard for the extractive industry. The issuance of the standard would help to address the differences that arise in using the two accounting methods, especially if it decides to eliminate one of the accounting methods.

Since the earnings quality between SE and FC firms significantly varies, potential investors must be aware of the type of accounting method used by a company before making a decision to invest their funds in the company.

It is also the hope of the researcher that the study will add value to the existing body of knowledge for the benefit of both policy makers and future researchers.

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