

Accounting Practices and Regulations for Extractive Industries: A Framework for Harmonisation

Hafez Abdo (corresponding author)

University of Nottingham

Jubilee Campus, Nottingham University Business School

Nottingham, NG8 1BB

Email: hafez.abdo@nottingham.ac.uk

ORCID: <https://orcid.org/0000-0001-9279-0035>

Linkdin: <https://www.linkedin.com/in/professor-hafez-abdo-29580758/>

Musa Mangena

University of Nottingham

Jubilee Campus, Nottingham University Business School

Nottingham, NG8 1BB

Email: musa.mangena@nottingham.ac.uk

ORCID: <https://orcid.org/0000-0002-3005-8110>

Linkdin: <https://www.linkedin.com/in/professor-musa-mangena-22192416/>

Freeman Brobbey Owusu

Nottingham Trent University

Nottingham Business School

Email: Freeman.owusu@ntu.ac.uk

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Abstract

Purpose

The purpose of this study is to provide a harmonisation framework for the diverse accounting practices by extractive industries.

Research Design

The study takes a three-stage approach. The first involves a comprehensive literature review of historical evolution of accounting regulations by extractive industries. The second involves constructing an accounting practice index for extractive industries. The third involves constructing a harmonisation framework.

Findings

Our accounting practice index provides empirical evidence of the wide diversity of accounting practices by extractive industries. Analysis of the literature review addresses the several attempts by accounting and regulatory bodies to standardise the diverse practices of accounting by extractive industries and reasons for lack of successful standardisations. We extract lessons from these previous attempts and propose a harmonisation framework.

Implications

Our proposed harmonisation framework can be used to align together the diverse accounting practices by extractive industries and enhance comparability and consistency of accounting figures and statements produced by these industries. Harmonising the diverse accounting practices is crucial for investment decision making.

Originality

Our harmonisation framework is the first of its kind that could enhance the comparability of accounts of extractive industries' firms and be used to harmonise diverse accounting practices by other industries.

Keywords: Accounting regulations, Accounting History, Extractive industries, Harmonisation, IFRS

Accounting practices and regulations for extractive industries: A framework for harmonisation

1. Introduction

The mining, oil and gas sectors, collectively referred to as the extractive industries (hereinafter EI) (IASB, 2000), are globally significant economically, environmentally, and politically (Brock *et al.*, 1987; Gray *et al.*, 2019). The EI have, for almost a century, been deploying different accounting methods even for companies operating in the same jurisdiction (Brock *et al.*, 1987; Pacter, 2001; dos Santos and dos Santos, 2014; Gray *et al.*, 2019). The variation in accounting methods on the capitalisation or expensing of similar expenditure items by companies, have been at the core of the historical accounting controversies associated with EI (Brock *et al.*, 1987; Cortese, 2011). The professional accounting bodies, for example the Financial Accounting Standard Board (FASB) and International Accounting Standard Committee / Board (IASB), have acknowledged these diversities in practices and their impact on the comparability of accounts (see FASB 1977; 1980; IASB, 2000; IASB, 2020). Given this, accounting standards setters have made several attempts to standardise accounting practices by EI since 1908. However, despite these many attempts, due to intense lobbying by the industry players, diversity still exists which confirms lack of success of these attempts (see Nobes and Parker, 1981). Therefore, an out-of-the box approach is required to tackle this age-long issue of diversity of accounting practices.

In this paper, we develop a framework that accounting and regulatory bodies can employ to harmonise accounting practices in ways that can be acceptable to all players. To develop the proposed framework, we first undertake a comprehensive literature review of accounting in EI to understand the evolution and controversies surrounding accounting regulation and practices

by these industries. This helps to identify the attempts made by accounting bodies and regulatory agencies to harmonise and/or standardise such accounting practices and the impediments they faced. Second, in constructing our harmonisation framework we draw on lessons from the attempts to standardise accounting practices by EI. In addressing these objectives, we answer these questions: (1) what are the unique accounting problems that are faced by the EI, and how have these accounting problems been addressed in the past? (2) what attempts have been made by both accounting and regulatory bodies to harmonise accounting practices by the EI? how successful have these attempts been? (3) what lessons can be learned from the failure of the historical attempts by accounting bodies to harmonise accounting practices? and how can these lessons be applied to ensure successful harmonisation of accounting practices by EI?

Accounting for EI has been a concern for academics and professionals for decades and has gained attention in the existing literature. One strand of literature has focused on debates relating to lobbying by EI firms (e.g., Russell and Tarbert, 2006.; Cortese *et al.*, 2009; Cortese, 2011; dos Santos and dos Santos, 2014), other strand has discussed the diversity in accounting practices and regulations (e.g., Field, 1969; Brock *et al.*, 1987; Gerhardy, 1999; Karapinar *et al.*, 2012). Others have analysed reporting practices by the EI as well as the accounting challenges and how they are currently dealt with by accounting standards (Luther, 1995;1996;1998 Gray *et al.*, 2019), examined the arguments for the different accounting methods (Baker, 1976; Deakin, 1979) and analysed the value relevance of different methods (Myers, 1974; Sunder, 1976; Bandyopadhyay, 1994; Bryant, 2003; Power *et al.*, 2017), evaluated the successfulness of IFRS 6 in harmonising accounting practices by EI (Abdo, 2016), evaluated fitness of the current accounting standards for EI (Cortese *et al.*, 2021), and suggested divergence from IFRS 6 to IAS 38 (Nobes and Stadler, 2021).

Wallace and Gernon (1991) posit that a major difficulty for academic literature is to develop a comparative framework that allows harmonising different accounting practices (also see Gray, 1983). It is this lack of a framework for harmonising accounting practices by EI and the absence of a comprehensive literature review of the development of accounting regulations and practices by EI that motivated this study. We acknowledge review-base studies (such as Gray *et al.*, 2019), however these studies do not extend back to the beginning of the accounting regulations for EI, as we do so in this study. We are also motivated by lack of success made by previous studies to harmonise and/or standardise accounting practices by EI (such as Nobes and Stadler, 2021) where radical suggestions for changes were made. Furthermore, we are motivated by Nobes and Parker's (1981) suggestion for harmonising diverse accounting practices by entities, as well as Judge *et al.*'s (2010) recommendations for establishing a comprehensive harmonisation framework that address key controversies in accounting for EI. Therefore, we consider these previous studies and recommendations in constructing our harmonisation framework.

Our study differs from all these prior published works in two main ways. First, we conduct a more extensive literature review on accounting regulations and practices in the EI to fully address how and why historical attempts to harmonise/standardise accounting practices by EI failed and to draw inspirations from them to guide constructing our harmonisation framework. Our review dates back from the early 19th century, for which, except for Luther (1998), no other prior study (of which we are aware) has undertaken a comprehensive historical review of accounting regulations by EI. Luther (1998) is limited in scope, providing a narrative of accounting practices by only gold mining companies in South Africa in the late 1800s and early 1900s. Second, whereas previous studies have focused on describing, discussing, and criticising the diversified accounting practices by EI, apart from Nobes and Stadler (2021), no study to date has proposed a pathway for harmonising the diverse practices. Nobes and Stadler

(2021) suggest complete removal of IFRS 6 and accounting for exploration and evaluation expenditure of the EI under IAS 38. Such approach is problematic for a number of reasons. First, it introduces a radical change to accounting by EI, this approach has not been successful in the past. Second, it requires expensing pre-exploration, exploration and appraisal expenditure even when commercial minerals are found. Third, it does not align the practice with any of the existing accounting methods by EI, and such an approach is likely to be opposed by industry players through .. Thus, our study contributes to the literature and practice by extending the literature back to the early days of accounting regulations concerning EI, and by including the recent academic works on this topic. Our study addresses previous attempts made by accounting standard setters and regulatory bodies and reasons for their failure in standardising and/or harmonising the accounting practices; we use lessons learned from these attempts to propose a harmonisation framework for the EI.

The remainder of this paper is structured as follows. The section 2 provides a background view of accounting for EI and discusses the challenges in accounting for these industries. Section 3 describes the method employed in this study, and section 4 presents the findings from the comprehensive review. Section 5 discusses the lessons drawn from historical efforts to harmonise accounting practices in the EI and develops the harmonisation framework. Section delineates the concluding remarks.

2. Accounting for extractive industries

2.1 Investment phases and accounting methods used in extractive industries

Historically, EI have used methods of accounting that differ principally from one another on how pre-development activities (i.e., acquisition, exploration, and evaluation activities) are accounted for (Coutts, 1963; Smith and Brock, 1959), thus producing radically divergent reported results (Russell and Tarbert, 2006; Cortese *et al.*, 2021). On each end of the spectrum

are the full cost (FC) and successful efforts (SE) methods (Pacter, 2001), with others being reserve recognition accounting (RRA), the area of interest (AOI), the expense all (costs written off) method, and the appropriation method (Micallef, 2001; Alfredson *et al.*, 2009).ⁱ

Extractive investment goes via several stages, these are prospecting, acquisition, exploration, evaluation, development, production, and decommissioning (Abdo, 2018). If evaluation of a project confirms commercial viability of discovered resources, extractive companies develop the mine in readiness for production. However, pre-development stage is subject to significant risk and uncertainty as mineral resources may not be found in commercial quantities despite significant expenditure on prospecting, acquisition, exploration, and evaluation activities (Brock, 1959; Luther, 1996). Therefore, treatment for pre-development expenditure has been at the heart of controversies of accounting by EI, the core of the controversy is whether pre-development expenditure should be capitalised as incurred, expensed as incurred or capitalised pending decision of economic viability of the discovered mine.

Successful effort (SE) method users initially capitalise pre-development expenditure pending decision of economic viability of the discovered resources. Should evaluation confirm this viability the initially capitalised costs are recognised as assets otherwise they are expensed (Flory and Grossman, 1978; Amernic, 1979; Bryant, 2003; Cortese *et al.*, 2010; Abdo, 2016). Full cost (FC) method users capitalise pre-development expenditure whether the discovery is economically viable or not (Gerhardy, 1999; KPMG, 2017; Abdo, 2018), however capitalisation of expenditure in any cost centre is limited to the value of mineral reserves available in that cost centre (FASB, 1977; Lilien and Pastena, 1981). The Area of Interest (AOI) method is a method developed by Australian Accounting Standard Board (AASB) for their extractive industries in AAS7 (previously DS 12/308) and AASB 1022 (Gerhardy, 1999). The AAS7 and AASB 6, which recommend the AOI method, allow the costs incurred during

Exploration and Evaluation (E&E) phases on a particular area of interest to be either expensed as incurred or partially or fully capitalised. E&E expenditure can be capitalised if they are expected to be recouped through successful development and exploitation of the area of interest, or alternatively expensed. Users of expense all (EA) method write off all pre-development expenditure as incurred (Brock, 1956; Gerhardy, 1999; Power *et al.*, 2017). Appropriation method users capitalise costs of digging the main shaft and buying and installing plant and machineries are capitalised as permanent work or development (Luther, 1996). However, once production starts, development expenditures funded out of revenue from operations and hence charged as expense in the income statement (Luther, 1998). Future major expansion will not be financed by equity or bank loan but from internally generated operating surplus (Luther, 2003).

Owing to deploying different accounting methods by EI, there is lack of comparability of accounts lacks due to two main reasons: (1) EI companies operating in the same country are permitted to use different accounting methods (Field, 1969; Luther, 1996; Pacter, 2001; Gray *et al.*, 2019). (2) EI companies that use the same accounting methods deploy different accounting alternatives when accounting for the same transaction (Most, 1974; 1975; Truman, 1975; Amernic, 1979; Brock *et al.*, 1987; Pacter, 2001; Cortese, 2011; Karapinar *et al.*, 2012). Deployment of different practices and accounting methods result in different accounting figures being reported for extractive activities of a similar nature (Brooks, 2008). In line with this, Pacter (2001: online) states “*there is no single successful efforts method or full cost method. Many variations are found in practice*” (also see Nobes and Stadler, 2021). This significantly impedes the comparability of reported figures, thereby limiting their usefulness for stakeholders (Lourens and Henderson, 1972; Watts and Zimmerman, 1983). However, given their usability and historical roots in the accounting practice, each of these accounting methods represents a ‘voice’ in accounting for EI, thus users of each of these methods claim

that their chosen method produces financial statements that faithfully represent the financial performance and position of their entity.

Controversies of accounting for EI varies and involve: capitalisation versus write-off of pre-development expenses (Bierman *et al.*, 1974; Nethercott, 1975; Brooks, 2008), the choice of cost centre (Most, 1972; Gerhardy, 1999), the choice of the unit of accounts (IASB, 2020), the application of amortisation and matching principles (Field, 1969; Lourens and Henderson, 1972), impairment recognition (Pariser and Titard, 1991; Pacter, 2001), disclosure of accounting-related information (Bierman *et al.*, 1974), and the definitions of reserves and resources (Gray *et al.*, 2019). These issues have been subjects for academic and professional debates for several decades (Brock *et al.*, 1987; Macintosh and Baker, 2002). Many of these issues have been politically charged (Solomons, 1978; Connor, 1979; Gorton, 1991; Nichols, 2012), and several remain unresolved (Most, 1974; 1975; Trueman, 1975; Gerhardy, 1999; Cortese and Irvine, 2010; Misund, 2017). The implication of the politicisation of this accounting agenda has resulted in persistent diversity in EI accounting and reporting practices as regulators try, and fail, to reduce accounting alternatives for this sector, therefore lack of comparability and consistency remain a label of accounting by EI to date. This situation gives rise to our study where we attempt to propose a harmonisation framework that may reduce these controversies and enhance comparability of accounts produced by EI firms.

2.2 Harmonisation of accounting for extractive industries

Harmonising accounting practices focuses on bringing the different accounting practices in line together (Wallace and Gernon, 1991). By issuing IASs and IFRSs, the IASC/B were successful in unifying accounting practices by different nations (166 countries as of 2022- see IFRS (2022)). Part of their success was underpinned by suitable will forces and endorsement by governments and international organisations (Judge *et al.*, 2010). Why then, have accounting

standard-setters and regulators, powerful as they may be, failed to develop and enforce standards that result in harmonised accounting practices by EI? The adoption of accounting systems and methods by companies is influenced by several factors. These include but not limited to political pressure, regulatory framework, and availability of alternative choices (Nobes and Parker, 1981; Watts and Zimmerman, 1990; Wallace and Gernon, 1991). Harmonising accounting practices by EI, in comparison to the cases of other corporations, has not yet been achieved for a number of reasons: (1) EI firms would lobby against regulations and standards that may impact their financial positions and/or performance (dos Santos and dos Santos, 2014). (2) EI firms are politically powerful (Brock *et al.*, 1987; Gray *et al.*, 2019) to the extent that efforts of accounting bodies to standardise accounting practices by these firms have been subject to lobbying and therefore rendered them unsuccessful (Russell and Tarbert, 2006; Cortese *et al.*, 2009; Kang, 2016).

Therefore, there is the need for a suitable harmonisation framework that will enhance comparability and consistency of accounts of EI companies and ensure that their financial statements show a true and fair view of the operations. Such a solution requires the elimination of much of the alternative accounting treatments within each of the accounting methods and a creation of a basis for comparing accounting numbers produced by the EI companies (see Judge *et al.*, 2010).

3. Methods

According to Webster and Watson (2002), Dakduk and González (2018), and Snyder (2019) an effective literature review facilitates understanding the key issues on a topic, clarify areas where substantial research is conducted and provide direction to areas where research is needed (also see Denyer and Tranfield, 2009). Thus, to understand the historical evolution of accounting regulations and attempts to standardise accounting practices by EI, we undertook a

systematic review of the academic literature and accounting regulation of EI. Our aim is to identify and review two important strands of literature relevant to our aims and research questions. First, to analyse the long-established literature to understand the key accounting controversies by EI. Second, to identify and understand the attempts by accounting and regulatory bodies to standardise accounting practices by EI. Studying these strands of literature allows us, on one hand, to understand why attempts to harmonise and/or standardise accounting practices by EI have been unsuccessful. On the other hand, this review allows us to extract lessons from the failure of these attempts to propose a harmonisation framework that can be used to eliminate differences in accounting practices by EI. Therefore, we paid particular attention to studies that addressed attempts to harmonise and standardise accounting practices by EI and the reasons for their failure.

Following Denyer and Tranfield (2009), we started our review by locating studies and selecting the most appropriate literature sources for our work. Our literature search focused on historical and contemporary academic and commissioned studies which focus on accounting regulations of the EI. Our approach is analogous to Gray *et al.* (2019) and aligns with Snyder (2019). In order to conduct a systematic literature review, we used the search phrases of: 'Extractive industry', 'oil and gas', 'mining', 'minerals' and 'natural resources'. Owing to the focus of our study on the historical evolution of accounting regulations, we added the words 'accounting regulations' to these phrases. We used the two Databases that Gray *et al.* (2019) used for their search, these are: Science Direct and Business Sources Premier. Science Direct Database offers articles from 1996. Since our study extends prior that date, we also used the Business Source Premier Database which offers published materials between 1918 and 2015. The results of this search were 10,982 articles. We then considered results from Business Sources Premier and topped these up with search results from Science Direct Database between 2015 and 2020, this gave us a total of 11,053 articles/papers. We screened these papers by

checking titles and abstracts to identify the most relevant articles. This process resulted in 130 sources that included articles, books, and reports. To ensure that our articles/papers were comprehensive, we also examined the references of the 130 articles/papers, but no new sources were identified.

To understand the historical evolution of, and controversies in accounting practices by EI, we use published monographs, typically commissioned by accounting bodies and government entities (see Appendix 1). We identified 11 monographs and 1 seminal research paper.ⁱⁱ Of these 12 studies five were commissioned by regulatory bodies, seven were not commissioned. These 12 sources were used to construct an accounting practice index for pre-development expenditure incurred by EI (see Appendix Two). This index shows the historical diversity of accounting practices by EI and the different basis used to capitalise or expense similar cost items. The 11 monographs and the research paper were all identified from the literature and by means of being referenced by other literature. They were published between 1956 and 2009, therefore covering a relatively long period, addressing evolution and diversity in accounting practices for pre-development expenditures of EI. In constructing our accounting practice index, for each of the investment stages of EI we identified the key expenses. This identification of expenses emerged from the identified 11 monographs and 1 research paper. Then we read through each of our 12 sources and noted how each expenditure item was accounted for. In order to validate this index, the researchers reviewed the index individually, then met and compared their notes from these reviews and no material differences were identified.

To validate our constructed harmonisation framework, we consulted professionals from different organisations, these include two from the Big Four auditing firms, one is an ex-IASB member, one finance manager from an oil and gas company and two academics who are specialised in accounting for EI. We also benefited from feedback and comments made by

academic colleagues when our framework was presented in conferences and workshops nationally and internationally.

4. Findings of the comprehensive review

4.1 Historical waves of the accounting for extractive industries literature

The literature on regulations and differences in accounting and reporting practices in the EI has a long history dating back from the early 1900s (see Charleton 1903; Hoover, 1903; Curle, 1905; Waller, 1957; Irving and Draper, 1958; Smith and Brocks, 1959). To the best of our knowledge, no study has put together in one piece these many studies to highlight the historical evolution of accounting regulations, and this makes our study the first of this kind. It is evident that literature has witnessed distinct waves that, in the main, reflect changes in accounting regulations and practices. These waves are discussed in detail below and summarised in Appendix Three.

In the first wave, covering the pre-1960 periods, the earlier literature on accounting for EI focused mainly on the mining industry with limited attention to the oil and gas industry (see Charleton, 1903; Hoover, 1903; Curle, 1905). Luther (1998) argues that South African gold mining companies used the appropriation method of accounting since the late 1800s. Prior to the mid-1950s, oil and gas companies used the philosophy of successful efforts (SE) method where expenditure on unsuccessful discoveries was written off (Brock, 1956; Malmquist, 1990). However, users of SE method do not comply with the provisions of this method but use different alternatives, and therefore comparability of accounting numbers produced by these companies was lacking (Brock *et al.*, 1987).

The boost in the oil and gas business led to emergence of smaller companies which were financially weaker than larger companies and these were unable to bear writing-off

expenditures of unsuccessful discoveries (Frazier and Ingersoll, 1986; Brooks, 2008). Therefore, a new accounting method emerged known as the full cost method (FC). Companies that used the FC method to account for their economic activities applied several different approaches in accounting for similar activities. For example, some FC companies write-off an expenditure item if the activity undertaken by company's own staff but capitalize the same item if the activity is undertaken by external trade; other FC companies capitalise the item whether the activity is undertaken internally or outsourced externally. This diverse application of FC caused a lack of comparability of accounts among users of FC methods and between FC companies and companies that used other accounting methods. Thus, diversity in accounting practices became a real issue and comparability of accounting numbers, consistency of accounting for EI and fair view of financial statements of EI became a critical problem. Against the backdrop of this diversity of accounting treatments of similar expenditure items, calls for harmonising accounting practices were made by stakeholders (see Brock *et al.*, 1987; Murphy, 2005).

A second wave of literature, covering the period 1960s—2000, featured debates mainly in the USA, about the two widely used accounting methods, the SE vs FC (Connor, 1979; Carinie, 1985). In particular, in the 1960s and early 1970s, this literature paid attention to examining the effects of using FC or SE accounting, criticising and comparing the accounting practices under these two methods (e.g., Poter, 1965; Field, 1969; Most, 1972; 1974; 1975; Bierman *et al.*, 1974; Meyers, 1974; Truman, 1975; Sunder, 1976; Baker, 1976; FASB, 1977; Flory and Grossman, 1978; Whittred, 1978; Deakin, 1979). Criticism focused on fitness of each of the alternative methods in meeting the matching concept of accounting, reflecting true and fair view of the reporting companies, and meeting investors needs for decision making.ⁱⁱⁱ Fragmentation and diversity of accounting by EI started to be a character of this industry. Therefore, following the 1973 oil crisis in the U.S, the SEC and the FASB were pressured by

politicians to regulate accounting practices in the oil and gas industry (see Painter, 2014). This resulted in several accounting regulations, for example issuing Statements of Financial Accounting 19 and 69 and the introduction of Reserve Recognition Accounting (RRA) Method. These events were material for rich literature on the impact of these regulations on companies (Truman, 1975; Sunder, 1976; Baker, 1976; Whittred, 1978; Deakin, 1979).

The third and final wave started post 2000 and paid particular attention to the efforts of the IASB to standardize accounting practices by issuing IFRS 6—*Accounting for extractive industries*. The focus of the literature during this period was on evaluating and criticising IFRS 6 (Nichols, 2007; Cortese and Irvine, 2010; Noël *et al.*, 2010; Abdo, 2016), developing a comprehensive accounting standard for the EI (Brock, 2001; Nichols, 2007; 2009), the efforts of the IASB to engineer a comprehensive accounting standard for the EI based on a Discussion Paper that was published in 2010 (for example, Wright *et al.*, 2010; Russell and Jenkins, 2010; Nichols, 2012; dos Santos and dos Santos, 2014), questioning the validity of EI accounting related standards (Cortese *et al.*, 2021; Nobes and Stadler, 2021), and criticising the IASB decision to change status of IFRS 6 from temporary to permanent (Abdo and Owusu, 2023).

4.2 Diversity in accounting practices

The diversity in accounting and reporting practices by the EI has been the subject of debate and investigation by both the academic community and the accounting profession (see for example Zeff, 1978; Van Riper, 1994; Misund, 2017; Power *et al.*, 2017).

Charleton (1901 and 1903) and Hoover (1903) appear to have been the first to highlight the problem of diversity in accounting for mineral resources. Charleton (1901) noted that ‘*uniformity could do no possible harm to the proprietors and would be of the greatest possible advantage to mining-men generally*’ (cited in Vent and Milne, 1989, p. 68). Also, Charleton (1903) stated:

Under the head of “development,” all sums are included that are charged to “development,” “diamond drilling,” or “shaft-sinking” – whether treated as capital charges, or debited to “revenue” or “profit and loss account,” and written off in the balance Sheet...the same items in the table [Costs at Kalgoorlie in 1900, page 208] have been grouped, as far as possible, together under each head, but it is impossible to do so with absolute exactness, owing to the different way in which the accounts at several mines are subdivided and presented. (p. 209)

The Accounting Principal Board (APB) (1972) attributes differences across accounting methods for EI to being rooted in the philosophy of each of these methods and the interpretation of the matching concept (see Brooks, 2008). In this regard, whilst FC users claim that both successful and unsuccessful expenditure are deemed necessary for finding commercial reserves and therefore should collectively be capitalised. SE users argue that only expenditure on successful discoveries should be capitalised and considered as necessary to generate revenues from discovered reserves. Given these differences, studies called for harmonisation of accounting methods for the EI operations. For example, Amernic (1979) investigated the underlining reasons for adopting one of the two accounting methods, SE and FC, by 52 Canadian oil and gas companies. Amernic maintained that the existence of different methods hinders inter-firm comparability and stakeholders suffer the consequences. Therefore, Amernic (1979) recommended that the Accounting Research Committee (ARC) of the Canadian Institute of Chartered Accountants (CICA) to make sure that the basic standard of comparability of accounting practices is achieved to help users in comparing the accounts of EI firms. Similarly, Truman (1975) and Most (1974; 1975) identified several differences in accounting practices by EI, these are: different capitalisation policies, accounting methods used for computing depreciation, depletion and amortisations (DD&A), and tax deferral practices as some of the underlying reasons for dissimilarities in the reported amounts of extractive industry companies.

Other studies reported differences in accounting practice within the same accounting method (see Brock, 1956; 1983; Field, 1969; McDonald 1974; Lilien and Pastena, 1981; Brock *et al.*, 1987; Nichols, 2007). For example, McDonald (1974) and Lilien and Pastena (1981) show that whilst companies may use the same accounting method, several differences in accounting practices are exercised by those users. Brock (1956) and Dehne (1983) reported dis-similarities in capitalising or writing off certain expense while applying the SE method. In this context, Amernic (1979), Brock (1983) and Gerhardy (1999) concluded that reducing diversity in accounting by EI and enhancing comparability of these industries' accounts cannot be achieved unless much of the choices are removed.

4.3 Attempts to harmonise accounting practices by extractive industries

Historically, several calls on, and attempts by, accounting standard setting bodies to eliminate heterogeneous accounting practices by EI have been made to provide a uniform accounting practice that allows comparability and consistency of accounting figures (Lilien and Pastena, 1981; Nichols, 2012; Power *et al.*, 2017) (see Appendix Four). However, attempts to change accounting regulations of EI have been subject to resistance and lobbying by EI firms (Russell and Tarbert, 2006; Cortese *et al.*, 2009; Russell and Jenkins, 2010), and in most cases have been politically charged (Connor, 1979; Gorton, 1991; Macintosh and Baker, 2002; Cortese, 2011 Nichols, 2012).

4.3.1 The early harmonization attempts: pre-1960s

Calls for harmonisation and restriction of alternative accounting practices in the EI can be traced back to the late 1800s when the Institute of Mining and Metallurgy expressed interest in standardising accounting for mining. This followed the establishment of the first British mining exchange in 1855, later renamed the Mining Exchange of London (Burt, 1972), and the establishment of the Institute of Accounting and Auditors in the South African Republic in 1894 (Luther, 1998) that argued for adopting a uniform system for the mining industries.

Similarly, in Australia, the Chamber of Mines of Western Australia passed a resolution in its monthly report (July 1903) stating ‘*affirming the desirableness of adopting a uniform system of keeping mine accounts*’ (see Vent and Milne, 1989, p. 64). Hoover (1903) made one of the earliest calls for harmonisation through the American Institute of Mining Engineers and the English Institution of Mining and Metallurgy to come up with a uniform system of accounting standards (see Vent and Milne, 1989). Hoover (1903, p. 44) stated: ‘*there is a crying need for greater uniformity in the formulation of mine accounts*’. Furthermore, Curle (1905, p. 29) stated in his book “The Gold Mines of the World”:

At present the methods for each of these [costs] are legion, and seem designed to conceal rather than reveal the financial position; but there must be some one method, in accounts especially, which is the best of all, and with the assistance of skilled accountants and an actuary or two, the institute [The Institute of Mining and Metallurgy] should be able to draft here a great reform ...I hope that the time is approaching when the system of standardization will be extended to mining costs and mining accounts.

In response to the accounting diversity and the calls to harmonise accounting practices, in 1908, the English Institution of Mining and Metallurgy made the first attempt to harmonisation by establishing a Mine Account and Cost Sheets Committee to work towards a standard system for regulating the entire British mining industry (Vent and Milne, 1989; Luther, 1996). The Committee issued a report in 1910 which recommended standardising accounting practices in the mining sector, but the recommendations were voluntary (Power *et al.*, 2017). Given the voluntary nature of the recommendations, the attempt to standardise accounting practices by the British mining industry was not successful.

4.3.2 Harmonization attempts: 1960s - 2000

Discussion of harmonisation calls in this section is divided into three eras, these are the 1960s-1970s., 1970s-1990s., and 1990s-2000. Significant accounting regulatory events during these periods underlie this division and classification.

The 1960s – 1970s era

This era was marked by two commissioned studies. The first was commissioned by the Research Committee of the Canadian Institute of Chartered Accountants and was conducted by Coutts (1963). The aim of this study was to consider the various accounting treatments for pre-production expenditure, rationalise and criticise each method, indicate preferences, and propose a pathway to harmonise varied practices (Coutts, 1963). The Coutts study was guided by two important questions—the first concerns the treatments of pre-production expenditure and the second focused on the desirability of recording the fair value of oil and gas reserves in the accounts. However, in support of the FC method, Coutts (1963, p. 25) recommends that *‘All expenses incurred in the process of exploring for oil and gas and developing for production of those reserves found (pre-production expenses) should be capitalised as part of the cost of the reserves discovered’*.

The emergence of the FC method in the late 1950s and earlier 1960s, and the different applications of accounting approaches within both SE and FC accounting for extractive industries in general and for the oil and gas industry in particular resulted in a widespread in different alternative treatments of similar cost items (Brock *et al.*, 1987). Given this, in the mid-1960s, accountants, financial analysts, and individual and corporate investors urged the APB, of the American Institute of Certified Public Accountants (AICPA), which was the main accounting standard-setter in the USA, to eliminate some of the accounting practices and narrow the diversity of accounting methods used by these industries (Brock, 1983).

In response to these calls, in 1964, the APB appointed a partner (Robert Field) at Price Waterhouse & Co to study financial accounting and reporting in the extractive industries (Lourens and Henderson, 1972; Nichols, 2012). Using annual reports and accounts of 264 extractive companies, Field analysed the common accounting and reporting practices of oil and gas and other mining companies operating in the United States of America during the period

1963-1966. His aim was to identify the accounting problems faced by extractive industries' firms. In his report, unlike Coutts (1963), Field (1969) recommended abolishing the FC method and keeping the SE method of accounting for EI (see Foster, 1971). However, due to his suggestion of discounting FC method, Fields' recommendations were not welcomed and supported, but rather were objected and rejected mainly by FC users. The study was reviewed in 1970 but was dropped in 1973 when the APB was replaced by the FASB (Nichols, 2012). Coutts' and Field's studies represent a theme in literature that supports single accounting method. Owing to continuing using various accounting methods by EI harmonising accounting practices based on a single method approach proved impractical. Therefore, a lesson to be learnt from these attempts in this era (1960s – 1970s) is that any harmonisation framework needs to make sure that none of the accounting methods in use be subject to direct elimination, else such a proposal would be subject to lobbying by companies using the method in question.

The 1970s -1990s era

During the 1950s and the mid-1960s mineral production in Australia increased by 346 per cent, and the value of mineral production more than doubled between 1965 and 1970 (Lourens and Henderson, 1972). With no clear accounting standards in place, this boom created serious problems for accountants in terms of dealing with the increased capital investments in mining industries. Against this backdrop, the Australian Society of Accountants (ASA) commissioned Lourens and Henderson (1972) to undertake a study on financial reporting in the EI. The study aimed to understand the accounting practices used by mining industries in Australia to assist the ASA to develop suitable accounting practices for the mining industry. Lourens and Henderson (1972) view that achieving comparable financial statements requires a reduction in alternative accounting treatments of similar cost items—as an essential step towards the development of an appropriate accounting standard for the EI. Lourens and Henderson's study created a clearer theme of thinking in reducing accounting choices to achieve harmonisation.

We return to this line of argument later in this study where we present our framework for harmonisation.

The Australian Accounting Standard (AAS) 7 that was issued in 1977 allowed extractive companies to choose the accounting method they prefer for pre-development costs (Cortese *et al.*, 2009). However, the AAS 7 was updated in 1989 where, in accounting for pre-development expenditure, extractive companies were required to follow the practice of AOI method^{iv}, which aligns to large extent with the philosophy of the SE method (AAS 7, 1989; Cortese *et al.*, 2009). Yet, alternative treatments of similar cost items existed, and the standard allowed variations in practice to persist (Gerhardy, 1999).

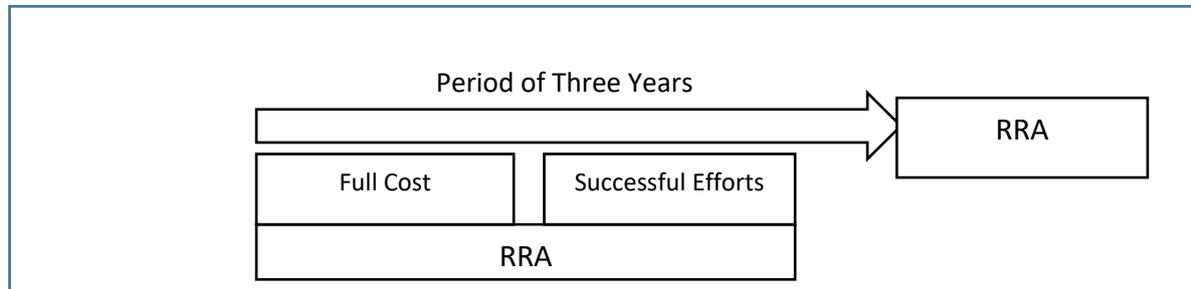
A particular key development and perhaps even a turning point in attempts to regulate accounting for the extractive industries, came as an effect of the 1973 Arab-Israel war, labelled as Yom Kippur. Because the United States and some Western European countries supported Israel in that war, the Arab members of OPEC embargoed oil exports to the United States and reduced exports to Western European countries by 5 per cent. This significantly increased oil prices from \$3 a barrel in 1973 to \$12 in 1974 (see Macintosh and Baker, 2002). The embargo created intense public and congressional interest in the oil and gas industry (Brock *et al.*, 1987). This culminated in the USA Congress asking the SEC to require oil and gas companies to file quantities and costs of their oil and gas reserves. This created the need for uniformity of accounting practices in the EI (Dyckman and Smith, 1979; Luther, 1996; Cortese, 2011; Nichols, 2012; Power *et al.*, 2017) and in 1975, the Congress issued the Energy Policy and Conservation Act (EPCA) which called for establishing a national energy database (Brock, 1983). Underpinned by the EPCA, the Congress tasked the SEC to develop uniform regulations for the oil and gas accounting by December 1977 (Gorton, 1991).

In response to the SEC, the FASB issued Statement of Financial Accounting Standard (SFAS) 19 in December 1977 (*Financial Accounting and Reporting by Oil and Gas Producing Companies*). SFAS 19 called on FC companies to switch to the SE method (FASB, 1977; Dyckman and Smith, 1979; Luther, 1996; Spear and Leis, 1997; Macintosh and Baker, 2002; Nichols, 2012). The issuance of SFAS 19 represents the third recommendation by US regulators to eliminate the FC method of accounting (the first was made by Field in 1969 and followed by APB's in 1972). The switch from FC to SE was expected to result in a decline in equity security prices for FC companies (Dyckman and Smith, 1979) and it was feared that a volatility in earnings could impair FC companies' ability to raise capital (Dehne, 1983; Nichols, 2012; Power *et al.*, 2017). Under intense pressure, the SEC was eventually forced to change course (Flory and Grossman, 1978; Connor, 1979; Gorton, 1991; Noël *et al.*, 2010; Cortese, 2011; Power *et al.*, 2017), rule out SFAS19 and permitted the use of both FC and SE methods of accounting (FASB, 1980; Brock *et al.*, 1987). This attempt by the FASB confirms the unsuccessful approach of harmonisation based on direct eliminating accounting method(s) in favour of a single method. It also confirms the powerful lobbying impact of the EI against standards and regulations that do not meet their preference, the FC companies in this case (see dos Santos and dos Santos, 2014).

In August 1978, RRA was issued via Accounting Series Release No. 253 (ASR 253) (Magliolo, 1986), and the SEC required oil and gas companies to use RRA which incorporates a current value method instead of using the historical cost basis (Magliolo, 1986). The SEC permitted continuous use of the FC and SE methods for a period of 3 years (Lilien and Pastena, 1981; Dehne, 1983; Power *et al.*, 2017). However, it required companies to provide RRA-based supplementary statements along with financial statements produced based on the SE or FC methods (Brock, 1983). The approach aimed to warrant RRA ultimate adoption as the basis

for accounting practices by oil and gas companies. The SEC approach to unify accounting practices by oil and gas companies is presented in figure One.

Figure One: SEC harmonising approach of accounting by oil and gas companies



Luther (1996) argues that two key drivers motivated the SEC to propose the use of RRA and these were ‘*limitations of conventional historical cost accounting and political pressure arising from dramatically higher oil prices*’ (p, 69). To a large extent, RRA was a form of ‘discovery accounting’ (Most, 1979), and a form of fair value accounting based on valuation of proved oil and gas reserves (Nichols, 2012). By introducing RRA, the SEC aimed to address the inadequacy of historical cost accounting methods and provide a fair representation of oil and gas reserves on the financial statements of producing companies (Dehan, 1984; Brock *et al.*, 1987). RRA would assign a value to ‘proved’ oil and gas reserves as an asset on the balance sheet of the reporting entity. Net income, according to RRA, is deemed as the net increase of new reserves discovered during an accounting period and the increase in the value of previously discovered reserves (Macintosh and Baker, 2002).

The SEC anticipated that RRA, via its supplementary disclosure requirements, would provide a suitable basis for uniformity of the primary financial statements of oil and gas companies (SEC, 1980). However, Connor (1979) argues that the theoretical viability of RRA was critically impaired and would not facilitate the development of a reliable energy database, as was hoped by the SEC. The method resulted in misleading and unreliable estimates (Connor, 1979), suffered a high level of subjectivity in estimating proved oil and gas reserves quantities (volumes), costs and values (Connor, 1979; Nichols, 2012), and did not offer answers to when

reserves will be produced and at what capital and operational costs (Macintosh and Baker, 2002). Also, because oil prices could not be predicted accurately, RRA income was subject to unpredictable and misleading fluctuations (Connor, 1979). Owing to these shortcomings, in March 1980, the SEC concluded that RRA was inappropriate as a primary basis for accounting for oil and gas investment activities (Brock *et al.*, 1987).

Despite being unsuccessful from the outset, this attempt, on the one hand, is evidence that an out of the box style of approach is required to harmonise accounting practices by EI. On the other hand, the approach supports our view that harmonisation based on multiple methods approach can be successful.

In November 1982, the FASB issued SFAS 69 (*disclosures about oil and gas producing activities*) which adopted supplementary disclosure requirements that included some of the information disclosed in RRA (see FASB, 1982).^v Thus, the two methods, SE and FC, continued to be allowed under US GAAP (Gallun *et al.*, 2001). Owing to this new regulation, differences in reporting practices by EI continued, the controversy remained, and the debate continued to escalate.

The 1990s – 2000s era

The harmonisation efforts in this period started with the 1998 IASC decision to appoint a Steering Committee on EI to develop, for the first time, a comprehensive international accounting and reporting standard aimed at unifying accounting regulations and practices by EI (Gerhardy, 1999; Micallef, 2001; Nichols, 2007; Karapinar *et al.*, 2012). According to the IASB (2010), the main reasons for undertaking the project were to address the divergence of accounting practices, to reduce the number of accounting alternatives, and thus to enhance comparability and fair view of the financial position and performance of EI (also see Brock, 2001; Wright *et al.*, 2010; Karapinar *et al.*, 2012). In November 2000, the Steering Committee

published an Issue Paper (IP) '*Extractive Industries*'. In particular, the IP expressed specific views on the need for a single accounting standard., the use of historical cost accounting and the preference for SE method. The IP attracted 52 comment letters^{vi} (IASB, 2010; Power *et al.*, 2017) and according to Noël *et al.* (2010) commentators lobbied against the adoption of historical based accounting alongside value-based disclosures claiming that such adoption would not lead to reliability, fairness, and comparability of financial statements of reporting entities. Thus, this project was stalled in 2000 (Wright *et al.*, 2010; Russell and Jenkins, 2010; Nichols, 2012). This attempt to harmonise accounting practices by EI confirmed the clear continuing rejection of the single accounting method approach for the EI. Therefore, a lesson to be learnt is that the single accounting method approach would not be free from lobbying against.

4.3.3 Harmonisation attempts post 2000

In 2000, the IASC was restructured as the IASB and the European Union required listed companies to report under International Accounting Standards (IASs) (Li, 2010). In December 2004, the IASB issued IFRS 6 (*Exploration for and Evaluation of Mineral Resources*), with an effective date of 1 January 2006 (IFRS, 2017) as an interim standard pending the development of a comprehensive standard (Fleming, 2005; Brooks, 2008; Noël *et al.*, 2010). To provide an interim solution to the conflicting views associated with the different methods of accounting for the activities of EI, IFRS 6 did not stipulate a specific cost method (Karapinaar *et al.*, 2012; Abdo, 2016), its design-maintained diversity of accounting practices, not achieving comparability of accounts (Karapinaar *et al.*, 2012; Power *et al.*, 2017). IFRS 6 permitted EI to follow the accounting policies they used prior to the adoption of the IFRS (Wright *et al.*, 2010; Power *et al.*, 2017; IFRS, 2018). Therefore, it codified the FC, SE and other methods used by EI (Cortese and Irvine. 2010; Russell and Jenkins, 2010; Abdo, 2016), thus giving flexibility to the EI in accounting for their investment activities (Noël *et al.*, 2010). IASB

(2020) asserts that accounting policies applied under IFRS 6 lacks consistency and comparability both between and within jurisdictions. This situation is inconsistent with the mission statement of the IASB that “IFRS Standards bring transparency by enhancing the international comparability and quality of financial information, enabling investors and other market participants to make informed economic decisions” (IFRS, 2021: online). Therefore, Karapinaar *et al.* (2012, p. 42) concluded that IASB failed to narrow down accounting alternatives and that “*IFRS 6 is the main obstacle to extractive companies reporting comparable and consistent financial statements*”.

Given the interim nature of IFRS 6 and the IASB realisation of the standard weaknesses the IASB authorised, in July 2004, a research project aimed at comprehensively addressing accounting for EI. A Discussion Paper (*The Extractive Activities*) was issued in April 2010 (IASB, 2010). The aim was to use the Discussion Paper (DP) as a foundation for constructing a comprehensive IFRS that could supersede IFRS 6 (Nichols, 2007). The DP proposed a new direction in accounting for EI where recognition of assets would be based on acquired rights, rather than on phase of investment. A total of 141 comment letters were received from individual and corporate respondents (IFRS, 2019b). Following the responses in the comment letters, the IASB considered the proposed approach in the DP radical for the EI (see IFRS, 2019b), therefore, assigned low priority to the research contained in the DP and suspended working on it. A lesson to be learnt from this case is that a radical change to the current accounting practices by EI may not be a suitable and immune from lobbying a harmonisation pathway.

In 2018, the IASB placed the EI project on its active agenda and in 2019, the IASB decided to start a new research project that is not a continuation of the previous research. It aims to gather new evidence to help deciding whether to start developing a proposal on accounting for EI that would amend or replace IFRS 6 (IFRS, 2019a, online). In January 2022 the IASB,

despite acknowledging the shortcomings of IFRS 6, failed to construct a comprehensive accounting standard for the EI, therefore decided to change the status of IFRS 6 from interim to permanent; therefore, closed the project (see Abdo and Owusu, 2023).

5. Discussion of lessons from historical attempts and development of the harmonisation framework

5.1 Discussion of lessons from historical attempts

Given the diversity in accounting practices by EI, earlier calls were made to harmonise and standardise these practices (see Amernic, 1979; Lilien and Pastena, 1981) and accounting and regulatory bodies actually made efforts to standardise these practices (see Appendix Four). However, diversity in the EI persists till e (see Appendix Two), this allows us to conclude that none of these efforts was successful in harmonising the accounting practices in the EI. Nobes and Parker (1981) contend that in order to standardise, there is the need to first harmonise the practices. Standardisation efforts were faced by lobbying from the industry via comment letters and responses to the IP and the DP by individuals and corporations (see dos Santos and dos Santos, 2014). This lobbying is reinforced by the political and economic strengths of EI (see Cortese *et al.*, 2009).

The failure of regulatory and accounting standard setting bodies to standardise accounting practices by EI clearly demonstrates a weak coercive power that these bodies have over EI companies. These industries are economically and politically very powerful (Cortese *et al.*, 2009) and through intense lobbying of the political establishments (that rely on these companies for resources), they can shape the course of regulation affecting their industry (dos Santos and dos Santos, 2014). This is what Cortese (2011) posits as “...*industry’s capture of the regulatory process.*”(p. 404). Accounting and regulatory bodies such as FASB and IASB,

for example, would have been expected to succeed in forcing the companies to change accounting practices to preferred methods (DiMaggio and Powell, 1983). However, the power to force change appears to be undermined by regulatory bodies' lack of power over the resources that the EI have—coercive power rests with those with the resources—in this case the EI themselves instead of the regulators (Russell and Tarbert, 2006). It is this power that EIs use to lobby and win their battles against accounting and governmental regulators (Watts and Zimmerman, 1986; Luther, 1996). Furthermore, and since each accounting method represents a 'voice' in the accounting practice of EI no superior method seems to be dragging the attention of companies more than the others. Thus, it is left for the extractive companies to decide on which method and accounting alternatives to follow.

There are reasons that can be advanced to understand the rationale for intense lobbying by the EI firms against changes to accounting regulations by EI. Since the different accounting methods and choices result in different accounting figures, any attempt to regulate accounting practices by EI would adversely affect the reported figures of several companies in these industries (see Cortese, 2011, p. 404). Such decline in reported figures would impact several important accounting indicators, for instance the profitability levels, asset values, debt/equity ratio and ROA (Dyckman and Smith, 1979). These indicators have implications for EI when it comes to their ability to raise external funds (Watts and Zimmerman, 1978; 1990; DiMaggio and Powell, 1983; Irvine, 2008). The perceived impact would trigger companies to lobby against such changes as documented by Gorton (1991) and Van Riper (1994) in the case of US. The successful lobbying of EI against attempts to standardise accounting by these industries indicates that, first, a different approach to standardisation from the previous approaches is required, and second, a suitable coercive power is required to enforce implementation of a new accounting standard.

The second wave of literature (1960s – 2000) directed our attention to the importance of political and regulatory pressure exerted by the SEC on oil and gas companies and the success of this approach in enforcing changes to accounting practices by EI. However, despite a successful enforcement of the regulations and implementing RRA by oil and gas companies owing to shortcomings in the philosophy and design of RRA this attempt was not successful in harmonising accounting practices by EI. Though, despite being an unsuccessful attempt it offers a key lesson to be learned and used when attempting to harmonise or to construct a new standard for the EI. Driven by political will power, companies were already compliant with the SEC requirement of preparing a supplementary set of accounts based on RRA alongside their chosen accounting method. This, in fact, confirms that such an un-radical approach to harmonisation and thereafter standardisation, that does not discount any of the accounting methods in the first instance, can possibly be effective should a suitable framework be used, and a political will exist to support the proposed approach (see Watts and Zimmerman, 1983).

IFRS 6, whilst offering limited harmonisation opportunity (Abdo, 2016), it does not offer a suitable platform for consistent and comparable accounting figures across EI firms (IASB, 2020; 2022). Issuing IFRS 6 faced different lobbying by the EI. Cortese and Irvine (2010) argue that the invisible influence of EI in the process of developing IFRS 6 has captured the regulatory process and led to different accounting methods being permitted under IFRS 6, therefore leaving the standard with little practical impact on harmonising accounting practices by EI (Abdo, 2016). Changing the status of IFRS 6 from interim to permanent does not reduce diversity and accounting practices (Abdo and Owusu, 2023), therefore a harmonisation framework is required to enhance comparability of accounts produced by EI.

5.2 The Harmonisation framework

Our analysis of the literature coupled with our knowledge in accounting regulations of the EI allow us to extract lessons from the many attempts made to harmonise accounting practices by

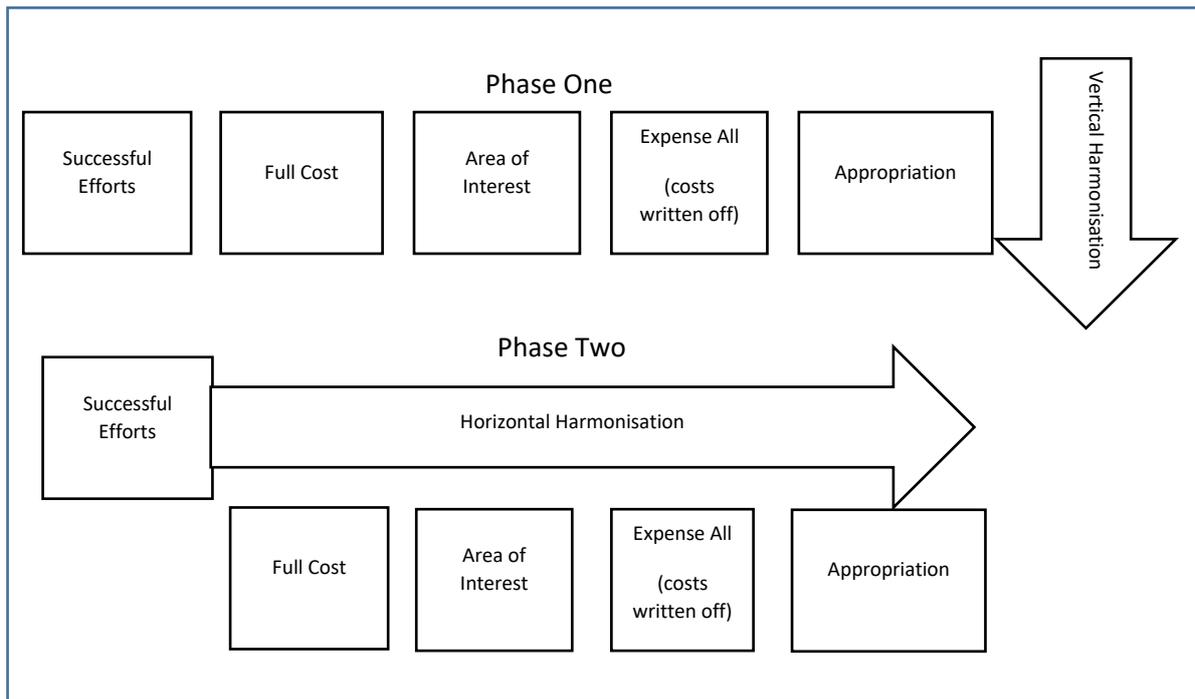
EI. We use these lessons to propose a harmonisation framework for accounting in the EI. Our framework is innovative in that it allows comparison of accounting figures by EI without forcing any company to immediately give up the use of its customary accounting method. This is important because each method of accounting for EI represents a ‘voice’ and has its strengths, consequently forcing companies to give up their accounting method would ignite their lobbying power. Therefore, any harmonisation plan/approach needs the support of these voices to work.

In order to enhance comparability of reported accounting figures by EI and achieve a suitable level of harmonisation of the diverse accounting practices by EI, a strategic harmonisation plan needs to be drafted and implemented over a reasonably sufficient period. A suitable political enforcement backup, like that produced by the EU and the accounting bodies for adopting IASs/IFRSs, is required to minimise the impact of powerful lobbyists. Such approach is expected to lead to adoption of a fair and meaningful harmonisation framework that allows standardising accounting by EI at a later stage (see Nobes and Parker, 1981).

Consistent with this argument, we propose a harmonisation framework for accounting practices by EI to take place in two phases. In the first phase, and in line with the literature recommendation (see Amernic, 1979; Lilien and Pastena, 1981; Brock, 1983; and Gerhardy, 1999), we suggest a vertical approach where accounting choices and alternative treatments within each of the available accounting methods be minimised. Using concentration indices, for example van der Tas (1988); Tay and Parker (1990) and Archer *et al.* (1996), should allow identifying concentration of accounting practices by EI around certain treatments; therefore, less used accounting alternatives can be eliminated. This practice will concentrate EI accounting practices around fewer alternatives thus enhance comparability of accounting figures produced by EI firms that deploy similar accounting methods in recording their expenditure. We label this type of harmonisation within each method as ‘vertical harmonisation’.

Our second phase of the harmonisation framework, which we label as ‘horizontal harmonisation’, is motivated by three drivers. The first is avoiding an immediate discount of any of the existing accounting method, the second is using an approach that has potential to be successful in harmonising accounting practice by EI, and the third is based on recommendations made by academic scholars and advised by our consultants. Historically, owing to its credibility over the other accounting methods, accounting and professional bodies favoured the SE method of accounting for pre-development expenditure. Therefore, in designing the second phase of our harmonisation framework, we use the SEC approach in implementing RRA in 1978. In so doing, we propose that the SE be considered as a base model and companies that use other methods of accounting be required to produce, in addition to their accounts, a second set of accounts based on the SE philosophy. In this case, companies would still be allowed to use their selected accounting method and at the same time serving the comparability objective of the accounting bodies via producing accounts in accordance with the SE method. Notwithstanding, this approach was suggested by scholars and has its roots in the accounting literature. For example, Nobes and Parker (1981) suggested that harmonising diverse and persistent accounting practice could be achieved by requiring companies to produce two sets of financial statements. Furthermore, they argue that such dual accounting procedure would be much easier to implement than a rigid standard that may face powerful lobbying, thus, “*many of the obstacles to standardisation on a single set of rules would become irrelevant*” (Nobes and Parker, 1981: 339). Figure Two presents our proposed framework of harmonisation.

Figure Two: Proposed framework for strategic harmonisation of accounting practices by extractive industries



Source: Authors' Construct

Keeping two sets of accounting books for companies not already using SE method of accounting would be cumbersome and costly (see Irvine, 2008). Therefore, we expect that, on the longer term and due to information production costs hypothesis of Watts and Zimmerman (1978; 1990; 1998), this approach will effectively eliminate all but the SE method of accounting as producing financial statements under more than one method would be cost prohibitive.

To validate our harmonisation framework, we consulted several professionals on its usefulness and practicalities.^{vii} Those professionals include two partners from the Big Four, one ex-IASB member, one financial manager from an oil and gas company and two academics who are specialised in accounting for extractive industries. Owing to the political and policy sensitivity of the issue around accounting standards our consultants did not want their participations to be audio recorded or for their names or organisations to be mentioned. Consultants suggested that owing to the historical lobbying against regulations of the EI, a soft approach that extends over a reasonably long period of time would be suitable for achieving success. A key message from our consultants was to first reduce accounting choices within each of the individual accounting methods, then to find a basis for aligning the different methods together. Whilst two of the consultants suggested the use of FC as a base method for harmonisation the other four suggested that SE is a better method due to its conservatism and credibility; also, because SE and AOI are similar in many aspects therefore minority of EI firms would be required to produce two sets of accounts. The consultants' comments, suggestions and criticisms were taken on board when we developed our harmonisation framework. We also presented our harmonisation framework to the academic community in national and international accounting conferences and in research seminars both online and in person. Suggestions, feedback, and recommendations made by consultants and academic colleagues are that for such a framework to be successful, sufficient accounting disclosures are required

to enhance the readability and understandability of accounting figures of EI firms. Furthermore, they contend that the EI needs a consistent definition of reserves and resources along with consistent and unified asset measurement methodology. Such an accounting system should provide a platform that allows comparability and ensures consistency of accounts of different reporting entities and would establish a new chapter in accounting for EI.

Whilst our proposed two-phase harmonisation framework is expected to reduce diversity and enhance comparability between EI firms, which would aid decision making by investing communities, it would possibly help accounting bodies to standardise accounting practices by EI. Owing to the uniqueness of accounting by EI in deploying different accounting methods under the umbrella of IFRSs, this framework may not be suitable for other industries. However, phase one of the framework (the horizontal harmonisation) could be used for accounting of any other industry or business where different accounting alternatives are used.

6. Concluding remarks

The current accounting practices by the EI are based on using different accounting methods: SE, FC, AOI, expense all (costs written off) and appropriation. Each of these methods has its underlining philosophy and justification, and each claim to be producing accounts that reflect the true and fair view of the economic reality of the reporting entity. Although figures produced by these different methods are not consistent and/or comparable, each of these methods represents a 'voice' in the EI. The diversity in accounting practices by EI, lack of consistency and comparability of accounts produced and the need to harmonise these diverse practices has ignited efforts by accounting and governmental bodies to standardise these diverse practices. However, owing to the significant political and economic powers of EI companies and the lobbying power of extractive companies, harmonising and standardising of accounting

practices have not been as successful. Therefore, implementing harmonisation pathway requires suitable enforcing power from regulators and standard setters.

Diversity in accounting practices by EI exists at two levels: the first is a result of using different accounting methods by EI firms and the second resulted from deploying different accounting choices by companies that use the same accounting method. Radical approaches to standardise the diverse accounting practices by eliminating any of the existing methods have been impractical. Therefore, a moderate approach that does not enforce elimination of any accounting method or comes up with a completely new set of rules, but enhance comparability, consistency, and transparency in accounting for EI is required.

We propose a harmonisation framework based on two phases. The first phase, 'vertical harmonisation', focuses on unifying practices within the individual accounting methods. This should reduce accounting alternatives and choices available within same accounting methods. We suggest that the first phase be implemented on a timeline basis before the second phase. Observations and feedback from the first phase should be considered before beginning the second stage. The second phase, 'horizontal harmonisation', is to implement the harmonisation pathway across the different accounting methods by using one method, we suggest using SE, as a basis for comparison. Observations from the first stage could result in adopting a modified approach to SE as it is applied now. Disclosures of information are required to be part of the harmonization practices.

Building on our proposed harmonisation framework and in application of the vertical harmonization, it is key to research the extent of diversity within each of the accounting methods for EI. Therefore, to study the concentration of the accounting treatments of pre-development cost items within each method and across the different methods around certain practice(s). Furthermore, following recommendations made by several scholars (for example

Amernic, 1979; Lilien and Pastena, 1981; 1983; and Gerhardy, 1999) to reduce accounting choices to achieve a level of harmonisation a study based on the view of 'vertical harmonisation' is needed. Such a study would allow recommending eliminating accounting choices that are less used by the industry, therefore reducing the number of choices and thus enhancing comparability of accounts of EI firms that use the same accounting method. Whilst our study is based on a comprehensive literature review and consultations with few professionals and academics, future studies should seek to interview more and different stakeholders in the EI such as standard setters, regulatory bodies, practitioners, investors etc

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Appendix 1: Monographs used in constructing the accounting practice index

Monographs used in constructing the accounting practice index		
Author(s), Year	Book Title	Commissioning Body
Horace R. Brock , 1956	Petroleum accounting: accounting for geological and geophysical exploration costs.	Not commissioned – (USA) An article published in the Journal of Accounting
Robert E. Waller , 1956	Oil Accounting: Principles of oil exploration and production accounting in Canada	Committee of Accounting and Auditing Research of the Canadian Institute of Chartered Accountants
Robert H. Irving , JR and Verden R. Draper , 1958	Accounting Practices in the Petroleum Industry	Not commission – (USA)
C. Aubrey Smith and Horace R. Brock , 1959	Accounting for oil and gas producers: principles, procedures, and controls	Not commission – (USA)
W. B. Coutts , 1963	Accounting Problems in the Oil and Gas Industry	The Canadian Institute of Chartered Accountants – (Canada)
Stanley P. Porter , 1965	Petroleum Accounting Practices	Not commission – (USA)
Robert Field , 1969	Financial Reporting in the Extractive Industries	The Accounting Principle Board – (USA)
Roy Lourens and Susan Henderson , 1972	Financial Reporting in the Extractive Industries: an Australian Survey	Australian Society of Accountants – (Australia)
Accounting Principle Board (APB), 1972	Public Hearing on Accounting and Reporting Practices in the Petroleum Industry	APB - USA
John H. Myers , 1974	Full Cost vs. Successful Efforts in Petroleum Accounting	Ad Hoc Committee (Petroleum Companies) on Full Cost Accounting – (USA)
Rebecca A. Gallun Charlotte J. Wright Linda M. Nichols John W. Stevenson , 2001	Fundamentals of Oil & Gas Accounting	Not commission – (USA)
IFRS 6 Keith Alfredson <i>et al.</i> 2009. PWC, 2017	Financial Reporting in the oil and gas industry: international financial reporting standards	Not commission – IFRS

Appendix 2: Index of Historical Accounting Practices

Pre- 1960s						
		USA	Canada	USA	USA	
	Types of Acquisition, Evaluation and Exploration Costs	Horace R. Brock 1956	Robert E. Waller 1956	Robert H. Irving and Verden R. Draper, 1958	C. Aubery Smith and Horace R. Brock, 1959	
Acquisition	Acquisition Legal Costs	More Capitalise/Fewer Write off if paid to outsiders	More capitalise	More Capitalised/Fewer write off if paid to outsiders	Capitalise costs of leased acreages and write off others	
		More Write off/Fewer capitalise if undertaken by company own staff	Fewer write off if not linked to producing properties	More write off/Fewer capitalised if undertaken by company own staff	Capitalise the entire acquisition costs	
		More Write off if small amount of up to \$300			Capitalise costs of more than \$50	
	Leasehold Bonus	Capitalise if paid in cash	Capitalise	Majority capitalise	Capitalise	
		Not recorded if paid in oil		Few write off		
	Lease Rental Payments	More write Off	Capitalise	Majority write Off	More write Off	
		Few capitalise to leasehold		Few capitalise	Few capitalise	
	Delay Rental costs	Majority write off delay rentals	Write off	Write off	Write off	
Very few capitalise delay rentals						
Appraisal	Test Well Contribution – Dry Holes	Write off	Write off	Write off	Write off	
				Capitalise by newer companies		
	Test Well– Bottom Holes Contribution	Write off if dry	Write off is dry	Write off	Write off if dry	
		Capitalise/write off if test well is productive	Capitalise if test well is productive	Capitalise/write off if test well is productive	More Capitalise/ Few write off if test well is productive	
				Capitalise by newly established companies		
Exploration	Prospecting Costs	More write off	Capitalise	Generally Write off	Write off	
		Less capitalise		Sometimes capitalise	Capitalise	
					Capitalise if lead to acquisition	
	Intangible Drilling Costs (IDC)	Write off by some even in case of leading to producing wells, for tax purposes	Write off	Write off	Write off by fewer companies	Write off
			Capitalise if lead to producing properties	Capitalise if lead to producing properties		Capitalise
			Capitalise irrespective of results of exploration		Capitalise if linked to producing properties	
	Exploratory & Development Drilling Wells Costs	Capitalise/ Write off exploration costs if successful	Capitalise if lead to producing properties	Write off the entire costs if unsuccessful	Capitalise/ Write off exploration costs if successful	
		Write off the entire costs if unsuccessful	Capitalise irrespective of results of drilling	Capitalised by newly established companies	Write off the entire costs if unsuccessful	
Exploration Costs	Capitalised if paid to outsiders	Write off	Write off the entire costs if unsuccessful	Capitalise		
	Write off the entire costs if unsuccessful	Capitalise if lead to producing properties	Capitalised by newly established companies	Capitalise if lead to producing properties		

			Capitalise irrespective of results of exploration		Write off
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1960 - 2000					
	Types of Acquisition, Evaluation and Exploration Costs	Canada	USA	USA	Australia
		W. B. Coutts, 1963	Stanley P. Porter, 1965	Robert E. Field, 1969	Roy Lourens & Susan Henderson, 1972
Acquisition	Acquisition Legal Costs	Capitalise	Capitalise all	Capitalise all	Capitalise
			Capitalise costs that lead to property acquisition	Capitalise if paid to outsiders	Write off
	Leasehold Bonus	Capitalise	Capitalise	Capitalise	Capitalise
	Lease Rental Payments	Write off	Write off if not recoverable from production	Write off	Capitalise
		Capitalise	Capitalise if recoverable from production		Write off
Delay Rental costs	Write off	Few capitalise	Write off	Capitalise	
		More write Off			
Appraisal	Test Well Contribution – Dry Holes	Write off	Write off	Write off	Not specified
	Test Well– Bottom Holes Contribution	Write off	Write off	Write off	Not specified
	Capitalise if productive	Capitalise if productive	Capitalise if productive		
Exploration	Prospecting Costs	Write off	Write off all costs	Write off	Write off
		Capitalise if leading to producing properties	Capitalise costs paid to outsiders	Capitalise costs paid to outsiders	Capitalise
	Capitalise all costs		Capitalise		
	Intangible Drilling Costs (IDC)	Write off if not leading to producible properties	Capitalise	Capitalise	Not specified
			Few write off	Few write off	
	Exploratory & Development Drilling Wells Costs	Capitalise	Capitalise	Capitalise if leading to producing properties	Capitalise if leading to producing properties
Write off if non successful				Write off if non successful	Few write off
Exploration Costs	Capitalise if leading to producing properties	Write off if not leading to producible properties	Write off all	Capitalise if leading to producing properties	More capitalise
			Majority Capitalise all	Capitalise all	Few write off
		Few Capitalise if leading to producing properties	Capitalise what's paid to outsiders		

	1960 - 2000			Post 2000	
		USA	USA	USA	IFRS
Types of Acquisition, Evaluation and Exploration Costs	Accounting Principle Board (API), 1972	John H. Myers, 1974	Rebecca A. Gallun Charlotte J. Wright Linda M. Nichols	IFRS 6 Keith Alfredson et al. 2009. PWC, 2017	

				John W. Stevenson, 2001	
Acquisition	Acquisition Legal Costs	Capitalise direct costs	Capitalise	Capitalise	Write off expenses incur prior to obtaining exploration licences
		Write off indirect costs			
	Leasehold Bonus	Capitalise	Capitalise	Capitalise	Capitalise
	Lease Rental Payments	Capitalise all	Capitalise all	Capitalise all	Write off expenses incur prior to obtaining exploration licences
		Write off all	Write off all	Write off	
Delay Rental costs	Capitalise if leading to producing properties	Capitalise	Capitalise all	Write off	
		Write off	Write off		
Appraisal	Test Well Contribution – Dry Holes	Write off	Write off	Write off	Continue with the accounting policy used for expensing or capitalisation rental costs
			Capitalise if dry-development well	Capitalise all	
			Capitalise all costs		
	Test Well– Bottom Holes Contribution	Capitalise if successful	Capitalise all costs	Write off	
Write off		Capitalise if successful	Capitalise all		
Exploration	Prospecting Costs	Capitalise if lead to defining areas of interest	Capitalise if lead to producing properties	Capitalise all	Capitalise all
		Write off if not leading to defining areas of interest	Write off if do not lead to producing properties	Write off	Write off
		Write off all costs	Capitalise all costs		
	Intangible Drilling Costs (IDC)	Capitalise costs of extra depth	Capitalise if leading to producible properties	Capitalise all	Capitalise all
			Write off if not leading to producible properties	Write off	Write off
	Exploratory & Development Drilling Wells Costs	Capitalise if leading to producible properties	Capitalise	Capitalise costs of exploratory wells if leading to producible properties	Capitalise costs of exploratory wells if leading to producible properties
				Capitalise all	Capitalise all
		Write off if do not lead to producing properties	Write off	Capitalise costs of development drilling wells	Capitalise costs of development drilling wells
	Exploration Costs	Capitalise if leading to producible properties	Capitalise all	Capitalise if leading to producible properties	Capitalise if leading to producible properties
		Write off if do not lead to producing properties	Capitalise if leading to producible properties	Capitalise all	Capitalise all

Appendix 3: Waves of historical evolution of accounting literature on accounting for EI

Pre- 1960s

Recognition of differences in accounting practices by EI and earlier calls for harmonisation

1960 – 2000

1960s- 1970s: Criticising and comparing the accounting practices of FC and SE

1970s-1990s: Attempt by the FASB to standardise accounting by oil and gas industry., Impact of SFAS 19 on FC Companies., lobbying against SFAS 19., the need for standardizing accounting practices by EI.

1990s- 2000: Attempt by the IASC to construct a comprehensive accounting standard for the EI

Post-2000

Efforts by the International Accounting Standard Board to standardise accounting practices by EI

Appendix 4: Attempt To harmonise accounting practice by extractive industries

Year	Attempt To harmonise accounting practice by extractive industries
1908	The English Institution of Mining and Metallurgy established a Mine Accounts and Cost sheet Committee in an attempt to standardize an accounting system for British mining industry
1963	The Canadian Institute of Chartered Accountants (CICA) commissioned W. B. Coutts to study the accounting for oil and gas practices in use and the rationales for the different practices
1964	The Accounting Principles Board (APB) in the United States appointed a partner (Robert Field) at Price Waterhouse in 1964 to study financial accounting and reporting in the EI. Field recommended abolishing FC method and keeping the SE methods of accounting for EI
1972	The Australian Society of Accountants (ASA) commissioned Lourens and Henderson to undertake a study on financial reporting in the EI in order to develop a suitable accounting practices by the Australian mining industry. Lourens and Henderson recommended aligning the accounting practices with the concept of SE method of accounting
1973	The Australian Society of Accountants (ASA) opened up a discussion which aimed at bringing about greater uniformity for pre-production expenditure of the EI. As a result of this discussion, the area of interest (accounting method) was adopted in Australia
1977	The Australian Accounting Standard (AAS) 7 allowed extractive companies to choose the accounting method they like to use for pre-production costs
1977	Statement of Financial Accounting Standard (SFAS) 19, Financial Accounting and Reporting by Oil and Gas Producing Companies, was issued. The SFAS 19 called on full cost companies to switch to successful efforts methods
1978	The SEC required the use of its own reserve recognition accounting (RRA) method. RRA was proposed by the SEC in Accounting Series Release No. 253 (ASR 253), issued in August 1978
1998	The International Accounting Standard Committee (IASC) appointed a Steering Committee to develop a comprehensive accounting and reporting standard., this project was stalled in 2000.
2001	In 2001, the IASB announced that the project of constructing a comprehensive accounting standard for the EI will be resumed when time permit. In July 2002, the IASB suggested that completing a comprehensive project for the EI was not feasible in time.
2004	The IASB issued IFRS 6 (<i>Exploration for and Evaluation of Mineral Resources</i>), with an effective date of 1 January 2006. IFRS 6 did not stipulate specific cost method and permits extractive companies to follow the accounting policies they used prior to the adoption of IFRSs
2004	In 2004, the IASB authorized a research project to comprehensively address accounting for EI. The aim was to issue a discussion paper in late 2008 which was aimed to be a foundation for constructing a comprehensive IFRS for the EI to be issued in 2011. The Discussion

	Paper (<i>The Extractive Activities</i>) was issued in April 2010 and comments were invited to be received by 30 July 2010. Given the feedback and comments received by the IASB on the Discussion Paper, the IASB decided to drop this project.
2008	The SEC issued a “Final Rule – <i>Modernization of Oil and Gas Reporting</i> ”. Aimed at offering a revision to the definition and evaluation methods of oil and gas reserves and to the disclosures requirements of these reserves.
2010	The FASB published an accounting standard update: Extractive Activities–oil and gas (Topic 932). The objective of which is to “to align the oil and gas reserve estimation and disclosure requirements of Extractive Activities–Oil and Gas (Topic 932) with the requirements in the Securities and Exchange Commission’s final rule, <i>Modernization of the Oil and Gas Reporting Requirements</i> (the Final Rule)”.
2018	The IASB added the extractive activities to its agenda in 2018. The IASB decided to start a new research project on EI
2022	The IASB changed the status of IFRS 6 from interim to permanent

Source: Authors compilation from literature

ⁱ For detailed explanation of the similarities and differences of these methods see Deegan (1999: 583-586)

ⁱⁱ This research study was conducted by Professor Horace R. Brock in 1956 with the aim of analysing the widely diverse accounting practices by the oil industry and recommending ways to minimise the divergence in accounting treatment of similar expenditure items. The study is well cited by the literature, for example Field (1969).

ⁱⁱⁱ Differences in applying the matching concept by extractive industries have been addressed by Smith & Brocks (1959: 76) as “the determination of what costs of a given period are to be matched against the realized revenues of that period finds the industry badly divided. These variations are concerned chiefly with exploration, leasing, and development costs and less with actual expenses of operating oil and gas properties. For many of these items it is generally agreed that there are no uniformly accepted practices in the petroleum industry”.

^{iv} For discussion on the advantages and disadvantages of using the Area of Interest as a cost pool see Coutts (1963: 27-31). AAS7 (1989: 6) defines the AOI as: "area of interest" means an individual geological area which is considered to constitute a favourable environment for the presence of a mineral deposit or an oil or natural gas field, or has been proved to contain such a deposit or field.

^v “under SFAS-69 companies now had to disclose as supplementary information: proved oil and gas reserves (as per ASR-257); capitalised costs; costs incurred for property acquisition, exploration, and development, results of operations; and a standardized measure of discounted future net cash flows from reserves” (Macintosh and Baker, 2002: 222).

^{vi} The Comment letters are available from:

<https://www.ifrs.org/projects/2016/extractive-activities-2010/comment-letters-projects/summary-of-issues/#comment-letters>.

^{vii} Our consultants requested that their participation remains anonymised and did not agree for their participations to be recorded.