CHAPTER 1:
LITERATURE REVIEW AND RESEARCH METHODOLOGY

1.1. LITERATURE REVIEW:

The researcher has divided this section of the study into two sub-sections, the first sub-section has shown the general previous studies about accounting information systems; and the second sub-section has shown the previous studies about accounting information systems in petroleum industry.

1.1.1. Literature Review in Accounting Information Systems:

In this sub-section, the researcher has shown the methodology, objectives, and results of the 16 previous studies, researches, papers, theses; and surveys from different countries of the world.

1. According to (Dearman, 1998)\(^1\) in his research study:

His study has developed a model of cognitive adaptation to changes in AIS, and he has tested the hypothesis that whether individuals adapt their judgment /decision-making processes to changes in accounting information systems is determined by the interaction of task, relevant knowledge, cognitive ability, and motivation to make appropriate decisions.

Results shown that the majority of subjects did not adapt their cognitive process in response to a change in the AIS from a traditional cost accounting system to activity based on costing system, or vice versa. Those who did adapt had the requisite knowledge about the nature of the difference between costs reported by the different accounting systems, had high problem solving ability, and exhibited an intrinsic motivation to perform data fixation are the result of person(knowledge and ability) and task (motivation) interaction and are not directly attributable to accounting aggregation and measurement.

2. **According to (Tribunella, 1998)** in his research study:

   The study has investigated a methodology for building information systems for GAAP. The proposed system stored GAAP in an electronic text information base and retrieves it by conceptual area.

   As a result, physically fragmented segments of accounting texts are linked together by conceptual area. In the final stage of the study, prototype-system retrievals age tested for conformity with GAAP and compared to a Key-word search for precision. The prototype’s performance justifies additional investigation of the proposed methodology as a potential solution to the information-overload problem in accounting.

3. **According to (Verdaasdonk, 1999)** in his research study:

   His study presented an information model that is able to support Operations Management (OM) decisions with relevant accounting information. Firstly; it identifies three reasons why Resource-Event-Agent (REA) types systems do not support (OM)

---

decisions with relevant extant accounting information. Secondly; an information model is designed which resolves the identified problems. The model consists of two parts. The first part is concerned with the formalization of the accounting technique so that it can be implemented in standard software. The second part of the design is an object model that is able to supply the relevant data for the accounting technique. This object model builds on the REA model. The design is tested by means of a prototype and application for two operation management decisions.

4. According to (Durler, 1997) in his research study:

In Durler research, the study investigated inter company effects on the accounting information systems (AIS) of small businesses when Electronic Data Interchange (EDI) is implemented at the request of influential trading partners.

The results have suggested an association between owner/manager’s general computer attitude and the level of AIS computerization, as well as between owner/manager’s EDI awareness and AIS computerization. While the analysis suggested a relationship which exists between the owner/manager’s perceptions that EDI is forced on the small business and the level of AIS computerization.

5. According to (Dunn, 1994) in his research study:

The study has hypothesized that the use of an abstraction hierarchy (which decomposes a model into multiple views at varying levels of detail) as an interface to an events-based on accounting database would mitigate information overload and thereby enhance the user performance. Subjects use computerized interfaces (with either no

---

abstraction or and abstraction hierarchy) to generate financial statements using an REA accounting database. Subjects’ accuracy, speed and perceived manageability were measured, controlled for accounting and data modeling knowledge. On contrary to expectation, users with the abstraction hierarchy did not perform better that those without any abstraction in their interface, which is contrary to an axiomatic concept in computer science. Also the study was expanded on typical database studies by using a task sufficiently difficult to yield results that are more generalizable to real decision making.

6. According to (David, 1995) in his research study:

The study has presented the first empirical analysis of productivity and competitive advantage improvements from REA systems. To analyze systems which are currently operational in organizations, an Accounting Systems Characteristics (ASC) metric was developed, which was used to place organizations’ systems on a connection between traditional and Resource-Event-Agent (REA) accounting information systems. In addition, a questionnaire was developed to collect executives’ perceptions of competitive advantage from their information systems.

The results have been provided evidence that the more sophisticated systems provided firms with administrative efficiencies, although they were not supporting inter-organizational strategies for competitive advantage. In addition, firms with more sophisticated systems were more productive than those that used more traditional systems. Key systems characteristics were identified and the ASC metric provided a method of capturing information about these characteristics.

7. According to (Kowalczyk, 1996) in his research study:

Kowalczyk has studied whether the provision of expert system recommendations influenced decisions made by system users the task was to evaluate a hypothetical company and determine whether there was substantial doubt about the company’s ability to continue as a going concern.

The results suggested that individuals tended to anchor on system recommendations in making their own judgments for recommendation that were consistent with case information.

Results of the study also have shown that subjects showed confirmatory search behavior in weighting the relevancy of data items in their decisions. This implied that improved attention maybe given evidence that is incongruent with a system recommendation.

Finally, contrary to expectations, individuals who received recommendation did not have inflated confidence beliefs about either their judgment on the case or their ability to perform the task. However, those who received system solutions perceived less effort that is required for the task and provided fewer comments to support their decision.

8. According to (Abu-Musa, 2004) in his paper:

The objective of the study is to investigate the significant perceived security threats of computerized accounting information systems (AIS) in Saudi organizations. An empirical survey using a self administered questionnaire has been carried out to achieve the study.

---

The survey results have revealed that almost half of the responded Saudi organizations have suffered financial losses due to internal and external CAIS security threats. The statistical results also revealed that accidental and intentional entry of bad data, by employees’ sharing of passwords, introduction of computer viruses to CAIS, suppression and destruction of output, unauthorized document visibility, and directing prints and distributed information to people who are not entitled to receive are most significant perceived security threats to CAIS in Saudi organizations.

9. According to (Jong-Min Choe, 1996) 9

The objectives of the study were to examine the direct relationships between influencing factors and performance of accounting information systems (AIS), and to identify the moderating effect of evolution level of IS on the relationships.

The results of the empirical test suggested that there are significant positive correlations between the performance of an AIS and the influence factors such as user involvement, capability of IS personnel and organization size. It was also proved that the relationships between performance of AIS and influence factors are significantly influenced by the evolution level of IS. Hence, for the success of AIS, each influence factor should be considered differently in the degree of importance according to the level of IS evolution.

10. According to (Amer Tarek et al., 1987) 10

The study surveys academic accounting research in the areas of computer based accounting systems and Electronic Data Processing (EDP) auditing. It has also

considered the computer and information science literature noting certain areas of research which appear to be relevant to accounting and auditing. Accounting and EDP auditing research publications have been spread and lacking in a clearly defined direction. Although some streams of topically or methodologically related research have evolved, most efforts have been isolated instances addressing isolated topics.

The paper reviews, summarizes, and classifies the areas of academic accounting research in computer based on accounting systems and EDP auditing, as well as parallel areas in The (CIS) literature in attempt to provide some structure and guidance for future efforts.

11. An article by (Gal; Steinbart, 1987)\(^\text{11}\)

The authors mentioned three areas of the research that can be benefited from this article in the area of expert systems:

(1) The effective and efficient use of accounting information systems to support decision-making.

(2) The proper design and control of accounting information systems

(3) The design of intelligent front-ends to database systems

12. A study by (Kim, 1988)\(^\text{12}\)

The study described a field study of 28 hospital accounting information systems (HAIS) development groups designed to address the issue of "fit" between organizational context and the effective design of management accounting systems

---


Hypotheses are developed for studying the interaction effects of contextual and MAS design variables on performance.

The results indicated that the match between HAIS task predictability and coordination modes is significantly associated with good performance as measured by user information satisfaction.

13. A study by (Kittiya Yongvanicha; James Guthrie, 2005)

The study argued for the importance of reporting both Intellectual Capital (IC) information and non-economic performance. Based on an Extended Performance Reporting Framework, content analysis was conducted to examine the voluntary reporting practices within the annual reports of selected Australian mining companies.

The results of the study shown that, the sample companies tended to place greater emphases on Intellectual Capital (IC) information than non-economic performance information.

14. A study by (Constantinos, 2002)

The study aimed at improving practice and alerting researchers and managers of some of the issues involved in the area of AIS related to flexibility and adaptability of systems to changing conditions.

The paper, based on a mail survey addressed to Chief Information Officers involved specifically in AIS development/acquisition in Greek Small and Medium sized Enterprises (SME), provides a picture of current trends in Greece. The paper reported

---

13 Kittiya Yongvanicha; James Guthrie “Extended performance reporting: an examination of the Australian mining industry” a Macquarie Graduate School of Management, Macquarie University, NSW 2109& Australia University of Sydney, Australia, Published by Elsevier Ltd. 2005.

some findings from a wider pilot research study that addresses the Accounting Information Systems (AIS) development/acquisition practices adopted by a sample of Greek companies. Organizations, worldwide, realize that existing AIS are not flexible enough to adapt to rapidly changing conditions induced by globalization and new business paradigms. Many companies, despite high replacement costs, have replaced their legacy systems with off-the-shelf systems in order to remain competitive.

15. A study by (Noor; Malcolm)\(^1\)

The study focused on measuring the alignment of AIS Requirements and AIS capacity among small and medium sized firms SMEs in Malaysia and then investigated the link between AIS Alignment and performance. Using a mail questionnaire, data from 310 firms was collected on nineteen accounting information characteristics so that AIS requirements and AIS capacity could be compared.

The results indicated that a significant proportion of Malaysian SMEs had achieved high AIS alignment. Furthermore, the group of SMEs with high AIS alignment had achieved better organizational performance that firms with low AIS alignment.

The findings provided evidence of the importance of AIS alignment and deepened current understanding of the requirements for accounting information and the use of IT as an information processing mechanism.

\(^{15}\)Noor, Ismail; Malcolm, King “Firm Performance and AIS Alignment in Malaysian SMEs” Business school, Loughborough University, Liecestershire LE11 TU United Kingdom.
16. A study by (Lauri, 1997)\textsuperscript{16}

The study has revealed a variety of techniques being utilized to store data. Security is a foremost concern due to the use of personal computers, modems and local area networks. In addition to the use of accounting software packages, these companies also install devices to screen users wanting access to data dealing with classified transactions. Back up equipment has become a necessity with the increased use of computer communication systems.

The study also has shown a variety of methods being used to capture accounting data. Even the smallest organization is capable of automating its accounting system in some form that is not cost prohibitive, and some have developed quite sophisticated automated accounting systems. Larger organizations appear to now employ a variety of automated systems to deal with accounting information in addition to or in lieu of traditional mainframe accounting systems. Communication systems are utilized by businesses of all sizes in collecting and disseminating accounting information. Further, non-traditional information such as quality control and customer satisfaction data is being collected by the accounting systems.

1.1.2. Literature Review in Petroleum Accounting and Information Systems:

The researcher has shown 7 previous studies and researches relating to accounting systems in petroleum industry.

1. A study by (Chung; Ghicas, 1993) \(^{17}\)

The authors examine how lenders use accounting information to set the borrowing base of oil and gas firms. Determination of the borrowing base is a vital decision because it represents the lenders' exposure in the event of that the borrower defaults.

The study has found evidence on lenders' use of accounting information by examining actual lending agreements as well as through test of association. The sample consists of smaller petroleum firms that have a higher probability of default if unfavorable contingencies occur. The primary finding is that the value of firm's oil and gas reserves explain a large proportion of the variation in the firms' borrowing base and total outstanding debt.

The study also has found that, Reserve Recognition Accounting (RRA) has a higher explanatory power than book values. Although major fluctuations in oil prices during the period of the study, 1984-1987, suggest that historical costs may be relatively poor indicators of changes in asset values, the authors observed that, RRA information is used in setting the borrowing base for 21 of the 23 firms for which such agreements were available.

Furthermore, the study has found that, RRA is the pivotal information used by lenders in setting firms’ borrowing base. Industry publications advise lenders to

---

consider RRA, not book values, in setting lending limits. And most petroleum firms have lending agreements that stress RRA in setting the borrowing base. Moreover, the results indicated that RRA is highly associated with both borrowing base and total debt outstanding. The empirical tests don’t indicate that book values are used in setting borrowing limits or in explaining the total debt outstanding. The significance of RRA and the low incremental explanatory ability of book values hold whether petroleum prices are rising, falling, or stable.

2. A study by (Hamid, Mohamed A. Araouf, 2002)\textsuperscript{18}

The study has aimed to set the conceptual framework for environmental accounting (Environmental, Ecological, Natural resource, green accounting) at all levels for different purposes.

The study also has indicated that the Egyptian petroleum sector had already put adequate efforts in the field of environmental protection. However, the current accounting system does not reflect such efforts for different stakeholders. So, the valuation of a number of environmental assets and impacts indicated the importance of their inclusion in the accounting system for different users inside and outside the petroleum sector as well as, for different purposes such as economic planning, prioritizing environmental expenditures, improving the sector image etc.

3. A study by (Yahya, Al-Jabr; Nasser, Spear)\textsuperscript{19}

The study has aimed to provide evidence on the reported importance and frequency of write-downs associated with asset impairment by Full Cost (FC) and Successful Efforts (SE) firms. Authors also have provided evidence on the impact of write-downs on key financial and operating variables for both groups of firms.

The empirical results shown that, during 1995-2001 impairment write-downs had significantly affected the reported earnings of oil and gas firms. However, the impact of the ceiling test impairment rules for FC firms was significantly higher than that of SFAS 121\textsuperscript{20} impairment rules for SE firms. Interestingly, in an after impairment write-down environment, the average values of reported net equity, operating assets, and earnings of FC firms are not statistically different from those of SE firms.

The empirical results also shown both groups of firms took most of the write-downs during the fourth quarter. While the magnitude of the average write-down taken by FC firms is significantly higher than that of SE firms, SE firms reported on average more frequent write-downs. This evidence suggests that either (1) SE firms were able to use the relative flexibility inherent in SFAS 121 to smooth the effect of fluctuating oil and gas prices, or (2) FC firms were forced to take higher write downs during the quarters in which average oil and gas prices dropped significantly during the study sample period.


\textsuperscript{20}Mineral asset writedowns-SFAS121: Statement of financial accounting standards No121: Accounting for impairment of long-lived assets and for long-lived assets to be disposed off. SFAS 121 was issued in March 1995 and was effective for fiscal years beginning after December 15.
4. A study by (Yahya, Al Jabr ; Nasser, Spear)\textsuperscript{21}

The study has applied (Easton; Pae, 2003)\textsuperscript{22} returns model to examine the valuation implications of accounting conservatism and accounting method choice in the context of the oil and gas industry during 1995-2001.

The study results have suggested that in an environment of asymmetric impairment recognition rules, accounting in the oil and gas industry is, on average, unbiased with respect to accounting rules but conservative with respect to investments in positive net present value projects.

The study results also suggested that in an environment where impairment rules are in force the choice of the accounting method in the oil and gas industry does not result in differential valuation implications for security prices.

5. A study by (Lynne Conrad; Michael Sherer, 2001)\textsuperscript{23}

The paper has presented an analytical report on the external accountability and accounting developments in the British Gas industry during 1986 - 1998. Those developments were due to organization changes when British nationalized gas corporation was converted into a privatized organization. Those changes were namely: public service, commercial, and competition. For which analytical studies were conducted.


\textsuperscript{22}Easton, P.; Pae, J. “Accounting conservatism and the regression of returns on earnings and earnings changes” Ohio State University. 2003.

The study has provided substantial knowledge pertaining to privatized industries in a contextual analysis of organizational change and its effects. The results received from this research will benefit the policy for the future economy and political (governmental) regulation for privatized industries.

Finally, the study has provided the literature on management control and organizational change in reference to accountability and the role of accounting information. The study also has looked into three cultures framework: An analysis of organizational change, management control and the role of accounting information.

6. A study by (William M. McInnes, 2002)\textsuperscript{24}

The study has described and analysed the accounting costs reported in the financial statements of the British Gas Corporation (BGC) during its fourteen years (1972–86) as a state-owned natural monopoly. Evidence is provided of the various roles in which these accounting costs were used in the regulation of the corporation.

The agency perspective developed by (Whittington, 1985)\textsuperscript{25} is used to provide an analytical framework for discussion of the effects of BGC’s accounting costs on the allocation of burdens and rewards between gas consumers and taxpayers through being used in these various roles.


7. A study by (Johnson; Ramanan, 1988)\textsuperscript{26}

This study has examined the association between selected attributes of "successful efforts" firms and the decision to change to "full cost" accounting. Firms that changed to full cost are found to exhibit higher levels of financial risk (leverage) and exploration activity (capital expenditures) when compared to firms that retained successful efforts, and these differences are shown to predate full cost adoption by several years. Tests also indicate that the change to full cost is associated with concurrent increases in debt financing and exploration investment.

1.2. RESEARCH METHODOLOGY:

The researcher in this section of the study illustrates the methodology that he has approached through, and discussed the significant, objective of the study, problem of the study and the study hypotheses.

1.2.1. Significant of the Study:

This study has gained its significance because; in recent years, many national and foreign petroleum companies are working in Yemen.

The study also has discussed the accounting systems at those companies through the questionnaire and interviews with the specialization in accounting.

Moreover, the study has taken its importance from inescapable continuously developments in Accounting information systems. The more significant of this study for the following reasons:

1. This study appears important, because it discusses modern and new topic, i.e. it is not of the repetitive or conventional studies.

2. The first study considers about the accounting information systems in petroleum companies in Yemen because the petroleum companies consider the difficult and prohibited areas.

3. The sharing agreements between Yemeni government and petroleum companies does not consider the specification of the accounting systems and standards, which the company are going to apply.
4. The newspaper and magazines have discussed that, the petroleum companies don’t adhere of the social responsibilities as the environment protection and employees training on modern systems\textsuperscript{27,28}.

5. This study looks for the outputs of accounting information, if it is satisfied to the Yemeni environmental requires of these outputs, or there is gap between the users and outputs produced.

6. This study is also significant because the petroleum industry is considered as the backbone of Yemeni economic, the petroleum resources contribute to around 70\% of total government income\textsuperscript{29}. The petroleum industry is the important sector of the Republic of Yemen and the source of main income, too. The petroleum is Yemen’s main export. In 1997, the petroleum exports occupied around 86\% of the total Yemeni exports\textsuperscript{30}.

1.2.2. Objectives of the Study:

1. To know, to which extent the petroleum companies apply advance systems in its accounting information system departments.

2. To suggest the possibility petroleum companies which do not apply the advance systems, to replace them legacy systems applied in current with advance systems.

3. To analyze the employees qualifications and experience which extent they able to operate with advance systems.

4. To analyze the security policies and accounting standards applied in those companies, and to make the necessary recommendations.

\textsuperscript{27}AL-\textsc{AYYAM}, Issue No.4704, 6 February 2006. p.1.
\textsuperscript{29}The Economist Intelligence Unit Limited 2004, \url{www.eiu.com}
\textsuperscript{30}Country profile of Yemen www.bisnetworld.net/bisnet/countries/yemen
5. To know the Yemeni authorities (Tax Authority and Ministry of Oil and Minerals) opinions about to which extent, they satisfied of the accounting information systems outputs of those companies.

1.2.3. Problem of the Study:

The petroleum companies in Yemen implement upstream and downstream activities i.e. exploration, production, refinery, marketing, and other activities. Moreover, the majority of petroleum companies that have implemented the upstream activities are foreign companies in their originality from advance and modern countries in all systems. One of those advances is advance in accounting information system.

On the other hand, the downstream activities are government companies, which are not in exclusion of applying that advances in accounting information system. The problem of this study is summarized through the following question:

What is the extent of applying advance and modern accounting information systems in petroleum companies in Yemen? This question has created five-sub questions:

1. Do the petroleum companies apply advance and modern accounting information systems as Enterprise Resource Planning (ERP), (SAP oil & gas), expert systems, decision support systems?

2. Do the petroleum companies have skilled employees to operate contemporary accounting information systems?

3. Have the petroleum companies applied advance security tools and policies to protect its accounting information systems of the risks and threats?

4. What is the practicing extent of the international accounting standards (IAS) in petroleum companies?
5. Do the accounting information systems’ outputs in petroleum companies meet up the Yemeni environmental requirements?

1.2.4. Hypotheses of the Study:

The hypotheses in this study as follow:

1. The petroleum companies apply modern systems in their accounting information systems.
2. The petroleum companies have skilled employees to run its modern accounting information systems.
3. The petroleum companies have advance security plans and systems to protect its accounting information systems of the risks and threats.
4. The petroleum companies fully practiced the international accounting standards (AIS).
5. The accounting information systems applied in the petroleum companies meet up the Yemeni environmental requirements.

1.2.5. Data Sources:

According to the nature and objectives of the study, the researcher will rely on the following resources for getting and gathering data:

1) Primary Sources: The present study is empirical in nature so, primary sources considered as:

1. Questionnaire.
2. Interviews.
3. Observations.
2) Secondary Sources: To understand accounting information systems, and to cover the theoretical part of the study. So the previous studies, journals and reference books reviewed according to the requirements of the theoretical part of the study.

1.2.6. Statistics Methods Used in the Study:

The collected data has been analyzed by using the Microsoft Excel for showing the figures and for hypotheses examination, the researcher will use the (Mean) as statistical method, which basically depends on the ratios, if the hypothesis mean ratio is 50% and above it will be accepted hypothesis, and if the hypotheses mean ratio is less than 50%, it will be refused hypothesis. The researcher will establish his results and recommendations, according to the analysis and results of the questionnaires and interviews according to the scientific statistical and general acceptable standards of the samples.

1.2.7. Limitation of the Study:

The researcher has faced several complications and limitations until this study was achieved:

1. The researcher distributed the tentative questionnaire to some petroleum companies in order to diagnose the problem of the study precisely.

2. The researcher made some alterations in the tentative questionnaire and decreased the number of questions, after consulting with the specialists and experts in this field.

3. The petroleum companies was completely the researcher target in his study i.e. 100%, but the result of unmatched between the companies addresses provided to the researcher from Ministry of Oil and Minerals, and the real companies locations or the
new addresses, the researcher coerced to take 79% only as a study sample instead of 100%.

4. Double-mindedness of the Ministry of Oil principals for providing the researcher letters to petroleum companies, as this study was conducted in Yemen for the first time.

5. The researcher has expended and undergone so much to accomplish this study beginning with the searching about references, distributed the questionnaire and continually following the responses.

6. Feeling fear and hesitation when the sample individuals were providing data to the researcher during his visiting or interviewing them.

7. The researcher has been coerced to travel between the libraries of the main cities in Yemen and India because of the inadequate information of the petroleum accounting and accounting information systems references in university library.

8. Because of rareness of references, the researcher has coerced using some Arabic references, and chatting with his friends in different countries, for providing him the required references from British, Saudi Arabia, Egypt, Iraq, Jordan and Syria.

9. On consequence of the difficulties as I said above, the study period has taken around (3) continually working years.